Interstate
BRIDGE
Replacement Program

Interstate Bridge Replacement Program

DRAFT Supplemental Environmental Impact Statement + Section 4(f) Evaluation

September 2024

Produced in partnership with:

Federal Transit Administration

FHWA

Oregon Department of Transportation

Washington State Department of Transportation

TRIMET

C-TRAN

Metro

RTC Southwest Washington Regional Transportation Council

Interstate Bridge Replacement Program

Portland, Oregon, and Vancouver, Washington

DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

Submitted Pursuant to:

The National Environmental Policy Act (42 U.S.C. 4322(2)(c))
and the Washington State Environmental Policy Act (Ch. 43.21C RCW)

Submitted by:

Federal Highway Administration
Federal Transit Administration

and

Oregon Department of Transportation
Washington State Department of Transportation

Oregon Metro
Southwest Washington Regional Transportation Council

Tri-County Metropolitan Transportation District
Clark County Public Transportation Benefit Area

in cooperation with

National Oceanic and Atmospheric Administration National Marine Fisheries Service
National Park Service
U.S. Army Corps of Engineers
U.S. Coast Guard
U.S. Environmental Protection Agency
Washington State Department of Archaeology and Historic Preservation

Ralph J. Rizzo

FHWA, Washington Division Administrator

August 23, 2024

Date of Approval

KEITH LYNCH Digitally signed by KEITH LYNCH
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Keith Lynch

FHWA, Oregon Division Administrator

August 23, 2024

Date of Approval

SUSAN KAY FLETCHER

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Susan Fletcher

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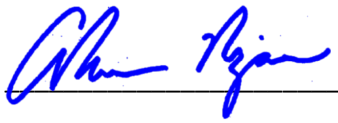
ODOT, IBR Assistant Program Administrator

AUGUST 22, 2024

Date of Approval



Ahmer Nizam

WSDOT, Environmental Services Office Director

August 22, 2024

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Oregon Metro, Council President

August 8th 2024

Date of Approval

Matt Ransom, AICP

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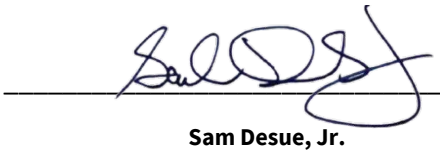
Southwest Washington Regional Transportation Council, Executive Director

08-22-2024

Date of Approval



Sam Desue, Jr.

TriMet, General Manager

8/22/2024

Date of Approval

Leann M. Caver

Leann Caver

C-TRAN, Chief Executive Officer

August 22, 2024

Date of Approval

Oregon

For ADA (Americans with Disabilities Act) or Civil Rights Title VI accommodations, translation/interpretation services, or more information call 503-731-4128, TTY 800-735-2900 or Oregon Relay Service 7-1-1.

Washington

Accommodation requests for people with disabilities in Washington can be made by contacting the WSDOT Diversity/ADA Affairs team at wsdotada@wsdot.wa.gov or by calling toll-free, 855-362-4ADA (4232). Persons who are deaf or hard of hearing may make a request by calling the Washington State Relay at 711. Any person who believes his/her Title VI protection has been violated, may file a complaint with WSDOT's Office of Equity and Civil Rights (OECR) Title VI Coordinator by contacting (360) 705-7090.

ABSTRACT

The Interstate Bridge Replacement (IBR) Program is a bridge, transit, and highway improvement project to address safety and mobility in the Interstate 5 (I-5) corridor between Portland, Oregon, and Vancouver, Washington. I-5 is the main interstate corridor on the West Coast of the United States (U.S.) from Canada to Mexico and one of only two roadway crossings of the Columbia River in the Portland-Vancouver metropolitan area. The IBR Program focuses on a 5-mile segment of the I-5 corridor that extends from approximately Victory Boulevard in Portland to State Route (SR) 500 in Vancouver.

The IBR Program is proposed by the Oregon and Washington State Departments of Transportation (ODOT and WSDOT), Southwest Washington Regional Transportation Council (RTC), Oregon Metro (Metro), Clark County Public Transportation Benefit Area (C-TRAN), and Tri-County Metropolitan Transportation District (TriMet). The Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) are the joint federal lead agencies for the IBR Program and are responsible for preparing the environmental documentation and overseeing the National Environmental Policy Act (NEPA) process.

The IBR Program is the renewal of the previously suspended I-5 Columbia River Crossing (CRC) project. The CRC project's NEPA process previously concluded with a 2011 Record of Decision and NEPA re-evaluations prepared in 2012 and 2013; however, the CRC project was suspended in 2014. In 2019, a bi-state legislative committee requested that ODOT and WSDOT reinitiate the CRC project, renaming it the IBR Program. In 2021 after the IBR Program was initiated, a third NEPA re-evaluation was prepared to evaluate the effect of changes in conditions and regulations since 2013, as well as potential design changes. FHWA and FTA determined that a supplemental environmental impact statement (SEIS) would be necessary to identify and disclose potentially new adverse impacts and mitigation associated with the IBR Program. Per 40 Code of Federal Regulations (CFR) 1506.13, this SEIS follows Council on Environmental Quality (CEQ) regulations that were in effect when the original Notice of Intent was published for the CRC project on September 27, 2005 (40 CFR Part 1506 as of 2005).

This Draft SEIS analyzes the transportation performance and potential impacts to the community and environment resulting from an updated No-Build Alternative and the proposed Modified Locally Preferred Alternative (Modified LPA). The IBR Program's Modified LPA is a modification of the CRC LPA and is the result of a multi-tiered screening process that included input from Program partners, tribes, and community members. The Modified LPA comprises a set of transportation components including a new pair of Columbia River bridges, a 1.9-mile light-rail transit (LRT) extension and associated LRT improvements from the Expo Center station in Portland to a new Evergreen Station in Vancouver, wider shoulders on I-5 from Victory/Interstate Boulevard in Portland to SR 500/39th Street in Vancouver, improvements to seven I-5 interchanges and I-5 mainline improvements, six new adjacent bridges across North Portland Harbor, active transportation improvements, integration of local bus transit service, and variable-rate tolling. There are several design options under evaluation for the Modified LPA, including three bridge configurations (double-deck fixed-span, single-level fixed-span, and single-level movable-span), site options for park and rides, one or two auxiliary lanes, alignment of the I-5 mainline in Vancouver, and the removal or inclusion of C Street ramps in Vancouver. The components of the Modified LPA are responsive to local agency policies and community priorities to support the mobility for people who walk, bike, roll, and drive throughout the study area. Based on a 2022 IBR Program cost estimate, the various components of the Modified LPA are expected to cost between $5 billion to $7.5 billion in year-of-expenditure dollars (YOE$).

Following publication of a Final SEIS, the federal lead agencies will issue an Amended Record of Decision, which would amend the 2011 Record of Decision.

The following persons can be contacted for additional information regarding this document:

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Federal Transit Administration
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915 Second Avenue, Suite 3192
Seattle, WA 98174
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FACT SHEET

Project Title

Interstate Bridge Replacement Program

Description

The Interstate Bridge Replacement (IBR) Program is a bridge, transit, and highway improvement project proposed by the Oregon and Washington State Departments of Transportation (ODOT and WSDOT), the Southwest Washington Regional Transportation Council (RTC), Oregon Metro (Metro), Clark County Public Transportation Benefit Area (C-TRAN), and Tri-County Metropolitan Transportation District (TriMet). The Program's purpose is to improve mobility in the Interstate (I-5) corridor by addressing present and future travel demand and mobility needs in the Program area. The Program area extends from approximately Victory Boulevard in Portland, Oregon, to State Route 500 in Vancouver, Washington, and includes the Interstate Bridge across the Columbia River. The Program is intended to address specific needs in the region through improvements to the following: travel safety and traffic operations on the Interstate Bridge and associated interchanges; highway freight mobility, interstate travel, and commerce; transit connectivity, reliability, and travel times; the availability of public transportation options in the study area; and the Interstate Bridge's structural integrity (seismic stability).

Date of Issue

September 20, 2024

Notice of Document Availability

An electronic copy of the Draft SEIS is available at no charge. Download an electronic copy here: www.interstatebridge.org

A printed copy and electronic copy of the Draft SEIS are available for viewing at the IBR Program office by appointment. To schedule an appointment:

Visit: SignUpGenius

Email: info@interstatebridge.org, or

Call: (360) 859-0494

Computers and internet access are available at various public libraries and meeting places throughout the Program area, as follows:

Washington Locations

- Fort Vancouver Regional Libraries
  Multiple locations - Please call to find a location near you. (360) 906-5000
- Clark College – Cannell Library
  1933 Fort Vancouver Way #112, Vancouver, WA 98663 (360) 992-2151
- Washington State University Vancouver Library
  14204 NE Salmon Creek Avenue, Vancouver, WA 98686 (360) 546-9680

- Camas Public Library
  625 NE 4th Ave, Camas, WA 98607 (360) 834-4692

Oregon Locations

- Multnomah County Library
  Multiple locations - Please call to find a location near you. (503) 988-5123
- Portland State University – Branford P. Millar Library
  1875 SW Park Avenue, Portland, OR 97201 (503) 725-5874
- Portland Community College Library
  Multiple locations - Please call to find a location near you. (971) 722-5322
- University of Portland Library – Wilson W. Clark Memorial Library
  5000 N. Willamette Boulevard, Portland, OR 97203 (503) 943-7111
- Clackamas Community College Library
  19600 Molalla Avenue, Oregon City, Oregon 97045 (503) 594-6042
- Mt. Hood Community College Library
  26000 SE Stark Street, Gresham, OR 97030 (503) 491-7161
- Oregon Health & Science University Library
  3181 SW Sam Jackson Park Road, Portland, OR 97239 (503) 494-3460
- Oregon State University – Portland Center
  555 SW Morrison Street, 2nd Floor, Portland, OR 97204 (503) 273-4301
- University of Oregon – Portland Library & Learning Center
  2800 NE Liberty St, 2nd Floor, Portland, OR 97211 (503) 412-3671

Comment Period

September 20, 2024 – November 18, 2024

How to Submit Comments

Comments on the Draft SEIS will be responded to in the Final SEIS.

Written comments should not include any hyperlinks to outside materials or information. Any materials or information the commenter wishes to have considered should be included within the comment. Written comments on the Draft SEIS can be submitted through the online comment form at www.interstatebridge.org/DraftSEIS, by email to DraftSEIS@interstatebridge.org or by regular mail to the address below.

IBR Program Draft SEIS
c/o Chris Regan, IBR Program Environmental Manager
500 Broadway Street, Suite 200
Vancouver, WA 98660

Comments may also be submitted by leaving a voice message on the IBR Program's comment line at (866) IBR-SEIS (866-427-7347) (toll-free). Voice messages need to explicitly say "Draft SEIS" or "Draft Supplemental EIS" for them to be identified and addressed as comments on the Draft SEIS.

Comments can be submitted orally and in writing at a public hearing for the Draft SEIS. The dates and locations of the public hearings are detailed below.

Public Hearings

Public hearings will be held in Portland and Vancouver and virtually on the following dates and locations:

Tuesday, October 15, 2024
Clark College, Gaiser Hall 150
1933 Fort Vancouver Way
Vancouver, WA 98663
5:30-8:30 PM

Thursday, October 17, 2024
Portland Expo Center, Exhibit Hall E2
2060 N. Marine Drive
Portland, OR 97217
5:30-8:30 PM

Saturday, October 26, 2024
See www.interstatebridge.org for link
12:00-1:30 PM

Wednesday, October 30, 2024
See www.interstatebridge.org for link
6:00-7:30 PM

Subsequent Environmental Review

Following the Draft SEIS comment period and public hearings, the joint lead agencies will identify potential changes and refinements to the Modified LPA and proposed mitigation measures. Following refinements, the Program team will advance the engineering design and environmental analysis that will inform the Final SEIS and Amended Record of Decision.

ANTICIPATED PERMITS AND APPROVALS

Anticipated Federal, State, and Local Permits and Approvals

Permit or Approval	Issuing Agency
7460 permits for permanent and construction obstructions	Federal Aviation Administration
23 USC 129(a)(1)(E), Federal Tolling Authority	FHWA
Access revision report approval	FHWA
Design analysis approval	FHWA
Design approval	FHWA
Real estate acquisition review	FHWA
Right of way (interstate) approval	FHWA
Right of way (railroad) approval	BNSF Railway
Air quality conformity determination	FTA
Endangered Species Act Section 7 consultation	National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries), U.S. Fish and Wildlife Service (USFWS)
Magnuson-Stevens Fishery Conservation Management Act	NOAA Protected Resources Division
Marine Mammal Protection Act	NOAA Fisheries
National Historic Preservation Act Section 106	FHWA, FTA, National Park Service (NPS), Oregon State Historic Preservation Office (SHPO), and Washington State Department of Archaeology and Historic Preservation (DAHP)
Archaeological Resources Protection Act permit	NPS
Section 4(f) of the U.S. Department of Transportation Act of 1966 evaluation	FHWA, FTA
Section 6(f) of the Land and Water Conservation Fund Act documentation	FHWA, FTA, NPS
Bridge permit in accordance with the General Bridge Act of 1946	U.S. Coast Guard
Section 404 of the Clean Water Act (CWA)	U.S. Army Corps of Engineers (USACE)
Section 14 of the Rivers and Harbors Appropriation Act of 1899, as amended and codified in 33 USC 408 (Section 408)	USACE
Section 10 of the Rivers and Harbors Appropriation Act of 1899, as amended and codified in 33 USC 401 et seq.	USACE
Sole Source Aquifer Protection Act approval	U.S. Environmental Protection Agency
Migratory Bird Treaty Act	USFWS
Federal Lands to Parks program	U.S. General Services Administration, NPS
Approval of rail crossing, intersection, signals, and right of way encroachment permit	ODOT, WSDOT
Voluntary Cleanup Pathway approval	Oregon Department of Environmental Quality (DEQ)
CWA National Pollutant Discharge Elimination System construction stormwater permits	DEQ, Washington State Department of Ecology (Ecology)

Permit or Approval	Issuing Agency
CWA Section 401 water quality certifications	DEQ, Ecology
Air quality permits	DEQ, Ecology
Removal-Fill Permit	Oregon Department of State Lands (DSL)
Aquatic land use (aquatic lands lease) authorization	DSL
Oregon Fish Passage Act approval	Oregon Department of Fish and Wildlife
Archaeological Excavation Permit	Oregon SHPO, Washington State DAHP
Aquatic use authorization	Washington Department of Natural Resources
Hydraulic Project Approval	Washington Department of Fish and Wildlife
City of Portland local permits and approvals (design review/land use review, historic resources review, noise variance, improvements in right of way, building permit – site development, sign permit, trade permits, non-park use permit)	City of Portland
City of Vancouver local permits and approvals (public facilities master plan [hybrid approach], transportation development review, traffic impact analysis, shoreline substantial development permit, critical areas permit, noise permit, waiver of certificate of appropriateness, building permit, trade permits, temporary use permit, access closure, sign permit [temporary])	City of Vancouver
Right-of-way permit for any encroaching in public right of way or City easements, tree permit, design review	City of Gresham

SUMMARY

The following summarizes information from the Interstate Bridge Replacement (IBR) Program Draft Supplemental Environmental Impact Statement (SEIS), including Program background, the transportation problems the Program seeks to fix, the Modified Locally Preferred Alternative (LPA), and the key benefits and impacts. It concludes with a brief discussion of the next steps and methods by which the public can continue to be involved in the Program.

What is the IBR Program?

The IBR Program updates and supplements the Interstate 5 (I-5) Columbia River Crossing (CRC) project (approved in 2011) and focuses on a 5-mile corridor that includes bridge, transit, active transportation, and highway improvements to address safety and mobility in the I-5 corridor between Portland, Oregon, and Vancouver, Washington (Figure 1).

I-5 is the main, and only continuous, north-south interstate highway on the west coast, linking the United States, Canada, and Mexico. In the Vancouver-Portland metropolitan region, I-5 and I-205 are the only two roadway crossings of the Columbia River and the major north-south highways that provide interstate connectivity and mobility. While the I-205 crossing provides important connectivity for the region, I-5 directly connects the central cities of Vancouver and Portland.

The 5-mile section of I-5 between State Route (SR) 500/39th Street in Vancouver and Columbia Boulevard in Portland heavily influences the traffic conditions of I-5 crossing over the Columbia River. This section includes seven interchanges that connect three state highways and several major arterial roadways. These interchanges serve a variety of land uses and provide access to downtown Vancouver, two international marine ports, industrial centers, residential neighborhoods, retail centers, and recreational areas.

Highway users and transit service within the IBR Program study area are currently constrained by outdated, substandard highway design features, traffic congestion that increases travel times, and the frequency of crashes that reduce reliability for vehicles and buses traveling between Vancouver and Portland. Additionally, to access light-rail transit (LRT), users traveling to Portland from Hayden Island or Vancouver have to transfer from buses, or walk, bike or drive to nearby park and rides/transit centers at Expo or Delta Park.

Who is leading the IBR Program?

The Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) are the federal lead agencies. Both agencies must comply with the National Environmental Policy Act (NEPA), including the publication of this Draft SEIS, as well as a Final SEIS, before they approve or provide funding to construct the improvements. Following the Final SEIS, FTA and FHWA will sign a Record of Decision (ROD) that will identify the preferred modified design of the selected alternative. The ROD for the Program will supplement the existing ROD for the CRC project that was signed in 2011 (CRC 2011a). The ROD will describe the measures needed to mitigate unavoidable environmental effects, as well as a monitoring and enforcement program to ensure that the mitigation measures are carried out effectively. By signing the ROD, FTA and FHWA are affirming that federal regulations have been met, thereby allowing the Program to proceed with property acquisitions and the final design of the selected alternative.

Figure 1. IBR Program Area Map

State transportation agencies and local governments in the Vancouver–Portland region have joined to develop a strategy for addressing highway, freight, transit, bicycle, and pedestrian needs, and to understand the importance of marine navigation on the Columbia River and North Portland Harbor and protected airspace for Pearson Field and Portland International Airport. The nonfederal joint lead agencies include the Oregon Department of Transportation (ODOT); Washington State Department of Transportation (WSDOT); local transit agencies Tri-County Metropolitan Transportation District (TriMet) and Clark County Public Transportation Benefit Area (C-TRAN); and regional metropolitan planning organizations Oregon Metro (Metro) and the Southwest Washington Regional Transportation Council (RTC). These nonfederal joint lead agencies, together with the Cities of Vancouver and Portland and Ports of Vancouver and Portland, comprise the state and local partner agencies that make-up an Executive Steering Group leading the Program. WSDOT also serves as the lead agency for the Washington State Environmental Policy Act review process.

WSDOT and ODOT are leading the preliminary highway design and Program management according to their respective Federal-State Stewardship & Oversight agreements with FHWA. TriMet and C-TRAN are leading the preliminary transit design and would operate the transit elements of the Program. Metro and RTC maintain the regional and metropolitan transportation plans that would include the Modified LPA for the IBR Program. The Program improvements are within the city limits of both Portland and Vancouver[1] and would connect to the local street networks in both cities. Therefore, the Cities of Portland and Vancouver have special expertise on city facilities and operations as well as local permitting authority over some elements of the Program. The Ports of Portland and Vancouver provide special expertise on regional and local freight movement, in particular, along Marine Drive, Mill Plain Boulevard, and Fourth Plain Boulevard.

Other state and federal agencies, tribes, and community partners are also participating in technical, regulatory, or advisory roles and government-to-government consultation.

The Program has worked with many other local, state, and federal agencies and tribes as well as many private and public community partners during the planning and development of this Program. Details on agency coordination and public involvement can be found in Appendices A and B.

How does the IBR Program build on prior studies and the CRC project?

Regional leaders identified the need to address the I-5 corridor, including the Interstate Bridge, through previous bistate, long-range planning studies. Transportation deficiencies in the IBR Program corridor have been evaluated for more than two decades. Prior studies identified a variety of transportation mobility and safety problems (for additional details on this work, see the CRC Final Environmental Impact Statement (EIS) [CRC 2011b]). For additional details on prior studies and their findings, as well as the development of the Purpose and Need statement, see Chapter 1 of the *Interstate 5 Columbia River Crossing Project Final Environmental Impact Statement and Final Section 4(f) Evaluation* (CRC 2011b).

The CRC project was active between 2005 and 2014. The Purpose and Need statement for the CRC project was developed by the CRC Task Force[2] and the joint lead agencies.[3] During the screening process for the CRC project, over 70 transportation components were screened to identify those that could meet the Purpose and Need. The components that passed the screening were packaged into a range of alternatives and were evaluated in the CRC Draft EIS, with an LPA identified and evaluated in the 2011 Final EIS and selected in the 2011 ROD. Subsequently, the selected alternative was modified by two signed re-evaluations (one in 2012 that raised the maximum vertical navigation clearance of the bridge from 95 feet to 116 feet and a second in 2013 that evaluated a phased construction approach). The CRC Selected Alternative identified in the 2011 ROD, as revised by the 2012 and 2013 re-evaluations, is referred to as the "CRC LPA." While the CRC project successfully completed the NEPA environmental review process when FHWA and FTA issued the ROD in 2011 it did not secure adequate state funding to advance to construction and was discontinued in 2014.

Recognizing that regional transportation issues and necessary improvements to the Interstate Bridge remained unaddressed, on November 18, 2019, Oregon Governor Kate Brown and Washington Governor Jay Inslee signed the Oregon-Washington Memorandum of Intent on Replacing the I-5 Bridge over the Columbia River to express interest in restarting the project. Also in 2019, a bistate legislative committee requested that ODOT and WSDOT restart the CRC project, now called the IBR Program.

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[1] Improvements at the Ruby Junction Maintenance Facility would be located in the City of Gresham.

[2] The CRC Task Force was a 39-member group formed in 2005 comprising leaders that represented a broad cross section of Washington and Oregon communities. Public agencies, businesses, civic organizations, maritime industries, neighborhoods, and freight, commuter, and environmental groups were represented on the task force. The group met 23 times over the course of the project development phase to advise the CRC project team and provide guidance and recommendations at key decision points. The task force concluded its work in summer 2008 after making its recommendation on the locally preferred alternative.

[3] FHWA, FTA, ODOT, WSDOT, Metro, RTC, TriMet, and C-TRAN.

As part of the NEPA process, in early 2021 the IBR Program began working with regional and local partner agencies and the public to review the Purpose and Need that was adopted for the CRC project. The IBR Program brought the Purpose and Need statement to partner agencies and the Program's three advisory groups to discuss the transportation needs identified for the CRC project. These transportation needs were also brought to the public for comment during an online open house, virtual community briefings, and an online survey. In mid-2021, the Program announced that these efforts validated that the six transportation needs identified in the CRC Purpose and Need statement still exist today, and that the values identified in the Vision and Values document remain community values. **Thus, the Purpose and Need statement for the IBR Program remains the same as documented in the 2011 Final EIS and 2011 ROD for the CRC project.**

Using the CRC LPA as its the baseline, or starting point, the IBR Program restarted and began evaluating whether past design assumptions still addressed today's changed conditions, including physical environment, community priorities, and regulations, or whether updates would be needed. In 2021, the IBR Program prepared a NEPA re-evaluation to assess the extent of changes in conditions and determine whether the previously approved Final EIS and ROD are still valid for a federal action or need to be updated with current conditions and changes in design. FHWA and FTA determined a Supplemental EIS (SEIS) should be prepared to identify and disclose new adverse impacts and mitigation associated with changes in conditions that occurred since 2013 (IBR 2021).

What problems does the IBR Program seek to fix?

As noted above, the Purpose and Need statement for the IBR Program, provided below, remains the same as documented in the 2011 Final EIS and 2011 ROD for the CRC project.

The text of the Purpose and Need has not been edited from its original wording, except for references to the name of the Program. More recent data and supplemental information are provided in sidebars and footnotes.[4]

In 2005, 280,000 vehicle trips crossed the Columbia River daily (northbound and southbound) in the Portland-Vancouver metropolitan region, of which 134,000 used the Interstate Bridge. By 2019, the total number of vehicle trips that crossed the Columbia River had increased to 313,000 per day, of which 143,400 used the Interstate Bridge.

Vehicle trips include those made in single-occupancy vehicles, high-occupancy vehicles, trucks, and transit vehicles (buses).

The **purpose** of the proposed action is to improve I-5 corridor mobility by addressing present and future travel demand and mobility needs in the Program area. The Program area extends from approximately Columbia Boulevard in the south to SR 500 in the north. Relative to the No-Build Alternative, the proposed action of the IBR Program is intended to achieve the following objectives: (a) improve travel safety and traffic operations on the I-5 river crossing and associated interchanges; (b) improve connectivity, reliability, travel times, and operations of public transportation modal alternatives in the Program area; (c) improve highway freight mobility and address interstate travel and commerce needs in the Program area; and (d) improve the I-5 river crossing's structural integrity (seismic stability).

The specific **needs** to be addressed by the proposed action of the IBR Program are addressed in the following subsections.

[4] Transportation data provided in the sidebars are from the IBR Transportation Technical Report. Due to the influence of the COVID-19 pandemic on travel patterns between 2020 and 2023, the IBR Program is following industry standards and using 2019 as the baseline year for the existing conditions section of this SEIS. The exception to using 2019 data is outputs from the Metro/RTC regional travel demand model which are from 2015. Metro and RTC had not yet updated their base-year model from 2015 to 2020 when this analysis was completed.

Growing travel demand and congestion

The duration of congestion on the Interstate Bridge roughly doubled from 2005 to 2019. In 2019, the I-5 corridor experienced heavy congestion and delay in both directions lasting up to almost 12 hours daily (compared with 4 to 6 hours daily in 2005).

Daily traffic demand over the I-5 Interstate Bridge is projected to increase by more than 25% by 2045.

Existing travel demand exceeds capacity in the Interstate Bridge and associated interchanges. This corridor experiences heavy congestion and delay lasting 4 to 6 hours daily[5] during the morning and afternoon peak travel periods and when traffic crashes, vehicle breakdowns, or bridge lifts occur. Due to excess travel demand and congestion in the I-5 corridor, many trips take the longer, alternative I-205 route across the Columbia River. Spillover traffic from I-5 onto parallel arterials such as Martin Luther King Jr. Boulevard and Interstate Avenue increases local congestion. In 2005, the two crossings[6] carried 280,000 vehicle trips across the Columbia River daily. Daily traffic demand over the Interstate Bridge is projected to increase by more than 35% during the next 20 years, with stop-and-go conditions increasing to approximately 15 hours daily if no improvements are made.

Impaired freight movement

I-5 is part of the National Truck Network, and the most important freight highway on the West Coast, linking international, national, and regional markets in Canada, Mexico, and the Pacific Rim with destinations throughout the western United States. In the center of the Program area, I-5 crosses over the Columbia River's deep-water shipping and barging channels and two river-level, transcontinental rail lines. The Interstate Bridge provides direct and important highway connections to the Port of Vancouver and Port of Portland facilities located on the Columbia River, as well as the majority of the area's freight consolidation facilities and distribution terminals. Freight volumes moved by truck to and from the area are projected to more than double over the next 25 years. Vehicle-hours of delay on truck routes in the Portland-Vancouver area are projected to increase by more than 90% over the next 20 years. Growing demand and congestion will result in increasing delay, costs, and uncertainty for all businesses that rely on this corridor for freight movement.

In 2019, more than 14,000 freight trips carrying over $132 million in commodities traveled across the I-5 Interstate Bridge each weekday. Freight volumes moved by truck, to and from the area, are projected to increase by 50 to 75% by year 2045.

Deficiencies such as narrow lanes and shoulders, as well as short merging, diverging, and weaving distances, reduce the efficiency and safety of freight truck movement.

[5] The hours of congestion refers to the total number of hours that the corridor experiences congestion. During the CRC project, congestion was defined as occurring when travel speeds were below 35 mph. ODOT and WSDOT are in the process of refining the definition of congestion with congestion occurring when speeds are below 45 miles per hour and severe congestion when speeds are below 35 miles per hour. Therefore, the IBR Program has defined congestion as speeds below 45 miles per hour.

[6] The two crossings are the I-5 Interstate Bridge and the I-205 Glenn Jackson bridge.

Limited public transportation operation, connectivity, and reliability

Due to limited public transportation options, a number of transportation markets are not well served. The key transit markets include trips between Portland Central City and the city of Vancouver and Clark County, trips between north/northeast Portland and the city of Vancouver and Clark County, and trips connecting the city of Vancouver and Clark County with the regional transit system in Oregon. Current congestion in the corridor adversely impacts public transportation service reliability and travel speed. Southbound bus travel times across the bridge are currently up to three times longer during parts of the AM peak compared to off-peak. Travel times for public transit using general purpose lanes on I-5 in the Program area are expected to increase substantially by 2030.

In 2005, southbound bus travel times across the bridges were up to three times longer during parts of the AM peak (i.e., morning high traffic period) than during off-peak times. As of 2019, bus travel times were four times longer during the AM peak.

If the bridges are not replaced, travel times for public transit using general-purpose lanes on southbound I-5 during the AM peak are expected to increase by 2045 because of increased congestion.

Safety and vulnerability to incidents

The Interstate Bridge and its approach sections experience crash rates more than two times higher than statewide averages for comparable facilities. Incident evaluations generally attribute these crashes to traffic congestion and weaving movements associated with closely spaced interchanges and short merge distances. Without breakdown lanes or shoulders, even minor traffic accidents or stalls cause severe delay or more serious accidents (Figure 2).

In 2005, the Interstate Bridge and its approach sections experienced crash rates more than two times higher than statewide averages for comparable facilities. As of 2019, crash rates were three times higher than statewide averages for comparable facilities. Crashes in the IBR Program area could increase by almost 30% by 2045 if no improvements are made.

There were seven fatal crashes in the Program area between 2015 and 2019.

Figure 2. Crash Blocking the Interstate Bridge

Substandard bicycle and pedestrian facilities

The bicycle/pedestrian lanes on the Interstate Bridge are about 3.5 to 4 feet wide, narrower than the 10-foot standard, and are located extremely close to traffic lanes, thus impacting safety for pedestrians and bicyclists (Figure 3). Direct pedestrian and bicycle connectivity are poor in the Program area.

Figure 3. Bicycle and Pedestrian Path on the Interstate Bridge

Compliance with the Americans with Disabilities Act (ADA) varies for the existing shared-use paths. The paths comply with the maximum gradient (4.7%) and there are no objects that overhang or protrude into the paths. However, the paths do not comply with guidelines for curb ramps (both in number and design), width, passing spaces, cross slope, or railing height (FHWA 2001; U.S. Access Board 2013). The paths are also near traffic lanes; this increases bicyclist and pedestrian exposure to vehicular traffic, noise, and emissions.

Seismic vulnerability

The existing Interstate Bridge is located in a seismically active zone. It does not meet current seismic standards and is vulnerable to failure in an earthquake.

All new federally funded highway bridges are required to be designed to the current edition of the American Association of State Highway and Transportation Officials Guide Specifications for Load-and-Resistance Factor Design (LRFD) Seismic Bridge Design (AASHTO 2022). In addition, State Departments of Transportation (DOTs) typically adopt local practices to address potential regional geologic hazards (e.g., the Cascadia Subduction Zone). State DOTs may also prescribe elevated levels of seismic performance based on the importance of the structure as it relates to public safety, national defense, and economic investment, as is the case for the Interstate Bridge.

The existing bridges were designed before modern seismic design codes were established. The foundations are likely to displace during a strong earthquake, resulting in the collapse of the bridge spans into the Columbia River. In addition, the movable span lift towers will be overstressed due to the inertia of the concrete counterweights and will collapse onto the bridge, causing the adjacent spans to fail. This collapse potential is due to the fact that hundreds of timber bridge support piles sit within loose sand that can liquefy during an earthquake.

How is the community engaged?

ODOT and WSDOT convened the 12-member Executive Steering Group to provide regional leadership recommendations on key program issues of importance to the community. Members of the Executive Steering Group include representatives from the 10 bistate partner agencies with a direct delivery or operational role in the integrated, multimodal transportation system around the Interstate Bridge, as well as a community representative from each state who serves on the Community Advisory Group.

The IBR Program has been engaging with partner agencies, tribal governments, local communities and organizations, and the public since late 2020 and has been conducting formal, targeted community engagement since February 2021. Targeted engagement has included user-specific outreach to representatives from the following groups: residents; commuters; transit users; business and freight industry; neighborhood associations and community groups; minorities and limited English speakers; tribal governments; elected officials; and the maritime industry. The IBR Program considers all comments received across these engagement efforts and incorporates recommendations as appropriate. In effect, this engagement has helped shape the communications strategy and implementation, the environmental review process, and the design options that are part of the Modified LPA. More information about the IBR Program's public involvement efforts can be found in Appendix B.

Program staff record and consider all comments received at events and by phone, email, or mail. Summaries or copies of these comments were provided to advisory leadership groups, such as the Executive Steering Group, for their reference in making recommendations. In the fall of 2021, the IBR Program shared design options with the public and sought feedback. The Community Engagement Report summarizes input received from more than 9,600 survey responses and 1,700 survey comments, community briefings, listening sessions, advisory groups, community working groups, and public comments (IBR Program 2021). While the Program cannot report consensus on preferences for specific design options, community feedback confirms a preference for design options that improve travel times, relieve congestion, improve safety, and mitigate negative impacts to people and the environment. Additional comment themes from the community engagement include:

- Number of auxiliary lanes
- Where on- and off-ramps are located
- Equitable implementation of tolling
- Integration of high-capacity transit
- Improved bicycle and pedestrian facilities
- LRT expansion into Vancouver
- Bridge replacement alternatives
- Funding details, including federal and state funding commitments
- Traffic flow disruptions during bridge construction
- Environmental impact mitigation
- Increased freight traffic capacity
- Future Maritime Transportation System navigation capability
- Equity considerations
- Workforce opportunities
- Considerations for services for those impacted by construction

What is the Modified LPA?

The CRC LPA was updated in close coordination with federal, tribal, regional, and local partners to establish the Modified LPA, which was endorsed by WSDOT, ODOT, and all eight local partner agencies in summer 2022. The Modified LPA includes a variety of transportation improvements throughout the 5-mile corridor. Chapter 2, Description of Alternatives, contains a detailed IBR Program description. The basic components of the CRC LPA as revised by the Modified LPA include:

- A new pair of Columbia River bridges—one for northbound and one for southbound travel—built west of the existing bridge. The new bridges would each include three through lanes, safety shoulders, and one auxiliary lane (a ramp-to-ramp connection on the highway that improves interchange safety by providing drivers with more space and time to merge, diverge, and weave) in each direction. When all highway, transit, and active transportation would be moved to the new Columbia River bridges, the existing Interstate Bridge (both spans) would be removed.
  - Three bridge configurations are under consideration: (1) double-deck truss bridges with fixed spans, (2) single-level bridges with fixed spans, and (3) single-level bridges with movable spans over the primary navigation channel. The fixed-span configurations would provide up to 116 feet of vertical navigation clearance, and the movable-span configuration would provide 178 feet of vertical navigation clearance in the open position. The primary navigation channel would be relocated approximately 500 feet south (measured by channel centerline) of its existing location near the Vancouver shoreline.
  - A two auxiliary lane design option (two ramp-to-ramp lanes connecting interchanges) across the Columbia River is also being evaluated. The second auxiliary lane in each direction of I-5 would be added from approximately Interstate Avenue/Victory Boulevard to SR 500/39th Street.
- A 1.9-mile light-rail transit (LRT) extension of the current Metropolitan Area Express (MAX) Yellow Line from the Expo Center MAX Station in North Portland, where it currently ends, to a terminus near Evergreen Boulevard in Vancouver. Improvements would include new stations at Hayden Island, downtown Vancouver (Waterfront Station), and near Evergreen Boulevard (Evergreen Station), as well as revisions to the existing Expo Center MAX Station. Park and rides to serve LRT riders in Vancouver could be included near the Waterfront Station and Evergreen Station. The Tri-County Metropolitan Transportation District of Oregon (TriMet), which operates the MAX system, would also operate the Yellow Line extension.
  - Potential site options for park and rides include three sites near the Waterfront Station and two near the Evergreen Station (up to one park and ride could be built for each station location in Vancouver).
- Associated LRT improvements such as traction power substations, overhead catenary system, signal and communications support facilities, an overnight light-rail vehicle (LRV) facility at the Expo Center, 19 new LRVs, and an expanded maintenance facility at TriMet's Ruby Junction.
- Integration of local bus transit service, including bus rapid transit (BRT) and express bus routes, in addition to the proposed new LRT service.
- Wider shoulders on I-5 from Interstate Avenue/Victory Boulevard to SR 500/39th Street to accommodate express bus-on-shoulder service in each direction.
- Associated bus transit service improvements would include three additional bus bays for eight new electric double-decker buses at the Clark County Public Transit Benefit Area Authority (C-TRAN) operations and maintenance facility (see Section 2.2.7, Transit Operating Characteristics, for more information about this service).

- Improvements to seven I-5 interchanges and I-5 mainline improvements between Interstate Avenue/ Victory Boulevard in Portland and SR 500/39th Street in Vancouver. Some adjacent local streets would be reconfigured to complement the new interchange designs, and improve local east-west connections.
  - An option that shifts the I-5 mainline up to 40 feet westward in downtown Vancouver between the SR 14 interchange and Mill Plain Boulevard interchange is being evaluated.
  - An option that eliminates the existing C Street ramps in downtown Vancouver is being evaluated.
- Six new adjacent bridges across North Portland Harbor: one on the east side of the existing I-5 North Portland Harbor bridge and five on the west side or overlapping with the existing bridge (which would be removed). The bridges would carry (from west to east) LRT tracks, southbound I-5 off-ramp to Marine Drive, southbound I-5 mainline, northbound I-5 mainline, northbound I-5 on-ramp from Marine Drive, and an arterial bridge for local traffic with a shared-use path for pedestrians and bicyclists.
- A variety of improvements for people who walk, bike, and roll throughout the study area, including a system of shared-use paths, bicycle lanes, sidewalks, enhanced wayfinding, and facility improvements to comply with the Americans with Disabilities Act. These are referred to in this document as *active transportation* improvements.
- Variable-rate tolling for motorists using the river crossing as a demand-management and financing tool.

The transportation improvements proposed for the Modified LPA and design options are shown in Figure 4. Additional details (including differences between the IBR Modified LPA and the CRC LPA) are available in Chapter 2.

Figure 4. Modified LPA Components

How would the Modified LPA be constructed?

The construction of bridges over the Columbia River sets the sequencing for other Program components. Accordingly, construction of the Columbia River bridges and the immediately adjacent highway connections and improvement elements would be timed early to aid the construction of other components. Demolition of the existing Interstate Bridge would take place after the new Columbia River bridges were opened to traffic.

Construction activities would require at least one large off-site location to stage equipment and materials. In addition, a large casting yard for fabricating elements of the bridges would likely be needed. Potential off-site locations have been evaluated and are described in detail in Chapter 2.

Electronic tolling infrastructure would be constructed and operational on the existing Interstate Bridge by the start of construction on the new Columbia River bridges. The toll rates and policies for tolling (including pre-completion tolling) would be determined after a more robust analysis and public process by the Oregon Transportation Commission and Washington State Transportation Commission.

Table 1 provides the estimated construction durations and additional information of Modified LPA components. The estimated durations are shown as ranges to reflect the potential for Program funding to be phased over time. In addition to funding, contractor schedules, regulatory restrictions on in-water work, river navigation considerations, permits and approvals, weather, materials, and equipment could all influence construction duration and overlap of certain components. Certain work below the ordinary high water mark of the Columbia River and North Portland Harbor would be restricted to minimize impacts to species listed under the Endangered Species Act and their designated critical habitat.

Throughout construction, active transportation facilities and three lanes in each direction on I-5 (accommodating personal vehicles, freight, and buses) would remain open during peak hours, except for short intermittent restrictions and/or closures. Advanced coordination and public notice would be given for restrictions, intermittent closures, and detours for highway, local roadway, transit, and active transportation users (refer to Section 3.1, Transportation, for additional information). At least one navigation channel would remain open throughout construction. Advanced coordination and notice would be given for restrictions or intermittent closures to navigation channels as required (refer to Section 3.2, Navigation, for additional information).

Table 1. Construction Activities and Estimated Duration

Component	Estimated Duration	Notes
Columbia River bridges	4 to 7 years	• Construction would likely begin with the main river bridges. • General sequence would include initial preparation and installation of foundation piles, shaft caps, pier columns, superstructure, and deck.
North Portland Harbor bridges	4 to 10 years	• Construction duration for North Portland Harbor bridges is estimated to be similar to the duration for Hayden Island Interchange construction. The existing North Portland Harbor bridge would be demolished in phases to accommodate traffic during construction of the new bridges.

Component	Estimated Duration	Notes
Hayden Island interchange	4 to 10 years	• Interchange construction duration would not necessarily entail continuous active construction. Hayden Island work could be broken into several contracts, which could spread work over a longer duration.
Marine Drive interchange	4 to 6 years	• Construction would need to be coordinated with construction of the North Portland Harbor bridges.
SR 14 interchange	4 to 6 years	• Interchange would be partially constructed before any traffic could be transferred to the new Columbia River bridges.
Demolition of the existing Interstate Bridge	1.5 to 2 years	• Demolition of the existing Interstate Bridge could begin only after traffic is rerouted to the new Columbia River bridges.
Three interchanges north of SR 14	3 to 4 years for all three	• Construction of these interchanges could be independent from each other and from construction of the Program components to the south. • More aggressive and costly staging could shorten this timeframe.
Light-rail	4 to 6 years	• The light-rail crossing would be built with the Columbia River bridges. Light-rail construction includes all the infrastructure associated with LRT (e.g., overhead catenary system, tracks, stations, park and rides).
Total construction timeline	9 to 15 years	• Funding, as well as contractor schedules, regulatory restrictions on in-water work and river navigation considerations, permits and approvals, weather, materials, and equipment, could all influence construction duration.

What are the effects of the Modified LPA and how do they compare to the No-Build Alternative?

This section highlights how the Modified LPA compares to the No-Build Alternative in terms of transportation performance and community and environmental effects. Table 2 and Table 3 summarize the key performance and impact differences.[7] Mitigation measures proposed for the effects are identified in Table 4. Chapter 3, Existing Conditions and Environmental Consequences, provides more detail on performance, impacts, and mitigation.

[7] All projections and forecasts in Tables 2 and 3 are for the design year of 2045 unless otherwise stated. The description of effects under the Modified LPA design options are in comparison to the Modified LPA with double-deck fixed-span Configuration, one auxiliary Lane, C Street ramps, and centered I-5.

Table 2. Summary of Transportation Effects or the No-Build Alternative and Modified LPA and Design Options[a]

1 Transportation Area	2 No-Build Alternative	3 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	4 Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5	5 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Shifted West	6 Modified LPA with Single-Level Fixed-Span Configuration,[b] One Auxiliary Lane, C Street Ramps, Centered I-5	7 Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	8 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Without C Street Ramps, Centered I-5[c]	9 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, Park-and-Ride Site Options
Hours of congestion/day at Interstate Bridge	SB: 16 hours. NB: 14 hours.	SB: 4.75 hours (70% reduction). NB: 9 hours (36% reduction).	SB: 4.5 hours (72% reduction). NB: 6 hours (57% reduction).	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Southbound weekday peak 2-hour average travel times from I-205 to I-405 in North Portland	AM: 58 minutes. PM: 29 minutes.	AM: 54 minutes (7% reduction). PM: 14 minutes (52% reduction).	AM: 50 minutes (14% reduction). PM: Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Northbound weekday peak 2-hour average travel times from I-405 in North Portland to I-205	AM: 18 minutes. PM: 42 minutes.	AM: 13 minutes (28% reduction). PM: 26 minutes (38% reduction).	AM: Same as effects listed in Column 3. PM: 14 minutes (67% reduction).	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	AM: Same as effects listed in Column 3. PM: 25 minutes (40% reduction).	Same as effects listed in Column 3.
Persons crossing over the Interstate Bridge per day	241,900 total: • 196,600 via general-purpose vehicles. • 30,100 via truck. • 14,800 via transit. • 400 via active transportation.	251,100 total: • 191,200 via general purpose vehicles. • 29,200 via truck. • 29,100 via transit. • 740 to 1,600 via active transportation.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Vehicle trips over the I-5 bridge/day	180,000 (+26% compared to existing conditions).	175,000 (-3% compared to No-Build Alternative).	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Bridge trips by active transportation (walk, bicycle, roll)	400 trips per day (similar to existing conditions). No improvement to facilities or connections.	Between 740 and 1,600 trips per day. Improved capacity, access, safety, and user experience for trips across the bridge as well as along connecting facilities.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Total travel time by transit between downtown Vancouver and Hayden Island[d]	AM SB: 36 minutes.[e] PM NB: 21 minutes.	AM SB: 17 minutes. PM NB: 17 minutes.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.

1 Transportation Area	2 No-Build Alternative	3 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	4 Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5	5 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Shifted West	6 Modified LPA with Single-Level Fixed-Span Configuration,[b] One Auxiliary Lane, C Street Ramps, Centered I-5	7 Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	8 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Without C Street Ramps, Centered I-5[c]	9 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, Park-and-Ride Site Options
Total travel time by transit between downtown Vancouver and Lombard Transit Center [d]	AM SB: 43 minutes. [f] PM NB: 41 minutes. [f]	AM SB: 25 minutes. [g] PM NB: 25 minutes. [g]	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Total travel time by transit between downtown Vancouver and Rose Quarter [d, h]	Express Bus, AM SB: 43 minutes. Express Bus, PM NB: 62 minutes LRT: Service not available.	Express Bus, AM SB: 52 minutes. Express Bus, PM NB: 38 minutes. LRT: 37 minutes (both AM SB and PM NB).	Express Bus, AM SB: 52 minutes. Express Bus, PM NB: 26 minutes. LRT: No change in effects.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Total travel time by transit between downtown Vancouver and Pioneer Square [d, h, i]	Express Bus AM SB: 48 minutes Express Bus PM NB: 67 minutes LRT: Service not available.	Express Bus, AM SB: 59 minutes. Express Bus, PM NB: 45 minutes. LRT: 47 minutes (both AM SB and PM NB).	Express Bus, AM SB: 59 minutes. Express Bus, PM NB: 33 minutes. LRT: No change in effects.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Freight mobility and access	No improvement.	Improved access, mobility, and safety with wider lanes and shoulders on the bridge and improved design at critical port access points at Mill Plain and Marine Drive.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Traffic safety	Crashes forecast to increase 28% for I-5 mainline, ramps, and ramp terminal intersections compared to existing conditions.	Crashes forecast to decrease 13% for I-5 mainline, ramps, and ramp terminal intersections compared to No-Build Alternative.	Crashes forecast to decrease 4% for I-5 mainline, ramps, and ramp terminal intersections compared to Modified LPA.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	The movable span configuration would perform worse (experience more crashes) than the fixed-span configurations but better (experience fewer crashes) than the No-Build Alternative.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Arterial and local street intersections operating below standards (AM/PM peaks)	9 intersections.	8 intersections.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	14 intersections.	Same as effects listed in Column 3.

1 Transportation Area	2 No-Build Alternative	3 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	4 Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5	5 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Shifted West	6 Modified LPA with Single-Level Fixed-Span Configuration,[b] One Auxiliary Lane, C Street Ramps, Centered I-5	7 Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	8 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Without C Street Ramps, Centered I-5[c]	9 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, Park-and-Ride Site Options
Transit safety and security	No improvement.	Light-rail stations provide a higher level of visibility and lighting than on-street bus stops. Stations would have additional safety measures incorporated into design.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Effect on river navigation	• No improvement. • Provides 263 feet of horizontal clearance and 178 feet of vertical clearance. • Continue risk to navigation from potential earthquake events, including the potential for the bridge failing and blocking or obstructing the navigation channels.	• Reduces the need for and severity of the S-curve maneuver and reduces number of piers. • Increases horizontal clearance to 400 feet and reduces vertical clearance to 116 feet. • Shifts the Upper Vancouver Turning Basin to the west by approximately 300-350 feet. • Navigation Safety: Constructs the new bridges west of the existing Interstate Bridge, reducing the available distance for vessels to align with the openings of the Columbia River bridges and the BNSF Railway Bridge. However, ship pilots and tug masters conducting ship simulations described the Modified LPA as improving navigation safety by providing more space to maneuver due to fewer bridge piers in the water and greater distance between the piers. Provides greater horizontal navigation and reduces the number of direction changes to transit the Interstate Bridge and position for passage through the BNSF bridge.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Similar to effects listed in Column 3, except: • 178 feet vertical navigation clearance in the open position. • Higher maximum vertical navigation clearance in the closed position compared to No-Build. • Improved navigation due to wider navigation channel openings. • Movable-span operations, and thus river navigation operations, may need increased restrictions on timing of bridge openings. • Would increase need for additional construction time, materials, and equipment.	Same as effects listed in Column 3.	Same as effects listed in Column 3.

1 Transportation Area	2 No-Build Alternative	3 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	4 Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5	5 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Shifted West	6 Modified LPA with Single-Level Fixed-Span Configuration,[b] One Auxiliary Lane, C Street Ramps, Centered I-5	7 Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	8 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Without C Street Ramps, Centered I-5[c]	9 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, Park-and-Ride Site Options
		• Improved navigation for most users due to wider navigation channel openings; some current users would not be able to pass under the bridges due to height unless accommodations are made. • Introduces a permanent and complete obstruction to navigation upstream of the new Columbia River bridges for vessels or cargo loads with vertical clearance requirements greater than 116 feet. • Improved navigation through increased seismic resiliency in event of potential earthquake by reduction in the risk of bridge failure or collapse and blocking or obstructing the navigation channels.						
Effect on aviation safety	No improvement.	Less intrusion into Pearson Field protected airspace as compared to the No-Build Alternative. Reduced potential for bird nesting and roosting.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Less intrusion into Pearson Field protected airspace.	More intrusion into Pearson Field protected airspace than effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.

a All projections and forecasts are for the design year of 2045 unless otherwise stated. The description of effects under the Modified LPA design options (Columns 4 through 9) are in comparison to the modified LPA with double-deck fixed-span Configuration, one auxiliary lane, C Street ramps, and Centered I-5, as described under Column 3.
b The effects associated with the single-level fixed-span configuration would be the same for all bridge type options, unless otherwise specified.
c The SR 14 interchange without C Street ramps design option would require express bus transit to be rerouted to access downtown Vancouver via Mill Plain Boulevard. This would add more travel time for express bus transit trips in and out of downtown Vancouver on express bus because of added distance and congestion on the mainline.
d Total transit travel times include 10 minutes of walk access (1/4 mile walk on either end of the trip at 3 mph average walk speed) in addition to initial and transfer (if applicable) wait time. Wait times are based on half the headway.
e Route 60 does not stop at Hayden Island southbound, so a trip from Vancouver to Hayden Island travels south to Delta Park and then back north to stop on Hayden Island.
f Route includes 60 Vancouver – Delta Park with transfer to Yellow Line LRT.
g Travel time is on Yellow Line LRT.
h Express Bus includes Route 101 from downtown Vancouver – Rose Quarter or Pioneer Square.
i Express Bus includes two stops between downtown Vancouver and Pioneer Square. LRT includes 16 stops between downtown Vancouver and Pioneer Square.
I- = Interstate; LRT = light-rail transit; LPA = Locally Preferred Alternative; NB = northbound; SB = southbound; SR = State Route

Table 3. Summary of Community and Environmental Effects for the No-Build Alternative and the Modified LPA [a]

1 Community and Environmental Effect	2 No-Build Alternative	3 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	4 Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5	5 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Mainline Westward Shift	6 Modified LPA with Single-Level Fixed-Span Configuration, [b] One Auxiliary Lane, C Street Ramps, Centered I-5	7 Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	8 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Without C Street Ramps, Centered I-5	9 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, Park-and-Ride Site Options
Acquisitions and displacements	None.	Approximately 47 acres of property acquired and displacement of: • 43 residential units. [c] • 36 businesses. [d] • 1 public use sites.	Similar to Column 3, with an additional 0.1 acres of property acquired.	Additional 0.9 acre of property acquired, and an additional 33 residential units and 3 businesses displaced.	Additional 0.2 acres of property acquired.	Same as effects listed in Column 6.	Same as effects listed in Column 3.	**Waterfront locations:** • Site 1: no acquisition or displacement. • Site 2: 0.1 acres acquired, no displacement. • Site 3: 1.5 acres acquired, 1 business displaced. **Evergreen locations:** • Site 1: 3.16 acres acquired, no displacement. • Site 2: no acquisition or displacement.
Land use and economics	• Existing land uses would remain vulnerable to high levels of congestion, unsafe conditions, and potential earthquake-induced failure. • No high-capacity transit, which is inconsistent with the stated policies and goals of regional transportation plans. • Congestion would impair freight movement and reduce area productivity, which could indirectly impact the implementation of land use plans and goals for economic development. • Loss in job growth could lead to decreased housing	• Converts approximately 47 acres of land to transportation use; currently primarily zoned industrial or commercial, with some land zoned residential. • High-capacity transit is consistent with state, regional, and local plans and policies. • Higher toll rates during peak periods would support regional and local policies for congestion and are not expected to change land use patterns. • Property tax revenues would be reduced compared to the No-Build Alternative. • Business displacements have the potential to impact 616 employees; affected businesses would be provided relocation assistance. • Bridge height would exclude up to eight existing users/vessels that require more than 116 feet of vertical clearance from passage	Similar to effects listed in Column 3, except: • Slightly more acquisition of property at the Fort Vancouver National Historic Site. • Improved traffic operations (shorter duration and length of congestion, reduced travel times, and improved mobility options) compared to design options with a single auxiliary lane would result in improved mobility and access for freight and employment.	Similar to effects listed in Column 3, except: • Larger areas of properties would be permanently acquired. • Additional 1 acre of permanent acquisition. • Additional three business displacements. • Potential to impact 142 additional employees.	Similar to effects listed in Column 3, except: • Lower maximum bridge height and reduced highway grade would benefit freight vehicle speed compared to double-deck configuration, with corresponding economic benefits.	Similar to effects listed in Column 3, except: • Bridge openings could interrupt vehicle and truck highway travel, transit service, and active transportation across the new Columbia River bridges. • No existing or future maritime vessels or cargo freight would be excluded from passage. • Lower bridge height compared to fixed-span configurations would allow fewer existing marine users/vessels to pass without a bridge opening. Movable-span operations, and thus river navigation operations, may have increased restrictions on bridge openings, which could impact marine commerce by restricting the	Similar to effects listed in Column 3, except: • Removal of the C Street ramps would result in traffic delay and increased travel times near the Mill Plain Boulevard interchange and in downtown Vancouver, which would have an economic impact on local businesses.	Same as effects listed in Column 3, plus: **Waterfront locations:** • Site 1: no acquisition or displacement. • Site 2: 0.1 acres acquired, no displacement. • Site 3: 1.5 acres acquired, 1 business displaced, 53 additional employees. **Evergreen locations:** • Site 1: 3.16 acres acquired, no displacement. • Site 2: no acquisition or displacement.

1 Community and Environmental Effect	2 No-Build Alternative	3 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	4 Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5	5 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Mainline Westward Shift	6 Modified LPA with Single-Level Fixed-Span Configuration, [b] One Auxiliary Lane, C Street Ramps, Centered I-5	7 Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	8 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Without C Street Ramps, Centered I-5	9 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, Park-and-Ride Site Options
	prices, increased commercial vacancies, and reduced demand for downtown revitalization.	underneath the new Columbia River bridges.				times of day for large vessel movements.		
Neighborhoods	• No change to existing neighborhoods, community facilities, or social resources. Future development might not be fully consistent with goals that assume improved mobility and expanded transit access. Neighborhoods would not benefit from reduced congestion, improved mobility, and access to employment.	• Would not adversely affect community cohesion in neighborhoods, except for Hayden Island. Could increase cohesion in neighborhoods near the Community Connector. • Would affect the Hayden Island neighborhood's community cohesion, including displacement of floating homes and changes to views. Fourteen businesses would be displaced. However, neighborhood cohesion would be improved by a more continuous street system, improved pedestrian and bicycle facilities, and transit that increases connections for residents. • Construction-related impacts such as traffic diversion noise, temporary reductions in air quality, and sidewalk disruptions.	Same as effects listed in Column 3.	Similar to effects listed in Column 3, but with potential residential displacements in Esther Short neighborhood.	Similar to effects listed in Column 3, except: • May help to maintain or improve neighborhood cohesion by providing additional transit station location options on Hayden Island, which would provide more opportunities for connection to residences and development.	Similar to the effects listed in Column 6, except: • Bridge openings would cause backups during non-peak commuting hours that would reduce reliability for vehicles, active transportation, similar to the No-Build Alternative, which may negatively affect neighborhood cohesion.	Same as effects listed in Column 3.	Same as effects listed in Column 3.

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Equity	• Equity priority communities would not benefit from increased mobility and accessibility. • Would avoid short- and long-term displacement of residents and businesses. • Would avoid construction-related impacts such as traffic diversion, noise, temporary reductions in air quality, and cost burdens of tolling.	• Increased access to high-capacity transit, increased availability of active transportation, and highway and driving travel time reductions. The degree of benefits would vary by equity priority community. • Increase in job access for all demographic groups due to faster travel times. • Potential displacement of encampments of houseless populations, residential displacements, and additional transportation cost from tolling. • Construction-related impacts such as traffic diversion, noise, temporary reductions in air quality, and cost burdens of tolling. • Tolling would place a burden on low-income travelers.	Similar to effects listed in Column 3, but: • Would reduce delay and congestion on the Columbia River bridges to a greater extent, which would improve travel times for motorists, express bus riders, and emergency vehicles; slightly greater increase in jobs access for all demographic groups.	Similar to effects listed in Column 3, except: • More residential displacements.	Similar to effects listed in Column 3, except: • Active transportation users would experience shorter distance to cross the bridge. • Users may feel safer due to the extra security from visibility from passing vehicles.	Similar to effects listed in Column 6, except: • There may be travel delays for transit and active transportation users due to openings of the movable span.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Environmental justice	• No displacement of residents, businesses, community resources, or jobs. • Travel times would increase by approximately 50% compared to existing times. Would not bring high-capacity transit to Hayden Island or downtown Vancouver. • Environmental conditions under the No-Build Alternative would affect EJ populations the same as the general population. Therefore, no disproportionately high and adverse effects have been identified.	• Increased access to high-capacity transit and active transportation, and reductions in vehicle travel time. Impacts to EJ populations would be the same as to the general public. • Increase in job access due to faster travel times. Because faster times would result from tolling, tolling would result in disproportionately high and adverse effects on EJ populations. • Residential and business displacements. Displacements in high-priority and meaningfully greater EJ areas such as the Esther Short neighborhood in Vancouver and the Rockwood neighborhood in Gresham would result in disproportionately high and adverse effects on EJ populations.	Same as effects listed in Column 3.	• Similar to effects listed in Column 3, but would increase residential and business displacements. • Additional displacement of the Normandy Apartments in the Esther Short neighborhood as a result of the I-5 westward shift would result in disproportionately high and adverse effects on EJ populations.	Similar to effects listed in Column 3, except: • Shared-use path users would have more exposure to noise. • Users would experience shorter distance to walk across the bridge. • Users may feel safer due to the extra security from visibility from passing vehicles. • Noise and visual impacts to EJ populations would be the same as to the general population.	Similar to effects listed in Column 3, except: • There may be travel delays for transit and active transportation users due to openings of the movable span. • Delays to transit and active transportation users as a result of bridge openings could also contribute to adverse effects on EJ populations.	Same as effects listed in Column 3.	Same as effects listed in Column 3.

1 Community and Environmental Effect	2 No-Build Alternative	3 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	4 Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5	5 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Mainline Westward Shift	6 Modified LPA with Single-Level Fixed-Span Configuration, [b] One Auxiliary Lane, C Street Ramps, Centered I-5	7 Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	8 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Without C Street Ramps, Centered I-5	9 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, Park-and-Ride Site Options
		• Increased traffic and noise impacts from construction. • Improved air quality. • Some adverse impacts to community cohesion.						
Public services and utilities	• Increased congestion on I-5 would increase delays in emergency response.	• Emergency service response time would be reduced with improved traffic conditions. • Utilities would be relocated or protected in place during construction and restored to full service following construction.	Similar to effects listed in Column 3, but further reduced congestion and multimodal operations would lead to improved response times.	Same as effects listed in Column 3.	Similar to effects listed in Column 3, but response times to transit and shared-use path incidents could improve because emergency vehicles would have better access to transit and active transportation facilities.	Delays and disruptions to emergency response due to bridge openings would continue, but with less frequency than the No-Build Alternative.	Same as effects listed in Column 3.	Utilities at the park-and-ride locations at W 4th Street and W 3rd Street could require relocation or replacement.
Total acres of park and recreation resources acquired (approximate)	0 acres.	1.3 acres	1.3 acres (+1,500 square feet compared to area of acquisitions stated in Column 3)	1.3 acres (-200 square feet compared to area of acquisitions stated in Column 3)	1.3 acres (+760 square feet compared to area of acquisitions stated in Column 3)	1.3 acres (+760 square feet compared to area of acquisitions stated in Column 3)	Same as effects listed in Column 3.	N/A
Linear feet of trails to be reconstructed and/or permanently realigned (approximate)	0 feet.	5,800 feet.	6,000 feet	5,800 feet	6,000 feet	6,000 feet	5,700 feet	N/A
Anticipated transit access to park and recreation resources in the study area	No change.	Would improve access to some large regional parks.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.

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Visual quality (changes to visual resources)	Constructed elements within the Area of Visual Effect (AVE) would not change. Project environment coherence would be negatively affected by increased traffic and congestion. Compatibility with the natural and cultural environments would stay the same.	New visual elements could alter the existing visual character and quality in the AVE (e.g., new bridges across the Columbia River). Landscape units where the effect to visual quality are beneficial or neutral would have a natural, cultural, and project environment that is compatible with existing visual conditions. Adverse effects to visual quality would result from blocking views of the natural environment and changes in visual experience from elevated bridge structures, such as to viewers in the floating homes at the North Portland Harbor bridges.	Additional width would contribute to a slightly increased visual mass for viewers in close proximity or beneath the structures in the Columbia River landscape unit.	Would include an improvement in the perceived visual quality by shifting project elements slightly farther from sensitive viewers at Kanaka Village and other views from Fort Vancouver National Historic Site in the Greater Central Park landscape unit.	May become a beneficial feature from nearby views in the Columbia River landscape unit depending on the chosen architectural design.	In the closed position, the lower height of the bridge decks would be similar, or less visible, than the existing Interstate bridge. Some components of a movable span could protrude higher into the skyline and be visible from the Vancouver, Fort Vancouver, and Hayden Island areas. In an open position, which would be intermittent and limited, the increased visibility of the bridge deck may obstruct additional views and skylines, and likely intensify visual impacts, especially for sensitive recreational viewers. The overall bridge deck would be higher and more visible than the existing bridge deck.	Would eliminate project environment elements associated with the C Street Ramps that would be visible for sensitive recreational viewers in the Greater Central Park landscape unit.	Potential site specific changes in the cultural visual environment in the Vancouver Downtown landscape unit.
Number of NRHP-listed or NRHP-eligible historic built environment resources affected	0	12	12	12	12	12	12	12
Number of archaeological sites affected	0	12	12	12	12	12	12	12
VMT in MSAT study area	3,537,900 VMT in 2045 (66% increase compared to existing conditions).	3,455,400 VMT in 2045 (62% increase compared to existing conditions).	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.

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Changes in air pollutant emissions	Future regional emissions would be substantially lower than existing emissions for all MSAT, CO, NO_X, and $PM_{2.5}$. Future regional emissions of SO_2, VOC would be up to 25% higher than existing conditions due to increased VMT.	Similar to No-Build Alternative (slightly lower emissions due to reduced VMT).	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Similar to effects listed in Column 3, but may slightly reduce operational emissions due to the lower profile grade, which would reduce acceleration and braking of vehicles crossing the bridges.	Similar to effects listed in Column 6, except for a minor increase in air quality pollutants due to vehicles idling during bridge openings. There would be fewer bridge openings than with the No-Build Alternative.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Changes in MSATs emissions (2045)	• 1,3-Butadiene: 100% reduction • Acetaldehyde: 82% reduction • Acrolein: 89% reduction • Benzene: 69% reduction • Diesel Particulate Matter: 86% reduction • Ethylbenzene: 29% reduction • Formaldehyde: 86% reduction • Naphthalene: 93% reduction • Polycyclic Organic Matter: 93% reduction	• 1,3-Butadiene: 100% reduction • Acetaldehyde: 85% reduction • Acrolein: 90% reduction • Benzene: 70% reduction • Diesel Particulate Matter: 88% reduction • Ethylbenzene: 29% reduction • Formaldehyde: 88% reduction • Naphthalene: 94% reduction • Polycyclic Organic Matter: 96% reduction	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Similar to effects listed in Column 3, but may slightly reduce operational emissions due to the lower profile grade, which would reduce acceleration and braking of vehicles crossing the bridges.	Similar to effects listed in Column 6, except for a minor increase in air pollutants due to vehicles idling during bridge openings. There would be fewer bridge openings than with the No-Build Alternative.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Changes in regional criteria pollutant emissions	• Carbon Monoxide: 61% reduction • Nitrogen Dioxide: 75% reduction • Sulfur Dioxide: 16% increase • Volatile Organic Compounds: 26% increase • Total PM_{10}: 46% increase • Total $PM_{2.5}$: 39% reduction	• Carbon Monoxide: 63% reduction • Nitrogen Dioxide: 79% reduction • Sulfur Dioxide: 9% increase • Volatile Organic Compounds: 25% increase • Total PM_{10}: 21% increase • Total $PM_{2.5}$: 48% reduction	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Similar to effects listed in Column 3, but may slightly reduce operational emissions due to the lower profile grade, which would reduce acceleration and braking of vehicles crossing the bridges.	Similar to effects listed in Column 6, except for a minor increase in air quality pollutants due to vehicles idling during bridge openings. There would be fewer bridge openings than with the No-Build Alternative.	Same as effects listed in Column 3.	Same as effects listed in Column 3.

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Number of receptors that exceed highway noise thresholds [e]	215	198	Similar to effects listed in Column 3, except: • Highway noise impacts, before and after mitigation, would be slightly different because traffic lanes would be slightly closer to noise-sensitive land uses. • No change to peak-hour traffic volumes, posted speed limit, or vehicle mix.	Similar to effects listed in Column 3, except for a barely perceptible increase in traffic noise west of I-5 near the southbound mainline and ramps.	Similar to effects listed in Column 3, except this option would result in a slight increase in highway noise impacts east and west of the bridge due to the wider bridge span (99 feet wider) and lower roadway deck (29 feet lower).	Similar to effects listed in Column 6.	Similar to effects listed in Column 3, except with minor changes to noise impacts at a level near or below perceptible range.	Same as effects listed in Column 3.
Number of receptors with moderate transit noise impact levels [e]	0	12 [f]	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Number of receptors with severe transit noise impact levels [e]	0	0	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Number of receptors with transit vibration impacts [e]	No vibration impacts without extension of light-rail.	12 residences and 1 theater	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Total Regional Transportation Energy Consumption (mmBtu/day)	• 271,933 in 2045 without electric vehicles • 190,771 in 2045 with electric vehicles	• 271,187 in 2045 without electric vehicles (-0.27% compared to No-Build Alternative) • 190,302 in 2045 with electric vehicles (-0.25% compared to No-Build Alternative)	Similar to effects listed in Column 3. Modeling results estimate a non-statistically significant difference of less than 0.1%.	Same as effects listed in Column 3.	Similar to effects listed in Column 3, but would slightly reduce operational emissions due to the reduced profile grade of the new Columbia River bridges.	Similar to effects listed in Column 6, except it would increase energy consumption due to the electricity required to open the bridge and as a result of idling by queued vehicles on the freeway during bridge openings.	Similar to effects listed in Column 3, but would create additional congestion on local streets, which would decrease vehicle efficiency, resulting in increased energy consumption.	Same as effects listed in Column 3.

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EMF	No change.	Similar to effects listed in Column 2. EMF emissions would increase slightly at certain locations but would remain well below exposure guidelines.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Water Quality and Stormwater Management	No change. Stormwater within the area would remain untreated until addressed according to state prioritization and available funding.	• Beneficial effect on receiving water quality (due to best management practices [BMPs] to remove pollutants). • Could cause changes in peak flows and stormwater runoff volumes.	• Beneficial effect on receiving water quality (due to BMPs to remove pollutants) with slight increase to pollutant loads. • Could cause changes in peak flows and stormwater runoff volumes.	Same as effects listed in Column 3.	• Beneficial effect on receiving water quality (due to BMPs to remove pollutants). • Could cause changes in peak flows and stormwater runoff volumes.	Potential for additional and accidental minor spills of materials and pollutants used for maintenance and operation of the movable-span configuration.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Contributing Impervious Area	178 acres total: • 0 acres treated • 21 acres infiltrated • 157 acres untreated	207 acres total: • 190 acres treated • 17 acres infiltrated • 0 acres untreated	211 acres total: • 194 acres treated. • 17 acres infiltrated. • 0 acres untreated.	Same as effects listed in Column 3.	210 acres total: • 193 acres treated. • 17 acres infiltrated. • 0 acres untreated.	214 acres total: • 197 acres treated. • 17 acres infiltrated. • 0 acres untreated.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Total Suspended Solids	120,272 lb/year.	16,720 lb/year.	17,072 lb/year.	Same as effects listed in Column 3.	16,984 lb/year.	17,336 ls/year.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Hydrology	No change (continued release of stormwater with degraded quality into receiving waters).	• Potential to cause long-term hydrologic effects to waterbodies due to an increase of 30 acres of contributing impervious area. • Could result in a small net rise to the base flood elevation. Measures would be analyzed to compensate for reductions to existing flood storage.	• Potential to cause long-term hydrologic effects due to an increase of 34 acres of contributing impervious area.	Same as effects listed in Column 3.	• Potential to cause long-term hydrologic effects due to an increase of 33 acres of contributing impervious area.	• Potential to cause long-term hydrologic effects due to an increase of 37 acres of contributing impervious area.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Wetland and Other Waters impacts	No change.	• 0.58 acres wetland fill. • 7.39 acres wetland buffer fill. • 0.13 acres net *restoration* of Columbia River/North Portland Harbor.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	0.03 acres net loss of Columbia River/North Portland Harbor. No change in effects to wetlands or wetland buffers listed in Column 3.	0.07 acres net loss of Columbia River/North Portland Harbor. No change in effects to wetlands or wetland buffers listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.

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Ecosystem - aquatic resources	• Continued impacts from untreated stormwater from approximately 156.4 acres of existing CIA. • Potential for injury and habitat degradation in the case of a bridge failure.	• Benthic habitat impact: 0.13 acres net restoration. • Additional Overwater Shading (Water Surface Level): 1.04 acres. • Additional Overwater Shading (Elevated Deck Level): 8.22 acres. • Beneficial effect of stormwater treatment for all post-project CIA, including approximately 156.4 acres of existing impervious area that is currently untreated.	• Similar to effects listed in Column 3, except would result in a greater amount of elevated overwater shading. • Overwater Shading (Elevated Deck): +13.02 acres.	Same as effects listed in Column 3.	• Benthic habitat impact: 0.03 acres net reduction. • Additional Overwater Shading (Water Surface Level): 1.41 acres. • Additional Overwater Shading (Elevated Deck Level): 10.78 acres.	• Benthic habitat impact: 0.07 acres net reduction. • Additional Overwater Shading (Water Surface Level): 1.58 acres to 2.16 acres. • Additional Overwater Shading (Elevated Deck Level): 10.78 acres.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Ecosystems - permanent loss of sensitive terrestrial habitat in Oregon (acres)	• Potential for injury and habitat degradation in the case of a bridge failure.	• “High” wildlife/riparian value: 1.12 • “Medium” wildlife/riparian value: 6.20 • Wetlands: 0.58 • Wetland Buffers: 7.39	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Similar to effects listed in Column 3, except would slightly reduce impervious surface.	Same as effects listed in Column 3.
Ecosystems - permanent loss of sensitive terrestrial habitat in Washington (acres)	Potential for injury and habitat degradation in the case of a bridge failure	• Riparian buffers: 0.79 • Biodiversity Areas: 0.15 • Oak Woodlands: <0.01 • Wetlands: 0 • Wetland Buffers: 0.06	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Geology/Groundwater	No change (seismic deficiencies remain, would not affect geologic resources, would sustain existing impacts to degradation of the groundwater quality).	• Improved public safety, minimizing damage to infrastructure, and limiting economic disruption due to seismic improvements. • Slight potential for increased use of materials that could spur expansion and/or opening of surface mines. • Benefits to groundwater as a result of stormwater management and treatment.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.	Similar to effects listed in Column 3.	Same as effects listed in Column 3.	Same as effects listed in Column 3.

1 Community and Environmental Effect	2 No-Build Alternative	3 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	4 Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5	5 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Mainline Westward Shift	6 Modified LPA with Single-Level Fixed-Span Configuration, [b] One Auxiliary Lane, C Street Ramps, Centered I-5	7 Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	8 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Without C Street Ramps, Centered I-5	9 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, Park-and-Ride Site Options
Hazardous materials	• No potential for adverse effects from acquisition of contaminated sites. • No beneficial effects from the cleanup of contaminated sites. • Untreated stormwater would continue to enter surface waterbodies and groundwater. • No improvement in existing spill risks from traffic congestion and collisions.	• Moderate potential for increased liability for property owners (ODOT and WSDOT) from the acquisition of contaminated sites. • Beneficial effects on human health and safety and surface and groundwater quality from cleanup and remediation of contaminated areas on acquired sites and limiting the possible off-site migration of contamination. • If residual contamination remains on acquired sites after cleanup, moderate potential for adverse effects on human health and safety if encountered during construction or with the possible off-site migration of contamination. • Beneficial effects from updates in stormwater conveyance and treatment. • Reduction in spill risk due to reduced traffic congestion and collisions.	Same as effects listed in Column 3, except would require the acquisition of a slightly larger area of property with a potential source of contamination.	Same as effects listed in Column 3.	• Requires the acquisition of a slightly larger area of property with a potential source of contamination. • Requires an increased area of in-water work due to larger bridge foundations, which could result in a comparatively greater potential risk of mobilizing hazardous materials in river sediments.	Same as effects listed in Column 3, except would require the acquisition of a slightly larger area of property with a potential source of contamination.	Same as effects listed in Column 3.	Same as effects listed in Column 3.
Climate Change	• Substantially lower energy consumption and greenhouse gas (GHG) emissions in 2045 due to increased electric vehicles in fleet and decarbonized electricity sources.	• Lower energy consumption and GHG emissions in 2045 similar to No-Build Alternative. • Increased mode share of low and no emissions modes (transit, active transportation). • Improvements in climate resilience with materials and design.	Similar to effects listed in Column 3, but would slightly reduce emissions due to improved congestion.	Same as effects listed in Column 3.	Similar to effects listed in Column 3, but would slightly reduce operational emissions due to the reduced profile grade of the new Columbia River bridges.	Similar to effects listed in Column 3, but would increase energy consumption due to the longer construction duration, additional materials required for the larger bridge foundations, and electricity required to raise and lower the bridge and as a result of idling during bridge closures.	Similar to effects listed in Column 3, but additional congestion and idling would decrease vehicle efficiency, resulting in increased GHG emissions.	Same as effects listed in Column 3.

Notes:
a All projections and forecasts are for the design year of 2045 unless otherwise stated. The description of effects under the Modified LPA design options (Columns 4 through 9) are in comparisons to the Modified LPA with double-deck fixed-span configuration, one auxiliary Lane, C Street ramps, and centered I-5, as described in Column 3.
b The effects associated with the single-level fixed-span configuration would be the same for all bridge type options, unless otherwise specified.
c Does not include the displacement of houseless individuals.
d Does not include the displacement of a billboard and cellular phone tower.
e Information represents noise impacts without mitigation.
f Does not include noise impacts at a hotel within range.
Key: AVE = Area of Visual Effect; EMF = electric and magnetic fields; GHG = greenhouse gas; I- = Interstate; lb = pounds; LPA = Locally Preferred Alternative; mmBtu = one million British thermal units; MSAT = mobile source air toxics; N/A = not applicable; NRHP = National Register of Historic Places; ODOT = Oregon Department of Transportation; PM10 = particulate matter less than or equal to 10 microns in diameter; VMT = vehicle miles traveled; WSDOT = Washington Department of Transportation

What mitigation or compensation is proposed for unavoidable adverse impacts?

This section summarizes the mitigation measures proposed for the community and environmental effects that would occur as a result of the Modified LPA. Mitigation and compensation would be adjusted as needed for differences in effects associated with the design options. As possible mitigations are identified and considered, the IBR Program will determine whether additional environmental analysis is necessary. The IBR Program would comply with all environmental laws and obtain necessary permits that outline protections for local air quality, water quality, fish and wildlife, and community livability (e.g., noise levels, light and glare, dust, etc.) during construction. Table 4 highlights the mitigation or compensation measures proposed for the effects described in Table 3. Chapter 3, Existing Conditions and Environmental Consequences, provides more detail on proposed mitigation or compensation measures.

Table 4. Summary of Mitigation or Compensation for Community and Environmental Effects

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
Transportation	**Long-Term Effects** ***Program-Specific Mitigation*** *I-5 Operations* Potential mitigation to meet ODOT's and/or WSDOT's performance standards on I-5 are summarized below. *Modified LPA* • Providing an additional auxiliary lane northbound and southbound within the IBR Program limits, and/or the program and partners could implement more intensive demand reduction and system management strategies beyond what the IBR Program already includes (variable-rate tolling, improved transit and active transportation systems, and enhanced transportation demand management (TDM) and transportation system management (TSM) systems). *Modified LPA and Design Options* • ODOT will continue to work with partners to study the downstream bottleneck at the I-5/I-405 split in North Portland. This downstream bottleneck is a separate project that ODOT is looking into understanding causes and potential solutions. • The southbound C-D roadway would be impacted by congestion spilling back from I-5 during the AM peak period, but even during the PM peak period when no downstream congestion is present, the CD roadway would not meet WSDOT's mobility standards. Potential mitigation measures could include braiding the Mill Plain on-ramp and SR 14 off-ramp and possibly providing a slip lane to continue providing access for trips traveling from the Mill Plain interchange to SR 14. *Bridge Openings* Measures to minimize disruptions to I-5 operations, transit service, and active transportation associated with bridge openings and gate closures under the Modified LPA with a single-level movable-span configuration could include: • Establish new bridge opening and gate closure timing limitations, which could include scheduled days and/or times that avoid peak periods for passenger vehicles and trucks, in coordination with the USCG. • Incorporate bridge opening and gate closure limitations into transit service schedules.

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
	• Disseminate information concerning bridge openings and gate closures to the public, businesses, travel organizations, freight industry, and mariners. *Arterials and Local Streets* • *Modified LPA without C Street ramps:* Six intersections in the Modified LPA design option without C Street ramps may require mitigation improvements and are summarized below. The impacts are caused by the additional traffic volumes accessing the Mill Plain Boulevard/15th Street east-west couplet due to the elimination of I-5 access via the C Street ramps. – Mill Plain Boulevard and Franklin Street – 15th Street and Washington Street – 15th Street and Main Street – Mill Plain Boulevard and Columbia Street – Mill Plain Boulevard and Broadway Street – Mill Plain Boulevard and I-5 northbound on-/off-ramps • Mitigation of this congestion could include retaining the C Street ramps. As part of final design, additional traffic analysis would be conducted to confirm the SEIS analysis and refine mitigation measures as needed. Final mitigation would be determined and agreed upon by the IBR Program and the affected agency. *Transit Reliability* In the course of considering mitigation, an updated on-time performance analysis in the Rose Quarter may be completed. Final mitigation measures will be determined and agreed upon with the appropriate agency partners as needed. The IBR Program could contribute a proportionate share toward identified mitigation to improve on-time performance at the Rose Quarter. **Temporary Effects** ***Regulatory Mitigation*** • Construction activities would comply with ODOT and WSDOT requirements for maintenance of traffic. More specific measures related to maintenance of traffic are discussed in the Program-Specific Mitigation section below. The Transportation Technical Report identifies additional potential mitigation measures and best practices such as for signage, traffic plans and control, access, communications, and safety. ***Program-Specific Mitigation*** *Study-Area Travel* • Develop Work Zone Transportation Management Plan (TMP) and a maintenance of traffic plans to address affected facilities and their mode of transportation. *Freight Mobility and Access* • Mitigation for freight and mobility would be an element of the Work Zone TMP identified above. In addition, the IBR Program would coordinate with all facility owners to notify them of facility or access closures. Construction information would be provided to affected local jurisdictions. Similar information would be provided to WSDOT and ODOT for use in the states' freight notification systems. The IBR Program would provide information in formats required by WSDOT and ODOT. • To minimize impacts to freight rail operations, the Program would coordinate with the railroad owners and rail operators and would obtain all applicable required permits. Construction would be limited to the times approved and coordinated with freight rail operators.

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
	Bridge Openings • During IBR construction, the IBR Program would coordinate with the U.S. Coast Guard, the ports, and other jurisdictions to minimize bridge openings and gate closures to minimize the impact to vehicles, active transportation, and transit. The work zone TMP would include coordination and communication with agencies, mariners, and the public for bridge openings and gate closures. *Arterials and Local Streets* • All minimization measures associated with constructing the Modified LPA would comply with local regulations governing construction traffic control and construction truck routing. The IBR Program would finalize detailed work zone TMPs in close coordination with local jurisdictions during the final design and permitting phases of the Program. *Transit Operations* • Transit service and facility modifications would be coordinated with TriMet and C-TRAN to minimize temporary impacts and disruptions to bus and light-rail facilities and service during construction. Detailed work zone TMPs and coordination/communication plans would be developed. This would include support for public information and communication throughout the construction period, including for periods where alternative routes, facilities, or services would be needed to maintain service. *Active Transportation* • The work zone TMP would include specific measures to maintain access to active transportation facilities and users. The Transportation Technical Report has additional detail on potential measures for construction areas, signage, lighting, communications, safety and maintenance. *Safety* • The IBR Program would implement the latest safety technology during construction (e.g., lane striping, Advanced Traffic Management System, Variable Message Signs, crash barriers, speed warning, etc.). *Transportation Demand Management and Transportation System Management* • The IBR Program would work with partner agencies on adapting and implementing TDM and TSM treatments during construction. Potential strategies could include: – Expanded transit service. – Vanpool/carpool program. – Telecommuting options. – Compressed work week/flexible work schedules. – Active transportation improvements and enhancements. *Tolling and Diversion* • The IBR Program would work with partner agencies to develop a detailed program and schedule for pre-completion tolling and any diversion impacts during construction. • Diversion impacts during construction will be evaluated and potential mitigation will be discussed with partner agencies to offset any impacts.
Aviation	**Long-Term Effects** ***Regulatory Requirements*** • Standards and regulatory measures have been evaluated and screened. These measures have been incorporated during the development of the Modified LPA to the extent possible and will continue to be refined as the design progresses.

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
	• During final design, the IBR Program would comply with the FAA's findings in response to the Program's Form 7460-1. The FAA would issue a finding of "hazard to aviation" or "no hazard to aviation" upon completion of the aeronautical review. In addition, the FAA would have requirements for marking obstacles; this would likely include marking according to FAA AC 70/7460-1M "Obstruction Marking and Lighting" using equipment specified in AC 150/5345-43J "Specification for Obstruction Lighting Equipment." *Program-Specific Mitigation* • Provide obstruction marking and lighting to make the river crossing structures visible to aircraft. Design roadway or accent lighting on the bridges and surrounding interchanges to limit light or glare that could affect aviation at Pearson Field or Portland International Airport. • Place wire mesh or other deterrents over the top of temporary stormwater detention ponds to conceal open water when they are full to prevent birds from landing on open water. • Incorporate designs of proposed structures and features of the Program that minimize locations for birds to roost or nest. **Temporary Effects** *Regulatory Requirements* • To protect and minimize temporary effects on aviation during construction, standard and regulatory mitigation measures such as BMPs would be implemented. Construction BMPs applicable to the Modified LPA are discussed in Section 3.14, Water Quality and Hydrology. • Standard and regulatory mitigation measures for aviation include: – In the area of demolition of the Interstate Bridge and construction activities for the Columbia River bridges and the SR 14 interchange, FAA would review and approve the location and height of tall construction equipment proposed by the contractor. Equipment would be marked following the FAA's Obstruction Marking and Lighting Standards described in Advisory Circular 70/460-1M. – Apply dust control measures, such as watering exposed soil and using gravel surfacing on temporary construction roads, to mitigate potential reduction and visibility to aviation from construction activities in the SR 14 area. Section 3.10.6, Air Quality lists dust control requirements in both Oregon and Washington. Manage construction materials and activities to minimize glare and smoke. *Program-Specific Mitigation* • Construction specifications for contractors working near Pearson Field would include a condition that any electronic devices used for communication or other purposes cannot interfere with equipment required for air navigation and communication. • Place wire mesh or other deterrents over the top of temporary stormwater ponds to prevent birds from landing on open water. • Provide public involvement throughout construction to provide information to pilots and the public.
Navigation	**Long-Term Effects** *Regulatory Requirements* • Standards and regulatory measures have been evaluated and screened. These measures have been incorporated during the development of the Modified LPA to the extent possible and will continue to be refined as the design progresses. *Avoidance Measures*

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
	• The Modified LPA with a fixed-span configuration would have long-term effects to marine-based operations currently operating on the Columbia River, including five vessels and three upstream fabricators when shipping large cargo requiring vertical navigation clearance over 116 feet. Under the double-deck and single-level fixed-span configurations, these vessels and cargo shipments would be unable to transit beneath the new Columbia River bridges in either some conditions when river levels approach or exceed ordinary high water levels or be permanently precluded from transiting the bridge. The IBR Program would continue to coordinate with the affected vessel owners and river users to reach mutually acceptable decisions and agreements to avoid impacts through adjustments to vessels or business operations prior to publication of the Final SEIS. *Program-Specific Mitigation* • Provide obstruction marking and lighting to make the river crossing structures visible to river traffic. Design roadway or accent lighting on the bridges and surrounding interchanges to limit light or glare that could affect river navigation. • Update navigation charts and other navigation publications to reflect changes to VNC and HNC for future river users. **Temporary Effects** *Regulatory Requirements* • Develop construction phasing and staging plans to help ensure that construction activities would be planned to maintain a minimum channel for navigation. The Construction Staging Plan would be reviewed and approved by the USCG Captain of the Port prior to construction. Coordination and approval by the USCG Captain of the Port would occur for changes to the three navigation channels at each of the different times bridge pier sets would be constructed. Closures or restrictions on river traffic would be communicated in advance, enabling river users to accommodate their schedules, tug and barge configurations, requirements for assist tugs, shipping marine freight by other modes (e.g., truck, rail), use of different vessels with lower vertical clearance, and other options during construction activities that disrupt navigation and enable USACE to fulfill its navigation missions. • Provide Local Notice to Mariners throughout construction to provide information to tug operators, pilots, and the public. *Program-Specific Mitigation* • Make available an assist tug(s) to support safe navigation when vertical or horizontal clearances are reduced and assistance is needed to safely navigate the restricted channel. • Conduct outreach to inform the navigation community, recreational boaters, and other river users of waterway restrictions and other construction activities that may restrict or otherwise change local navigation conditions. • Provide information via local maritime publications, social media, local media, and other similar platforms. • Provide signage and notices at boat ramps, water access points, marinas, and other locations frequented by river users to inform them of the construction activities and where additional information can be found on the Program. • Notify individual vessel owners where information indicates they could be specifically impacted during construction. • Require all construction barges to have active AIS signals and construction channel lines be updated on the published navigation charts. • Modify the USACE Dredge *Yaquina* to have a lowerable mast or other feature to enable passage of the Interstate Bridge during construction.

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
Property Acquisitions and Displacements	**Long-Term Effects** *Regulatory Requirements* • Purchase property at fair market value and provide relocation assistance per the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Act). *Program-Specific Mitigation* No Program-specific mitigation measures are proposed for long-term effects related to property acquisitions and displacements. **Temporary Effects** *Regulatory Requirements* There are no specific regulatory requirements for mitigation of temporary property impacts. *Program-Specific Mitigation* As project design progresses, the IBR Program would develop approaches to managing temporary construction easements as part of the overall project right-of-way plan. The plan would identify measures that would be taken by contractors to avoid, minimize, and mitigate impacts to property temporarily used for construction. Program-specific measures that may be included in the plan to minimize and mitigate for temporary effects related to property acquisition and displacements include: • Mitigation for construction easements could include payment to property owners in exchange for the use of their property during construction. For example, one method for compensation would be to pay the equivalent of a rental based on the property valuation. Site impacts from temporary construction uses would be restored or compensated according to fair market or contributory value. • Mitigation may be needed in areas where construction of the Modified LPA could block or impede access to residences or businesses. Continued access to properties during construction would be maintained to the extent possible. Specific provisions may include signage to let the public know that businesses are open and conducting construction during non-peak business hours.
Land Use and Economic Activity	**Long-Term Effects** *Regulatory Requirements* • Purchase property at fair market value and provide relocation assistance per the Uniform Act. *Program-Specific Mitigation* • The Land Use Technical Report identifies several measures which, although they are not specifically land use mitigation, support the Modified LPA's compatibility with existing land uses: – The use of interchange area management plans to guide development within the vicinity of interchanges. – Mitigation for effects to historic resources, including demolition of the existing Interstate Bridge. – Avoidance of potential land use conflicts by planning and design efforts to support integration of park-and-ride facilities with current and planned land uses in downtown Vancouver.

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
	Temporary Effects *Regulatory Requirements* • Construction BMPs would be used to avoid or minimize indirect construction effects on land use and economics, such as dust, noise, and aesthetic impacts. These measures are discussed in Section 3.10, Air Quality; Section 3.11, Noise and Vibration; and Section 3.9, Visual Quality. *Program-Specific Mitigation* *Land Use* • Monitor noise levels on a regular basis during construction near noise-sensitive receptors located closest to construction activities to reduce disturbance to nearby land uses and confirm compliance with noise thresholds set by local jurisdictions as well as the conditions of any noise variances obtained. • Schedule and manage work activities to minimize community disruption to the greatest extent feasible. • Implement mitigation measures for temporary impacts on residents as discussed in Section 3.3, Property Acquisitions and Displacements. • Carefully plan construction of the Modified LPA to phase work in such a way that reduces or avoids complete closure of affected roadways and access points to nearby businesses. Necessary detours would be routed to reduce travel times and signed to reduce confusion. Construction would be planned to keep business access points open as much as possible and would be well signed. A construction communication plan could be developed to inform travelers about detours and road closures and would direct them to businesses. *Economics* • Reduce impacts to local businesses by implementing a phased construction schedule that avoids complete closures of roads and access points to local businesses. A construction communication plan could be developed to inform travelers about detours and road closures and would direct them to businesses. • Design construction schedules to minimize temporary impacts to BNSF Railway lines and service frequency. • Provide outreach to businesses affected by construction and use assistance programs to help mitigate potential negative construction-related effects. • Coordinate with the Ports of Portland and Vancouver and associated businesses to identify ways to minimize delays for commercial freight vehicles during construction. • To keep freight moving during construction, the IBR Program would conduct outreach to businesses in areas with high volumes of freight traffic to determine access and site circulation needs and maintain access as needed.
Neighborhoods and Equity	**Long-Term Effects** *Regulatory Requirements* • Comply with the Uniform Relocation Act. When displacement cannot be avoided, federal and state regulations require property to be purchased at fair market value and all displaced residents to be provided with replacement housing and relocation assistance. Federal regulations, such as the Uniform Relocation Act, and state statutes determine the standards and procedures for providing such replacement housing, based on the characteristics of individual households. Relocation benefit packages usually include replacement housing for owners and renters, moving costs, and assistance in locating replacement housing.

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
	Relocation benefits for businesses can include moving costs, site search expenses, and business reestablishment expenses. ***Program-Specific Mitigation*** *Neighborhoods* • Work with residents and community members to understand impacts and avoid, minimize, or mitigate overall neutral effect on visual quality in study area neighborhoods. • Strategies to minimize impacts to neighborhood cohesion could include providing additional community gathering spaces such as pedestrian and bicycle facilities. *Equity* • Work with residents and community members to understand impacts and avoid, minimize, or mitigate those impacts. • Develop a package of community benefits, which may be captured in a variety of documents, including contract specifications, environmental documents, a potential workforce agreement and either a community benefits plan or report. Community benefits are likely to include a variety of investments and strategies to ensure workforce and contracting equity, enhance the local community, and offset burdens associated with construction and operation. **Temporary Effects** ***Regulatory Requirements*** • Construction BMPs would reduce impacts to neighborhoods and equity priority communities. These measures are used to address construction effects such as temporary easements, noise, dust, emissions from construction vehicles, and visual clutter. BMPs applicable to the potential impacts described above in Section 3.5.5 are discussed in Section 3.3, Acquisitions and Displacements; Section 3.09, Visual Quality; Section 3.10, Air Quality; and Section 3.11, Noise and Vibration. ***Program-Specific Mitigation*** • Where feasible, implement nighttime construction schedules and shield nighttime lighting. • Hold community meetings before construction starts to inform residents of the construction timeline, relevant staging plans, ramp and road closures, and detour plans. • Use temporary signage, including variable message signs, to inform drivers of traffic delays because of construction and/or heavy equipment entering or leaving the highway. • Provide signs for local business assistance alerting customers of continued operation and a hotline for construction information. • Conduct regional outreach activities to provide information on construction impacts and detours that include communications to businesses, agencies, and community-based organizations within the greater Portland and Vancouver area. Traffic advisories and updates would be made available to the public to help make travel choices. • Place communication and signage for temporary routes for pedestrians and biking well in advance of the detour areas. Wayfinding signage would be accessible, consistent, thorough, and maintained. • Coordinate with affected property owners to minimize potential impacts to structures and access points during construction. • Coordinate with local jurisdictions and other organizations offering services to people experiencing unsheltered houselessness in areas directly affected by construction activities. Services would be provided in advance of construction and could include harm reduction, access to health services, and emergency shelter or alternate housing options.

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
	• Restore removed landscaping on properties following construction or as otherwise agreed within the property rights process. • Pay property owners in exchange for the use of their property during construction.
Public Services and Utilities	**Long-Term Effects** *Regulatory Requirements* • Oregon Administrative Rules Database Chapter 660, Division 11: Public Facilities Planning. Governing bodies are directed to avoid, minimize, and mitigate impacts to public services if possible. • Growth Management Act (GMA) Revised Code of Washington 36.70A.030(33) defines public services. GMA directs local governments to avoid, minimize, and mitigate impacts to public services. • For utilities, the IBR Program would develop or modify existing agreements with affected utility owners to specify the locations of utilities within the right of way, access, and maintenance requirements, etc. *Program-Specific Mitigation* • Implement feasible mitigation strategies for increased travel times along emergency services routes as described in Section 3.1, Transportation, of this Draft SEIS. **Temporary Effects** *Regulatory Requirements* • Incorporate measures to maintain traffic flow and access during construction and to avoid and minimize temporary utility service disruptions into contract specifications. • Comply with current federal Dig Once laws (23 Code of Federal Regulations [CFR] 645.307) and associated state regulations and guidelines, which require advanced coordination with the broadband/fiber industry to invite these providers to participate in highway improvement projects. *Program-Specific Mitigation* • Protect utilities in place where feasible and cost effective. • Work with utility providers to relocate utilities when protection in place is not feasible, with the goal of relocating facilities only once to reduce service disruptions. • Work with service providers and the public to minimize temporary effects to the extent practicable. Advance communication with the impacted public services would be conducted to inform dispatchers and responders about planned road closures and detours. A preconstruction communication plan would be developed with affected emergency response groups and other public service agencies detailing how detour and road closure information would be provided to the services. • Evaluate the need for backup on-call emergency services to transport patients during bridge construction to mitigate highway delays. • Conduct public outreach campaigns before construction to ensure that detours and traffic rerouting plans during construction are available to public service providers and the communities they service. Provide detour signs on routes typically used and signed to access public service locations. • Coordinate closely with utility owners during project design to identify temporary facility needs and minimize temporary construction disruptions.

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
Parks and Recreation	**Long-Term Effects** *Regulatory Requirements* • If tree removal is unavoidable, replace trees on site and in kind at appropriate replacement ratios in compliance with applicable requirements of Portland and Vancouver city code. • Evaluate the feasibility and reasonableness of noise mitigation in accordance with WSDOT or ODOT criteria to shield park visitors and trail users from increased noise levels. *Program-Specific Mitigation* • If the acquired park land includes play equipment or other amenities, replace those features either in the same park or at one nearby. • Coordinate specific tree removal permitting processes and tree replanting requirements (location and type) for each park with the appropriate jurisdictions. • Screen portions of the transportation improvements from view with trees, vegetation, or built screens. • Explore retaining wall façade treatments to improve the visual quality, where feasible. **Temporary Effects** *Regulatory Requirements* • In compliance with the Cities of Vancouver and Portland's tree conservation requirements and codes, protect trees on park property that would be close to construction activities from adverse impacts as directed by the agency managing the park land (the cities of Vancouver, Portland, and Gresham, National Park Service (NPS), and the Vancouver Public School District). • Employ BMPs, including those outlined in WSDOT and ODOT construction manuals, to minimize increased levels of noise, vibration, glare from construction lights, emissions from construction vehicles, or dust from demolition of existing structures. • Comply with local ordinance requirements to provide additional protection for park users. *Program- Specific Mitigation* • Restore landscaping to its original condition and select plants that are resilient or adaptive to future climate conditions for new landscaping once construction is complete. • Protect trees on park property that would be close to construction activities but not removed, as agreed to with the appropriate jurisdiction. Restore landscaping to its original condition once construction is complete. • Restore landscaping to as close as possible to its original condition once construction is complete. • Establish detour routes based on work zone TMP. • Schedule construction-related closures at public parks and recreation facilities to minimize effects on large events, as feasible. • Provide notice to users of the recreational trails of the temporary limits on recreation in the Columbia River. • Notify recreational anglers of temporary access restrictions to fishing areas and consider other coordination efforts, including working with WDFW/ODFW to share closure information and distribute this information at locations that serve the fishing community.
Cultural Resources	Identification of the mitigation for adverse effects to historic properties assessed under NEPA will be completed through the National Historic Protection Act Section 106 process. FHWA and FTA, in coordination with WSDOT and ODOT, and in consultation with Oregon State Historic

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
	Preservation Office, Washington Department of Archaeology and Historic Preservation, consulting tribes, and other consulting parties, have chosen to complete the Section 106 process and resolve adverse effects on historic properties through the development of a Programmatic Agreement (PA) pursuant to 36 CFR 800.14(b). A Draft PA, with redactions for sensitive information as deemed appropriate by FHWA and FTA in consultation with consulting tribes and other consulting parties, is currently undergoing consultation and will be made available to the public prior to publication of the Final SEIS, as required by 36 CFR 800.14(b)(2)(ii). The Final PA will be executed prior to the issuance of the ROD and will be included as an appendix to the ROD.
Visual Quality	**Long-Term Effects** ***Regulatory Requirements*** • Meet the design standards of the Cities of Vancouver and Portland, TriMet, and C-TRAN for visual quality, including street furniture and transit stations. • Restore impacted roadsides in interchange and corridor areas in accordance with applicable vegetation and tree mitigation requirements. ***Program-Specific Mitigation*** *Mitigation Common to All Landscape Units, as feasible* • For local streets and transit stations, restore damaged landscapes, replant street trees, and provide enhanced landscapes to integrate the facilities into the community. • Shield station and facility lighting. • Minimize structural bulk, such as for ramps and columns. • Design architectural features to blend with the surrounding community. • Design gateways in coordination with applicable local plans including designs for landscaping, wall treatments, and other Program improvements. *Mitigation for Transit Stops and Stations, as feasible* • Design transit structural and architectural elements to be context-sensitive, and system-related signage and transit patron cues to be consistent with other transit system elements within respective systems. • Design the signal pole color, location, and style in accordance with the lighting district standards of the jurisdiction where the poles would be located (Portland or Vancouver). • Integrate transit facilities into the design of the community connector. *Place-Specific Mitigation, as feasible* • Transit Stations and Park and Rides – Conduct public design charrettes during the final design phases to refine the plans for each station area and park and ride. • Columbia River Landscape Unit – North Portland Harbor Crossings ▪ Preserve views of Mount Hood, to the extent practicable, for all users. – Hayden Island ▪ Integrate transit stations with the ground level, such as with landscaping. ▪ Evaluate surrounding views from the transit platform. ▪ Consult with the federally recognized tribes in the design process and provide opportunities to include cultural features such as, public art, historic education, plazas, or indigenous canoe watercraft landing and taking off locations. – Hayden Island Bridgehead

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
	▪ Separate structures to admit daylight, if feasible. Maintain the separation between bridge structures across the island to ensure daylight and viable landscape at ground level, if feasible. ▪ Explore the incorporation of preserved bridgehead character into final design. ▪ Consult with the federally recognized tribes in the design process and provide opportunities to include public art, historic education, plazas, water access, or other cultural features. ▪ Explore public art opportunities on Hayden Island to announce arrival in Oregon, including pylons, piers, and other structures. – Columbia River Spans ▪ Design the active transportation on the Columbia River bridges for as low-stress an environment as possible ▪ Use art and landscaping to build anticipation of the river crossing in those approaching the main span, as feasible. ▪ Include lighting that would give expression to the architecture after dark, as feasible. – North Bank ▪ Incorporate a destination public open space under the bridge area as feasible. ▪ Consult with the federally recognized tribes in the design process and provide opportunities to include cultural features such as public art, historic education, plazas, or water access. ▪ Encourage creating or enhancing spaces, events, or initiatives that activate open spaces and urban environments along the Main Street extension to the river. Enhancements may include public art, street furniture, bike and pedestrian facilities, popup markets and public events, or other measures. ▪ Activate open spaces and screen structures with landscaping. ▪ Use architecture or public art to mark entry and departure from each bridge. • Vancouver Downtown Landscape Unit – Transit Structure “Landing” in Vancouver ▪ Provide landscaping, public art, or other façade treatments for the walls of the light-rail landing structure, as feasible. ▪ Coordinate and design transit structures and facilities in conjunction with the Community Connector. – Park-and-Ride Facilities ▪ Incorporate design guidelines and consider input from downtown interested parties and the general public. ▪ Buffer the park and ride from adjacent uses, mainly with landscaping but potentially with public art, fencing, or other elements, as feasible. ▪ Comply with City of Vancouver Design Standards and have them reviewed by the Vancouver Design Review Committee. ▪ To the extent feasible, eliminate potential glare from the park-and-ride structure components. ▪ Incorporate public art reflective of the unique context at each park-and-ride facility. – McLoughlin Boulevard Crossing ▪ Coordinate lighting under structures with city and I-5 lighting. ▪ Keep the spaces beneath freeway structures clear of unauthorized uses to the extent possible. • Greater Central Park Landscape Unit

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
	– SR 14 Interchange ▪ Maintain existing vegetation wherever possible, particularly between the Kanaka Village and SR 14 ramps. Landscape plans should include plantings as visual screens. Replacement trees should be as large caliper trees as practical to replace screening value as quickly as possible. ▪ Provide visual and physical connections between under-bridge structures. Connect the Vancouver Land Bridge and Old Apple Tree Park with downtown Vancouver by combining improved sight lines, improved access, and integrated landscape design. ▪ Use Vancouver Land Bridge landscaping in new landscaped areas as feasible. ▪ Activate open spaces and screen structures with landscaping. Use landscape to organize the diversity and extent of open spaces associated with the interchanges and to screen the railroad berm. • Burnt Bridge Creek Landscape Unit – Ensure compatibility of overpass approaches with neighborhoods with input from the neighborhood facing each end of the bridges, as feasible. – Identify a local design theme for overpasses. **Temporary Effects** *Regulatory Requirements* • There are no regulatory requirements for temporary effects to visual quality, specifically. The Program would meet federal, state, and local design standards for light and glare. *Program-Specific Mitigation* • Follow standard construction specifications regarding the reduction of light and glare. • Shield construction site lighting to reduce spillover light onto nearby residences and businesses, as feasible. • Minimize visual obtrusiveness by locating construction equipment and stockpiling materials in less visually sensitive areas, when feasible, and in areas not visible from the road or to residents and businesses. • Provide, as feasible, public areas to observe the construction and demolition processes, using them as an opportunity for public education.
Air Quality	**Long-Term Effects** *Regulatory Requirements* • There are no regulatory requirements that would be directly implemented by the IBR Program. *Program-Specific Mitigation* • No mitigation proposed as long-term air quality impacts are not expected. **Temporary Effects** *Regulatory Requirements - Oregon* • Comply with Division 208 of Oregon Administrative Rule (OAR) 340. • Comply with ODOT Standard Specifications Section 290. • Comply with the Clean Diesel Construction Standard (OAR-731-005-0800). • Comply with Oregon House Bill 2007, known as the “Clean Diesel Bill."

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	• Comply with City of Portland Clean Air Construction Program that to reduce diesel emissions by implementing a standard set of idle reduction and diesel equipment requirements on job sites. *Regulatory Requirements - Washington* • Comply with WSDOT Standard Specifications for Road, Bridge, and Municipal Construction, Section 1.07.5(4). • Comply with fugitive dust control BMPs set forth in the Associated General Contractors of Washington Education Foundation and Fugitive Dust Task Force Pamphlet, "Guide to Handling Fugitive Dust From Construction Projects." *Program-Specific Mitigation* • Through contract specifications, encourage all contractors to minimize impacts to surrounding communities such as using newer low-emitting construction equipment and electric equipment, and avoiding haul routes through residential areas.
Noise and Vibration	**Long-Term Effects** *Highway Traffic Noise Mitigation* Mitigation related to highway traffic noise include mitigation (abatement) measures that meet ODOT's and WSDOT's feasibility and reasonableness criteria may be recommended for inclusion in the Modified LPA. Feasibility primarily deals with engineering considerations such as whether substantial noise level reductions can be achieved or whether there would be a negative effect on property access resulting from the placement of noise walls for example. Reasonableness includes three factors: (1) if abatement is cost-effective; (2) if abatement can achieve the design goal; (3) and if the abatement is desired by benefiting receptors. The complete list of potential traffic noise abatement measures can be found in Section 7 of the Noise and Vibration Technical Report. Under ODOT and WSDOT policies, the following noise abatement measures must be considered: • Traffic management measures (for example, traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, and exclusive land designations). • Highway design measures (for example, alteration of horizontal/vertical alignments). • Acquisition of property rights (either in fee or lesser interest) for construction of noise barriers. • Acquisition of real property or interests therein (predominantly unimproved property) to serve as a buffer zone to preempt development that would be adversely impacted by traffic noise. • Sound insulation of all Activity Category D land uses, including public use or nonprofit institutional structures. • Construction of sound barriers (including landscaping for aesthetic purposes), whether within or outside the highway right of way. Interstate construction funds may not participate in landscaping. Noise mitigation was evaluated at all locations where traffic noise impacts were predicted. Noise walls were evaluated to mitigate noise impacts at 16 locations in Washington and 3 in Oregon. Of those evaluated, 11 noise walls were determined to be feasible and reasonable by ODOT and WSDOT criteria (10 in Washington, 1 in Oregon). *Light-Rail Noise Mitigation in Downtown Vancouver*

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	• Install tall safety barriers or sound barriers along the elevated structure to mitigate the noise impacts at site LRT-1, which represents the Normandy Apartments located at E 7th Street and E C Street in downtown Vancouver. A 3- to 4-foot acoustical absorbent wall or 6-foot reflective wall would reduce noise levels at this location by 7 to 10 dBA. • Equip all light-rail track curves with a radius of less than 300 feet with wayside lubricators. After construction of the alignment, during the initial testing, if additional curves are identified with wheel squeal, install wayside track lubricators, as necessary. Light-rail noise mitigation was determined not to be needed in Portland. *Light-Rail Vibration Mitigation in Vancouver* • Use resilient rail fasteners to mitigate for vibration impacts located along direct fixation track way. Resilient rail fasteners typically reduce vibration levels by 5 vibration in decibels (VdB), which would not reduce all the predicted vibration levels to below the FTA 72 VdB criteria for residential land uses. Receivers LRV-1 and LRV-2, with predicted levels of 77 VdB and 81 VdB, respectively, would be the only locations where there is still a potential for vibration impact following mitigation. • Perform additional testing to ensure that the vibration levels at LRV-1 and LRV-2 would be below the 72 VdB criteria (Section 3.11, Figure 3.11-9). No vibration impacts are predicted in the Portland segment; therefore, no mitigation is needed. **Temporary Effects** Construction noise and vibration BMPs applicable to the Modified LPA with any design option are discussed below. ***Construction Noise*** *Regulatory Requirements* • Comply with ODOT construction noise abatement measures (§ 00290.32 Noise Control) at the time of construction. • If a specific noise impact complaint occurs during the construction of the Modified LPA, implement noise mitigation measures outlined in Section 3.11.6 as directed by the engineer. Although WSDOT does not have noise control provisions, WSDOT would voluntarily comply with § 00290.32 for work completed in Washington. *Program-Specific Mitigation* In addition to § 00290.32, ODOT and WSDOT would also implement additional noise abatement methods, including: • Limit activities that produce the highest noise levels (such as hauling, loading spoils, jack hammering, and using other demolition equipment) to 7:00 a.m. to 7:00 p.m. Maximum noise levels associated with pile driving could reach 105 dBA at distances of 50 feet. Mitigation of the noise associated with pile driving would, when possible, include drilled shafts or auguring rather than driving piles (however, using an auger is not likely to be feasible or practical for all locations) or limiting the times the activity could take place. Other less effective methods of reducing noise from pile driving include coating the piles, using pile pads, or using piston mufflers. If pile driving exceeds the limits set forth in Table 3.11-4 in Section 3.11, Noise and Vibration, a noise variance would be requested from the local jurisdiction. • Keep a construction log for each of the construction staging areas. The log would contain general construction information such as the time an activity took place, type of equipment used, and other information that might help with potential noise effects. • Establish a complaint hotline to investigate noise complaints and compare them to the construction logs. A construction monitoring and complaint program would help to ensure

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	that all equipment meets state, local, and any manufacturer's specifications for noise emissions. Equipment not meeting the standards would be removed from service until proper repairs were made and the equipment retested for compliance. This procedure would apply to all haul trucks, loaders, excavators, and other equipment that would be used extensively at the construction sites and that would contribute to potential noise effects. • Use equipment complying with pertinent equipment noise standards of the EPA. *Construction Vibration* *Regulatory Requirements* • Monitor all activities that might produce vibration levels at or above 0.5 inches per second if structures are near the construction activity, in compliance with WSDOT and ODOT requirements. This would include pile driving, vibratory sheet installation, soil compacting, and other construction activities with the potential to cause high levels of vibration. • For historic built properties within 500 feet of construction, monitor construction activities where construction-related vibration would exceed 0.2 inches per second for transient vibrations and 0.1 inches per second for continuous vibrations. Additional vibration mitigation measures intended to protect marine life are described in Section 3.16, Ecosystems. Additional mitigation measures related to built historic resources are described in Section 3.8. *Program-Specific Mitigation* No specific mitigation measures are proposed for vibration levels during construction.
Energy	**Long-Term Effects** *Regulatory Requirements* State-level legislation and policy in Oregon and Washington support reducing emissions from transportation to minimize contributions to climate change; However, there are no specific requirements for mitigation actions in federal, state, or local regulations. The Program supports state, regional, and local goals to reduce greenhouse gas emissions. To help facilitate a shift from single-occupancy vehicles, the Program would improve multimodal transportation options including: • Extended light-rail. • Expanded active transportation facilities. • Demand management (e.g., variable-rate tolling). • Operation and maintenance efficiencies. *Program-Specific Mitigation* • Use energy-efficient electrical systems for transit stations and other electrical needs to decrease energy consumption. **Temporary Effects** *Regulatory Requirements* • In Oregon, comply with ODOT Standard Specifications Section 290. • In Washington, company with WSDOT Standard Specifications Division 1-07. *Program-Specific Mitigation* • All work in Washington and Oregon will follow the WSDOT Environmental Manual, Chapter 425: Air Quality, Energy, and Greenhouse Gases, including: – Minimize delays to traffic during peak travel times. – Minimize unnecessary idling of on-site diesel construction equipment.

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	– Educate vehicle operators to shut off equipment when not in active use to reduce emissions from idling. – Prepare a traffic control plan with detours and strategic construction timing (e.g., night work) to move traffic through the area and reduce backups and delays to the traveling public to the extent practicable. • Continue to consider advances in energy-reducing and/or energy-saving materials and methods.
Water Quality and Hydrology	**Long-Term Effects** *Regulatory Requirements* • As design progresses, conduct a detailed hydraulic analysis of the affected floodplains. If a rise in the base flood elevation is predicted, assess mitigation through floodplain excavation (cut/fill balance) activities within the footprint of the Modified LPA and determine whether additional land may be required to accomplish the required mitigation. Conduct a Location Hydraulic Study to document the impacts, mitigation measures, evaluation of alternatives, and findings in accordance with the provisions of 23 CFR 650A. • Work with the City of Portland to ensure flood storage compensation does not jeopardize threatened and endangered species and their habitat (revised Floodplain Development Code Chapter 24.50 Flood Hazard Areas). • Comply with ODOT and WSDOT stormwater management requirements and the Cities of Portland and Vancouver regulations for the portions of the Modified LPA along City-managed roads during construction and for the long-term treatment of stormwater runoff prior to discharge into receiving waters. • Select and design water quality BMPs to ensure compliance with all federal, state, and local regulatory requirements, construction and municipal stormwater permit requirements issued through CWA section 401, to reduce suspended solids, particulates, and dissolved metals; to reflect the latest climate models; and to treat newly identified pollutants like 6PPD-quinone. • Construct flow control facilities to infiltrate or reduce the flow rates of all study area runoff, pursuant to local regulatory requirements. Mitigation for increased runoff to the Columbia Slough or the Columbia River would not be required because these water bodies are exempt from stormwater quantity management. However, the effects of increased runoff would be reduced using stormwater infiltration. This would allow groundwater recharge to continue and minimize the increase in runoff volumes and peak discharges. *Program-Specific Mitigation* *Hydrology* • Offset potential rise in the base flood elevation through floodplain excavation (cut/fill balance) activities as determined through a Location Hydraulic Study. • In the Burnt Bridge Creek watershed, construct infiltration facilities to provide complete infiltration of all Program-related runoff, such as providing underground injection control requirements, to the extent practicable, for the wellhead protection zone present in the watershed to manage stormwater volumes. As design progresses, select site-specific BMP facilities. • Prepare stormwater monitoring plan(s) to evaluate the long-term performance and effectiveness of the updated stormwater conveyance and treatment systems. Based on the findings, complete modifications or enhancements to the system(s) to meet discharge performance criteria.

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	• Compensate for additional fill in floodplains to achieve a no net loss of floodplain as a result of removal of materials within the City of Portland Floodplain Hazard Areas. *Water Quality* Where applicable in the project area, the following proposed water quality treatment facilities would be used to treat stormwater runoff and mitigate the increase in contributing impervious surfaces. Definitions of these treatment facility types are presented in Section 7.2.2 of the Water Quality and Hydrology Technical Report. • Treat stormwater runoff through bioretention ponds/planters, biofiltration swales, bioslopes (Oregon), and/or media filter drains (Washington) that provide water quality treatment via infiltration through a phosphorus-free, compost-amended soil medium and/or vegetation. Vegetation also provides uptake of some water. • Water quality treatment facilities that have demonstrated effectiveness for advanced treatment would be designed according to each jurisdiction's specifications such as according to Ecology's Technology Assessment Protocol program (Washington), the 2020 Stormwater Management Manual (Portland), and Vancouver's Surface Water Management Program. **Temporary Effects** *Regulatory Requirements* • Regulatory requirements for temporary effects of stormwater runoff during construction would include compliance with ODOT, WSDOT, Portland, and Vancouver's regulations including the preparation of a spill prevention, control, countermeasure (SPCC) plan and pollution control plan (PCP), and temporary erosion and sediment control. In addition, all federal, state, and local permits related to water quality and hydrology would be obtained. See Section 8 in the Water Quality and Hydrology Technical Report for a complete list of required federal, state, and local permits. *Spill Prevention/Pollution Control Measures* • Require the contractor to prepare an SPCC plan and PCP prior to beginning construction. These plans would be provided to the National Oceanic and Atmospheric Administration Marine Fisheries Service (NOAA Fisheries) for review and approval. The SPCC plan and PCP would identify the appropriate spill containment materials, as well as the means and methods of implementation, response, and reporting, in the event of a spill. All elements of the SPCC plan and PCP would be available at the project site at all times. For additional details, consult ODOT Standard Specification 00290.00 to 00290.90 and WSDOT Standard Specification 1-07.15. *Site Erosion/Sediment Control Measures* • Require the contractor to prepare and implement a temporary erosion and sediment control plan (TESCP) to minimize impacts associated with clearing, vegetation removal, grading, filling, compaction, or excavation. The BMPs identified in the TESCP would be used to control sediments in areas impacted by vegetation removal or ground-disturbing activities. Additional temporary control measures may be required beyond those described in the TESCP if it appears pollution or erosion may result from weather, nature of the materials or progress on the construction. For additional details, consult ODOT Standard Specifications 00280.00 to 00280.90 and WSDOT Temporary Erosion and Sediment Control Manual M3109.02. • Stabilize all exposed soils as directed in measures prescribed in the TESCP. Hydro-seed all bare soil areas following grading activities and revegetate all temporarily disturbed areas with native vegetation indigenous to the location. For additional details, consult ODOT

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	Standard Specifications 01030.00 to 01030.90 and WSDOT Temporary Erosion and Sediment Control Manual M3109.02. • Where site conditions support vegetative growth, plant native vegetation indigenous to the location in areas temporarily disturbed by construction activities. Trees would be planted when consistent with highway safety standards. Riparian vegetation would be replanted with species native to geographic region. Planted vegetation would be maintained and monitored to meet regulatory permit requirements. For additional details, consult ODOT Standard Specifications 01040.00 to 01040.90 and WSDOT Temporary Erosion and Sediment Control Manual M3109.02. ***Program-Specific Mitigation*** *Hydrology* • Minimize changes to groundwater hydrology by limiting groundwater pumping to areas where it cannot be avoided. *Water Quality* • Study, test, and remediate sites with existing soil or groundwater contamination near construction areas before any construction. See Section 3.18, Hazardous Materials for specific mitigation actions. • Conduct in-water work during approved periods for the Columbia River, as approved by Washington Department of Fish & Wildlife (WDFW), Oregon Department of Fish & Wildlife (ODFW), NOAA Fisheries, and U.S. Fish and Wildlife Service (USFWS). See Section 3.16, Ecosystems for specific mitigation measures. • Stage construction equipment used for in-water work activities above the ordinary high water mark (OHWM). Only the operational portion of construction equipment would enter the active stream channel (below the OHWM). • If in-water dredging is required outside of a cofferdam, use a clamshell bucket within the established in water work windows. Dredging, handling, and disposal of dredged materials shall be conducted consistent with the requirements and conditions of the regulatory permits issued for the Modified LPA. • If required, monitor turbidity and provide a "rest" period to allow turbidity, if any, to dissipate between in-water work activities.
Wetlands	**Long-Term Effects** ***Regulatory Requirements*** • Develop the Modified LPA consistent with the applicable federal, state, and local agency regulatory mitigation related to filling or removing material in wetlands and other waters of the U.S. and state. • Prepare a compensatory mitigation plan that satisfies applicable federal, state, and local regulatory requirements, and that demonstrates no net loss of function and values of wetland resources. ***Program-Specific Mitigation*** • Continue to evaluate mitigation to offset losses of wetland and waters functions and values, including wetland buffers, as the Modified LPA design progresses. • In cooperation with federal, state, and local agencies, tribes, and conservation groups, identify agency-approved compensatory mitigation banks and potential permittee responsible mitigation sites in both Oregon and Washington to fulfill the compensatory requirements for permanent, temporary, and indirect impacts.

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	• For unavoidable impacts to Vanport wetlands, increased mitigation ratios would be required because it is an existing wetland mitigation site. **Temporary Effects** *Regulatory Requirements* • Implement appropriate high visibility/exclusionary fencing around avoided wetlands and other waters prior to the start of construction. • Implement appropriate sediment and erosion control procedures during construction activities. • Replace vegetation temporarily cleared for construction activity in accordance with local regulatory guidance. • Avoid working outside of the in-water work window without first seeking an exception. • Offset unavoidable temporary impacts that cannot be minimized through BMPs through the purchase of credits from a mitigation bank or permittee responsible mitigation, similar to the mitigation used for certain long-term effects. *Program-Specific Mitigation* • Avoid and minimize short-term impacts to wetland resources in final design to the extent practicable. • Restore temporarily disturbed wetland and wetland buffer habitats consistent with applicable regulatory requirements.
Ecosystems	**Long-Term Effects** *Regulatory Requirements* • Provide stormwater quality and quantity treatment that meets or exceeds applicable regulatory requirements for all post-project contributing impervious areas. *Program-Specific Mitigation* • Avoid and minimize long-term impacts to ecosystem resources in final design to the extent practicable. • Provide compensatory mitigation for unavoidable impacts to ecosystem resources, consistent with applicable federal, state, and local regulatory requirements. • Prepare a compensatory mitigation plan that satisfies applicable federal, state, and local regulatory requirements, and that demonstrates no net loss of function of ecosystem resources. • Provide an alternate nesting structure, either on the new Columbia River bridges or within the vicinity, to offset removal of an existing peregrine falcon nest from demolition of the existing Interstate Bridge. **Temporary Effects** *Regulatory Requirements* *General Measures and Conditions* • Perform all work according to the requirements and conditions of the regulatory permits that are issued for the Modified LPA. • Require contractor to prepare a Water Quality Protection and Monitoring Plan (WQPMP) to satisfy the monitoring and reporting requirements of the 401 Water Quality Certifications that are ultimately issued for the project. The WQPMP would be provided to NOAA Fisheries for review and approval prior to implementation. The WQPMP would identify the timing and methodology for water-quality sampling during construction of the Modified LPA, as well as

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	methods of implementation and reporting. If, in the future, a standard water-quality monitoring plan is adopted by ODOT and/or WSDOT, this plan, with the agreement of NOAA Fisheries, may replace the contractor plan. • In compliance with ODOT and WSDOT policy and construction administration practice in Oregon and Washington, have one or more department of transportation inspectors on site during construction. The role of the inspector(s) would be to monitor compliance with contract and permit requirements. • If in-water dredging is required outside of a cofferdam, use a clamshell bucket. Dredging and handling and disposal of dredged materials shall be conducted consistent with the requirements and conditions of the regulatory permits issued for the Modified LPA. • Prohibit work barges from grounding out. • Dispose of excess or waste materials in an appropriate manner consistent with applicable local, state, and federal regulations; do not dispose of or abandon waste materials waterward of the OHWM or allow them to enter waters of the state. • All pumps must employ a fish screen that meets the following specifications: – An automated cleaning device with a minimum effective surface area of 2.5 square feet per cubic foot per second and a nominal maximum approach velocity of 0.4 feet per second, or no automated cleaning device, a minimum effective surface area of 1 square foot per cubic foot per second and a nominal maximum approach rate of 0.2 feet per second; and – A round or square screen mesh that is no larger than 0.094 inches (2.38 millimeters [mm]) in the narrow dimension, or any other shape that is no larger than 0.069 inches (1.75 mm) in the narrow dimension; and – Each fish screen must be installed, operated, and maintained according to NOAA Fisheries fish screen criteria. *Spill Prevention/Pollution Control Measures* • Require contractor to prepare an SPCC plan and PCP prior to beginning construction. These plans would be provided to NOAA Fisheries for review and approval. The SPCC plan and PCP would identify the appropriate spill containment materials; as well as the means and methods of implementation, response, and reporting. All elements of the SPCC plan and PCP would be available at the project site at all times. For additional detail, consult ODOT Standard Specification 00290.00 to 00290.90. • Require contractor to designate at least one employee as the erosion and spill control (ESC) lead. The ESC lead would be responsible for the implementation of the SPCC plan and PCP. • Maintain applicable spill response equipment and material designated in the SPCC plan and PCP at the job site. • With the exception of barges and stationary large equipment (cranes, oscillators) operating from barges or work platforms, fuel and maintain equipment at least 150 feet from the OHWM of any waterbody using secondary containment to minimize potential for spills or leaks entering the waterway. • Clean and inspect all equipment to be used for construction activities prior to arriving at the project site, to ensure no potentially hazardous materials are exposed, no leaks are present, free of noxious weeds, and the equipment is functioning properly. Daily inspection and cleanup procedures would be identified. • Should a leak be detected on heavy equipment used for the project, immediately remove the equipment from the area, and do not use again until adequately repaired. Where off-site repair is not practicable, the SPCC plan and PCP would document measures to be implemented to prevent and/or contain accidental spills in the work/repair area to ensure no

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	contaminants escape containment to surface waters and cause a violation of applicable water-quality standards. • Operate construction equipment from on top of floating barges, from the decks of temporary work bridges and platforms, the decks of the existing or replacement bridges, or from portions of the streambank above the OHWM. Barges and support vessels would be operated in the water. • Provide suitable containment measures for all equipment (including barges, work decks, stationary power equipment, and storage facilities) in the SPCC plan and PCP to prevent and/or contain accidental spills to ensure that no contaminants escape containment to surface waters and cause a violation of applicable water-quality standards. • Design and install temporary work bridges and platforms, cofferdams, and drilled shaft isolation casings consistent with the ODOT Hydraulics Manual, which establishes criteria to avoid these structures being overtopped during high water events. • Process water generated on site from construction, demolition or washing activities would be contained and treated to meet applicable water-quality standards before entering or re-entering surface waters. • Do not conduct paving, chip sealing, or stripe painting activities during periods of rain or wet weather. • In the SPCC plan and PCP, establish a concrete truck chute cleanout area to properly contain wet concrete as part of ODOT Standard Specification 00290.30(a). *Site Erosion/Sediment Control Measures* • Require contractor prepare and implement a TESCP to minimize impacts associated with clearing, vegetation removal, grading, filling, compaction, or excavation. The BMPs identified in the TESCP would be used to control sediments from all vegetation removal or ground-disturbing activities. Additional temporary control measures may be required beyond those described in the TESCP if it appears pollution or erosion may result from weather, nature of the materials or progress on the work. For additional detail, consult ODOT Standard Specifications 00280.00 to 00280.90. • As part of the TESCP, delineate clearing limits with orange barrier fencing wherever clearing is proposed in or adjacent to a stream/wetland or its buffer and install perimeter protection/silt fence as needed to protect surface waters and other critical areas. Location would be specified in the field, based upon site conditions and the TESCP. For additional silt fence detail, consult ODOT Standard Specification 00280.16(c). • Require contractor to designate at least one employee as the ESC lead. The ESC lead would be responsible for the implementation of the SPCC plan and PCP and would also be responsible for ensuring compliance with all local, state, and federal erosion and sediment control requirements. • All TESCP measures would be inspected and maintained as required by applicable permit requirements. Contractor would also conduct maintenance and repair of TESCP measures as described in ODOT Standard Specifications 00280.60 to 00280.70. • For landward construction and demolition, locate project staging and material storage areas a minimum of 150 feet from surface waters, in currently developed areas such as parking lots or managed fields, unless determined by an ODOT/WSDOT biologist that the topographic features or other site characteristics allow for site use closer to the edge of surface waters. • Complete excavation activities under dry or dewatered conditions where practicable. All surface water flowing toward the excavation would be diverted through utilization of cofferdams and/or berms. Cofferdams and berms must be constructed of sandbags, clean rock, steel sheeting, or other non-erodible material.

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	• Limit bank shaping to the extent as shown on the approved grading plans. Minor adjustments made in the field would occur only after engineer's review and approval. • Install biodegradable erosion control blankets on areas of ground-disturbing activities on steep slopes (1V:3H or steeper) that are susceptible to erosion and within 150 feet of surface waters. Areas of ground-disturbing activities that do not fit the above criteria would implement erosion control measures as identified in the approved TESCP. For additional erosion control blanket detail, consult ODOT Standard Specification 00280.14I. • Cover erodible materials (material capable of being displaced and transported by rain, wind or surface water runoff) temporarily stored or stockpiled for use in project activities to prevent sediments from being washed from the storage area to surface waters. Temporary storage or stockpiles must follow measures as described in ODOT Standard Specification 00280.42. • Stabilize all exposed soils as directed in measures prescribed in the TESCP. Hydro-seed all bare soil areas following grading activities and revegetate all temporarily disturbed areas with native vegetation indigenous to the location. For additional details, consult ODOT Standard Specifications 01030.00 to 01030.90. • Where site conditions support vegetative growth, plant native vegetation indigenous to the location in areas temporarily disturbed by construction activities. Revegetation of construction easements and other areas would occur after the project is completed. Trees would be planted when consistent with highway safety standards. Riparian vegetation would be replanted with species native to geographic region. Planted vegetation would be maintained and monitored to meet regulatory permit requirements. For additional detail, consult ODOT Standard Specifications 01040.00 to 01040.90. *Pile Installation and Removal BMPs* • Use a vibratory hammer to drive steel piles to the maximum extent practicable, to minimize noise levels. • Conduct impact pile driving below the OHWM between September 15 and April 15. Vibratory pile installation and removal (as well as certain other in-water construction activities) may occur on a year-round basis, provided they are conducted in compliance with all regulatory approvals. • No more than two impact pile drivers would be operated simultaneously within the same waterbody channel. • Employ a bubble curtain or other similarly effective noise attenuation device during all impact pile driving conducted in water depths greater than 2 feet (0.67 meters). • Develop and implement a hydroacoustic monitoring plan, based on the template developed by the Fisheries Hydroacoustic Working Group, in coordination with FHWA and FTA to confirm the effectiveness of the noise attenuation devices and that predicted noise levels adequately capture the area of the potential onset of injury. • Prepare a marine mammal monitoring plan, and establish injury protection zones for marine mammals. • Install cones or other anti-perching devices on open-ended pipe piles to discourage perching by piscivorous birds. • Remove temporary piles with a vibratory hammer, or by direct pulling, and prohibit intentionally breaking by twisting or bending. • If a temporary pile cannot be removed, cut or press the pile 3 feet below the mudline. At locations where hazardous materials are present or adjacent to utilities, temporary piles may be cut off at the mud line with underwater torches, if such activity would not conflict with navigation elements. *Work Area Isolation and Fish Salvage BMPs*

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	• Develop a temporary water management plan, consistent with the requirements of ODOT Special Provision Section 00245.03, and provide to NOAA Fisheries for review and approval prior to any work area isolation of fish salvage activities. • Install cofferdams and isolation casings in a manner that minimizes fish entrapment. Sheet piles would be installed from upstream to downstream, lowered slowly until contact with the substrate. • Screen drilled shaft isolation casings at the bottom, to minimize potential for fish entrapment during installation. Screen shall have maximum openings of approximately 3/32 inch (2.38 mm) measured on a diagonal (NOAA Fisheries 2022). • Conduct fish salvage according to the best practices established in the biological opinion for ODOT's Federal Aid Highway Programmatic consultation. • Have a qualified fishery biologist conduct and supervise fish capture and release activity to minimize risk of injury to fish. • Prepare a fish salvage report and submit to NOAA Fisheries, USFWS, ODFW, and WDFW following project completion. • Make a reasonable effort to capture Endangered Species Act-listed fish known or likely to be present in an in-water isolated work area using methods that minimize the risk of injury. Attempts to seine and/or net fish would precede the use of electrofishing equipment. • If electrofishing must be used, conduct consistent with NOAA Fisheries "Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act" (NOAA Fisheries 2000), or most recent version. *Work Area Lighting BMPs* • Conduct construction activities consistent with local, state and federal permit restrictions for allowable work hours. If work occurs at night, temporary lighting may be required to provide better visibility for driver and worker safety. If temporary lighting is required, contractor would use directional lighting with shielded luminaries to control glare and direct light onto work area, not surface waters. ***Program-Specific Mitigation*** • Avoid and minimize short-term impacts to ecosystem resources in final design to the extent practicable. • Restore temporarily disturbed terrestrial habitats consistent with applicable regulatory requirements. • Provide compensatory mitigation for unavoidable impacts to ecosystem resources, consistent with applicable federal, state, and local regulatory requirements. • Conduct activities with the potential to impact nesting migratory birds, such as nest removal, consistent with the provisions of the Migratory Bird Treaty Act, which requires nests of migratory birds to be removed only at times when nests are inactive.
Geology and Groundwater	**Long-Term Effects** ***Regulatory Requirements*** • Design structures to comply with federal, state, and city building seismic codes and standards and apply advancements in earthquake science and construction materials and updates in the conceptual model. • Design systems to minimize contamination of groundwater resources in compliance with Vancouver Municipal Code Chapter 14.26 Water and Sewers – Water Resources Protection and Portland City Code Title 21.35, Well Head Protection, and any applicable Washington and Oregon regulations.

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
	Program-Specific Mitigation • Design structures to consider stormwater infiltration or other changed conditions near shallow footings, retaining walls, and other structures that could increase the potential for soil liquefication during a future seismic event. • Design the Modified LPA to accommodate a range of future conditions resulting from climate change to provide resilience for geologic concerns, such as increased erosion and scour, as feasible. • Conduct site-specific assessments of existing geologic hazards such as, but not limited to, faults, ancient landslides, steep cut slopes, non-seismic settlements, and soil liquefaction during design of the Modified LPA, as feasible. Site-specific assessments should include the use of geotechnical drilling, test pitting, material testing, geophysical techniques, subsurface displacement monitoring (inclinometers) and monitoring well installation, as feasible. Assessment would include recommended options for avoiding or mitigating geologic hazards. • Consider the use of light weight fills or geoform in areas adjacent to existing flood control levees and structures to minimize the potential for settlements. • Assess soil stabilization techniques to minimize the potential for soil liquefaction and non-seismic settlements during design of the Modified LPA. Stabilization techniques may include, but are not limited to, the use of soil mixing, compaction grouting, jet grouting, and stone columns. • Locate stormwater treatment facilities, to the extent possible, away from City of Vancouver well head protection zones for WS-1 and WS-3, and the Cascade Expansion groundwater protection area in Gresham for the Ruby Junction location. **Temporary Effects** *Regulatory Requirements* • Prepare and implement erosion control and stormwater pollution prevention plans and grading plans during construction. Plans would adhere to ODOT and WSDOT guidelines. • Prepare and implement stormwater discharge permits for construction. • Conduct inspection and observation monitoring of all Modified LPA elements during construction and long-term operations to ensure that appropriate construction and maintenance measures are being taken. *Program-Specific Mitigation* • Evaluate local geologic resources for future material needs. • Recycle or reuse aggregate, quarry rock, asphalt, and concrete materials to the extent practical.
Hazardous Materials	**Long-Term Effects** *Regulatory Requirements* In accordance with FTA and FHWA standard procedures, the IBR Program has prepared Phase I ESAs to identify existing environmental issues on properties to be acquired. The results and recommendations of the Phase I ESAs have been incorporated into this Draft SEIS. • Prepare Phase II ESAs for properties where identified recognized environmental conditions (RECs) indicate that a subsurface investigation is necessary to confirm the nature and extent of contamination and define the specific measures and applicable regulatory agency approvals needed to address the contamination. Incorporate the Phase II results into the

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
	Final SEIS and ROD to provide decision-makers with a more detailed understanding of cleanup obligations and costs. • Develop detailed hazardous management plans during the final design and as part of the property acquisition process. Obtain necessary regulatory approvals to address areas where cleanup and remediation are needed. The remediation or cleanup of hazardous material sites affected by the Modified LPA would be required prior to construction. • In accordance with Safety Standards for Construction Work: Lead (Washington Administrative Code [WAC] 296-155) and General Occupational Health Standards: Asbestos (WAC 296-62 Part I-1), conduct hazardous building material surveys on structures proposed for demolition, prior to demolition, to identify any asbestos-containing materials, lead-based paint, and other hazardous materials. Based on the survey results, conduct necessary abatement prior to demolition. Dispose lead-based paint, asbestos-containing materials, and other hazardous materials at facilities permitted to receive these materials in accordance with federal, state, and local agency regulations. • Prepare a Program-wide construction health and safety plan, as required by federal Occupational Safety and Health Act regulations and state regulations, to minimize the potential for exposure of construction workers to hazardous materials and the risk to human health and the environment. • Prepare a site-specific contaminated media management plan to ensure proper characterization, management, storage, disposal, and reporting of contaminated materials encountered during construction activities. The plan would outline the roles and responsibilities of personnel; health and safety requirements; methods and procedures for characterizing, managing, storing, and disposing of waste; and reporting requirements. *Program-Specific Mitigation* • No Program-specific mitigation measures are proposed for long-term effects related to hazardous materials. **Temporary Effects** *Regulatory Requirements* • Construction BMPs applicable to the Modified LPA are discussed in Section 3.14, Water Quality and Hydrology and adherence to program SPCC Plan. Other required measures to reduce the risk of spills, leaks, or other releases during construction activities include: – Conduct fueling, maintenance, and cleaning in areas that are contained by berms or other containment. – Minimize the production or generation of hazardous materials, both upland and during demolition and replacement of over water spans. – Label and store hazardous waste according to federal regulations. – Locate hazardous waste (including contaminated spoils) storage away from storm drains or surface water. – Recycle materials such as used motor oil and water-based paint as appropriate. – Handle potential spills of hazardous materials in conformance with applicable regulatory requirements and adhere to the Program spill prevention, control, and countermeasure plan. *Program-Specific Mitigation* No Program-specific mitigation measures are proposed for temporary effects related to hazardous materials.

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
Climate Change	**Regulatory Requirements** State-level legislation and policy in Oregon and Washington support reducing emissions from transportation to minimize contributions to climate change. There are no specific requirements for mitigation actions in federal, state, or local regulations. **Program-Specific Mitigation** As noted above, there are no specific requirements for mitigation actions in federal, state, or local regulations. However, the Program supports state, regional, and local goals to reduce greenhouse gas emissions. The Program is improving and adding multimodal transportation options (to facilitate mode shift), including the extension of light-rail, and the expansion of active transportation facilities; implementing demand management (e.g., variable-rate tolling); and implementing operation and maintenance efficiencies (e.g., using renewable energy for bridge operation needs, using zero-emission transit vehicles). *Long-Term Effects* The IBR Program would reduce GHG emissions in support of local, regional, and state goals. This section outlines concepts to further reduce or minimize GHG emissions associated with the construction or operations and maintenance of the Modified LPA. In developing these concepts, the IBR Program collaborated with ODOT, WSDOT, and the eight local agency partners. The IBR Program team will continue to consider and incorporate mitigation and minimization measures during the development of the EIS and through final design and construction. • User Emissions and User Experience: Design and Implementation Considerations – To increase resiliency, the design will consider future conditions, including more frequent and severe winter storms, lower low water conditions in the dry season, and an increase in the number and intensity of hot days during summer months. – In consideration of the effects of changing future climate conditions on users of the transportation system, the design considers the provision of shade and other treatments, with a focus on active transportation and transit users. • Operations and Maintenance – Minimizing energy use (e.g., LED lights) and using green energy sources. – Providing energy storage on the bridges for operations if power is interrupted. – Maximizing the renewable electricity supply for operations (lights, signs, transit, toll collection) toward 100% as soon as practical. – Exploring potential for wind generation, solar panels for energy needs, or piezoelectric energy harvesters to generate energy from traffic vibration. – Using an all-electric or hydrogen maintenance fleet (anticipated by 2045). – Establishing guidelines for replacement equipment, alternative fuel use, and materials standards. *Construction Effects* Strategies to reduce the energy consumed by the construction of the Modified LPA would include a range of options. Oregon and Washington have standard specifications that would reduce GHG emissions during construction, including: • ODOT Standard Specifications Section 290, which has requirements for environmental protection, and include air pollution control measures. These control measures include vehicle and equipment idling limitations, which would also reduce energy usage and GHG emissions. • Many of WSDOT's standards specifications to minimize air quality impacts would also reduce energy use and GHG emissions, including:

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
	– Minimizing delays to traffic during peak travel times. – Minimizing unnecessary idling of on-site diesel construction equipment. – Educating vehicle operators to shut off equipment when not in active use to reduce emissions from idling. – Preparing a traffic control plan with detours and strategic construction timing (such as night work) to continue moving traffic through the area and reduce backups and delays to the traveling public, to the extent possible. As construction packages and plans are developed, the IBR Program will evaluate the potential to further reduce GHGs associated with construction. This could be implemented through construction bid document specifications or performance requirements, and could include: • Construction materials. – Design specifications for materials to reduce embodied emissions; use Environmental Product Declarations to evaluate various material choices and options. – Minimize lengthy supply chains for materials by using local sources where possible while still maintaining acceptable quality levels for materials. – Use cleaner production methods for cement and concrete (e.g., consider different mixes, fuel specifications for kiln and manufacture), and if found viable, incorporate into material specifications. – Maximize inclusion of recycled material to reduce virgin material production and inclusion. This would include recycling existing concrete and asphalt pavements within Program limits to be used as aggregate base, subbase, backfill materials, etc. – Consider prioritizing suppliers that document accountability to their sustainable practices, such as by participating and reporting to the EPA ENERGY STAR Challenge for Industry. • Fuel and energy use. – Specify emissions targets for contractors and encourage use of renewable fuels and electric equipment. – Specify improved diesel emissions standards for construction and vehicles. – Use renewable diesel, renewable propane, or other lower-carbon fuels in construction equipment and transport of materials. – Select specified electrical equipment (e.g., lighting) to maximize for energy efficiency, as long as the equipment meets safety and other project needs and requirements. – Seek to prioritize the use of battery-powered equipment and limit the use of diesel equipment operating under less stringent emissions standards than EPA's Tier 4.[8] • Waste reduction. – Minimize construction waste. – Consider adopting or establishing a zero-waste demolition plan, including a recycling plan, to maximize the recycling or reuse of old bridge components. • Traffic management during construction.[9] • Support and encourage alternative modes during construction, such as transit subsidies or elimination of fares during construction period. • Other approaches as suggested by interested parties, agencies, and the public.

[8] EPA has adopted a comprehensive national program to reduce emissions from nonroad (construction equipment) diesel engines by integrating engine and fuel controls as a system to gain the greatest emission reductions. To meet these Tier 4 emission standards, engine manufacturers will produce new engines with advanced emission control technologies.

[9] Measures for minimizing the effects of construction-related traffic congestion (and thus emissions) are described in the Transportation Technical Report.

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
Environmental Justice	**Long-Term Effects** *Regulatory Requirements* The applicable regulatory requirements are listed below: • Title 42 USC Section 4601, the Uniform Relocation Assistance and Real Property Policies Act (1970) • Title 23 CFR Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise • ORS 467.010, Chapter 340, Division 35, Noise Control Regulations *Acquisitions and Displacements* • Compliance with Title 42 USC Section 4601, the Uniform Relocation Assistance and Real Property Policies Act (see Section 3.3, Property Acquisitions and Displacements). For low-income populations or populations with special circumstances, a relocation program could include housing assistance. *Noise* • Compliance with ODOT and WSDOT standard specifications for noise abatement that apply to highway construction activities, including noise and vibration monitoring (see Section 3.11, Noise and Vibration). Monitoring would include: – Establish a complaint hotline to investigate noise complaints during construction. A construction monitoring and complaint program would help ensure that all equipment meets state, local, and manufacturer specifications for noise emissions. Equipment not meeting the standards would be removed from service until proper repairs were made and the equipment retested for compliance. This procedure would apply to all haul trucks, loaders, excavators, and other equipment that would be used extensively at the construction sites and that would contribute to potential noise effects. – Conduct vibration monitoring of all activities that might produce vibration levels at or above 0.5 inches per second where structures are near the construction activity. This would include pile driving, vibratory sheet installation, soil compaction, and other construction activities with the potential to cause high levels of vibration. There is no effective method to completely eliminate vibration effects from construction; however, by restricting and monitoring vibration-producing activities, vibration effects from construction can be kept to a minimum. *Tolling* – No regulations are currently in place to offset the impacts of IBR Program tolls on low-income populations, although such regulations may be implemented in the future in support of a low-income tolling program or equitable tolling policy that would reduce or offset the economic burden of tolling on low-income and minority populations. Toll rates and policies implemented on the existing Interstate Bridge (pre-completion tolling) and the new Columbia River bridges under the Modified LPA (long-term tolling) would be jointly set by the Oregon Transportation Commission and the Washington State Transportation Commission. The commissions would consider possible exemptions and discounts, which may include a low-income discount program. Both commissions would work together to determine how to apply such exemptions and discounts to the IBR Program.

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
	Program-Specific Mitigation *Transportation Impacts* • Monitor and adjust ramp meter rates manage travel times, delay, and other operational performance measures consistent with ODOT and WSDOT highway procedures. • Coordinate with local jurisdictions to adjust local street networks that could include the following actions: – Prohibit on-street parking during peak periods to improve vehicle flow and reduce travel delays associated with slowdowns to accommodate vehicles entering and exiting on-street parking spaces. – Add turn pockets at needed locations (e.g., a southbound right-turn lane at 15th and Columbia Streets in Vancouver) to improve vehicle flow and reduce travel delays associated with bottlenecking at intersections. – Alter traffic signal timing (e.g., for the Mill Plain Boulevard interchange signal) to maximize operational flow and reduce travel delays. *Business Displacements and Loss of Service Industry Jobs* • Provide mitigation for the loss of service industry jobs under a potential future workforce agreement and/or Project Labor Agreement. This agreement would be further defined as project design and planning progress, and would cover such topics as: – Adopting goals for involvement of minority, women-owned, emerging, and disadvantaged businesses in Program construction contracting. – Developing workforce practices to provide experience and business opportunities for disadvantaged workers and companies, such as requiring contractors to have apprentices perform a percentage of construction labor. – Providing job training and establishing preferences in contracting for local services. – Implementing a monitoring and evaluation program to track these measures through final project design, construction, and operation to help ensure that the benefits of promoting participation from minority-owned businesses are realized. *Tolling* Program-specific measures to minimize disproportionately high and adverse effects on EJ populations related to tolling are proposed as part of this EIS. As described in Section 3.20, Environmental Justice, tolling the existing Interstate Bridge and the new Columbia River bridges would result in higher transportation costs as a proportion of household spending for some EJ populations. Some of the project benefits—such as increased investments in the regional transit, walking, and bicycling network—may not be accessible or practical for EJ populations with fixed schedules and employment, school, and/or childcare commitments. Although the method of payment for a potential tolling program has not been determined, a transponder model has the potential to present a burden to low-income and minority populations due to the up-front cost and technical requirements of purchasing and setting up a transponder. Program-specific mitigation measures to address disproportionately high and adverse effects on EJ populations resulting from tolling may include: • A Low-Income and/or Equitable Tolling Program: If the OTC and WSTC choose to implement a low-income toll program on the existing Interstate Bridge (pre-completion tolling) and the new Columbia River bridges under the Modified LPA (long-term tolling), it would play a critical role in mitigating disproportionately high and adverse effects of tolling on EJ populations. Additional mitigation may be needed if I-205 is tolled in the future or if a regional tolling system is implemented. Both transportation commissions are actively studying low-income tolling programs, including how such a program could be implemented in each state. Key work done to date includes:

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
	– The Oregon Tolling Program I-205 and I-5 Toll Project's Equity Framework (2023). The OTC has advanced key elements of a low-income toll program – the first of its kind in the nation – that will serve low-income travelers who cannot change their travel schedules or who travel frequently on interstate facilities. The program will balance impacts to other travelers while still achieving overall program goals to reduce traffic congestion and raise revenue for transportation improvements. Key commitments include at least a 50% discount on tolls for customers in Oregon or Washington whose household income is up to 200% of the federal poverty level and exemptions for federally recognized tribes and tribal government vehicles. – WSDOT Low-Income Toll Program Study for I-405 & SR 167 Express Toll Lanes (2021). WSDOT has developed a range of program options and evaluation metrics to assess toll discount program options to benefit equity populations. Options include percentage-based and fixed-rate discounts per trip, time-based toll credits, free toll trips, and lowering the maximum toll rate. Although this study was for the I-405 and SR 167 Express Toll Lanes in Washington and would not directly apply to the IBR Program, the study and its findings may influence future discussions and coordination between the OTC and WSTC regarding the future of a regional toll program. • Equitable Access to Technology and Information: ODOT, WSDOT, and regional partners will provide program-specific information, such as how to obtain transponders and/or how to receive transportation assistance, particularly for low-income drivers. – Locate venues for acquiring transponders near lower-income neighborhoods. The IBR Program would partner with public agencies and public service providers to identify locations that are convenient for low- or lower-income neighborhoods and that are accessible by multiple modes of travel. – Enable populations without credit cards or checking accounts to obtain transponders by paying with cash or electronic bank transfer cards. – Share information with and through other public service providers, particularly those that provide direct service to EJ populations. – Share information about existing rideshare opportunities such as local carpool and vanpool providers or work with partners to develop new programs. • Early, Inclusive, and Equitable Public Engagement: Public engagement and outreach is proposed as a critical step to ensure that transportation users can make informed travel choices when crossing the Columbia River. Public engagement should conduct specific outreach to potentially impacted EJ populations, connect these populations to assistance resources such as a future low-income and/or equitable tolling program and other travel options, and provide transparent information about the costs and impacts to their trips resulting from a future IBR tolling program. **Temporary Effects** *Acquisitions and Displacements* • Meet with property owners who would be affected by temporary acquisitions to discuss details of the acquisition, such as the duration of the acquisition and the operating schedule for construction activities. • Proposed mitigation measures are described in Section 3.3, Property Acquisitions and Displacements. *Transportation* • Proposed mitigation measures are described in Section 3.1, Transportation; Section 3.4, Land Use and Economic Activity; Section 3.5, Neighborhoods and Equity; and Section 3.6, Public Services and Utilities.

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
	• Maintain safe and accessible pathways, especially near public housing, senior housing, and public services. • Coordinate with TriMet to maintain paratransit service for qualifying mobility-impaired Hayden Island residents. *Noise* • Proposed mitigation measures are described in Section 3.11, Noise and Vibration. *Air Quality* • Proposed mitigation measures are described in 3.10, Air Quality.
Section 6(f) and FLP Resources	**Long-Term Effects** ***Regulatory Requirements*** This Draft SEIS identifies potentially affected Section 6(f)- and Federal Lands to Parks (FLP)-protected parkland resources, potential avoidance alternatives, and agency process requirements, early steps in a much longer process required to convert Section 6(f)- and FLP-protected properties to nonpark uses. The IBR Program has begun this process by initiating consultation with the Oregon Parks and Recreation Department (OPRD) and the City of Portland to discuss potential 6(f) impacts at East Delta Park and NPS, the City of Vancouver, and the City of Portland to discuss potential FLP impacts at Marshall Park, Old Apple Tree Park, and East Delta Park. Looking forward, the conversion process will generally include replacement property proposal and consultation. This process will consider public comment on potential conversion of Land and Water Conservation Fund (LWCF) and FLP lands identified in the Draft SEIS. The IBR Program will continue to look for ways to first avoid and then minimize effects on LWCF and FLP resources. If all practical alternatives to conversion of LWCF and FLP resources have been ruled out, the IBR Program will coordinate with the local agencies with jurisdiction over the LWCF and FLP resources, as well as a broader coordination process with the OPRD, NPS, and the GSA. ***Avoidance*** Alternatives to avoid 6(f) properties including reducing the right-of-way width of I-5 or realigning the Modified LPA farther west were developed. The Program then determined whether other impacts could result from the avoidance alternatives and whether these alternatives would meet the Program's overall Purpose and Need and specific objectives. ***Program-Specific Mitigation*** Program-specific mitigation measures for long-term effects related to LWCF resources will be developed in coordination with mitigation proposed for parks and recreation (see Section 3.7), and will be based on further consultations with the local, state, and national parks agencies throughout and beyond the NEPA process. **Temporary Effects** • Mitigation measures for temporary effects related to LWCF resources will be developed in coordination with mitigation proposed for parks and recreation (see Section 3.7), and will be based on further consultations with the local, state, and national parks agencies throughout and beyond the NEPA process.
Section 4(f) Resources	**Long-Term and Temporary Effects** ***Regulatory Requirements***

Resource Affected	Proposed Mitigation or Compensation for the Modified LPA
	• 23 CFR 774.17 directs agencies to include all reasonable measures to minimize harm or mitigate for adverse impacts and effects to Section 4(f) resources. These measures have been incorporated during the development of the Modified LPA to the extent possible and will continue to be refined as the design progresses. ***Program-Specific Mitigation*** • No program-specific mitigation measures are proposed for long-term or temporary effects related to Section 4(f) resources beyond those proposed under Parks and Recreation.

How will the IBR Program address climate in design and construction?

Climate considerations guide planning for all areas of work on the IBR Program, including design, construction, operation, and maintenance. The effort falls into three broad categories of actions: reducing GHG emissions, managing risks, and building for resiliency. Approaches to these efforts are outlined below.

- Reduce GHG impacts by implementing Program components.
  - Improve transportation options (to facilitate mode shift).
  - Implement demand management (e.g., variable-rate tolling).
  - Optimize construction approaches.
  - Implement operation and maintenance efficiencies (e.g., auxiliary lanes, ramp meters).
- Evaluate risks to determine the consequences of climate hazards in the following categories: social (people, community), environmental (contamination, destruction), and economic (cost of repair, financial losses).
- Optimize the resiliency of the infrastructure by addressing vulnerability from natural hazards.

Local partners can support further GHG reductions by implementing complementary services and policies, such as:

- Providing higher frequency mass transit and deeper investments.
- Approving land uses and building permits in patterns that reduce single occupant vehicle trips.
- Providing mobility hub options.

Questions the IBR Program would continue to address in ongoing design include:

- How would future climate affect our natural systems and infrastructure?
- How would historically vulnerable people be affected by climate change?
- How can the IBR Program lessen the climate impacts for equity priority communities?
- How can we design resilient infrastructure?

How will the IBR Program address equity through process and outcomes?

In tandem with the IBR Equity Advisory Group, the Program adopted an equity framework to guide the processes and desired outcomes in terms of furthering equity. At the core of the framework is a Program-specific equity definition and six equity objectives, which together form the basis for the analysis presented in the Draft SEIS and other Program efforts.

Definition of equity

The IBR Program defines equity in terms of both process and outcomes. Together, process equity and outcome equity contribute to addressing the harmful impacts of and removing longstanding injustices experienced by historically underserved communities.

***Process Equity** means that the Program centers and prioritizes access, influence, and decision-making power for equity priority communities throughout the Program in establishing objectives, design, implementation, and evaluation of success.*

***Outcome Equity** is the result of successful Process Equity and is demonstrated by tangible transportation, community, and economic benefits for equity priority communities.*

Equity priority communities are those who experience and/or have experienced discrimination and exclusion based on identity or status, such as:

- Black, Indigenous, and People of Color
- Tribal governments
- People with disabilities
- Communities with limited English proficiency
- Persons with lower incomes
- Houseless individuals and families
- Immigrants and refugees
- Young people
- Older adults

Equity objectives

The IBR Program has established six equity objectives:

1. **Mobility and accessibility**: Improve mobility, accessibility, and connectivity, especially for lower-income travelers, people with disabilities, and historically underserved communities who experience transportation barriers.
2. **Physical design**: Integrate equity, area history, and culture into the physical design elements of the Program including bridge aesthetics, artwork, amenities, and impacts to adjacent land uses.
3. **Community benefits**: Find opportunities for and implement local community improvements in addition to required mitigations.
4. **Workforce equity and economic opportunity**: Ensure that economic opportunities generated by the Program benefit minority- and women-owned firms; Black, Indigenous, and People of Color (BIPOC) workers; workers with disabilities; and young people.
5. **Decision-making processes**: Prioritize access, influence, and decision-making power for Equity Priority Communities throughout the Program in establishing objectives, design, implementation, and evaluation of success.

6. **Avoid further harm**: Actively seek out options with a harm-reduction priority rather than simply mitigate disproportionate impacts on historically impacted and underserved communities and populations.

What are the next steps and how will a decision be made?

The community has an opportunity to review this Draft SEIS and provide feedback during the public review and comment period. The design of the Modified LPA may be further refined based on public input and findings. Following the public comment period, and in collaboration with the joint leads, cooperating and participating agencies, and tribes, the IBR Program will determine which design options are consistent with the Vision and Values (see Chapter 1) and should be advanced to the Final SEIS and formally recommended by the Program. The design of the Modified LPA would be developed to a level of detail to allow the IBR Program to apply for permits and update cost estimates.

The IBR Program will continue to work and foster relationships with agencies, tribes, and the public through completion of the Program.

How can the public learn more about and be involved in the IBR Program?

The Program website (www.interstatebridge.org) provides more information, including background and the process that has led to the development of this Draft SEIS. The website also has information on upcoming public events, Program milestones, and how to view the Draft SEIS.

You are invited to submit your comments on the Draft SEIS between through November 18, 2024. Comments received during this time will be reviewed and considered, and responses will be published in the Final SEIS. Comments **about the Draft SEIS** can be submitted by several methods:

- **Written comments** on the Draft SEIS can be submitted through the online comment form www.interstatebridge.org/DraftSEIS**,** by email to DraftSEIS@interstatebridge.org**,** or by regular mail to the address below. Written comments should not include any hyperlinks to outside materials or information. Any materials or information the commenter wishes to have considered should be included within the comment.

  IBR Program Draft SEIS
  c/o Chris Regan
  500 Broadway Street, Suite 200
  Vancouver, WA 98660

- **Phone:** Leave a voice message on the IBR Program's comment line at (866) IBR-SEIS (866-427-7347) (toll-free). Voice messages need to explicitly say "**Draft Supplemental EIS**" or "**Draft SEIS**" for them to be identified and addressed as comments on the Draft SEIS.

- **Attend a public hearing:** Public hearings will be held in Portland and Vancouver and virtually at the dates and locations listed below.

  Tuesday, October 15, 2024
  Clark College, Gaiser Hall 150
  1933 Fort Vancouver Way
  Vancouver, WA 98663
  5:30-8:30 PM

Thursday, October 17, 2024
Portland Expo Center, Exhibit Hall E2
2060 N. Marine Drive
Portland, OR 97217
5:30-8:30 PM

Saturday, October 26, 2024
See www.interstatebridge.org for link
12:00-1:30 PM

Wednesday, October 30, 2024
See www.interstatebridge.org for link
6:00-7:30 PM

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ABBREVIATIONS AND ACRONYMS

Abbreviation/Acronym	Definition
AASHTO	American Association of State Highway and Transportation Officials
AC	alternating current
ACM	asbestos-containing material
ADA	Americans with Disabilities Act
APE	Area of Potential Effect
AVE	Area of Visual Effect
AWDT	Average weekday daily traffic
BIPOC	Black Indigenous, and People of Color
BLTS	Bike Level of Traffic Stress
BMP	best management practice
BRT	bus rapid transit
CD	collector-distributor
CEQ	Council on Environmental Quality
CESCL	certified erosion and sediment control lead
CFR	Code of Federal Regulations
CIA	contributing impervious area
CMMP	contaminated media management plan
CRC	Columbia River Crossing
CRD	Columbia River Datum
CSZ	Cascadia Subduction Zone
C-TRAN	Clark County Public Transit Benefit Area Authority
CWA	Clean Water Act
DAHP	Washington Department of Archaeology and Historic Preservation

Abbreviation/Acronym	Definition
dB	decibels
dBA	A-weighted decibel
DC	direct current
DDE 4,4’	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DEQ	Oregon Department of Environmental Quality
DOI	U.S. Department of the Interior
DOT	Department of Transportation
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
EJ	environmental justice
EMF	electromagnetic field
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESC	erosion and spill control
ESCP	erosion and sediment control plan
ESHB	Engrossed Substitute House Bill
EV	Electric vehicle
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FLP	Federal Lands to Parks
FOE	Finding of Effect
FR	Federal Register
FRA	Federal Railroad Administration

Abbreviation/Acronym	Definition
FTA	Federal Transit Administration
FY	fiscal year
G	gauss
GHG	greenhouse gas
GIS	geographical information system
GSA	General Services Administration
HBC	Hudson's Bay Company
HBE	historic built environment
HNC	horizontal navigation clearance
HPRCSIT	historic properties of religious and cultural significance to Indian tribes
Hz	hertz
I-205	Interstate 205
I-5	Interstate 5
IBR	Interstate Bridge Replacement
ICNIRP	International Commission on Non-Ionizing Radiation Protection
in/sec	inches per second
kV/m	kilovolts per meter
KVP	key viewpoint
Landing	Vancouver Landing at Terminal 1
LCR FNC	Lower Columbia River Federal Navigation Channel
LCR NAV Historic District	Lower Columbia River Federal Navigation Historic District
LCRWT	Lower Columbia River Water Trail
LOS	Level of service
LPA	Locally Preferred Alternative
LRFD	load-and-resistance factor design

Abbreviation/Acronym	Definition
LRT	light-rail transit
LRV	light-rail vehicle
LU	landscape unit
LUST	leaking underground storage tank
LWCF	Land and Water Conservation Fund
MAX	Metropolitan Area Express
MBTA	Migratory Bird Treaty Act
Metro	Oregon Metro
mG	milligauss
mm	millimeters
MOA	memorandum of agreement
MOU	memorandum of understanding
MOVES	MOtor Vehicle Emissions Simulator
mph	miles per hour
MSA	Metropolitan Statistical Area
MSAT	mobile source air toxics
MT	metric tons
NAAQS	National Ambient Air Quality Standards
NAC	noise abatement criteria
NAICS	North American Industry Classification System
NCO	non-commissioned officer
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NHS	National Historic Site

Abbreviation/Acronym	Definition
NOAA Fisheries	National Oceanic and Atmospheric Administration National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NRI	Natural Resource Inventory
OAR	Oregon Administrative Rules
OCS	Obstacle Clearance Surface
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
OHWM	ordinary high water mark
OPRD	Oregon Parks and Recreation Department
ORS	Oregon Revised Statute
OTC	Oregon Transportation Commission
PA	programmatic agreement
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCC	Portland City Code
PCP	pollution control plan
PDX	Portland International Airport
PM	particulate matter
PMSA	Primary Metropolitan Statistical Area
PP&R	Portland Parks and Recreation
PRM	permittee responsible mitigation
RCO	Recreation and Conservation Office

Abbreviation/Acronym	Definition
RCP	Representative Concentration Pathway
RCW	Revised Code of Washington
RM	river mile
RMPP	Regional Mobility Pricing Project
ROD	Record of Decision
RTC	Southwest Washington Regional Transportation Council
RTP	Regional Transportation Plan
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
Section 4(f)	Section 4(f) of the U.S. Department of Transportation Act
Section 6(f)	Section 6(f) of the federal Land and Water Conservation Fund Act
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SMSA	Standard Metropolitan Statistical Area
SOI	species of interest
SPCC	spill prevention control and countermeasure
SR	State Route
SRKW	Southern Resident killer whale
SSA	Sole source aquifer
SWPPP	Stormwater Pollution Prevention Plan
TCM	transportation control measure
TCP	traditional cultural property
TDA	tire derived aggregate
TDM	transportation demand management

Abbreviation/Acronym	Definition
TMDL	Total Maximum Daily Load
TMP	Transportation Management Plan
TriMet	Tri-County Metropolitan Transportation District of Oregon
TSM	transportation system management
Uniform Act	Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (as amended)
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USCG	U.S. Coast Guard
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
V/C	volume-to-capacity
V/m	volts per meter
VHD	Vehicle hours of delay
VHT	Vehicle hours of travel
VMC	Vancouver Municipal Code
VMT	Vehicle miles traveled
VNC	vertical navigation clearance
VNHR	Vancouver National Historic Reserve
VPR&C	Vancouver Parks, Recreation and Cultural Services
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WQPMP	Water Quality Protection and Monitoring Plan
WSDOT	Washington State Department of Transportation
WSP	Washington State Patrol

Abbreviation/Acronym	Definition
WSTC	Washington State Transportation Commission
ZEV	Zero Emission Vehicle

1. PURPOSE AND NEED

This chapter describes the primary purpose for the Interstate Bridge Replacement Program.

1.1 Importance of the I-5 Corridor and the Interstate Bridge

As the only continuous north-south interstate route on the West Coast of the United States connecting the Canadian and Mexican borders, Interstate 5 (I-5) is vital to the local, regional, state, and national economies. At the Columbia River, I-5 provides a critical economic connection to two major ports, deepwater shipping, upriver barging, two transcontinental rail lines, and much of the region's industrial land. Truck-hauled freight movement over the I-5 Columbia River crossing is critical for industrial centers, for employment, and for the regional and national economies.

Chapter Contents

1.1 Importance of the I-5 Corridor and the Interstate Bridge

1.2 Confirming the I-5 Columbia River Crossing Project's Purpose and Need

1.3 Purpose and Need for the IBR Program

1.4 Compliance with NEPA Regulations

1.5 Vision and Values

1.6 Next Steps

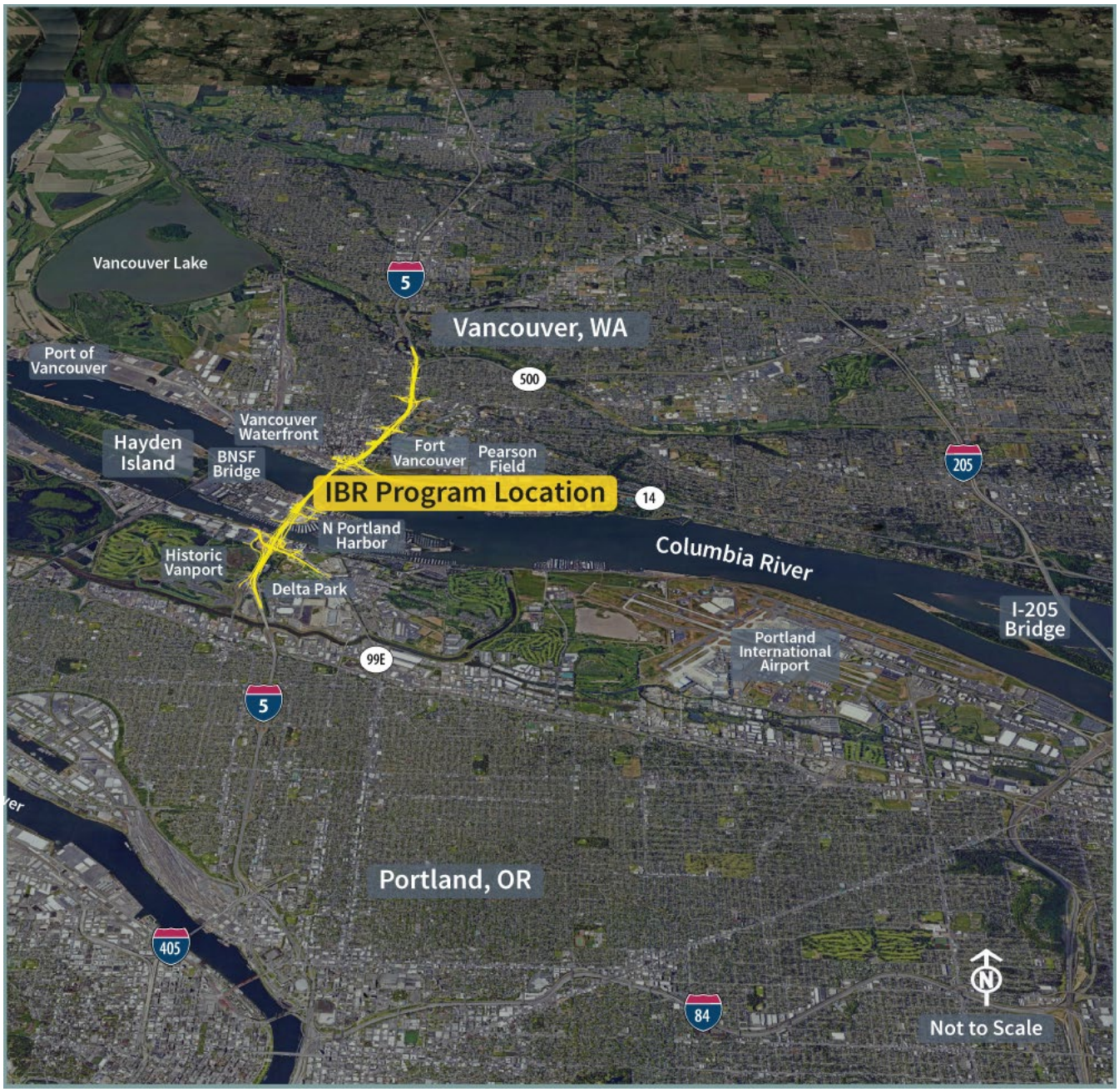
The Interstate Bridge provides the primary transportation link between Vancouver, Washington, and Portland, Oregon, and it is the only direct connection between the downtown areas of these cities. Residents of Vancouver and Portland drive, ride buses, bicycle, and walk across the Interstate Bridge for work, recreation, shopping, and entertainment. In 2019,[1] 143,400 trips were taken over the bridge each weekday by car, transit, bicycle, and walking. The Interstate 205 (I-205) Glenn Jackson Bridge, about 6 miles east, is the only other crossing over the Columbia River within the Portland-Vancouver metropolitan area. I-205 provides important connectivity for the region—particularly eastside suburban areas—but provides a less direct link between the downtown hubs in Portland and Vancouver.

1.2 Confirming the I-5 Columbia River Crossing Project's Purpose and Need

The Interstate Bridge Replacement (IBR) Program is a renewal of the previously suspended Columbia River Crossing (CRC) project, which completed the National Environmental Policy Act (NEPA) process with a signed Record of Decision (ROD) in 2011 and two re-evaluations in 2012 and 2013. Numerous studies conducted for the CRC project and past planning studies in this section of I-5 (see Figure 1-1), identified a variety of transportation mobility and safety problems. For additional details on these studies and their findings, please see Section 1.2 of the *Interstate 5 Columbia River Crossing Project Final Environmental Impact Statement and Final Section 4(f) Evaluation* (CRC 2011a).

[1] 2019 is used as the baseline year for most of the existing conditions data because it provides a more accurate baseline than more recent years, which were influenced by restrictions related to the COVID-19 pandemic.

Figure 1-1. Program Vicinity



The Purpose and Need statement for the CRC project was developed by the CRC Task Force[2] and the joint lead agencies.[3] Please see Chapter 1 of the CRC project Final Environmental Impact Statement (EIS) to learn more about how the Purpose and Need was developed and about agency and public input (CRC 2011a). As part of the NEPA process, the IBR Program began working with regional and local partner agencies and the public in

[2] The CRC Task Force was a 39-member group formed in 2005 that was composed of leaders representing a broad cross section of Washington and Oregon communities. Public agencies, businesses, civic organizations, neighborhoods, and freight, commuter, and environmental groups were represented on the task force. The group met 23 times over the course of the CRC project development phase to advise the project team and provide guidance and recommendations at key decision points. The task force concluded its work in summer 2008 after making its recommendation on the Locally Preferred Alternative.

[3] The joint lead agencies for the CRC project were the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), Oregon Department of Transportation (ODOT), Washington State Department of Transportation (WSDOT), Oregon Metro (Metro), Southwest Washington Regional Transportation Council (RTC), Tri-County Metropolitan Transportation District (TriMet), and Clark County Public Transportation Benefit Area (C-TRAN).

early 2021 to review the Purpose and Need that was adopted for the CRC project. The IBR Program brought the Purpose and Need, as well as the Vision and Values (identified in Section 1.5), to partner agencies[4] and the Program's three advisory groups[5] to discuss the transportation needs identified for the CRC project. These transportation needs were also brought to the public for comment during an online open house, virtual community briefings, and an online survey.

In mid-2021, the IBR Program announced that these efforts confirmed that the six transportation needs identified in the CRC Purpose and Need statement still exist today, and that the values identified in the Vision and Values document remain community values. This was documented in a third NEPA re-evaluation (IBR 2021b) that was prepared in 2021 to evaluate the effect of changes in conditions and regulations since 2013, as well as potential design changes. **Thus, the Purpose and Need statement for the IBR Program, provided below, remains the same as documented in the 2011 Final EIS and 2011 ROD for the CRC project.** Please see the 2021 Community Engagement Summary Report (IBR 2021a) and the NEPA re-evaluation (IBR 2021b) for additional details on how community partner outreach and public engagement helped confirm the Purpose and Need statement.

1.3 Purpose and Need for the IBR Program

One of the first and most important steps of any major project is to define why the project has been initiated and what problem(s) it seeks to address. The Purpose and Need statement provides this definition for projects complying with NEPA and serves as the basis for defining how project alternatives will be developed and evaluated. A reasonable alternative must address the needs specified in the Purpose and Need statement for the alternative to be considered in an EIS; thus, the Purpose and Need is an influential statement that guides future development of the project.

The Purpose and Need statement for the IBR Program, developed by the lead agencies, project sponsors, and CRC Task Force, can be found in Sections 1.3.1 and 1.3.2. The text of the Purpose and Need has not been edited from its original wording, with the exception of references to the name of the Program. More recent data and supplemental information are provided in sidebars and footnotes. [6]

1.3.1 Program Purpose

The purpose of the proposed action is to improve I-5 corridor mobility by addressing present and future travel demand and mobility needs in the Program area. The Program area extends from approximately Columbia Boulevard in the south to State Route (SR) 500 in the north (Figure 1-1). Relative to the No-Build Alternative, the proposed action is intended to achieve the following objectives: (a) improve travel safety and traffic operations on the I-5 river crossing and associated interchanges; (b) improve connectivity, reliability, travel times, and operations of public transportation modal alternatives in the Program area; (c) improve highway freight mobility and address interstate travel and commerce needs in the Program area; and (d) improve the I-5 river crossing's structural integrity (seismic stability).

[4] C-TRAN, TriMet, Metro, RTC, the Cities of Portland and Vancouver, and the Ports of Portland and Vancouver.

[5] The Executive Steering Group, Community Advisory Group, and Equity Advisory Group. The advisory groups are detailed in Chapter 6 of this Draft Supplemental EIS (SEIS).

[6] Transportation data provided in the sidebars are from the IBR Program Transportation Technical Report. Due to the influence of the COVID-19 pandemic on travel patterns between 2020 and 2023, the IBR Program is following industry standards and using 2019 as the baseline year for the existing conditions section of this SEIS. The exception to using 2019 data is outputs from the Metro/RTC regional travel demand model which are from 2015. Metro and RTC had not yet updated their base-year model from 2015 to 2020 when this analysis was completed.

1.3.2 Program Needs

The specific needs to be addressed by the proposed action include:

- **Growing travel demand and congestion:** Existing travel demand exceeds capacity on the Interstate Bridge and associated interchanges. This corridor experiences heavy congestion and delay lasting 4 to 6 hours daily[7] during the morning and afternoon peak travel periods and when traffic crashes, vehicle breakdowns, or bridge lifts occur. Due to excess travel demand and congestion in the I-5 corridor, many trips take the longer, alternative I-205 route across the river. Spillover traffic from I-5 onto parallel arterials such as Martin Luther King Jr. Boulevard and Interstate Avenue increases local congestion. In 2005, the two crossings[8] carried 280,000 vehicle trips across the Columbia River daily. Daily traffic demand over the Interstate Bridge is projected to increase by more than 35% during the next 20 years, with stop-and-go conditions increasing to approximately 15 hours daily if no improvements are made.
- **Impaired freight movement:** I-5 is part of the National Truck Network, and the most important freight highway on the West Coast, linking international, national, and regional markets in Canada, Mexico, and the Pacific Rim with destinations throughout the western United States. In the center of the Program area, I-5 intersects with the Columbia River's deep water shipping and barging channels, as well as two river-level, transcontinental rail lines. The Interstate Bridge provides direct and important highway connections to the Port of Vancouver and Port of Portland facilities located on the Columbia River, as well as the majority of the area's freight consolidation facilities and distribution terminals. Freight volumes moved by truck to and from the area are projected to more than double over the next 25 years. Vehicle-hours of delay on truck routes in the Portland-Vancouver area are projected to increase by more than 90% over the next 20 years. Growing demand and congestion will result in increasing delay, costs, and uncertainty for all businesses that rely on this corridor for freight movement.

In 2005, 280,000 vehicle trips crossed the Columbia River daily (northbound and southbound) in the Portland-Vancouver metropolitan region, of which 134,000 used the Interstate Bridge. By 2019, the total number of vehicle trips that crossed the Columbia River had increased to 313,000 per day, of which 143,400 used the Interstate Bridge.

Vehicle trips include those made in single-occupancy vehicles, high-occupancy vehicles, trucks, and transit vehicles (buses).

The duration of congestion on the Interstate Bridge roughly doubled from 2005 to 2019. In 2019, the I-5 corridor experienced heavy congestion and delay in both directions lasting up to almost 12 hours daily (compared with 4 to 6 hours daily in 2005).

Daily traffic demand over the I-5 Interstate Bridge is projected to increase by more than 25% by 2045.

In 2019, more than 14,000 freight trips carrying over $132 million in commodities traveled across the I-5 Interstate Bridge each weekday. Freight volumes moved by truck to and from the area are projected to increase by 50% to 75% by 2045.

Deficiencies such as narrow lanes and shoulders, as well as short merging, diverging, and weaving distances, reduce the efficiency and safety of freight truck movement.

[7] The hours of congestion refers to the total number of hours that the corridor experiences congestion. During the CRC project, congestion was defined as occurring when travel speeds were below 35 mph. ODOT and WSDOT are in the process of refining the definition of congestion with congestion occurring when speeds are below 45 miles per hour and severe congestion when speeds are below 35 miles per hour. Therefore, the IBR Program has defined congestion as speeds below 45 miles per hour.

[8] The two crossings are the I-5 Interstate Bridge and the I-205 Glenn Jackson Bridge.

- **Limited public transportation operation, connectivity, and reliability:** Due to limited public transportation options, a number of transportation markets are not well served. The key transit markets include trips between Portland Central City and the city of Vancouver and Clark County, trips between north/northeast Portland and the city of Vancouver and Clark County, and trips connecting the city of Vancouver and Clark County with the regional transit system in Oregon. Current congestion in the corridor adversely impacts public transportation service reliability and travel speed. Southbound bus travel times across the bridge are currently up to three times longer during parts of the AM peak compared to off-peak. Travel times for public transit using general purpose lanes on I-5 in the Program area are expected to increase substantially by 2030.
- **Safety and vulnerability to incidents:** The Interstate Bridge and its approach sections experience crash rates more than two times higher than statewide averages for comparable facilities. Incident evaluations generally attribute these crashes to traffic congestion and weaving movements associated with closely spaced interchanges and short merge distances. Without breakdown lanes or shoulders, even minor traffic accidents or stalls cause severe delay or more serious accidents (Figure 1-2).

In 2005, southbound bus travel times across the Interstate Bridge were up to three times longer during parts of the AM peak (i.e., morning high traffic period) than during off-peak times. As of 2019, bus travel times were four times longer during the AM peak.

If the Interstate Bridge is not replaced, travel times for public transit using general-purpose lanes on southbound I-5 during the AM peak are expected to increase by 2045 as a result of increased congestion.

In 2005, the Interstate Bridge and its approach sections experienced crash rates more than two times higher than statewide averages for comparable facilities. As of 2019, crash rates were three times higher than average. Crashes in the IBR Program area could increase by almost 30% by 2045 if no improvements are made.

There were seven fatal crashes in the Program area between 2015 and 2019.

Figure 1-2. Crash Blocking the Interstate Bridge

- **Substandard bicycle and pedestrian facilities:** The bicycle/pedestrian lanes on the Interstate Bridge are about 3.5 to 4 feet wide, narrower than the 10-foot standard, and are located extremely close to traffic lanes, thus impacting safety for pedestrians and bicyclists (Figure 1-3). Direct pedestrian and bicycle connectivity are poor in the Program area.

Figure 1-3. Bicycle and Pedestrian Path on the Interstate Bridge

Compliance with the Americans with Disabilities Act (ADA) varies for the existing shared-use paths. The paths comply with the maximum gradient (4.7%), and there are no objects that overhang or protrude into the path. However, the paths do not comply with guidelines for curb ramps (both in number and design), width, passing spaces, cross slope, or railing height (FHWA 2001; U.S. Access Board 2013). The paths are also near traffic lanes; this increases bicyclist and pedestrian exposure to vehicular traffic, noise, and emissions.

- **Seismic vulnerability:** The existing Interstate Bridge is located in a seismically active zone. It does not meet current seismic standards and is vulnerable to failure in an earthquake.

The existing Interstate Bridge was designed before modern seismic design codes were established. The foundations are likely to displace during a strong earthquake, resulting in the collapse of the bridge spans into the Columbia River. In addition, the movable span lift towers would be overstressed due to the inertia of the concrete counterweights and would collapse onto the bridge, causing the adjacent spans to fail. This collapse potential is due to the fact that hundreds of timber bridge support piles sit within loose sand that can liquefy during an earthquake.

All new federally funded highway bridges are required to be designed to the current edition of the AASHTO Guide Specifications for Load-and-Resistance Factor Design (LRFD) Seismic Bridge Design (AASHTO 2022). In addition, State Departments of Transportation (DOTs) typically adopt local practices to address potential geologic hazards in the region (e.g., the Cascadia Subduction Zone). State DOTs may also prescribe elevated levels of seismic performance based on the importance of the structure as it relates to public safety, national defense, and economic investment, as is the case for the Interstate Bridge.

1.4 Compliance with NEPA Regulations

The Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) are the joint federal lead agencies for the IBR Program and are responsible for preparing the environmental documentation and overseeing the NEPA process. Additional NEPA joint lead agencies include the Oregon and Washington State Departments of Transportation (ODOT and WSDOT), Southwest Washington Regional Transportation Council (RTC), Oregon Metro (Metro), Clark County Public Transportation Benefit Area (C-TRAN), and Tri-County Metropolitan Transportation District (TriMet).

The notice to prepare a Supplemental EIS (SEIS) was published in the Federal Register on April 5, 2023 to advise other federal, state, and local agencies; tribes; and the public that an SEIS was being prepared for the IBR Program. Per the requirements of 23 Code of Regulations (CFR) 771.130(a), FHWA and FTA prepared a NEPA re-evaluation in 2021 that considered changes to existing conditions, including regulations, community priorities, and the physical environment (IBR 2021b). The CRC Locally Preferred Alternative (LPA), as selected in the 2011 ROD and revised in the 2012 and 2013 re-evaluations, included replacing the existing Interstate Bridge with two stacked, fixed-span bridges over the Columbia River; the new bridges would include dedicated space for light-rail transit and a shared-use path, among other improvements.

This Draft SEIS evaluates the Modified LPA, which was created through a collaborative process with partner agencies, tribes, and the public to identify an updated solution that reflects the current and future conditions of the region. The Modified LPA is described in Chapter 2.The development of the Modified LPA is detailed in Section 2.5.1, which summarizes the differences between the CRC LPA and the Modified LPA; this is further detailed in Appendix D.

FHWA and FTA are required to develop an agency coordination plan to outline how the IBR Program will work with the public; tribes; and local, state, and federal agencies with an interest in the Program (23 CFR 771.123). The IBR Program Agency Coordination Plan was first drafted in 2021 and has undergone periodic review and revisions since that time. Appendices A and B of this Draft SEIS document how the Program has coordinated with agencies, tribes, and the public to date.

> Development of the Modified LPA is described in Section 2.5. This section summarizes the changes that have occurred since 2013 that led to modifications in the design and highlights the differences between CRC project components and IBR Program components.

During the CRC project, interested federal, state, and local agencies and tribal governments served as cooperating and participating agencies and tribes as defined in Section 6002 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) during the NEPA process. These designations allow federal, state, and local agencies and tribes to have a formal role in the environmental review process.

In October 2022, FHWA and FTA sent invitations to agencies and tribal governments with an interest in the Program area to reinvite them to be cooperating agencies, participating agencies, or participating tribes for the IBR Program.

Cooperating agencies are federal agencies invited to participate in the development of an EIS and may use this document to fulfill the NEPA review requirements for their permit or approval decision. In addition to federal agencies, a state or local agency or a Native American tribe may, by agreement with the lead agencies, also become a cooperating agency or tribe. The following agencies are serving as cooperating agencies for the IBR Program:

- National Oceanic and Atmospheric Administration National Marine Fisheries Service
- National Park Service

- U.S. Army Corps of Engineers
- U.S. Coast Guard
- U.S. Environmental Protection Agency
- Washington State Department of Archaeology and Historic Preservation

Participating agencies and tribes are federal, state, and local agencies and tribal governments that have an interest in the Program under review. Each participating agency or tribe has the opportunity to participate in Program meetings, open houses, and workshops, in addition to reviewing and providing comments on certain NEPA milestones and activities. Participating agencies and tribes are invited to:

- Participate in the NEPA process starting at the earliest possible time. Participation includes providing comments and responses on NEPA documents, reviewing studies or methodologies on only the areas within the special expertise or jurisdiction of the agency or tribe, and advising on the level of detail for the analysis of impacts.
- Identify, as early as practicable, environmental issues of concern regarding the IBR Program.
- Provide meaningful and timely input on unresolved issues.
- Comment on the proposed NEPA schedule.

Designation as a participating agency or tribe does not imply Program support and, if applicable, does not provide an agency or tribe with increased oversight or approval authority beyond its statutory limits. The following agencies are designated as participating agencies for the Program:

- Federal Aviation Administration
- U.S. Fish and Wildlife Service
- U.S. General Services Administration
- Oregon Department of Environmental Quality
- Oregon Department of Fish and Wildlife
- Oregon Department of Land Conservation and Development
- Oregon Department of State Lands
- Oregon State Historic Preservation Office
- Washington State Department of Ecology
- Washington State Department of Fish and Wildlife
- Washington State Department of Natural Resources
- City of Portland
- City of Vancouver
- Port of Portland
- Port of Vancouver USA
- Urban Flood Safety and Water Quality District

The following are federally recognized tribes identified as participating tribes for the Program:

- Confederated Tribes and Bands of the Yakama Nation

- Confederated Tribes of Siletz Indians of Oregon
- Confederated Tribes of the Colville Reservation
- Confederated Tribes of the Grand Ronde Community of Oregon
- Confederated Tribes of the Umatilla Indian Reservation
- Confederated Tribes of the Warm Springs Reservation of Oregon
- Cowlitz Indian Tribe
- Nez Perce Tribe
- Nisqually Indian Tribe
- Spokane Tribe of the Spokane Reservation

During the CRC project, the NEPA joint lead agencies worked with a group of state and federal agencies likely to have permitting or approval authority over one or more elements of the project. The group was referred to as the Interstate Collaborative Environmental Process group, or InterCEP. Details on InterCEP and agency coordination during the CRC project can be found in the CRC Final EIS (CRC 2011a). In a continuation of this collaborative effort, the IBR Program is hosting an ongoing series of inter-agency working groups with federal, state, and local agencies and tribes as well as inter-tribal meetings. Each working group focuses on a different environmental topic, such as endangered species, and provides an opportunity for the agencies, tribes, and the IBR Program to collaborate on potential solutions and seek early consensus on permitting requirements. Additional details on the working groups can be found in Appendix A.

Cooperating agencies, participating agencies, participating tribes, and the public have been given multiple opportunities for formal comment on several important elements of this Program. These opportunities are described in Appendix A, Agency and Tribal Coordination, and Appendix B, Public Involvement. For the formal comment opportunities provided during the CRC project, please see Chapter 1 of the CRC Final EIS.

1.5 Vision and Values

During the CRC project, the joint lead agencies, with the help and recommendation of the CRC Task Force, developed a vision for how to address the Purpose and Need and the values they would follow in doing so. As previously noted, the values identified in the CRC Vision and Values statement remain community values. **Thus, the Vision and Values statement for the IBR Program, provided below, remains the same as documented in the 2011 Final EIS and 2011 ROD for the CRC project.**

The text of the Vision and Values statement has not been edited from its original wording, with the exception of references to the name of the Program.

These values, along with the Purpose and Need, were instrumental in defining the evaluation criteria used during the development of the range of alternatives evaluated in the CRC project's EIS (see Sections 2.6 through 2.8 of the CRC Final EIS for information on this process).

As with the Purpose and Need, the IBR Program worked with regional and local partner agencies and the public to review and comment on the Vision and Values. Opportunities for the public to comment included an online open house, virtual community briefings, and an online survey.[9] The outcome of these efforts was the confirmation that the Vision and Values listed below remain community values.

The following is a statement of the IBR Program vision:

[9] Additional details on public engagement opportunities are described in Appendix B, Public Involvement.

> *The Interstate Bridge Replacement (IBR) Program Vision provides the foundation for developing criteria and performance measures that will be used to evaluate the IBR Program alternatives. The IBR Program NEPA process will include consideration of crossing infrastructure; multimodal transportation; connectivity; high-capacity transit; land use; funding; community and business interests; under-represented, low income, and minority communities; commuter and freight mobility; maritime mobility; and the environment.*

Values that have guided this Program's development and framed identification and evaluation of alternatives are noted below.

1.5.1 Community Livability

- Supporting a healthy community.
- Supporting a healthy and vibrant mix of residential, commercial, industrial, recreational, cultural, and historic areas land uses.
- Supporting aesthetic quality that achieves the level of a regional landmark.
- Recognizing the history of the community surrounding the Program area, supporting improved community cohesion, and avoiding neighborhood disruption.
- Preserving parks, historic and cultural resources, and green spaces.

1.5.2 Mobility, Reliability, Accessibility, Congestion Reduction, and Efficiency

- Providing congestion reduction and mobility, reliability, and accessibility for all users, and recognizing the requirements of local, intra-corridor, and interstate movement now and in the future.
- Providing an efficient transportation system through transportation system management , encouraging reduced reliance on single-occupancy vehicles, improving incident management, and providing increased capacity measures.

Reliability refers to consistency or dependability in travel times as measured from day to day and/or across different times of the day.

Mobility refers to the ability to easily move between different locations.

Modal refers to the various methods (or modes) of transportation such as motor vehicle, transit, walking, cycling, rolling, or other means.

1.5.3 Modal Choice

- Providing modal choice for users of the river crossing including highway, transit, high-capacity transit, bicycle, and pedestrian modes.

1.5.4 Safety

- Ensuring safety for vehicles (trucks, cars, emergency, and transit), pedestrians, bicyclists, river users, and air traffic at the crossing.

1.5.5 Regional Economy and Freight Mobility

- Supporting a sound regional economy and job growth.
- Enhancing the I-5 corridor as a global trade gateway by addressing the need to move freight efficiently and reliably through the Program area, and allowing for river navigational needs.

1.5.6 Stewardship of Natural and Human Resources

- Respecting, protecting, and improving natural resources including fish, wildlife habitat, and water quality.
- Supporting improved air quality.
- Minimizing impacts of noise, light, and glare.
- Supporting energy efficiency through design, construction, and use.

1.5.7 Distribution of Impacts and Benefits

- Ensuring the fair distribution of benefits and adverse effects of the Program for the region, communities, and neighborhoods adjacent to the Program area.

1.5.8 Cost-Effectiveness and Financial Resources

- Ensuring cost-effectiveness in design, construction, maintenance, and operation.
- Ensuring a reliable funding plan for the Program.

1.5.9 Bi-State Cooperation

- Fostering regional cooperation and planning.
- Supporting existing growth management plans in both states.
- Supporting balanced job growth.

1.6 Next Steps

The community will have an opportunity to review this Draft SEIS and provide feedback during the public review and comment period. The design of the proposed improvements, including the selection of specific design options, may be further refined based on findings and public input, which will be documented in the Final SEIS and an Amended ROD issued by FHWA and FTA. The design of the Modified LPA will be developed to a level of detail that will allow the IBR Program to apply for permits and update cost estimates. The IBR Program will continue to work and foster relationships with agencies, tribes, and the public through completion of the Program.

2. DESCRIPTION OF ALTERNATIVES

2.1 Introduction

Chapter Contents

2.1 Introduction
2.2 Components of the Modified LPA
2.3 Modified LPA Construction
2.4 No-Build Alternative
2.5 Development of the Modified LPA
2.6 Additional Compliance Underway
2.7 Anticipated Permits and Approvals

The Interstate Bridge Replacement (IBR) Program is a continuation of the previously suspended Columbia River Crossing (CRC) project with the same purpose to replace the aging Interstate 5 (I-5) Bridge across the Columbia River with a modern, seismically resilient multimodal structure. The proposed infrastructure improvements are located along a 5-mile stretch of the I-5 corridor that extends from approximately Victory Boulevard in Portland to State Route (SR) 500 in Vancouver as shown in Figure 2-1.

The alternatives evaluated to address the project's Purpose and Need were presented in the CRC Draft EIS (2008) and Final EIS (2011) and are briefly summarized below. The 2008 CRC Draft EIS evaluated a No-Build Alternative and four build alternatives[1] (see Table 2-1). The reasonable range of alternatives evaluated in the CRC Draft EIS included design components (*i.e.*, river crossing type, transit mode) that had passed a Purpose and Need screening process (CRC 2007, 2008), and had been bundled with additional improvements for freight, active transportation, highway traffic, and transportation system management and transportation demand management. Section 2.5.1 includes details about the initial screening effort for the CRC project's National Environmental Policy Act (NEPA) alternatives analysis that determined the range of alternatives evaluated in the CRC Draft EIS. The CRC Final EIS (2011) identified a Locally Preferred Alternative (LPA), which was based on Alternative 3, and included design options[2] of stacked transit/highway bridges and a high-capacity transit (HCT) northern terminus at Clark College. The CRC project completed its NEPA compliance with the identification of a Selected Alternative in a Record of Decision (ROD) in 2011 (CRC 2011b) and was revised by two NEPA re-evaluations that were completed in 2012 and 2013. The CRC Selected Alternative identified in the 2011 ROD, as revised by the 2012 and 2013 re-evaluations, is referred to as the "CRC LPA."[3] In 2014, the CRC project was suspended.

Table 2-1. CRC Draft EIS Alternatives and Design Options

Design Components	Alternative 1 (No-Build)	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Multimodal River Crossing and Highway	Existing Bridges	Replacement	Replacement	Supplemental	Supplemental

[1] A build alternative includes a set of corridor-wide multimodal improvements defined to address the project's purpose and need.

[2] Design options are refinements to an alternative being considered for a specific project component. The design options for each component represent a range of potential options for the design of the component. Identifying design options allows for the analysis and disclosure of the range of potential impacts for that specific component. After public comments are reviewed following the public comment period, design options may be narrowed to a single solution, which may be a specific option evaluated or a solution that is within the range of impacts disclosed in the Draft SEIS.

[3] FHWA and FTA published a notice to prepare a Supplemental Environmental Impact Statement for the Interstate Bridge Replacement Program in the Federal Register (Volume 88, Number 65) on April 5, 2023. This notice referred to the Selected Alternative from the 2011 CRC Project's ROD, which was also known as the Locally Preferred Alternative (LPA). For purpose of this SEIS, the CRC LPA refers to the CRC Selected Alternative from the 2011 ROD, as revised by the 2012 and 2013 re-evaluations.

Design Components	Alternative 1 (No-Build)	Alternative 2	Alternative 3	Alternative 4	Alternative 5
River Crossing Options	Existing Bridges	(A) Stacked Transit/Highway Bridge (B) Separate Transit and Highway Bridges	(A) Stacked Transit/Highway Bridge (B) Separate Transit and Highway Bridges	Upgrade Existing Bridges and Add New Supplemental Bridge	Upgrade Existing Bridges and Add New Supplemental Bridge
HCT Mode [a]	None	BRT	LRT	BRT	LRT
HCT Northern Terminus Options	N/A	(A) Kiggins Bowl, (B) Lincoln, (C) Clark College MOS, or (D) Mill Plain MOS	(A) Kiggins Bowl, (B) Lincoln, (C) Clark College MOS, or (D) Mill Plain MOS	(A) Kiggins Bowl, (B) Lincoln, (C) Clark College MOS, or (D) Mill Plain MOS	(A) Kiggins Bowl, (B) Lincoln, (C) Clark College MOS, or (D) Mill Plain MOS
TDM/TSM	Current Programs	Expanded TDM/TSM programs	Expanded TDM/TSM programs	Expanded TDM/TSM programs	Expanded TDM/TSM programs

Source: CRC 2008

a HCT Mode also dictates the location of a maintenance base expansion. BRT would entail expanding a bus maintenance facility in eastern Vancouver. LRT would entail expanding the Ruby Junction maintenance base in Gresham.

b Alternative 3 was also evaluated without a toll to quantify the traffic effects of tolling the I-5 crossing.

BRT = bus rapid transit; HCT = high-capacity transit; I-5 = Interstate 5; LRT = light-rail transit; MOS = minimum operable segment; N/A = Not applicable; TDM = transportation demand management; TSM = transportation system management

In 2019, a bi-state legislative committee requested that the Oregon Department of Transportation (ODOT) and the Washington State Department of Transportation (WSDOT) restart the CRC project, renaming it the *IBR Program*. The CRC project was never constructed, and the overall problems—the needs for the project—that the CRC project sought to address still existed and remained unresolved. Some detailed characteristics of those problems had evolved and, in some cases, worsened over time (see Section 1.3, Purpose and Need for the IBR Program). The range of alternatives evaluated in the CRC Final EIS continue to be valid for the project overall as they remain technically and economically feasible solutions that meet the Purpose and Need, which has remained unchanged. The range of alternatives—other than the No-Build Alternative and CRC LPA as modified to address changed conditions (described in Section 2.5)—is not altered or reexamined in this Supplemental EIS (SEIS). Only the No-Build Alternative and CRC LPA are reexamined in the Draft SEIS because the CRC LPA was selected in the ROD and is now being advanced to construction by the IBR Program, and the No-Build Alternative provides baseline conditions and a no action option for decision-makers.

Using the CRC LPA as its the baseline, or starting point, the IBR Program restarted the CRC project and began evaluating whether past design assumptions still addressed today's changed conditions, including physical environment, community priorities, and regulations, or whether updates would be needed (see Section 2.5.2, Updating the CRC LPA). In 2021, the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) issued a NEPA re-evaluation that assessed the extent of changes in conditions and determined an SEIS should be prepared to identify and disclose new adverse impacts and mitigation associated with changes in conditions affecting the CRC LPA that occurred since 2013 (IBR 2021a).

Figure 2-1. IBR Program Location Overview

While the main components (e.g., a pair of replacement bridges across the Columbia River, extension of light-rail into Vancouver, improvements to seven interchanges, active transportation improvements, and variable-rate tolling) have not changed since the CRC LPA, some details of these components have been revised due to changed conditions. As a result, modifications to the CRC LPA were pursued and no new alternatives were developed. As part of the updates to the CRC LPA, several of the CRC river crossing types and transit modes were revisited in response to public input. Past Purpose and Need screenings of a high-speed rail transit mode and tunnel or new bridge river crossing types were reassessed (IBR 2021b; IBR 2021c; IBR 2021e). In addition, a variation of the draft supplemental bridge alternative in the CRC project was reassessed to determine whether it would meet the Purpose and Need (IBR 2021d). Each of these reassessments concluded the Purpose and Need would not be met by the respective alternative.

The CRC LPA was updated in close coordination with federal, tribal, state, regional, and local partners to establish the Modified LPA. Section 2.5.1, Selected Alternative in the 2011 Record of Decision and Subsequent Modifications in 2012 to 2013, summarizes the differences between the CRC LPA and the Modified LPA. Section 2.5.2,Updating the CRC LPA, summarizes the changes that have occurred since the 2013 CRC Re-evaluation and evaluation of changes and modifications required to address such changes which was conducted as part of the IBR Program, including revisiting past screening and investigating variations on prior design components. This is further detailed in Appendix D, Design Options Development, Screening, and Evaluation Technical Report. **The updated version of the CRC LPA is referred to as the IBR Modified LPA**.

The Modified LPA was developed through a collaborative process with the local and regional agencies partnering with the IBR Program as well as consultation with tribes.

Section 2.2, Components of the Modified LPA, describes specific components of the IBR Program's Modified LPA. Short summaries of the differences between the CRC LPA and the Modified LPA and what triggered those changes are included throughout this chapter in callout boxes titled, *What's changed with IBR?* If there is no callout box, there are no major changes from the CRC LPA. For additional detail on the changes, refer to Sections 2.5.1 and 2.5.2.

Development of the Modified LPA is described in Section 2.5, Development of the Modified LPA. This section summarizes the changes that have occurred since 2013 that prompted modifications in the design and highlights the differences between the CRC LPA and IBR Program Modified LPA.

Section 2.3, Modified LPA Construction, describes how the Modified LPA would be constructed. Section 2.4, No-Build Alternative, describes the No-Build Alternative, which serves as a baseline for evaluating environmental impacts. Section 2.5, Development of the Modified LPA, describes how design options for the Modified LPA were created and evaluated and the ways in which the Modified LPA differs from the CRC LPA. Section 2.6, Additional Compliance Underway, addresses additional regulatory compliance that is underway for the Modified LPA. Section 2.7, Anticipated Permits and Approvals, includes the federal, state, and local permits, clearances, and approvals that are anticipated to be required to construct the Modified LPA.

2.2 Components of the Modified LPA

The basic components of the Modified LPA include:

- A new pair of Columbia River bridges—one for northbound and one for southbound travel—built west of the existing bridge. The new bridges would each include three through lanes, safety shoulders, and one auxiliary lane (a ramp-to-ramp connection on the highway that improves interchange safety by providing drivers with more space and time to merge, diverge, and weave) in each direction. When all highway, transit, and active transportation would be moved to the new Columbia River bridges, the existing Interstate Bridge (both spans) would be removed.
  - Three bridge configurations are under consideration: (1) double-deck truss bridges with fixed spans, (2) single-level bridges with fixed spans, and (3) single-level bridges with movable spans over the primary navigation channel. The fixed-span configurations would provide up to 116 feet of vertical navigation clearance, and the movable-span configuration would provide 178 feet of vertical navigation clearance in the open position. The primary navigation channel would be relocated approximately 500 feet south (measured by channel centerline) of its existing location near the Vancouver shoreline.
  - A two auxiliary lane design option (two ramp-to-ramp lanes connecting interchanges) across the Columbia River is also being evaluated. The second auxiliary lane in each direction of I-5 would be added from approximately Interstate Avenue/Victory Boulevard to SR 500/39th Street.

- A 1.9-mile light-rail transit (LRT) extension of the current Metropolitan Area Express (MAX) Yellow Line from the Expo Center MAX Station in North Portland, where it currently ends, to a terminus near Evergreen Boulevard in Vancouver. Improvements would include new stations at Hayden Island, downtown Vancouver (Waterfront Station), and near Evergreen Boulevard (Evergreen Station), as well as revisions to the existing Expo Center MAX Station. Park and rides to serve LRT riders in Vancouver could be included near the Waterfront Station and Evergreen Station. The Tri-County Metropolitan Transportation District of Oregon (TriMet), which operates the MAX system, would also operate the Yellow Line extension.
  - Potential site options for park and rides include three sites near the Waterfront Station and two near the Evergreen Station (up to one park and ride could be built for each station location in Vancouver).
- Associated LRT improvements such as traction power substations, overhead catenary system, signal and communications support facilities, an overnight light-rail vehicle (LRV) facility at the Expo Center, 19 new LRVs, and an expanded maintenance facility at TriMet's Ruby Junction.
- Integration of local bus transit service, including bus rapid transit (BRT) and express bus routes, in addition to the proposed new LRT service.
- Wider shoulders on I-5 from Interstate Avenue/Victory Boulevard to SR 500/39th Street to accommodate express bus-on-shoulder service in each direction.
- Associated bus transit service improvements would include three additional bus bays for eight new electric double-decker buses at the Clark County Public Transit Benefit Area Authority (C-TRAN) operations and maintenance facility (see Section 2.2.7, Transit Operating Characteristics, for more information about this service).
- Improvements to seven I-5 interchanges and I-5 mainline improvements between Interstate Avenue/ Victory Boulevard in Portland and SR 500/39th Street in Vancouver. Some adjacent local streets would be reconfigured to complement the new interchange designs, and improve local east-west connections.
  - An option that shifts the I-5 mainline up to 40 feet westward in downtown Vancouver between the SR 14 interchange and Mill Plain Boulevard interchange is being evaluated.
  - An option that eliminates the existing C Street ramps in downtown Vancouver is being evaluated.
- Six new adjacent bridges across North Portland Harbor: one on the east side of the existing I-5 North Portland Harbor bridge and five on the west side or overlapping with the existing bridge (which would be removed). The bridges would carry (from west to east) LRT tracks, southbound I-5 off-ramp to Marine Drive, southbound I-5 mainline, northbound I-5 mainline, northbound I-5 on-ramp from Marine Drive, and an arterial bridge for local traffic with a shared-use path for pedestrians and bicyclists.
- A variety of improvements for people who walk, bike, and roll throughout the study area, including a system of shared-use paths, bicycle lanes, sidewalks, enhanced wayfinding, and facility improvements to comply with the Americans with Disabilities Act. These are referred to in this document as *active transportation* improvements.
- Variable-rate tolling for motorists using the river crossing as a demand-management and financing tool.

The transportation improvements proposed for the Modified LPA and the design options are shown in Figure 2-2. The Modified LPA includes all of the components listed above. If there are differences in environmental effects or benefits between the design options, those are identified in the relative Chapter 3 resources sections.

Figure 2-2. Modified LPA Components

Section 2.2.1, Interstate 5 Mainline, describes the overall configuration of the I-5 mainline through the study area, and Sections 2.2.2, Portland Mainland and Hayden Island (Subarea A), through Section 2.2.5, Upper Vancouver (Subarea D), provide additional detail on four geographic subareas (A through D), which are shown on Figure 2-3. In each subarea, improvements to I-5, its interchanges, and the local roadways are described first, followed by transit and active transportation improvements. Design options are described under separate headings in the subareas in which they would be located.

Table 2-2 shows the different combinations of design options analyzed in this Draft SEIS. However, **any combination of design options is compatible**. In other words, any of the bridge configurations could be combined with one or two auxiliary lanes, with or without the C Street ramps, a centered or westward shift of I-5 in downtown Vancouver, and any of the park-and-ride location options. Figures in each section show both the anticipated limit of ground disturbance, which includes disturbance from temporary construction activities, and the location of permanent infrastructure elements.

Figure 2-3. Modified LPA – Geographic Subareas

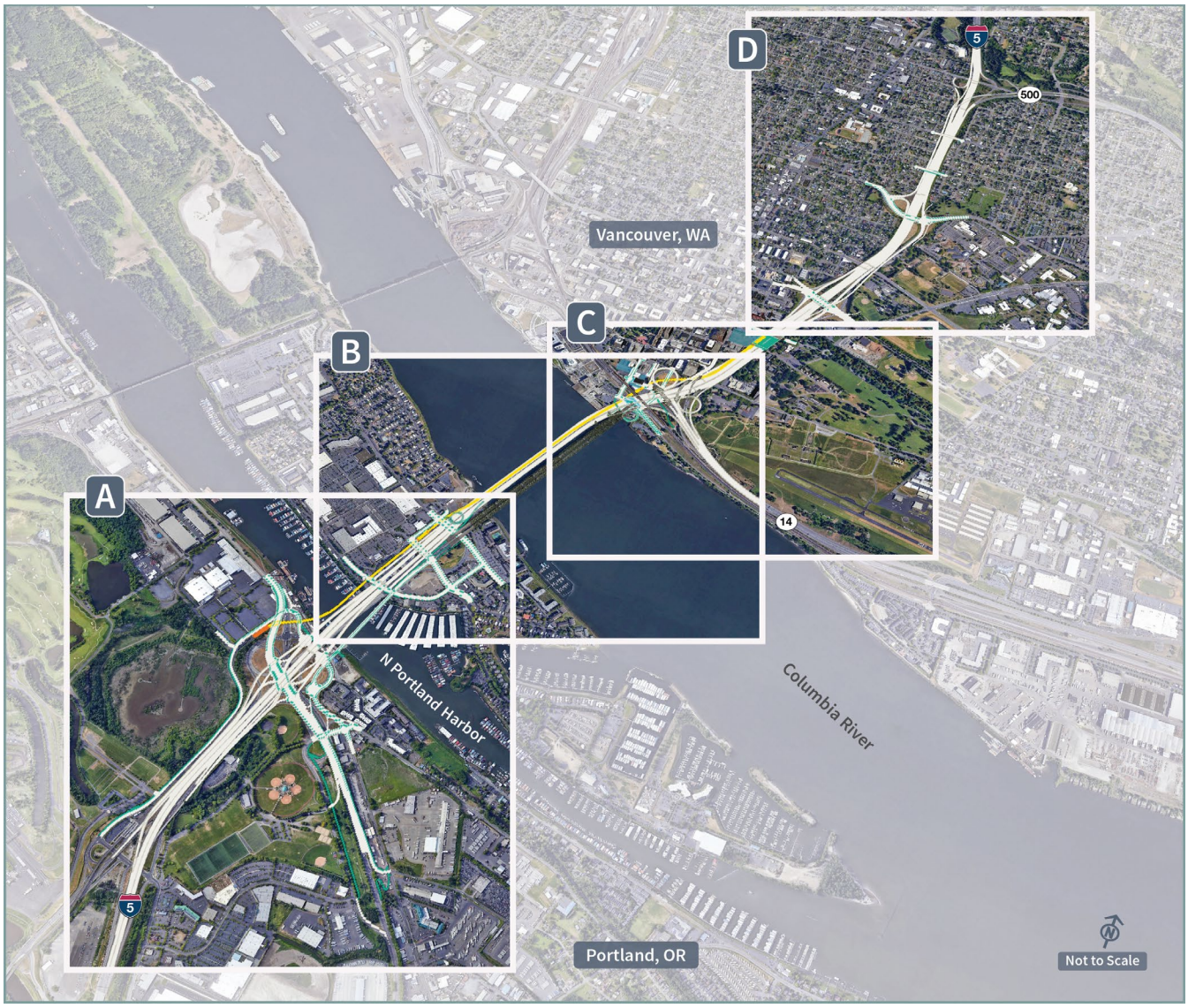


Table 2-2. Modified LPA and Design Options

Design Options	Modified LPA	Modified LPA with Two Auxiliary Lanes	Modified LPA Without C Street Ramps	Modified LPA with I-5 Shifted West	Modified LPA with a Single-Level Fixed-Span Configuration	Modified LPA with a Single-Level Movable-Span Configuration
Bridge Configuration	**Double-deck fixed-span**	Double-deck fixed-span	Double-deck fixed-span	Double-deck fixed-span	**Single-level fixed-span**	**Single-level movable-span**
Auxiliary Lanes	**One**	**Two**	One	One	One	One
C Street Ramps	**With C Street ramps**	With C Street ramps	**Without C Street Ramps**	With C Street ramps	With C Street ramps	With C Street ramps
I-5 Alignment	**Centered**	Centered	Centered	**Shifted West**	Centered	Centered

Design Options	Modified LPA	Modified LPA with Two Auxiliary Lanes	Modified LPA Without C Street Ramps	Modified LPA with I-5 Shifted West	Modified LPA with a Single-Level Fixed-Span Configuration	Modified LPA with a Single-Level Movable-Span Configuration
Park-and-Ride Options	**Waterfront**: 1. Columbia Way (below I-5); 2. Columbia Street/SR 14; 3. Columbia Street/Phil Arnold Way **Evergreen**: 1. Library Square; 2. Columbia Credit Union					

Bold text indicates which design option is different in each configuration.

2.2.1 Interstate 5 Mainline

Today, within the 5-mile corridor, I-5 has three 12-foot-wide through lanes in each direction, an approximately 6- to 11-foot-wide inside shoulder, and an approximately 10- to 12-foot-wide outside shoulder with the exception of the Interstate Bridge, which has approximately 2- to 3-foot-wide inside and outside shoulders. There are currently intermittent auxiliary lanes between the Victory Boulevard and Hayden Island interchanges in Oregon and between SR 14 and SR 500 in Washington.

What's changed with IBR?

In response to local agency policies and community priorities, the Modified LPA includes one auxiliary lane in each direction, whereas the CRC LPA had two. However, the Modified LPA does include a second auxiliary lane option from Interstate Avenue/Victory Boulevard to SR 500/39th Street that has the same alignment and lane configuration as the CRC LPA. Otherwise, the proposed configuration of the I-5 highway is similar between CRC and IBR.

The Modified LPA would include three 12-foot through lanes from Interstate Avenue/Victory Boulevard to SR 500/39th Street and a 12-foot auxiliary lane from the Marine Drive interchange to the Mill Plain Boulevard interchange in each direction. Many of the existing auxiliary lanes on I-5 between the SR 14 and Main Street interchanges in Vancouver would remain, although they would be reconfigured. The existing auxiliary lanes between the Victory Boulevard and Hayden Island interchanges would be replaced with changes to on- and off-ramps and interchange reconfigurations. The Modified LPA would also include wider shoulders (12-foot inside shoulders and 10- to 12-foot outside shoulders) to be consistent with ODOT and WSDOT design standards. The wider inside shoulder would be used by express bus service to bypass mainline congestion, known as "bus on shoulder" (refer to Section 2.2.7, Transit Operating Characteristics). The shoulder would be available for express bus service when general-purpose speeds are below 35 miles per hour (mph).

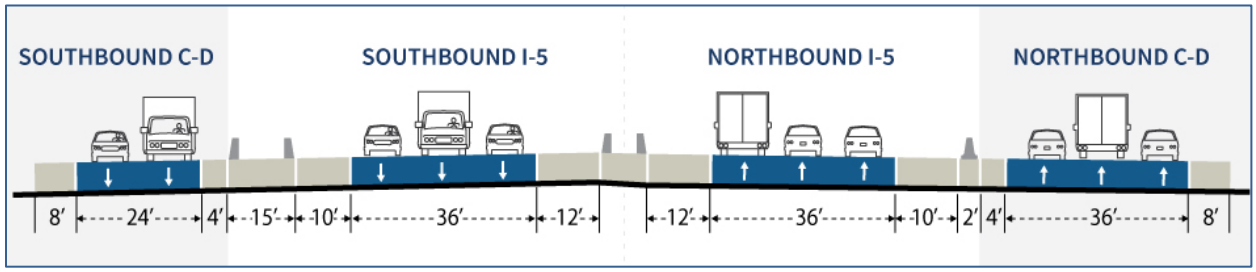
Figure 2-4 shows a cross section of the collector-distributor (C-D)[4] roadways, Figure 2-5 shows the location of the C-D roadways, and Figure 2-6 shows the proposed auxiliary lane layout. The existing Interstate Bridge over the Columbia River does not have an auxiliary lane; the Modified LPA would add one auxiliary lane in each direction across the new Columbia River bridges.

On I-5 northbound, the auxiliary lane that would begin at the on-ramp from Marine Drive would continue across the Columbia River bridge and end at the off-ramp to the C-D roadway, north of SR 14 (see Figure 2-5). The on-ramp from SR 14 westbound would join the off-ramp to the C-D roadway, forming the northbound C-D roadway between SR 14 and Fourth Plain Boulevard. The C-D roadway would provide access from I-5

[4] A collector-distributer roadway parallels and connects the main travel lanes of a highway and frontage roads or entrance ramps.

northbound to the off-ramps at Mill Plain Boulevard and Fourth Plain Boulevard. The C-D roadway would also provide access from SR 14 westbound to the off-ramps at Mill Plain Boulevard and Fourth Plain Boulevard, and to the on-ramp to I-5 northbound.

Figure 2-4. Cross Section of the Collector-Distributor Roadways



On I-5 northbound, the Modified LPA would also add one auxiliary lane beginning at the on-ramp from the C-D roadway and ending at the on-ramp from 39th Street, connecting to an existing auxiliary lane from 39th Street to the off-ramp at Main Street. Another existing auxiliary lane would remain between the on-ramp from Mill Plain Boulevard to the off-ramp to SR 500.

On I-5 southbound, the off-ramp to the C-D roadway would join the on-ramp from Mill Plain Boulevard to form a C-D roadway. The C-D roadway would provide access from I-5 southbound to the off-ramp to SR 14 eastbound and from Mill Plain Boulevard to the off-ramp to SR 14 eastbound and the on-ramp to I-5 southbound.

On I-5 southbound, an auxiliary lane would begin at the on-ramp from the C-D roadway and would continue across the southbound Columbia River bridge and end at the off-ramp to Marine Drive. The combined on-ramp from SR 14 westbound and C Street would merge into this auxiliary lane.

Two Auxiliary Lane Design Option

This design option would add a second 12-foot-wide auxiliary lane in each direction of I-5 with the intent to further optimize travel flow in the corridor. This second auxiliary lane is proposed from the Interstate Avenue/Victory Boulevard interchange to the SR 500/39th Street interchange.

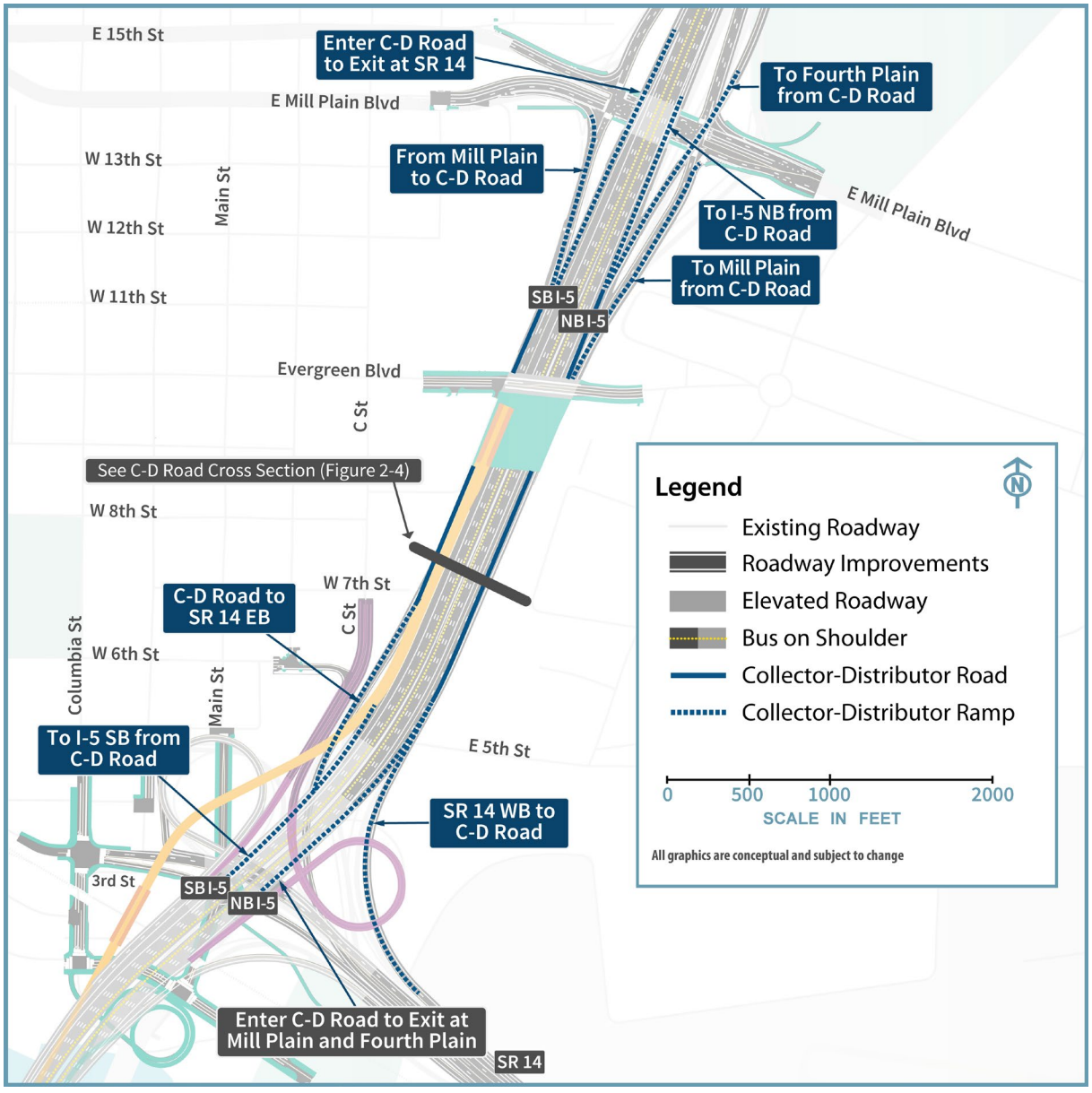
On I-5 northbound, one auxiliary lane would begin at the combined on-ramp from Interstate Avenue and Victory Boulevard, and a second auxiliary lane would begin at the on-ramp from Marine Drive. Both auxiliary lanes would continue across the northbound Columbia River bridge, and the on-ramp from Hayden Island would merge into the second auxiliary lane on the northbound Columbia River bridge. At the off-ramp to the C-D roadway, the second auxiliary lane would end but the first auxiliary lane would continue. A second auxiliary lane would begin again at the on-ramp from Mill Plain Boulevard. The second auxiliary lane would end at the off-ramp to SR 500, and the first auxiliary lane would connect to an existing auxiliary lane at 39th Street to the off-ramp at Main Street.

On I-5 southbound, two auxiliary lanes would begin at the on-ramp from SR 500. Between the on-ramp from Fourth Plain Boulevard and the off-ramp to Mill Plain Boulevard, one auxiliary lane would be added to the existing two auxiliary lanes. The second auxiliary lane would end at the off-ramp to the C-D roadway, but the first auxiliary lane would continue. A second auxiliary lane would begin again at the southbound I-5 on-ramp from the C-D roadway. Both auxiliary lanes would continue across the southbound Columbia River bridge, and the combined on-ramp from SR 14 westbound and C Street would merge into the second auxiliary lane on the southbound Columbia River bridge. The second auxiliary lane would end at the off-ramp to Marine Drive, and the first auxiliary lane would end at the combined off-ramp to Interstate Avenue and Victory Boulevard.

Figure 2-6 shows a comparison of the one auxiliary lane configuration and the two auxiliary lane configuration design options. Figure 2-7 shows a comparison of the footprints (i.e., the limit of permanent improvements) of

the one auxiliary lane and two auxiliary lane configurations on a double-deck fixed-span bridge. For all Modified LPA bridge configurations (described in Section 2.2.3), the footprints of the two auxiliary lane configurations differ only over the Columbia River and in downtown Vancouver. The rest of the corridor would have the same footprint. For all bridge configurations analyzed in this document, the two auxiliary lane option would add 16 feet (8 feet in each direction) in total roadway width compared to the one auxiliary lane option due to the increased shoulder widths for the one auxiliary lane option.[5] The traffic operations analysis incorporating both the one and two auxiliary lane design options applies equally to all bridge configurations in this Draft SEIS.

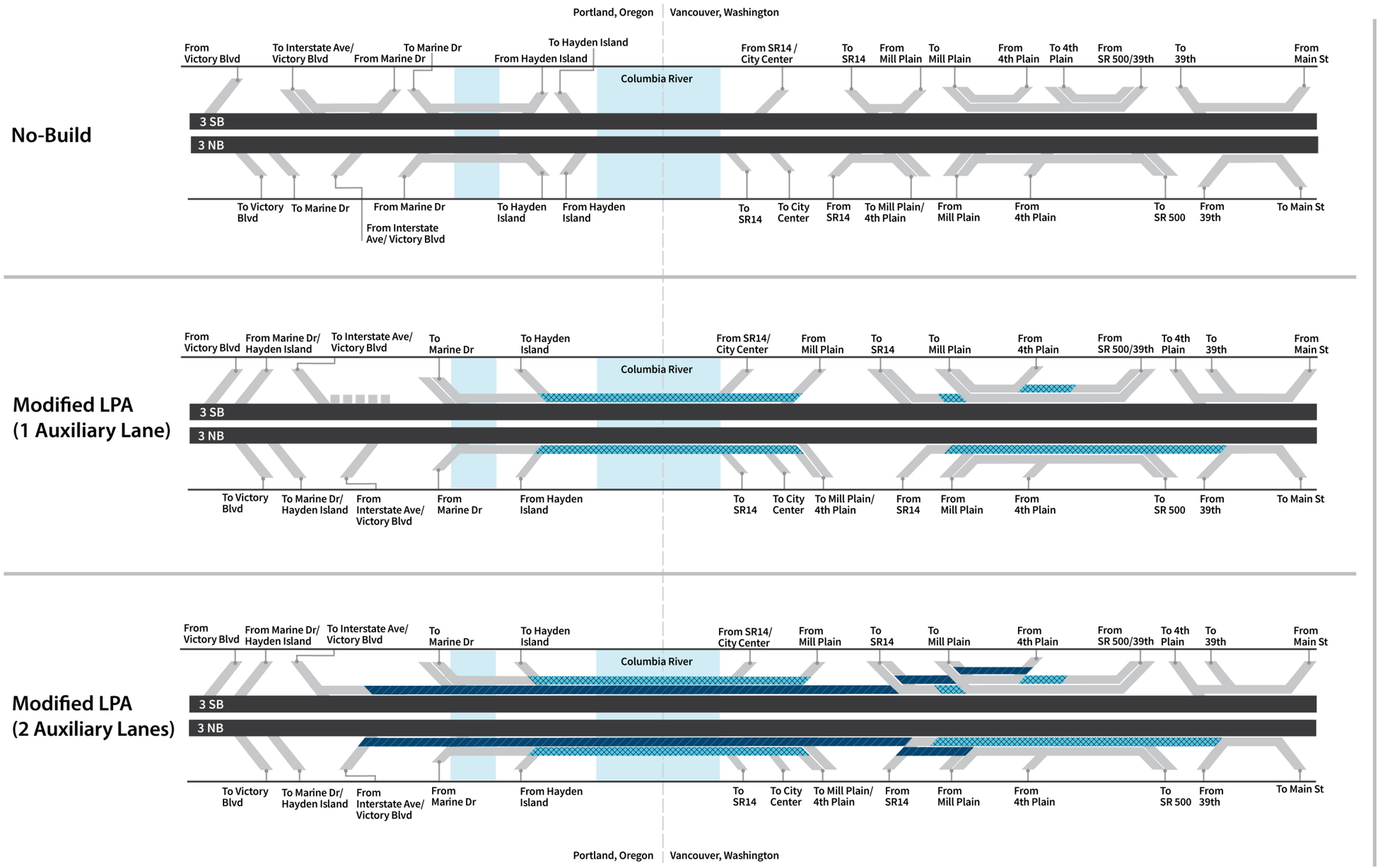
Figure 2-5. Collector-Distributor Roadways



C-D = collector-distributor; EB = eastbound; NB = northbound; SB = southbound; WB = westbound

[5] Under the one auxiliary lane option, the width of each shoulder would be approximately 14 feet to accommodate maintenance of traffic during construction. Under the two auxiliary lane option, maintenance of traffic could be accommodated with 12-foot shoulders because the additional 12-foot auxiliary lane provides adequate roadway width. The total difference in roadway width in each direction between the one auxiliary lane option and the two auxiliary lane option would be 8 feet (12-foot auxiliary lane – 2 feet from the inside shoulder – 2 feet from the outside shoulder = 8 feet).

Figure 2-6. Comparison of Auxiliary Lane Configurations



Each scenario has three through lanes in each direction

- Existing Through Lanes
- Interchange Ramps and Existing Auxiliary Lanes
- Existing Auxiliary Lanes Removed
- One Auxiliary Lane added in Modified LPA
- Second Auxiliary Lane added in Modified LPA

Notes:

Collector Distributor Lanes not shown.

The traffic operations analysis incorporating both the one and two auxiliary lane design option applies equally to all bridge configuration options in this Draft SEIS.

The C Street ramp (NB to City Center) is an option.

Figure is not to scale.

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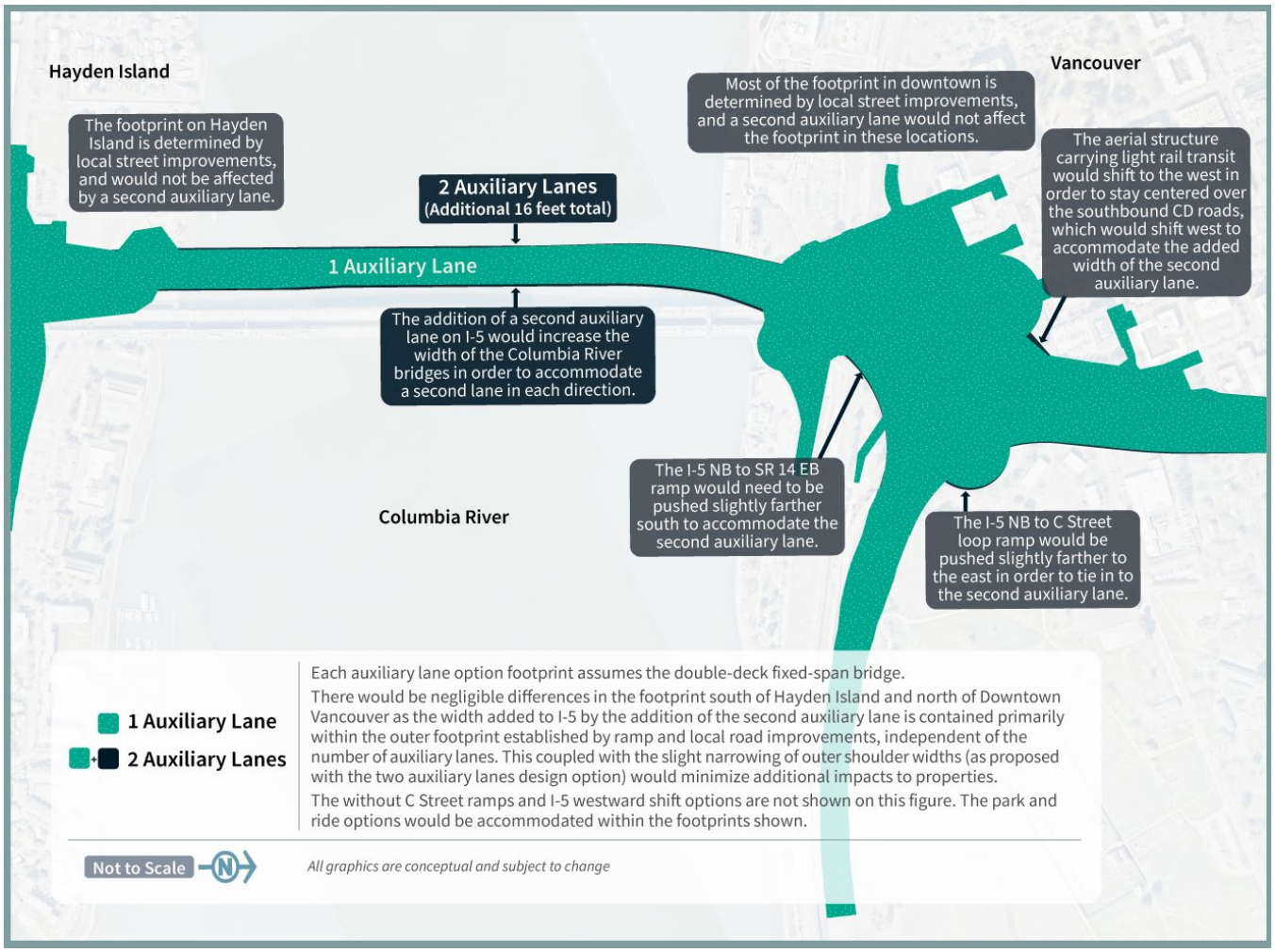
Figure 2-7. Auxiliary Lane Configuration Footprint Differences



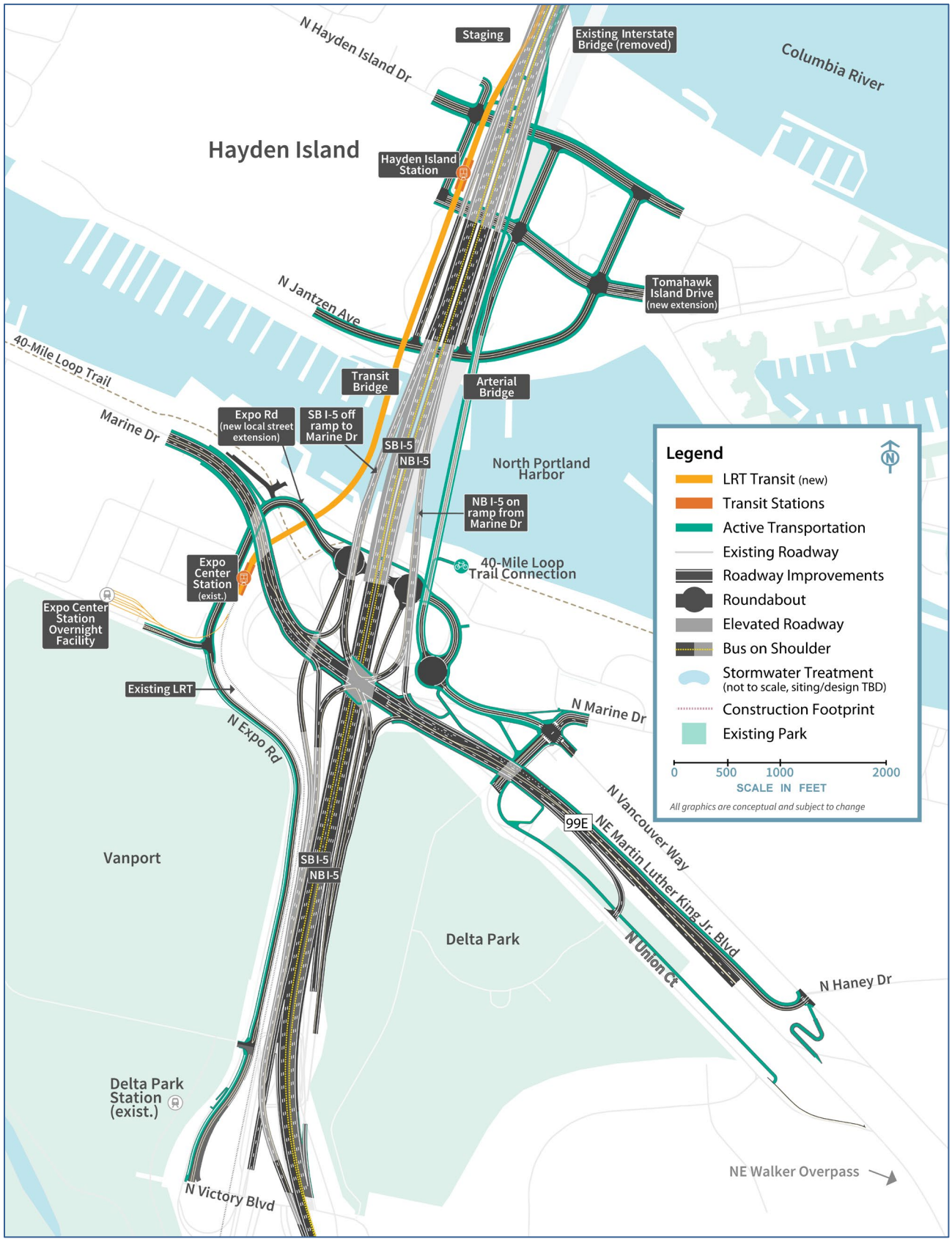
2.2.2 Portland Mainland and Hayden Island (Subarea A)

This section discusses the geographic Subarea A shown in Figure 2-3. See Figure 2-8 for highway and interchange improvements in Subarea A, including the North Portland Harbor bridge. Figure 2-8 illustrates the one auxiliary lane design option; please refer to Figure 2-6 and the accompanying description for how two auxiliary lanes would alter the Modified LPA's proposed design. Refer to Figure 2-3 for an overview of the geographic subareas.

Within Subarea A, the IBR Program has the potential to alter three federally authorized levee systems:

- The Oregon Slough segment of the Peninsula Drainage District Number 1 levee (PEN 1).
- The Oregon Slough segment of the Peninsula Drainage District Number 2 levee (PEN 2).
- The PEN1/PEN2 Cross Levee segment of the PEN 1 levee (Cross Levee).

Figure 2-8. Portland Mainland and Hayden Island (Subarea A)



LRT = light-rail transit; NB = northbound; SB = southbound; TBD = to be determined

The levee systems are shown on Figure 2-9, and intersections with Modified LPA components are described throughout Section 2.2.2, Portland Mainland and Hayden Island (Subarea A), where appropriate. Within Subarea A, the IBR Program study area intersects with PEN 1 to the west of I-5 and with PEN 2 to the east of I-5. PEN 1 and PEN 2 include a main levee along the south side of North Portland Harbor and are part of a combination of levees and floodwalls. PEN 1 and PEN 2 are separated by the Cross Levee that is intended to isolate the two districts if one of them fails. The Cross Levee is located along the I-5 mainline embankment, except in the Marine Drive interchange area where it is located on the west edge of the existing ramp from Marine Drive to southbound I-5.[6]

There are two concurrent efforts underway that are planning improvements to PEN1, PEN2, and the Cross Levee to reduce flood risk:

- The U.S. Army Corps of Engineers (USACE) Portland Metro Levee System (PMLS) project.
- The Flood Safe Columbia River (FSCR) program (also known as "Levee Ready Columbia").

The Urban Flood Safety and Water Quality District (UFSWQD)[7] is working with the USACE through the PMLS project, which includes improvements at PEN 1 and PEN 2 (e.g., raising these levees to elevation 38 feet North American Vertical Datum of 1988 [NAVD 88]).[8] Additionally, as part of the FSCR program, UFSWQD is studying raising a low spot in the Cross Levee on the southwest side of the Marine Drive interchange.

What's changed with IBR?

The Portland Metro Levee System (PMLS) project initiated in 2019 and Flood Safe Columbia River (FSCR) program was established in 2013, after the CRC LPA. There have been no changes to the CRC LPA at the request of the PMLS project or the FSCR program. There will be continued coordination throughout the design phase to ensure acceptable tie-ins to the existing levee system and levee modifications proposed by PMLS.

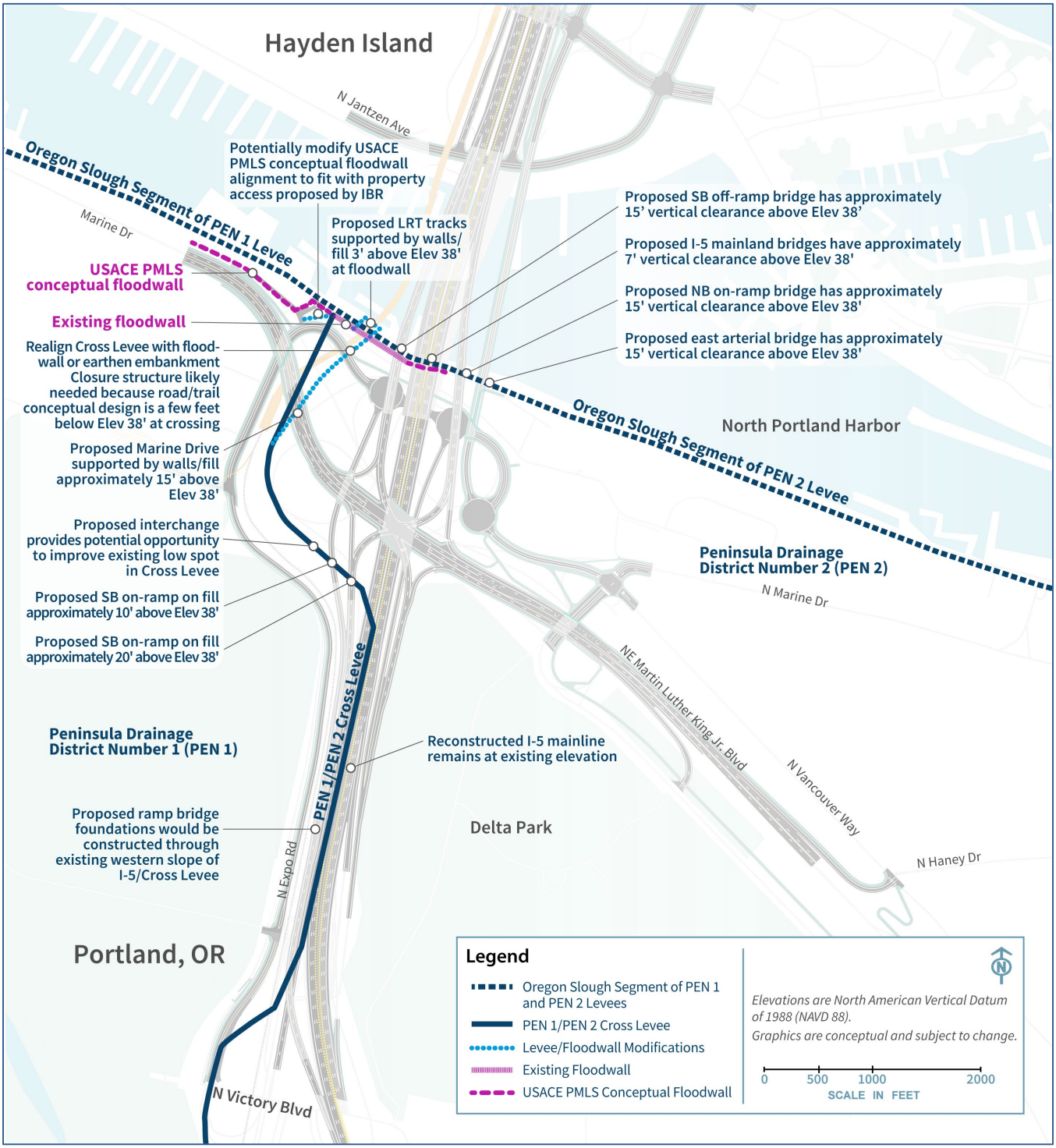
The IBR Program is in close coordination with these concurrent efforts to ensure that the IBR Program's design efforts consider the timing and scope of the PMLS and the FSCR proposed modifications. The intersection of the IBR Program proposed actions to both the existing levee configuration and the anticipated future condition based on the proposed PMLS and FSCR projects are described below, where appropriate.

[6] The portion of the original Denver Avenue levee alignment within the Marine Drive interchange area is no longer considered part of the levee system by UFSWQD.

[7] UFSWQD includes PEN 1 and PEN 2, Urban Flood Safety and Water Quality District No. 1, and the Sandy Drainage Improvement Company.

[8] NAVD 88 is a vertical control datum (reference point) used by federal agencies for surveying.

Figure 2-9. Levee Systems in Subarea A



Highways, Interchanges, and Local Roadways

Victory Boulevard/Interstate Avenue Interchange Area

The southern extent of the Modified LPA would improve two ramps at the Victory Boulevard/Interstate Avenue interchange (see Figure 2-8). The first ramp improvement would be the southbound I-5 off-ramp to Victory Boulevard/ Interstate Avenue; this off-ramp would be braided below (i.e., grade separated or pass below) the Marine Drive to the I-5 southbound on-ramp (see the Marine Drive Interchange Area section below). The other ramp improvement would lengthen the merge distance for northbound traffic entering I-5 from Victory Boulevard and from Interstate Avenue.

The existing I-5 mainline between Victory Boulevard/Interstate Avenue and Marine Drive is part of the Cross Levee (see Figure 2-9). The Modified LPA would require some pavement reconstruction of the mainline in this area; however, the improvements would mostly consist of pavement overlay and the profile and footprint would be similar to existing conditions.

What's changed with IBR?

The Victory Boulevard/Interstate Avenue interchange design is similar to the CRC LPA, except that the IBR Modified LPA on-ramp to northbound I-5 and southbound off-ramp from I-5 would merge and diverge directly from I-5 versus starting or ending the auxiliary lanes. This modification was a result of revising the design to include a one auxiliary lane option in addition to a two auxiliary lane option.

Marine Drive Interchange Area

The next interchange north of the Victory Boulevard/Interstate Avenue interchange is at Marine Drive. All movements within this interchange would be reconfigured to reduce congestion for motorists entering and exiting I-5. The new configuration would be a single-point urban interchange. The new interchange would be centered over I-5 versus on the west side under existing conditions. See Figure 2-8 for the Marine Drive interchange's layout and construction footprint.

The Marine Drive to I-5 southbound on-ramp would be braided over I-5 southbound to the Victory Boulevard/Interstate Avenue off-ramp. Martin Luther King Jr. Boulevard would have a new more direct connection to I-5 northbound.

What's changed with IBR?

Both the Modified LPA and CRC LPA include a single-point interchange at Marine Drive; however, due to changes in agency priorities, the Modified LPA does not include a planned future phase to replace the Marine Drive eastbound to I-5 north ramp with a directional flyover ramp that would bypass the traffic signal at the interchange that was included in the CRC LPA.

The new interchange configuration would change the westbound Marine Drive and westbound Vancouver Way connections to Martin Luther King Jr. Boulevard. An improved connection farther east of the interchange (near Haney Street) would provide access to westbound Martin Luther King Jr. Boulevard for these two streets. For eastbound travelers on Martin Luther King Jr. Boulevard exiting to Union Court, the existing loop connection would be replaced with a new connection farther east (near the access to the East Delta Park Owens Sports Complex).

Expo Road from Victory Boulevard to the Expo Center would be reconstructed with improved active transportation facilities. North of the Expo Center, Expo Road would be extended under Marine Drive and continue under I-5 to the east, connecting with Marine Drive and Vancouver Way through three new connected roundabouts. The westernmost roundabout would connect the new local street extension to I-5 southbound. The middle roundabout would connect the I-5 northbound off-ramp to the local street extension. The easternmost roundabout would connect the new local street extension to an arterial bridge crossing North Portland Harbor to Hayden Island. This roundabout would also connect the local street extension to Marine Dr and Vancouver Way.

To access Hayden Island using the arterial bridge from the east on Martin Luther King Jr. Boulevard, motorists would exit Martin Luther King Jr. Boulevard at the existing off-ramp to Vancouver Way just west of the Walker Street overpass. Then motorists would travel west on Vancouver Way, through the intersection with Marine Drive and straight through the roundabout to the arterial bridge.

From Hayden Island, motorists traveling south to Portland via Martin Luther King Jr. Boulevard would turn onto the arterial bridge southbound and travel straight through the roundabout onto Vancouver Way. At the intersection of Vancouver Way and Marine Drive, motorists would turn right onto Union Court and follow the existing road southeast to the existing on-ramp onto Martin Luther King Jr. Boulevard.

The conceptual floodwall alignment from the proposed USACE PMLS project is located on the north side of Marine Drive, near two industrial properties, with three proposed closure structures[9] for property access. The Modified LPA would realign Marine Drive to the south and provide access to the two industrial properties via the new local road extension from Expo Road. Therefore, the change in access for the two industrial properties could require small modifications to the floodwall alignment (a potential shift of 5 to 10 feet to the south) and closure structure locations.

Marine Drive and the two southbound on-ramps would travel over the Cross Levee approximately 10 to 20 feet above the proposed elevation of the improved levee, and they would be supported by fill and retaining walls near an existing low spot in the Cross Levee.

The I-5 southbound on-ramp from Marine Drive would continue on a new bridge structure. Although the bridge's foundation locations have not been determined yet, they would be constructed through the western slope of the Cross Levee (between the existing I-5 mainline and the existing light-rail).

North Portland Harbor Bridges

To the north of the Marine Drive interchange is the Hayden Island interchange area, which is shown in Figure 2-8. I-5 crosses over the North Portland Harbor when traveling between these two interchanges. The Modified LPA proposes to replace the existing I-5 bridge spanning North Portland Harbor to improve seismic resiliency.

Six new parallel bridges would be built across the waterway under the Modified LPA: one on the east side of the existing I-5 North Portland Harbor bridge and five on the west side or overlapping the location of the existing bridge (which would be removed). From west to east, these bridges would carry:

- The LRT tracks.
- The southbound I-5 off-ramp to Marine Drive.
- The southbound I-5 mainline.
- The northbound I-5 mainline.
- The northbound I-5 on-ramp from Marine Drive.

What's changed with IBR?

The Modified LPA design for crossing North Portland Harbor includes six new bridges spanning the harbor. The CRC LPA would have included five bridges but proposed to reuse the existing highway bridge to accommodate northbound and southbound mainline I-5 traffic while adding four new bridges to carry the LRT tracks, local traffic, and ramps from I-5 to and from the Marine Drive interchange.

The passage of time, the age of the existing bridge, and the structural integrity of the existing bridge were key in the proposal to replace the I-5 mainline bridges rather than retrofit them. The current proposal to replace the North Portland Harbor I-5 highway bridge created an opportunity for the IBR Program to straighten the alignment of the Columbia River bridges, which reduces impacts.

[9] Levee closure structures are put in place at openings along the embankment/floodwall to provide flood protection during high water conditions.

- An arterial bridge between the Portland mainland and Hayden Island for local traffic; this bridge would also include a shared-use path for pedestrians and bicyclists.

Each of the six replacement North Portland Harbor bridges would be supported on foundations constructed of 10-foot-diameter drilled shafts. Concrete columns would rise from the drilled shafts and connect to the superstructures of the bridges. All new structures would have at least as much vertical navigation clearance over North Portland Harbor as the existing North Portland Harbor bridge.

Compared to the existing bridge, the two new I-5 mainline bridges would have a similar vertical clearance of approximately 7 feet above the proposed height of the improved levees (elevation 38 feet NAVD 88). The two ramp bridges and the arterial bridge would have approximately 15 feet of vertical clearance above the proposed height of the levees. The foundation locations for the five roadway bridges have not been determined at this stage of design, but some foundations could be constructed through landward or riverward levee slopes.

Hayden Island Interchange Area

All traffic movements for the Hayden Island interchange would be reconfigured. See Figure 2-8 for a layout and construction footprint of the Hayden Island interchange. A half-diamond interchange would be built on Hayden Island with a northbound I-5 on-ramp from Jantzen Drive and a southbound I-5 off-ramp to Jantzen Drive. This would lengthen the ramps and improve merging/diverging speeds compared to the existing substandard ramps that require acceleration and deceleration in a short distance. The I-5 mainline would be partially elevated and partially located on fill across the island.

There would not be a southbound I-5 on-ramp or northbound I-5 off-ramp on Hayden Island. Connections to Hayden Island for those movements would be via the local access (i.e., arterial) bridge connecting North Portland to Hayden Island (Figure 2-10). Vehicles traveling northbound on I-5 wanting to access Hayden Island would exit with traffic going to the Marine Drive interchange, cross under Martin Luther King Jr. Boulevard to the new roundabout at the Expo Road local street extension, travel east through this roundabout to the easternmost roundabout, and use the arterial bridge to cross North Portland Harbor. Vehicles on Hayden Island looking to enter I-5 southbound would use the arterial bridge to cross North Portland Harbor, cross under I-5 using the new Expo Road local street extension to the westernmost roundabout, cross under Marine Drive, merge with the Marine Drive southbound on-ramp, and merge with I-5 southbound south of Victory Boulevard.

What's changed with IBR?

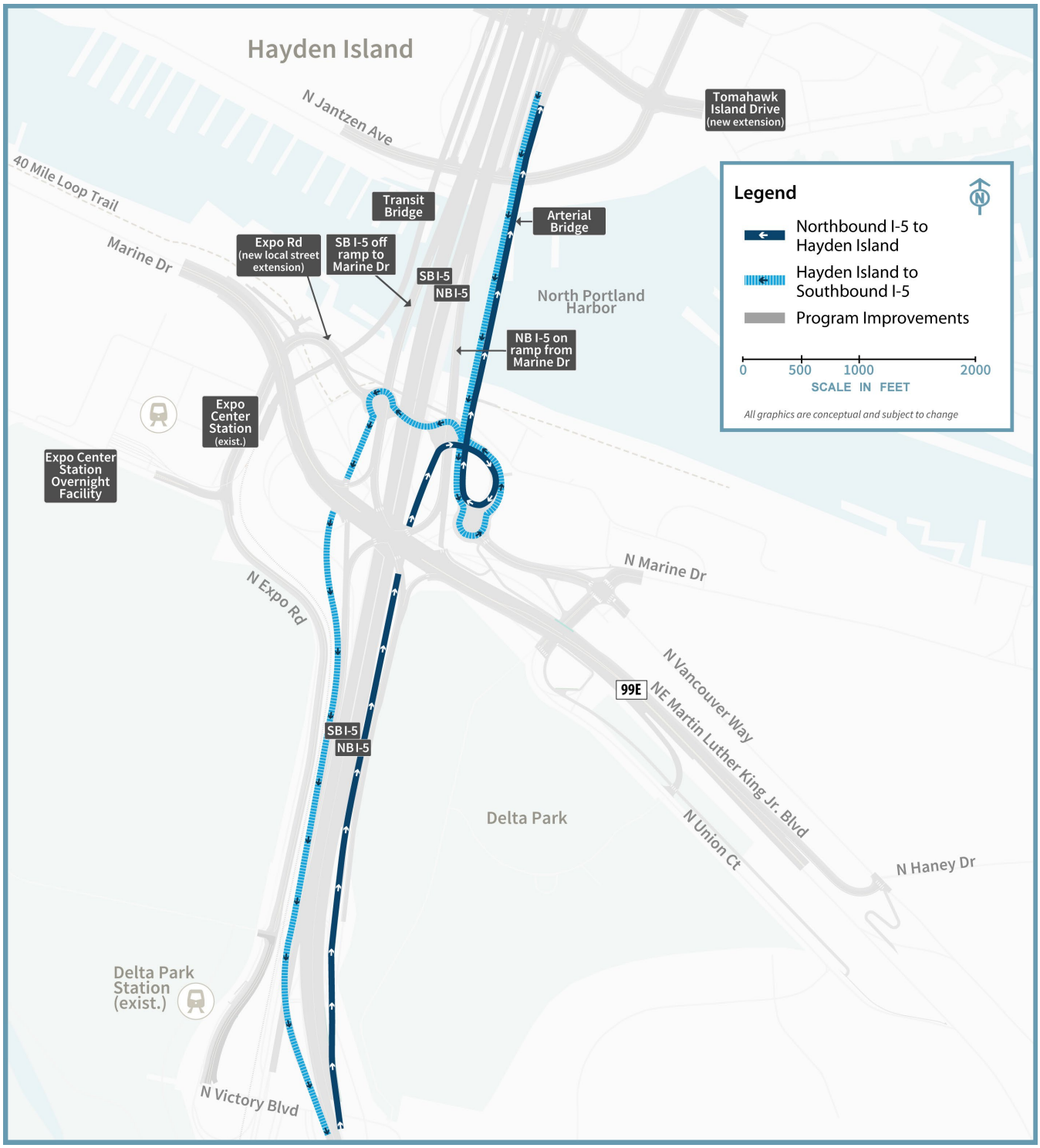
In response to local agency policies and community priorities, the IBR Program identified design modifications that could reduce the footprint (and associated impacts) on Hayden Island. Section 2.5.3, IBR Design Option Development and Screening, describes the screening process used to select design modifications. The Modified LPA includes a half-diamond interchange on Hayden Island, with an off-ramp from southbound I-5 and an on-ramp to northbound I-5 instead of the CRC LPA's proposed full interchange in a split tight-diamond configuration with access to and from both directions of I-5. With the Modified LPA, vehicles traveling between Hayden Island and the Portland mainland would use the new arterial bridge across North Portland Harbor.

Because of the modification to the Hayden Island interchange, local roadways on Hayden Island would also be configured somewhat differently in the Modified LPA than in the CRC LPA.

Improvements to Jantzen Avenue may include additional left-turn and right-turn lanes at the interchange ramp terminals and active transportation facilities. Improvements to Hayden Island Drive would include new connections to the new arterial bridge over North Portland Harbor. The existing I-5 northbound and southbound access points from Hayden Island Drive would also be removed. A new extension of Tomahawk

Island Drive would travel east-west through the middle of Hayden Island and under the I-5 interchange, thus improving connectivity across I-5 on the island.

Figure 2-10. Vehicle Circulation between Hayden Island and the Portland Mainland



NB = northbound; SB = southbound

Transit

A new light-rail alignment for northbound and southbound trains would be constructed within Subarea A (see Figure 2-8) to extend from the existing Expo Center MAX Station over North Portland Harbor to a new station at Hayden Island. An overnight LRV facility would be constructed on the southeast corner of the Expo Center property (see Figure 2-8) to provide storage for trains during hours when MAX is not in service. This facility is described in Section 2.2.6, Transit Support Facilities. The existing Expo Center MAX Station would be modified to remove the westernmost track and platform. Other platform modifications, including track realignment and regrading the station, are anticipated to transition to the extension alignment. This may require reconstruction of the operator break facility, signal/communication buildings, and traction power substations. Immediately north of the Expo Center MAX Station, the alignment would curve east toward I-5, pass beneath Marine Drive, cross the proposed Expo Road local street extension and the 40-Mile Loop Trail at grade, then rise over the existing levee onto a light-rail bridge to cross North Portland Harbor. On Hayden Island, proposed transit components include northbound and southbound LRT tracks over Hayden Island; the tracks would be elevated at approximately the height of the new I-5 mainline. An elevated LRT station would also be built on the island immediately west of I-5. The light-rail alignment would extend north on Hayden Island along the western edge of I-5 before transitioning onto the lower level of the new double-deck western bridge over the Columbia River (see Figure 2-8). For the single-level configurations, the light-rail alignment would extend to the outer edge of the western bridge over the Columbia River.

After crossing the new local road extension from Expo Road, the new light-rail track would cross over the main levee (see Figure 2-9). The light-rail profile is anticipated to be approximately 3 feet above the improved levees at the existing floodwall (and improved floodwall), and the tracks would be constructed on fill supported by retaining walls above the floodwall. North of the floodwall, the light-rail tracks would continue onto the new light-rail bridge over North Portland Harbor (as described above).

The Modified LPA's light-rail extension would be close to or would cross the north end of the Cross Levee. The IBR Program would realign the Cross Levee to the east of the light-rail alignment to avoid the need for a closure structure on the light-rail alignment. This realigned Cross Levee would cross the new local road extension. A closure structure may be required because the current proposed roadway is a few feet lower than the proposed elevation of the improved levee.

Active Transportation

In the Victory Boulevard interchange area (see Figure 2-8), active transportation facilities would be provided along Expo Road between Victory Boulevard and the Expo Center; this would provide a direct connection between the Victory Boulevard and Marine Drive interchange areas, as well as links to the Delta Park and Expo Center MAX Stations.

What's changed with IBR?

The Modified LPA would modify the alignment of the CRC LPA shared-use path to connect to other planned active transportation projects in the area (e.g., the 40-Mile Loop Trail, the two-way cycle track on Fourth Plain).

New shared-use path connections throughout the Marine Drive interchange area would provide access between the Bridgeton neighborhood (on the east side of I-5), Hayden Island, and the Expo Center MAX Station. There would also be connections to the existing portions of the 40-Mile Loop Trail, which runs north of Marine Drive under I-5 through the interchange area. The path would continue along the extension of Expo Road under the interchange to the intersection of Marine Drive and Vancouver Way, where it would connect under Martin Luther King Jr. Boulevard to Delta Park.

East of the Marine Drive interchange, new shared-use paths on Martin Luther King Jr. Boulevard and on the parallel street, Union Court, would connect travelers to Marine Drive and across the arterial bridge to Hayden

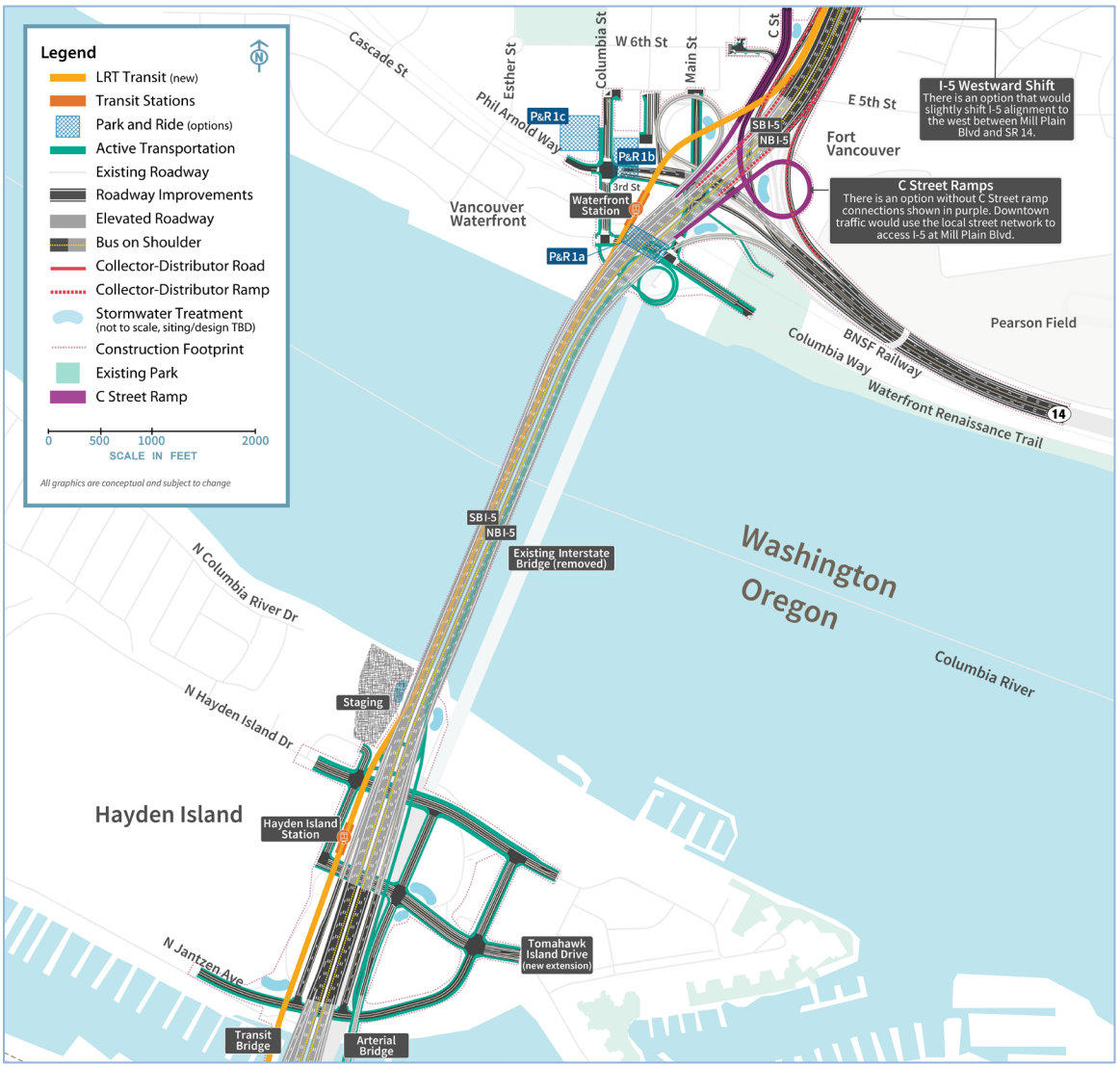
Island. The shared-use facilities on Martin Luther King Jr. Boulevard would provide westbound and eastbound cyclists and pedestrians with off-street crossings of the interchange and would also provide connections to both the Expo Center MAX Station and the 40-Mile Loop Trail to the west.

The new arterial bridge over North Portland Harbor would include a shared-use path for pedestrians and bicyclists (see Figure 2-8). On Hayden Island, pedestrian and bicycle facilities would be provided on Jantzen Avenue, Hayden Island Drive, and Tomahawk Island Drive. The shared-use path on the arterial bridge would continue along the arterial bridge to the south side of Tomahawk Island Drive. A parallel, elevated path from the arterial bridge would continue adjacent to I-5 across Hayden Island and cross above Tomahawk Island Drive and Hayden Island Drive to connect to the lower level of the new double-deck eastern bridge or the outer edge of the new single-level eastern bridge over the Columbia River. A ramp down to the north side of Hayden Island Drive would be provided from the elevated path.

2.2.3 Columbia River Bridges (Subarea B)

This section discusses the geographic Subarea B shown in Figure 2-3. See Figure 2-11 for highway and interchange improvements in Subarea B. Refer to Figure 2-3 for an overview of the geographic subareas.

Figure 2-11. Columbia River Bridges (Subarea B)



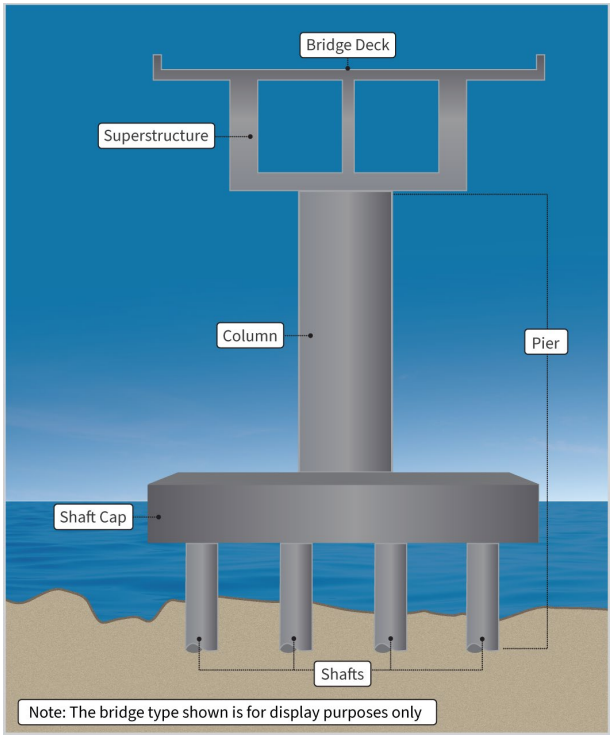
Highways, Interchanges, and Local Roadways

The two existing parallel I-5 bridges that cross the Columbia River would be replaced by two new parallel bridges, located west of the existing bridges (see Figure 2-11). The new eastern bridge would accommodate northbound highway traffic and a shared-use path. The new western bridge would carry southbound traffic and two-way light-rail tracks. Whereas the existing bridges each have three lanes with no shoulders, each of the two new bridges would be wide enough to accommodate three through lanes, one or two auxiliary lanes, and shoulders on both sides of the highway. Lanes and shoulders would be built to full design standards.

As with the existing bridge (Figure 2-13), the new Columbia River bridges would provide three navigation channels: a primary navigation channel and two barge channels (see Figure 2-14). The current location of the primary navigation channel is near the Vancouver shoreline where the existing lift spans are located. Under the Modified LPA, the primary navigation channel would be shifted south approximately 500 feet (measured by channel centerlines), and the existing center barge channel would shift north and become the north barge channel. The new primary navigation channel would be 400 feet wide (this width includes a 300-foot congressionally or USACE-authorized channel plus a 50-foot channel maintenance buffer on each side of the authorized channel) and the two barge channels would also each be 400 feet wide.

The existing Interstate Bridge has nine in-water pier sets,[10] whereas the new Columbia River bridges (any bridge configuration) would be built on six in-water pier sets, plus multiple piers on land (pier locations are shown on Figure 2-14). Each in-water pier set would be supported by a foundation of drilled shafts; each group of shafts would be tied together with a concrete shaft cap. Columns or pier walls would rise from the shaft caps and connect to the superstructures of the bridges (see Figure 2-12).

Figure 2-12. Bridge Foundation Concept



Bridge Configurations

Three bridge configurations are being considered: (1) double-deck fixed-span (with one bridge type), (2) a single-level fixed-span (with three potential bridge types), and (3) a single-level movable-span (with one bridge type). Both the double-deck and single-level fixed-span configurations would provide 116 feet of vertical navigation clearance at their respective highest spans; the same as the CRC LPA. The CRC LPA included a double-deck fixed-span bridge configuration. The single-level fixed-span configuration was developed and is being considered as part of the IBR Program in response to physical and contextual changes (i.e., design and operational considerations) since 2013 that necessitated examination of a refinement in the double-deck bridge configuration (e.g., ingress and egress of transit from the lower level of the double-deck fixed-span configuration on the north end of the southbound bridge).

[10] A pier set consists of the pier supporting the northbound bridge and the pier supporting the southbound bridge at a given location.

Consideration of the single-level movable-span configuration as part the IBR Program was necessitated by the U.S. Coast Guard's (USCG) review of the Program's navigation impacts on the Columbia River and issuance of a Preliminary Navigation Clearance Determination (PNCD) (USCG 2022). The USCG PNCD set the preliminary vertical navigation clearance recommended for the issuance of a bridge permit at 178 feet; this is the current vertical navigation clearance of the Interstate Bridge.

What's changed with IBR?

The CRC LPA included a double-deck fixed-span bridge configuration. The single-level fixed-span configuration was developed for the Modified LPA in response to physical and contextual changes (i.e., design and operational considerations) that necessitated examination of LRT ingress and egress of transit from the lower level of the double-deck fixed-span configuration on the north end of the southbound bridge.

The single-level movable-span configuration was developed to provide up to 178 feet VNC as recommended by the USCG in the Preliminary Navigation Clearance Determination (USCG 2022).

The IBR Program is carrying forward the three bridge configurations to address changed conditions, including changes in the USCG bridge permitting process, in order to ensure a permittable bridge configuration is within the range of options considered in the SEIS. The IBR Program continues to refine the details supporting navigation impacts and is coordinating closely with the USCG to determine how a fixed-span bridge may be permittable. Although the fixed-span configurations do not comply with the current USCG PNCD, they do meet the Purpose and Need and provide potential improvements to traffic (passenger vehicle and freight), transit, and active transportation operations. Additional discussion on pending actions to obtain authorizations from USCG and USACE for the Columbia River bridges' vertical and horizontal clearances and primary navigation channel location, including discussion with river users potentially affected by the fixed-span bridges, are described in Section 2.6, Additional Compliance Underway.

Each of the bridge configurations assumes one auxiliary lane; two auxiliary lanes could be applied to any of the bridge configurations. All typical sections for the one auxiliary lane option would provide 14-foot shoulders to maintain traffic during construction of the Modified LPA and future maintenance.

Figure 2-13. Existing Navigation Clearances of the Interstate Bridge

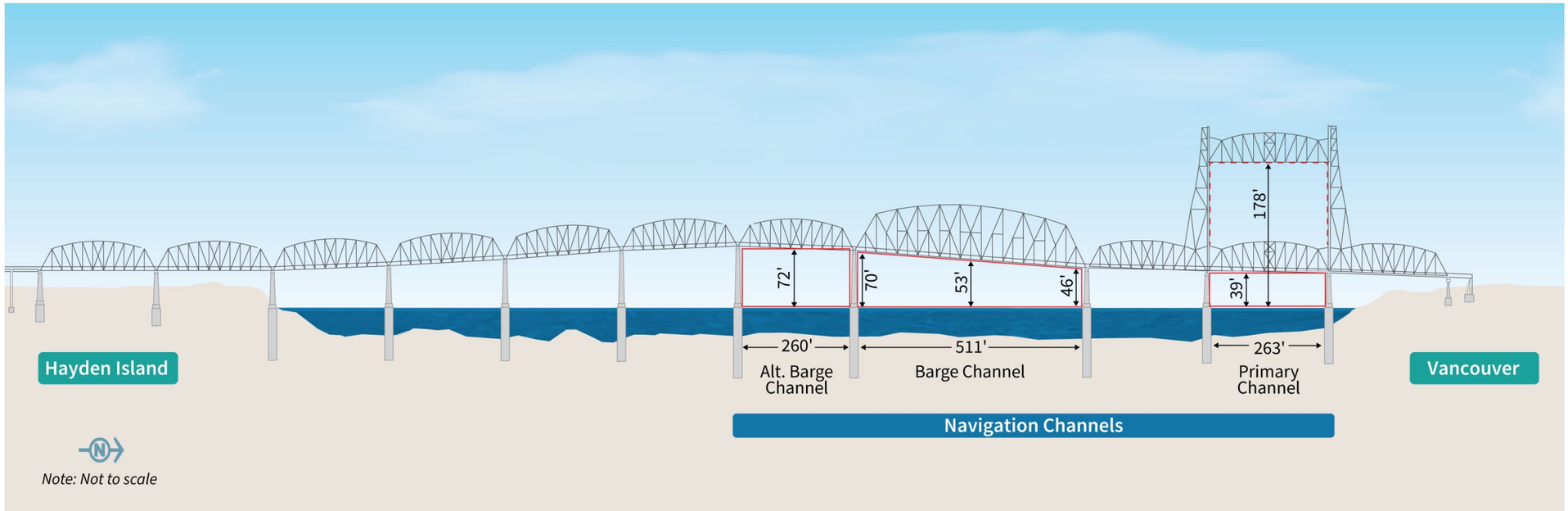
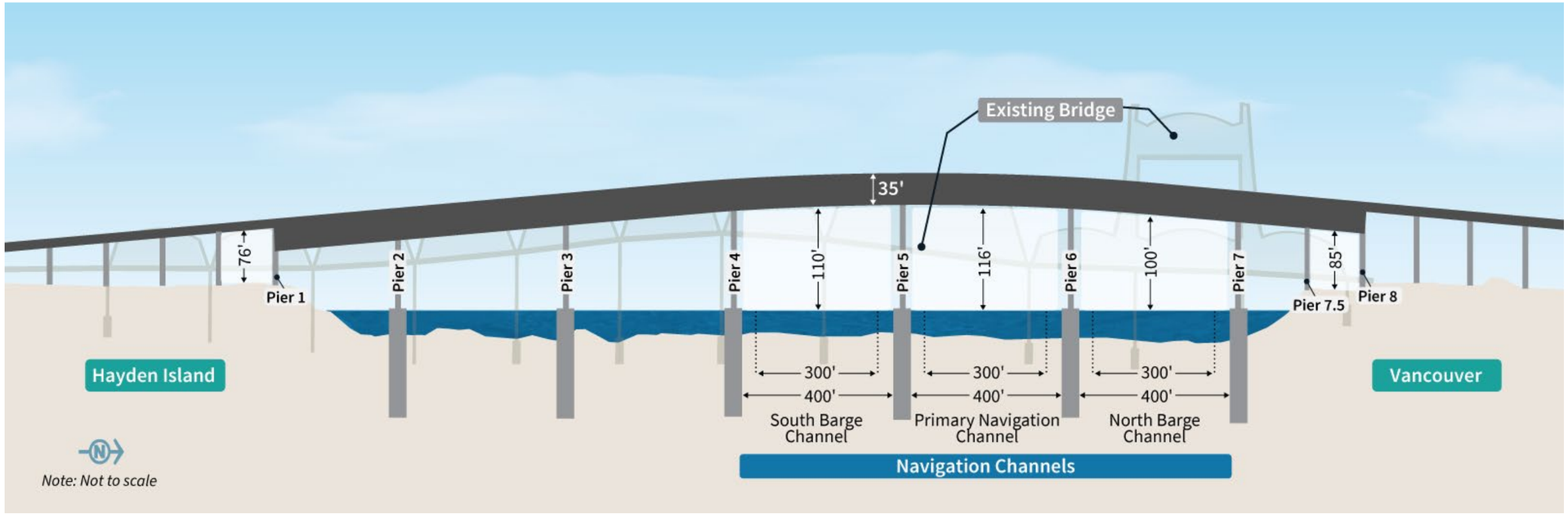


Figure 2-14. Profile and Navigation Clearances of the Proposed Modified LPA Columbia River Bridges with a Double-Deck Fixed-Span Configuration



Note: The location and widths of the proposed navigation channels would be same for all bridge configuration and bridge type options. The three navigation channels would each be 400 feet wide (this width includes a 300-foot congressionally or USACE-authorized channel (shown in dotted lines) plus a 50-foot channel maintenance buffer on each side of the authorized channel). The vertical navigation clearance would vary.

Double-Deck Fixed-Span Configuration

The double-deck fixed-span configuration would be two side-by-side, double-deck, fixed-span steel truss bridges. Figure 2-15 is an example of this configuration (this image is subject to change and is shown as a representative concept; it does not depict the final design). The double-deck fixed-span configuration would provide 116 feet of vertical navigation clearance for river traffic using the primary navigation channel and 400 feet of horizontal navigation clearance at the primary navigation channel, as well as barge channels. This bridge height would not impede takeoffs and landings by aircraft using Pearson Field or Portland International Airport.

The eastern bridge would accommodate northbound highway traffic on the upper level and the shared-use path and utilities on the lower level. The western bridge would carry southbound traffic on the upper level and two-way light-rail tracks on the lower level. Each bridge deck would be 79 feet wide, with a total out-to-out width of 173 feet.[11]

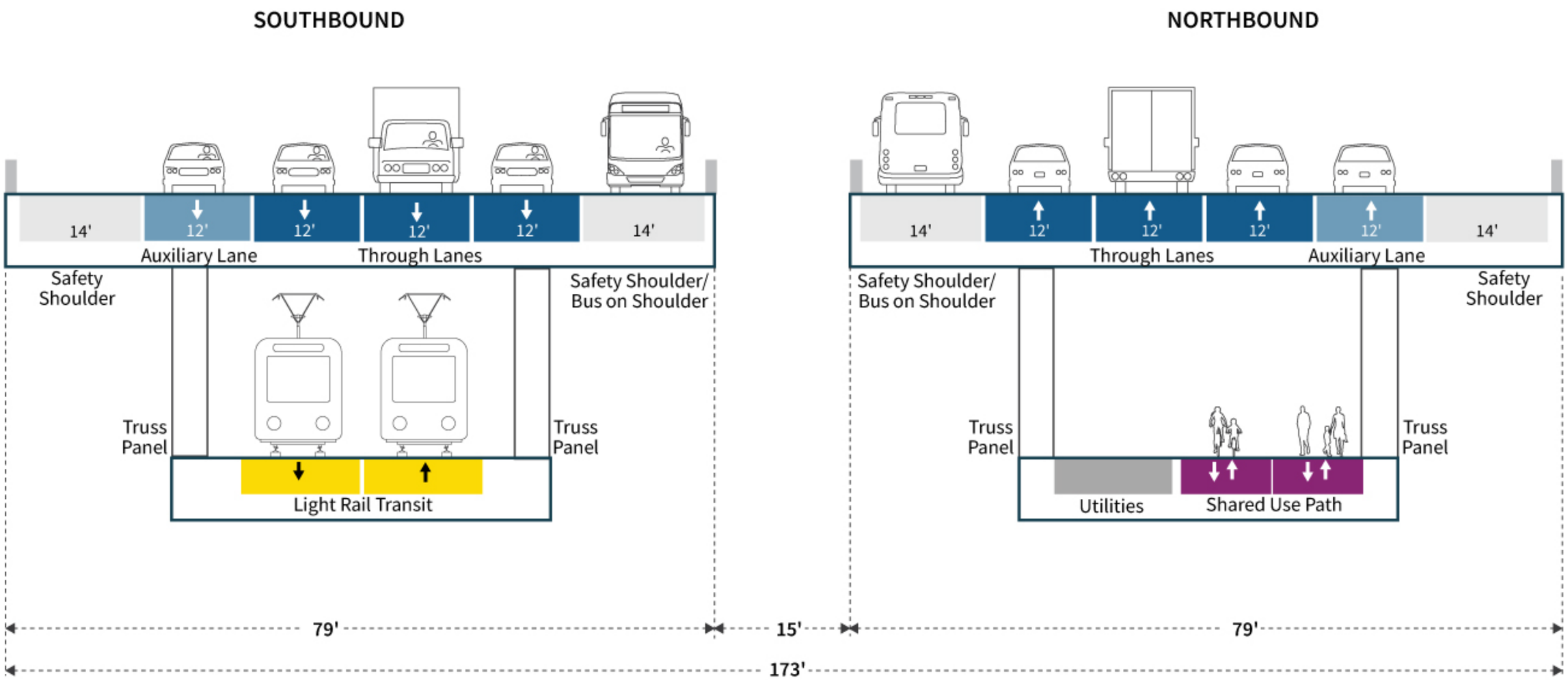
Figure 2-15. Conceptual Drawing of a Double-Deck Fixed-Span Configuration

Note: Visualization is looking southwest from Vancouver.

Figure 2-16 is a cross section of the two parallel double-deck bridges. Like all bridge configurations, the double-deck fixed-span configuration would have six in-water pier sets. Each pier set would require 12 in-water drilled shafts, for a total of 72 in-water drilled shafts. Each individual shaft cap would be approximately 50 feet by 85 feet. This bridge configuration would have a 3.8% maximum grade on the Oregon side of the bridge and a 4% maximum grade on the Washington side.

[11] "Out-to-out width" is the measurement between the outside edges of the bridge across its width at the widest point.

Figure 2-16. Cross Section of the Double-Deck Fixed-Span Configuration



Single-Level Fixed-Span Configuration

The single-level fixed-span configuration would have two side-by-side, single-level, fixed-span steel or concrete bridges. This SEIS considers three single-level fixed-span bridge type options: a girder bridge, an extradosed bridge, and a finback bridge. The description in this section applies to all three bridge types (unless otherwise indicated). Conceptual examples of each of these options are shown on Figure 2-17. These images are subject to change and do not represent final design.

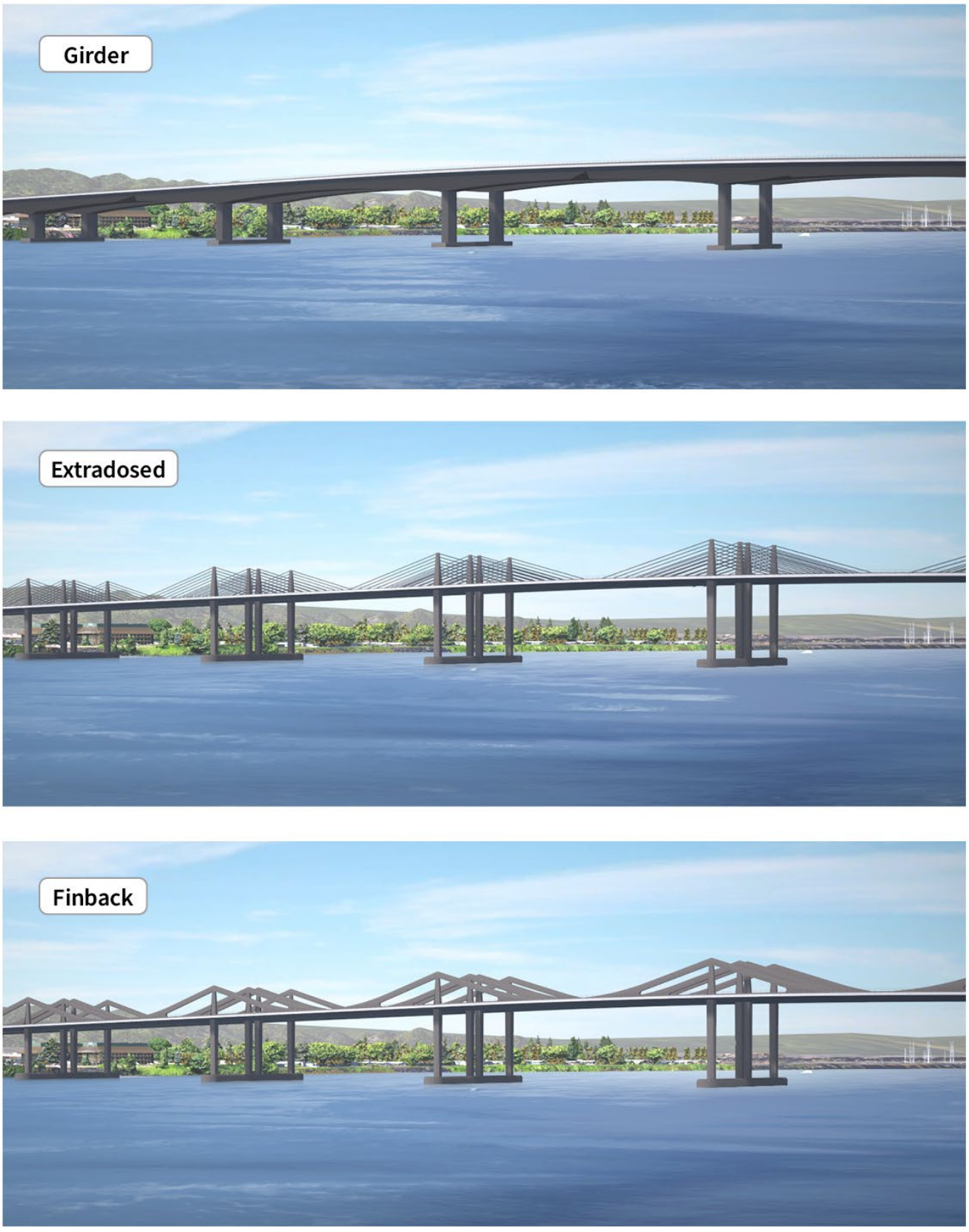
This configuration would provide 116 feet of vertical navigation clearance for river traffic using the primary navigation channel and 400 feet of horizontal navigation clearance at the primary navigation channel, as well as barge channels. This bridge height would not impede takeoffs and landings by aircraft using Pearson Field or Portland International Airport.

The eastern bridge would accommodate northbound highway traffic and the shared-use path; the bridge deck would be 104 feet wide. The western bridge would carry southbound traffic and two-way light-rail tracks; the bridge deck would be 113 feet wide. The I-5 highway, light-rail tracks, and the shared-use path would be on the same level across the two bridges, instead of being divided between two levels with the double-deck configuration. The total out-to-out width of the single-level fixed-span configuration (extradosed or finback options) would be 272 feet at its widest point, approximately 99 feet wider than the double-deck configuration. The total out-to-out width of the single-level fixed-span configuration (girder option) would be 232 feet at its widest point. Figure 2-18 shows a typical cross section of the single-level configuration. This cross section is a representative example of an extradosed or finback bridge as shown by the 10-foot-wide superstructure above the bridge deck; the girder bridge would not have the 10-foot-wide bridge columns shown on Figure 2-18.

There would be six in-water pier sets with 16 in-water drilled shafts on each combined shaft cap, for a total of 96 in-water drilled shafts. The combined shaft caps for each pier set would be 50 feet by 230 feet.

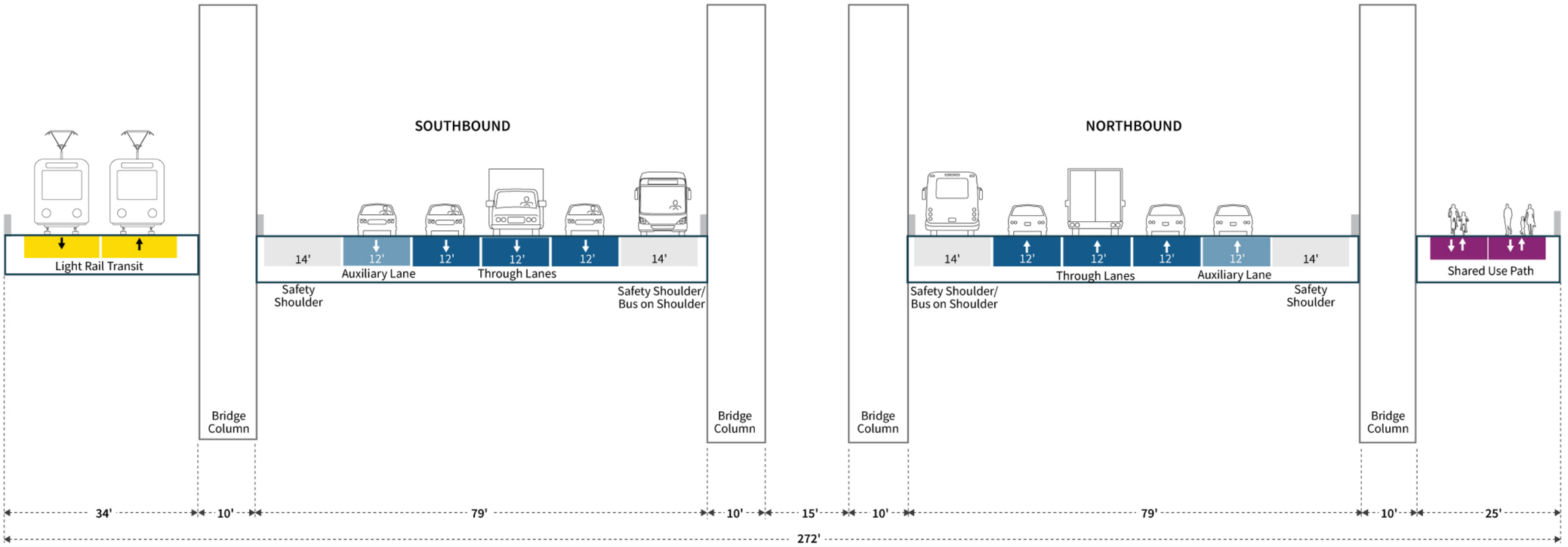
This bridge configuration would have a 3% maximum grade on both the Oregon and Washington sides of the bridge.

Figure 2-17. Conceptual Drawings of Single-Level Fixed-Span Bridge Types



Note: Visualizations are for illustrative purposes only. They do not reflect property impacts or represent final design. Visualization is looking southwest from Vancouver.

Figure 2-18. Cross Section of the Single-Level Fixed-Span Configuration (Extradosed or Finback Bridge Types)



Note: The cross section for a girder type bridge would be the same except that it would not have the four 10-foot bridge columns making the total out-to-out width 232 feet.

Single-Level Movable-Span Configuration

The single-level movable-span configuration would have two side-by-side, single-level steel girder bridges with movable spans between Piers 5 and 6. For the purpose of this Draft SEIS, the IBR Program assessed a vertical lift movable-span configuration with counterweights based on the analysis in the *River Crossing Bridge Clearance Assessment Report – Movable-Span Options,* included as part of Attachment C in Appendix D, Design Options Development, Screening, and Evaluation Technical Report. A conceptual example of a vertical lift-span bridge is shown in Figure 2-19. These images are subject to change and do not represent final design.

A movable span must be located on a straight and flat bridge section (i.e., without curvature and with minimal slope). To comply with these requirements, and for the bridge to maintain the highway, transit, and active transportation connections on Hayden Island and in Vancouver while minimizing property acquisitions and displacements, the movable span is proposed to be located 500 feet south of the existing lift span, between Piers 5 and 6. To accommodate this location of the movable span, the IBR Program is coordinating with USACE to obtain authorization to change the location of the primary navigation channel, which currently aligns with the Interstate Bridge lift spans near the Washington shoreline.

The single-level movable-span configuration would provide 92 feet of vertical navigation clearance over the proposed relocated primary navigation channel when the movable spans are in the closed position, with 99 feet of vertical navigation clearance available over the north barge channel. The 92-foot vertical clearance is based on achieving a straight, movable span and maintaining an acceptable grade for transit operations. In addition, it satisfies the requirement of a minimum of 72 feet of vertical navigation clearance (the existing Interstate Bridge's maximum clearance over the alternate (southernmost) barge channel when the existing lift span is in the closed position).

In the open position, the movable span would provide 178 feet of vertical navigation clearance over the proposed relocated primary navigation channel.

Similar to the fixed-span configurations, the movable span would provide 400 feet of horizontal navigation clearance for the primary navigation channel and for each of the two barge channels.

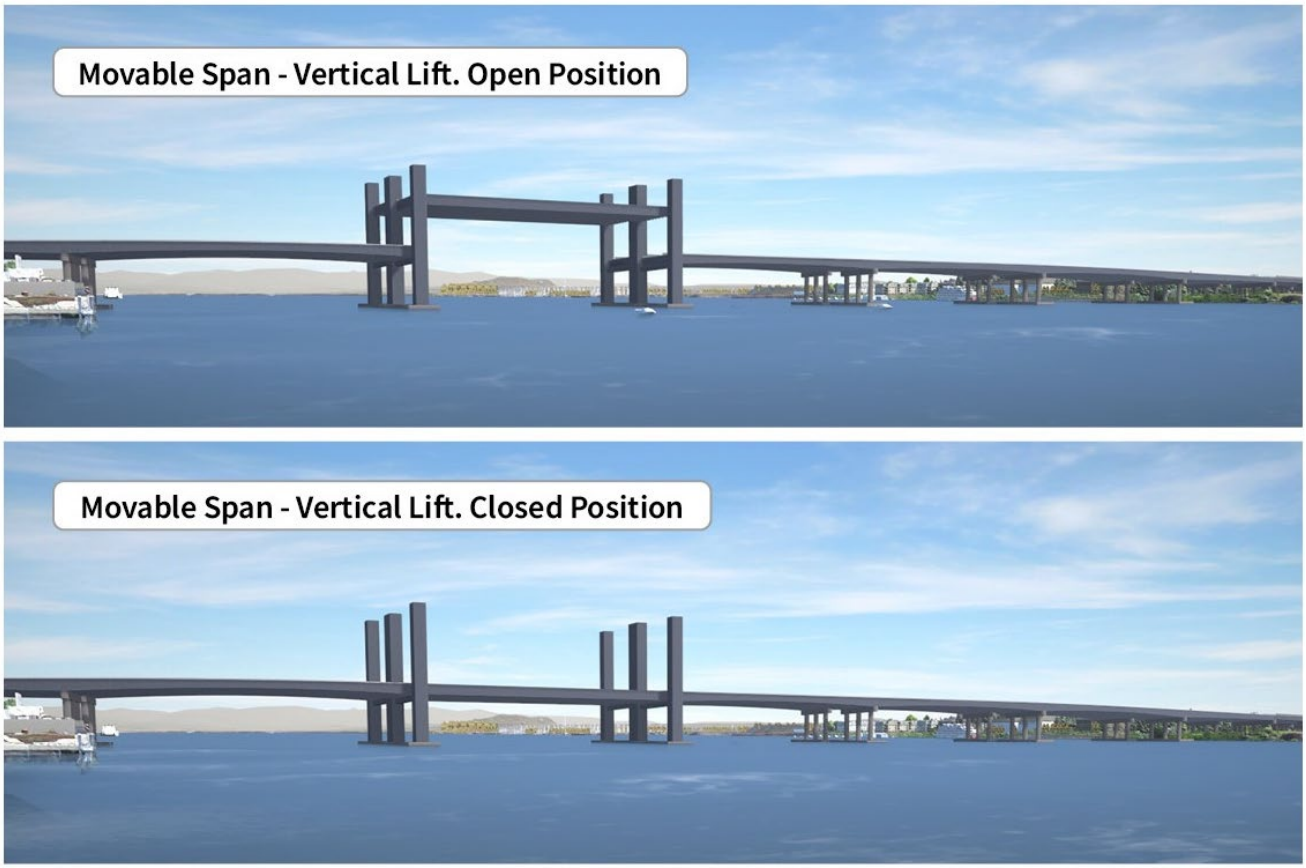
The vertical lift-span towers would be approximately 243 feet high; this is shorter than the existing lift-span towers, which are 247 feet high. This height of the vertical lift-span towers would not impede takeoffs and landings by aircraft using Portland International Airport. At Pearson Field, the Federal Aviation Administration issues obstacle departure procedures to avoid the existing Interstate Bridge lift towers; the single-level movable-span configuration would retain the same procedures.

Similar to the single-level fixed-span configuration, the eastern bridge would accommodate northbound highway traffic and the shared-use path, and the western bridge would carry southbound traffic and two-way light-rail tracks. The I-5 highway, light-rail tracks, and shared-use path would be on the same level across the bridges instead of on two levels as with the double-deck configuration. Cross sections of the single-level movable-span configuration are shown in Figure 2-20; the top cross section depicts the vertical lift spans (Piers 5 and 6), and the bottom cross section depicts the fixed spans (Piers 2, 3, 4, and 7). The movable and fixed cross sections are slightly different because the movable span requires lift towers, which are not required for the other fixed spans of the bridges.

There would be six in-water pier sets and two piers on land per bridge. The vertical lift span would have 22 in-water drilled shafts each for Piers 5 and 6; the shaft caps for these piers would be 50 feet by 312 feet to accommodate the vertical lift spans. Piers 2, 3, 4, and 7 would have 16 in-water drilled shafts each; the shaft caps for these piers would be the same as for the fixed-span options (50 feet by 230 feet). The vertical lift-span configuration would have a total of 108 in-water drilled shafts.

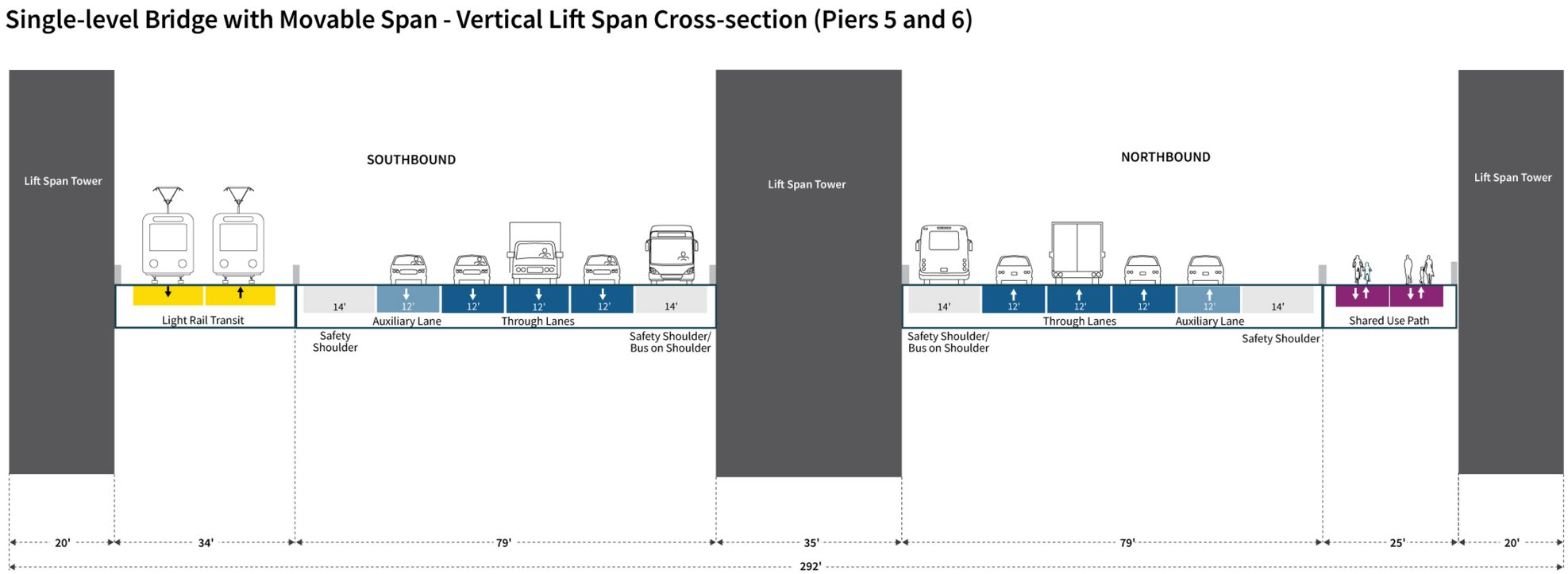
This single-level movable-span configuration would have a 3% maximum grade on the Oregon side of the bridge and a 1.5% maximum grade on the Washington side.

Figure 2-19. Conceptual Drawings of Single-Level Movable-Span Configurations in the Closed and Open Positions

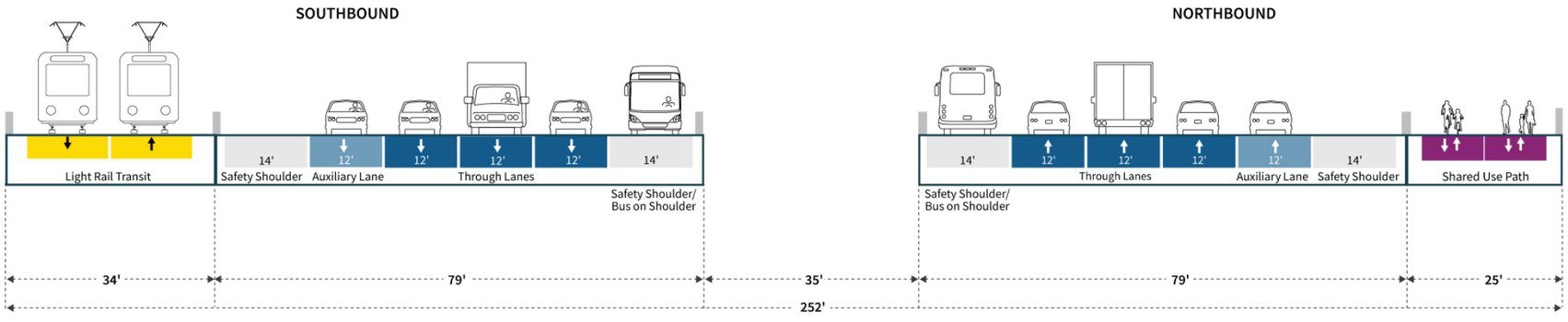


Note: Visualizations are for illustrative purposes only. They do not reflect property impacts or represent final design. Visualization is looking southeast (upstream) from Vancouver.

Figure 2-20. Cross Section of the Single-Level Movable-Span Bridge Type



Single-level Bridge with Movable Span - Fixed Spans Cross-section (Piers 2, 3, 4, and 7)



Summary of Bridge Configurations

This section summarizes and compares each of the bridge configurations. Table 2-3 lists the key considerations for each configuration. Figure 2-21 compares each configuration's footprint. The footprints of each configuration would differ in only three locations: over the Columbia River and at the bridge landings on Hayden Island and Vancouver. The rest of the I-5 corridor would have the same footprint. Over the Columbia River, the footprint of the double-deck fixed-span configuration would be 173 feet wide. Comparatively, the finback or extradosed bridge types of the single-level fixed-span configuration would be 272 feet wide (approximately 99 feet wider), and the single-level fixed-span configuration with a girder bridge type would be 232 feet wide (approximately 59 feet wider). The single-level movable-span configuration would be 252 feet wide (approximately 79 feet wider than the double-deck fixed-span configuration), except at Piers 5 and 6, where larger bridge foundations would require an additional 40 feet of width to support the movable span. The single-level configurations would have a wider footprint at the bridge landings on Hayden Island and Vancouver because transit and active transportation would be located adjacent to the highway, rather than below the highway in the double-deck option.

Figure 2-22 compares the basic profile of each configuration. The lower deck of the double-deck fixed-span and the single-level fixed-span configuration would have similar profiles. The single-level movable-span configuration would have a lower profile than the fixed-span configurations when the span is in the closed position.

Figure 2-21. Bridge Configuration Footprint Comparison

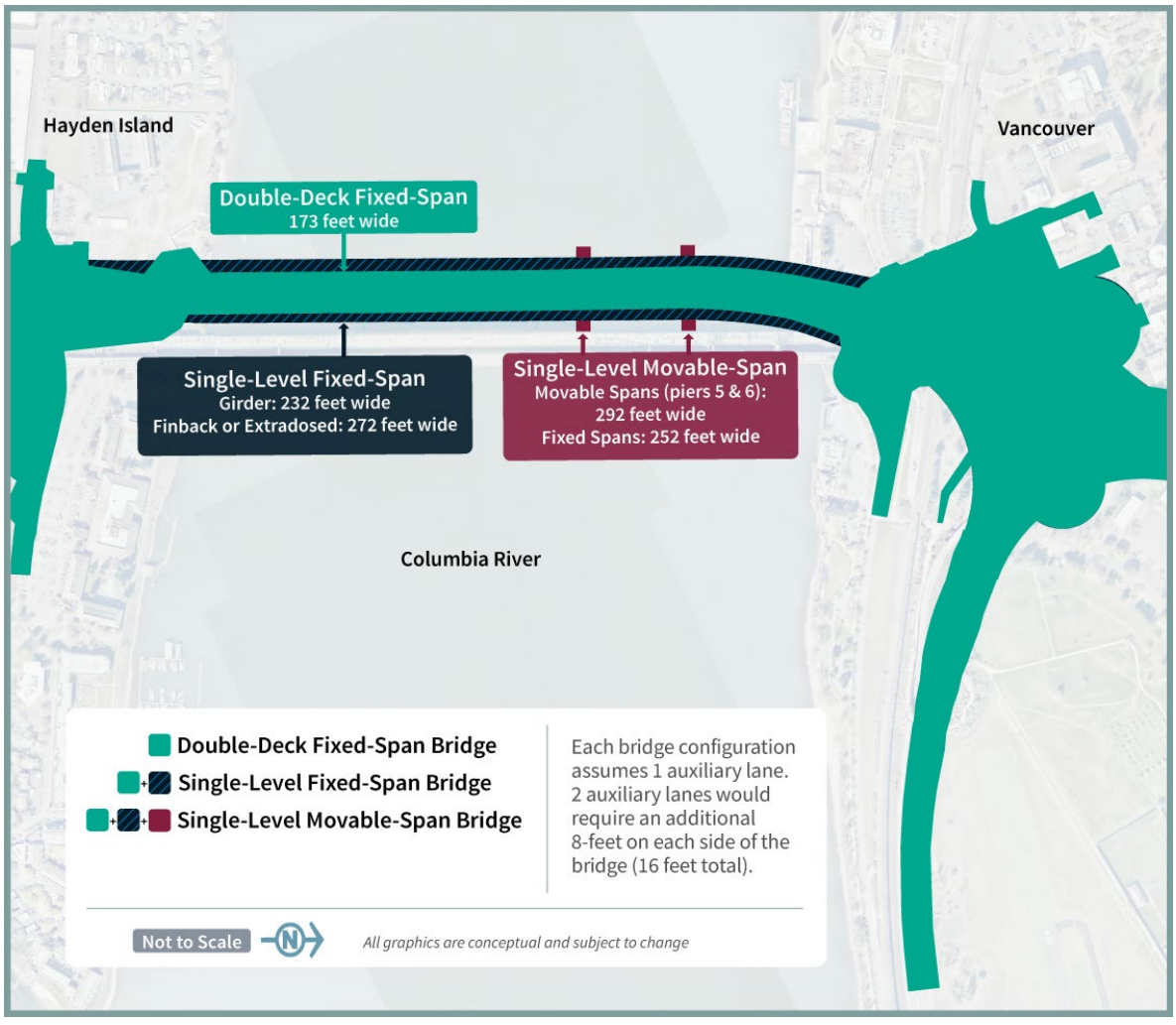
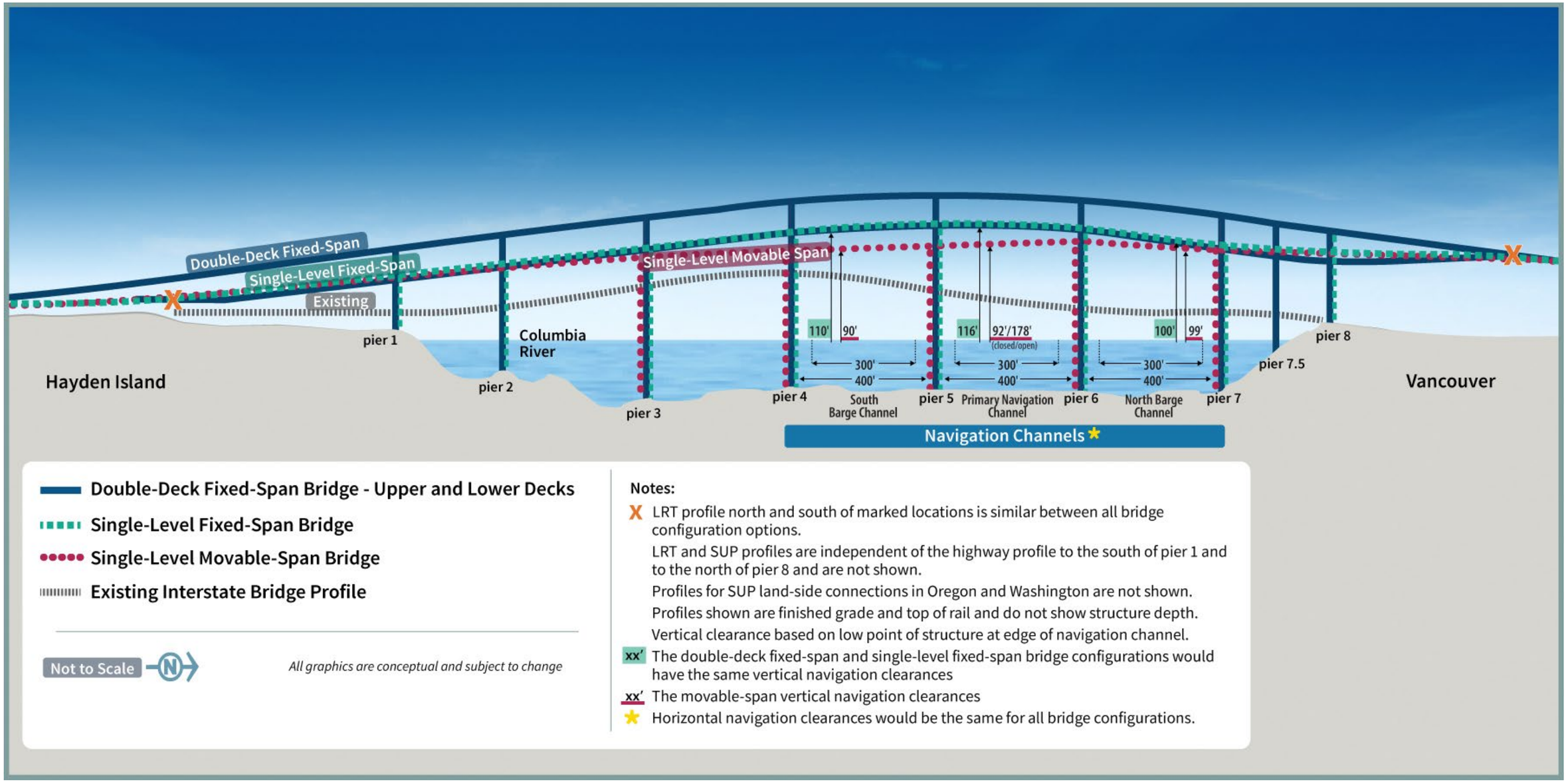


Figure 2-22. Bridge Configuration Profile Comparison



LRT = light-rail transit; SUP = shared-use path

Table 2-3. Summary of Bridge Configurations

	No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration	Modified LPA with Single-Level Fixed-Span Configuration [a]	Modified LPA with Single-Level Movable-Span Configuration
Bridge type	Steel through-truss spans.	Double-deck steel truss.	Single-level, concrete or steel girders, extradosed or finback.	Single-level, steel girders with vertical lift span.
Number of bridges	Two	Two	Two	Two
Movable-span type	Vertical lift span with counterweights.	N/A	N/A	Vertical lift span with counterweights.
Movable-span location	Adjacent to Vancouver shoreline.	N/A	N/A	Between Piers 5 and 6 (approximately 500 feet south of the existing lift span).
Lift opening restrictions	Weekday peak AM and PM highway travel periods. [b]	N/A	N/A	Additional restrictions to daytime bridge openings; requires future federal rulemaking process and authorization by USCG (beyond the assumed No-Build Alternative bridge restrictions for peak AM and PM highway travel periods).[b] Typical opening durations are assumed to be 9 to 18 minutes [c] for the purposes of impact analysis but would ultimately depend on various operational considerations related to vessel traffic and river and weather conditions. Additional time would also be required to stop traffic prior to opening and restart traffic after the bridge closes.
Out-to-out width [d]	138 feet total width.	173 feet total width.	Girder: 232 feet total width. Extradosed/Finback: 272 feet total width.	• 292 feet at the movable span. • 252 feet at the fixed spans.

	No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration	Modified LPA with Single-Level Fixed-Span Configuration [a]	Modified LPA with Single-Level Movable-Span Configuration
Deck widths	52 feet (SB) 52 feet (NB)	79 feet (SB) 79 feet (NB)	Girder: • 113 feet (SB) • 104 feet (NB) Extradosed/Finback: • 133 feet (SB) • 124 feet (NB)	113 feet SB fixed span. 104 feet NB fixed span.
Vertical navigation clearance	Primary navigation channel: • 39 feet when closed. • 178 feet when open. Barge channel: • 46 feet to 70 feet. Alternate barge channel: • 72 feet (maximum clearance without opening).	Primary navigation channel: • 116 feet maximum. North barge channel: • 100 feet maximum. South barge channel: • 110 feet maximum.	Primary navigation channel: • 116 feet maximum. North barge channel: • 100 feet maximum. South barge channel: • 110 feet maximum.	Primary navigation channel: • Closed position: 92 feet. • Open position: 178 feet. North barge channel: • 99 feet maximum. South barge channel: • 90 feet maximum.
Horizontal navigation clearance	263 feet for primary navigation channel. 511 feet for barge channel. 260 feet for alternate barge channel.	400 feet for all navigation channels (300-foot congressionally or USACE-authorized channel plus a 50-foot channel maintenance buffer on each side).	400 feet for all navigation channels (300-foot congressionally or USACE-authorized channel plus a 50-foot channel maintenance buffer on each side).	400 feet for all navigation channels (300-foot congressionally or USACE-authorized channel plus a 50-foot channel maintenance buffer on each side).
Maximum elevation of bridge component (NAVD 88)[e]	247 feet at top of lift tower.	166 feet.	Girder: 137 feet. Extradosed/Finback: 179 feet at top of pylons.	243 feet at top of lift tower.
Movable span length (from center of pier to center of pier)	278 feet.	N/A	N/A	450 feet.

	No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration	Modified LPA with Single-Level Fixed-Span Configuration [a]	Modified LPA with Single-Level Movable-Span Configuration
Number of in-water pier sets	Nine	Six	Six	Six
Number of in-water drilled shafts	N/A	72	96	108
Shaft cap sizes	N/A	50 feet by 85 feet.	50 feet by 230 feet.	Piers 2, 3, 4, and 7: 50 feet by 230 feet. Piers 5 and 6: 50 feet by 312 feet (one combined footing at each location to house tower/equipment for the lift span).
Maximum grade	5%	4% on the Washington side. 3.8% on the Oregon side.	3% on the Washington side. 3% on the Oregon side.	1.5% on the Washington side. 3% on the Oregon side.
Light-rail transit location	N/A	Below highway on SB bridge.	West of highway on SB bridge.	West of highway on SB bridge.
Express bus	Shared roadway lanes.	Inside shoulder of NB and SB (upper) bridges.	Inside shoulder of NB and SB bridges.	Inside shoulder of NB and SB bridges.
Shared-use path location	Sidewalk adjacent to roadway in both directions.	Below highway on NB bridge.	East of highway on NB bridge.	East of highway on NB bridge.

a When different bridge types are not mentioned, data applies to all bridge types under the specified bridge configuration.
b The No-Build Alternative assumes existing conditions that restrict bridge openings during weekday peak periods (Monday through Friday 6:30 a.m. to 9 a.m.; 2:30 p.m. to 6 p.m., excluding federal holidays). This Draft SEIS analysis estimates the potential frequency for bridge openings for vessels requiring more than 99 feet of clearance.
c For the purposes of the transportation analysis in this Draft SEIS (Section 3.1, Transportation), the movable-span opening time is assumed to be an average of 12 minutes.
d "Out-to-out width" is the measurement between the outside edges of the bridge across its width at the widest point.
e NAVD 88 (North American Vertical Datum of 1988) is a vertical control datum (reference point) used by federal agencies for surveying.
NB = northbound; SB = southbound; USCG = U.S. Coast Guard

2.2.4 Downtown Vancouver (Subarea C)

This section discusses the geographic Subarea C shown in Figure 2-3. See Figure 2-23 for all highway and interchange improvements in Subarea C. Refer to Figure 2-3 for an overview of the geographic subareas.

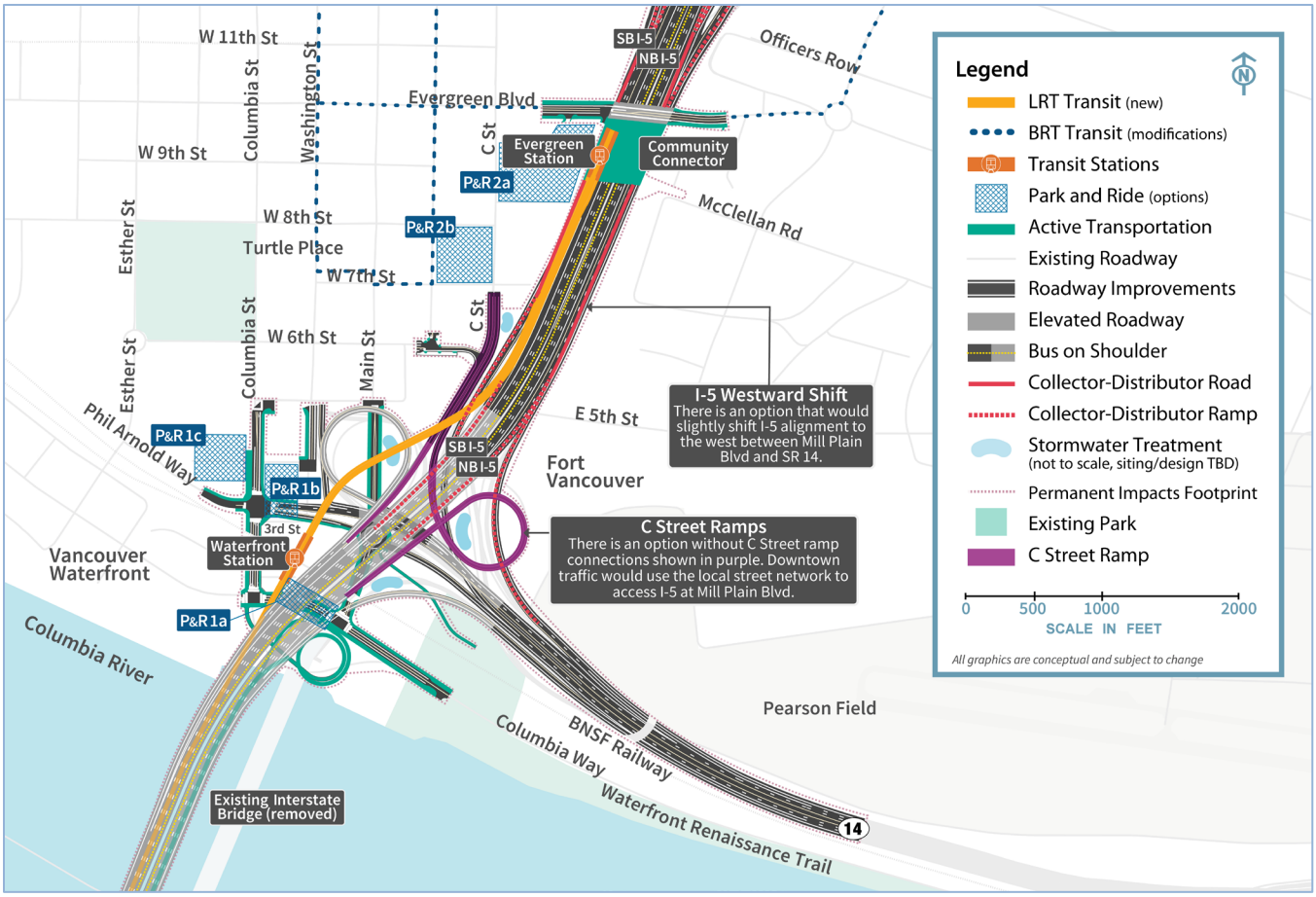
Highways, Interchanges, and Local Roadways

North of the Columbia River bridges in downtown Vancouver, improvements are proposed to the SR 14 interchange (Figure 2-23).

SR 14 Interchange

The new Columbia River bridges would touch down just north of the SR 14 interchange (Figure 2-23). The function of the SR 14 interchange would remain essentially the same as it is now, although the interchange would be elevated. Direct connections between I-5 and SR 14 would be rebuilt. Access to and from downtown Vancouver would be provided as it is today, but the connection points would be relocated. Downtown Vancouver I-5 access to and from the south would be at C Street as it is today, while downtown connections to and from SR 14 would be from Columbia Street at 3rd Street.

Figure 2-23. Downtown Vancouver (Subarea C)



BRT = bus rapid transit; LRT = light-rail transit; NB = northbound; P&R = park and ride; SB = southbound

Main Street would be extended between 5th Street and Columbia Way. Vehicles traveling from downtown Vancouver to access SR 14 eastbound would use the new extension of Main Street to the roundabout underneath I-5. If coming from the west or south (waterfront) in downtown Vancouver, vehicles would use the

Phil Arnold Way/3rd Street extension to the roundabout, then continue to SR 14 eastbound. The existing Columbia Way roadway under I-5 would be realigned to the north of its existing location and would intersect both the new Main Street extension and Columbia Street with T intersections.

In addition, the existing overcrossing of I-5 at Evergreen Boulevard would be reconstructed.

Design Option Without C Street Ramps

Under this design option, downtown Vancouver I-5 access to and from the south would be through the Mill Plain interchange rather than C Street. There would be no eastside loop ramp from I-5 northbound to C Street and no directional ramp on the west side of I-5 from C Street to I-5 southbound. The existing eastside loop ramp would be removed. This design option has been included because of changes in local planning that necessitate consideration of design options that reduce the footprint and associated direct and temporary environmental impacts in Vancouver.

What's changed with IBR?

The CRC project did not evaluate options to eliminate the C Street ramps or shift the I-5 mainline westward. Both options are included in the IBR Program in response to changed local agency planning considerations to reduce or shift the footprint and associated direct and temporary impacts in Vancouver.

Design Option to Shift I-5 Westward

This design option would shift the I-5 mainline and ramps approximately 40 feet to the west between SR 14 and Mill Plain Boulevard. The westward I-5 alignment shift could also be paired with the design option without C Street ramps. The inclusion of this design option is due to changes in local planning, which necessitate consideration of design options that that shifts the footprint and associated direct and temporary environmental impacts in Vancouver.

Transit

Light-Rail Alignment and Stations

Under the Modified LPA, the light-rail tracks would exit the highway bridge and be on their own bridge along the west side of the I-5 mainline after crossing the Columbia River (see Figure 2-23). The light-rail bridge would cross approximately 35 feet over the BNSF Railway tracks. An elevated light-rail station near the Vancouver waterfront (Waterfront Station) would be situated near the overcrossing of the BNSF tracks between Columbia Way and 3rd Street. Access to the elevated station would be primarily by elevator as the station is situated approximately 75 feet above existing ground level. A stairwell(s) would be provided for emergency egress. The number of elevators and stairwells provided would be based on the ultimate platform configuration, station location relative to the BNSF trackway, projected ridership, and fire and life safety requirements. Passenger drop-off facilities would be located at ground level and would be

What's changed with IBR?

In response to changes in community and local agencies' priorities, and to reduce property and streetscape impacts compared to the CRC LPA, the light-rail alignment proposed in the Modified LPA was realigned to run along the west side of I-5 along an elevated structure in Vancouver, with an elevated station at the Vancouver waterfront and an at-grade station near Evergreen Boulevard, adjacent to the Community Connector. In the CRC LPA, the light-rail alignment would have used a stand-alone structure from the Columbia River bridges to transition to/from at-grade tracks along Washington and Broadway Streets, with stations in downtown Vancouver at 9th and 15th Streets. The CRC LPA light-rail alignment would then have extended into upper Vancouver and turned east on 17th Street, terminating at Clark College (east of I-5 on McLoughlin Boulevard).

The Modified LPA was developed in close coordination with C-TRAN, TriMet, and the City of Vancouver and was informed by extensive community input and data. A terminus at Evergreen maximizes transfer opportunities given the direct connections to several local bus routes as well as planned BRT routes.

coordinated with the C-TRAN bus service at this location. The elevated light-rail tracks would continue north, cross over the westbound SR 14 on-ramp and the C Street/6th Street on-ramp to southbound I-5, and then straddle the southbound I-5 C-D roadway. Transit components in the downtown Vancouver area are similar between the two SR 14 interchange area design options discussed above.

North of the Waterfront Station, the light-rail tracks would continue to the Evergreen Station, which would be the terminus of the light-rail extension (see Figure 2-23). The light-rail tracks from downtown Vancouver to the terminus would be entirely on an elevated structure supported by single columns, where feasible, or by columns on either side of the roadway where needed. The light-rail tracks would be a minimum of 27 feet above the I-5 roadway surface. The Evergreen Station would be located at the same elevation as Evergreen Boulevard, on the proposed Community Connector, and it would provide connections to the existing C-TRAN BRT system. Passenger drop-off facilities would be near the station and would be coordinated with the C-TRAN bus service at this location.

Park and Rides

Up to two park and rides could be built in Vancouver along the light-rail alignment: one near the Waterfront Station and one near the Evergreen Station. Additional information regarding the park and rides can be found in Section 3.1, Transportation and the Transportation Technical Report.

Park and rides can expand the catchment area of public transit systems, making transit more accessible to people who live farther away from fixed-route transit service, and attracting new riders who might not have considered using public transit otherwise.

Waterfront Station Park-and-Ride Options

There are three site options for the park and ride near the Waterfront Station (see Figure 2-23). Each would accommodate up to 570 parking spaces.

1. Columbia Way (below I-5). This park-and-ride site would be a multilevel aboveground structure located below the new Columbia River bridges, immediately north of a realigned Columbia Way.
2. Columbia Street/SR 14. This park-and-ride site would be a multilevel aboveground structure located along the east side of Columbia Street. It could span across (or over) the SR 14 westbound off-ramp to provide parking on the north and south sides of the off-ramp.
3. Columbia Street/Phil Arnold Way (Waterfront Gateway Site). This park-and-ride site would be located along the west side of Columbia Street immediately north of Phil Arnold Way. This park and ride would be developed in coordination with the City of Vancouver's Waterfront Gateway program and could be a joint-use parking facility not constructed exclusively for park-and-ride users.

What's changed with IBR?

The park-and-ride location options have changed from the CRC LPA due to the change in LRT alignment and new development in Vancouver. The CRC LPA had three park and rides: Columbia (near the SR 14 interchange), Mill Plain (in uptown Vancouver), and Clark (on McLoughlin Boulevard near Clark College). Under the Modified LPA, the Columbia (Waterfront Station) park-and-ride site was modified because of new development at the CRC LPA site. The other park-and-ride sites were modified because of the change in the LRT terminus to Evergreen Boulevard in Vancouver, instead of Clark College in Vancouver, which was the light-rail terminus under the CRC LPA.

Evergreen Station Park-and-Ride Options

There are two site options for the park and ride near the Evergreen Station (see Figure 2-23).

1. Library Square. This park-and-ride site would be located along the east side of C Street and south of Evergreen Boulevard. It would accommodate up to 700 parking spaces in a multilevel belowground structure according to a future agreement on City-owned property associated with Library Square. Current design concepts suggest the park and ride most likely would be a joint-use parking facility for park-and-ride users and patrons of other uses on the ground or upper levels as negotiated as part of future decisions.
2. Columbia Credit Union. This park-and-ride site is an existing multistory garage that is located below the Columbia Credit Union office tower along the west side of C Street between 7th Street and 8th Street. The existing parking structure currently serves the office tower above it and the Regal City Center across the street. This would be a joint-use parking facility, not for the exclusive use of park-and-ride users, that could serve as additional or overflow parking if the 700 required parking spaces cannot be accommodated elsewhere.

Active Transportation

Within the downtown Vancouver area, the shared-use path on the northbound (or eastern) bridge would exit the bridge at the SR 14 interchange, loop down on the east side of I-5 via a vertical spiral path, and then cross back below I-5 to the west side of I-5 to connect to the Waterfront Renaissance Trail on Columbia Street and into Columbia Way (see Figure 2-23). Access would be provided across state right of way beneath the new bridges to provide a connection between the recreational areas along the City's Columbia River waterfront east of the bridges and existing and future waterfront uses west of the bridges.

Active transportation components in the downtown Vancouver area would be similar without the C Street ramps and with the I-5 westward shift.

At Evergreen Boulevard, a Community Connector is proposed to be built over I-5 just south of Evergreen Boulevard and east of the Evergreen Station (see Figure 2-23). The structure is proposed to include off-street pathways for active transportation modes including pedestrians, bicyclists, and other micro-mobility modes, and public space and amenities to support the active transportation facilities. The primary intent of the Community Connector is to improve connections between downtown Vancouver on the west side of I-5 and the Vancouver National Historic Reserve on the east side.

2.2.5 Upper Vancouver (Subarea D)

This section discusses the geographic Subarea D shown in Figure 2-3. See Figure 2-24 for all highway and interchange improvements in Subarea D. Refer to Figure 2-3 for an overview of the geographic subareas.

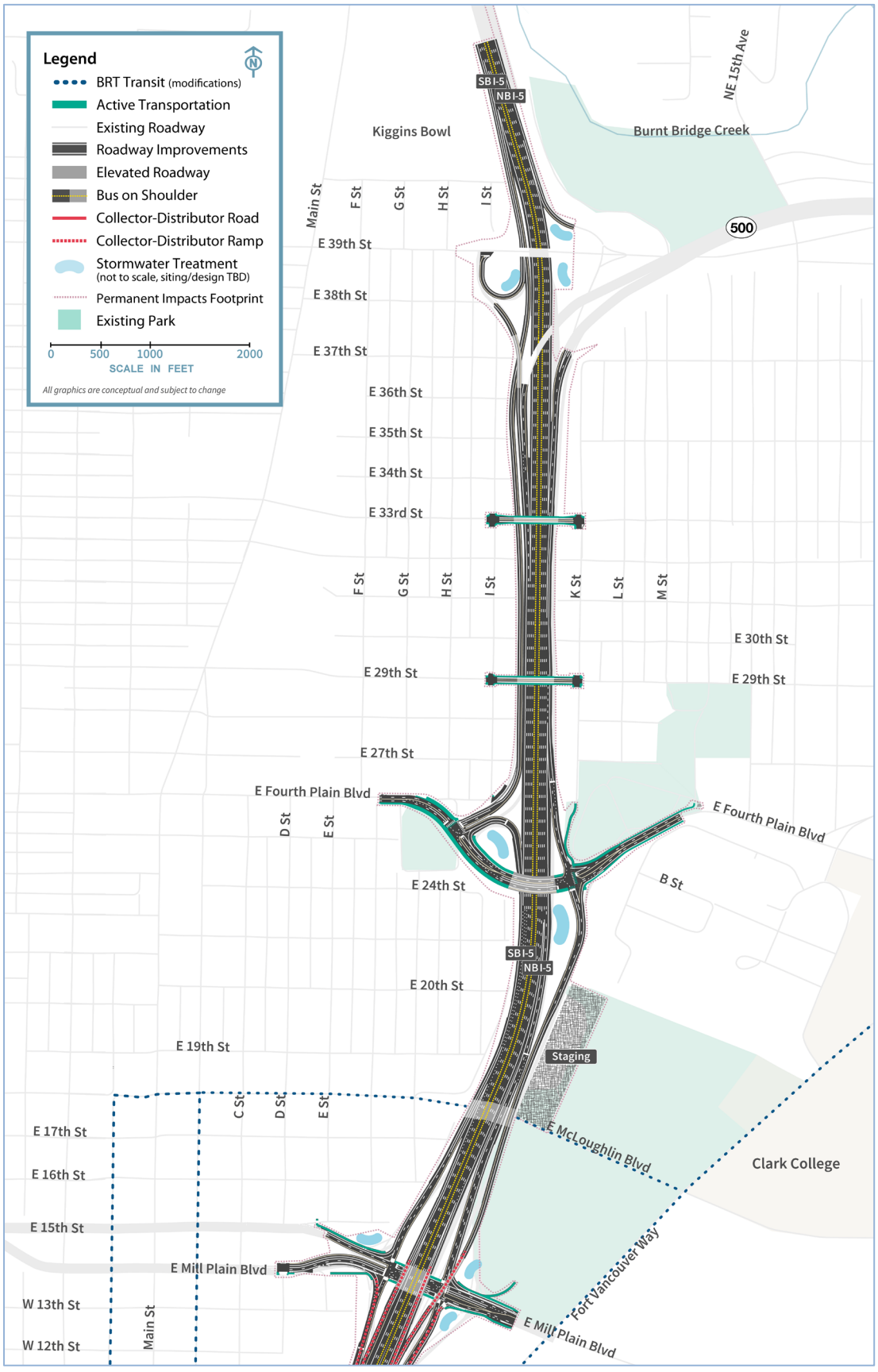
Highways, Interchanges, and Local Roadways

Within the upper Vancouver area, the IBR Program proposes improvements to three interchanges—Mill Plain, Fourth Plain, and SR 500—as described below.

Mill Plain Boulevard Interchange

The Mill Plain Boulevard interchange is north of the SR 14 interchange (see Figure 2-24). This interchange would be reconstructed as a tight-diamond configuration but would otherwise remain similar in function to the existing interchange. The ramp terminal intersections would be sized to accommodate high, wide heavy freight vehicles that travel between the Port of Vancouver and I-5. The off-ramp from I-5 northbound to Mill Plain Boulevard would diverge from the C-D road that would continue north, crossing over Mill Plain Boulevard, to provide access to Fourth Plain Boulevard via a C-D roadway. The off-ramp to Fourth Plain Boulevard would be reconstructed and would cross over Mill Plain Boulevard east of I-5, similar to the way it functions today.

Figure 2-24. Upper Vancouver (Subarea D)



BRT = bus rapid transit; TBD = to be determined

Fourth Plain Boulevard Interchange

At the Fourth Plain Boulevard interchange (Figure 2-24), improvements would include reconstruction of the overpass of I-5 and the ramp terminal intersections. Northbound I-5 traffic exiting to Fourth Plain Boulevard would first exit to the northbound C-D roadway which provides off-ramp access to Fourth Plain Boulevard and Mill Plain Boulevard. The westbound SR 14 to northbound I-5 on-ramp also joins the northbound C-D roadway before continuing north past the Fourth Plain Boulevard and Mill Plain Boulevard off-ramps as an auxiliary lane. The southbound I-5 off-ramp to Fourth Plain Boulevard would be braided below the 39th Street on-ramp to southbound I-5. This change would eliminate the existing nonstandard weave between the SR 500 interchange and the off-ramp to Fourth Plain Boulevard. It would also eliminate the existing westbound SR 500 to Fourth Plain Boulevard off-ramp connection. The existing overcrossing of I-5 at 29th Street would be reconstructed to accommodate a widened I-5, provide adequate vertical clearance over I-5, and provide pedestrian and bicycle facilities.

SR 500 Interchange

The northern terminus of the I-5 improvements would be in the SR 500 interchange area (Figure 2-24). The improvements would primarily be to connect the Modified LPA to existing ramps. The off-ramp from I-5 southbound to 39th Street would be reconstructed to establish the beginning of the braided ramp to Fourth Plain Boulevard and restore the loop ramp to 39th Street. Ramps from existing I-5 northbound to SR 500 eastbound and from 39th Street to I-5 northbound would be partially reconstructed. The existing bridges for 39th Street over I-5 and SR 500 westbound to I-5 southbound would be retained. The 39th Street to I-5 southbound on-ramp would be reconstructed and braided over (i.e., grade separated or pass over) the new I-5 southbound off-ramp to Fourth Plain Boulevard.

The existing overcrossing of I-5 at 33rd Street would also be reconstructed to accommodate a widened I-5, provide adequate vertical clearance over I-5, and provide pedestrian and bicycle facilities.

Transit

There would be no LRT facilities in upper Vancouver. Proposed operational changes to bus service, including I-5 bus-on-shoulder service, are described in Section 2.2.7, Transit Operating Characteristics.

What's changed with IBR?

The Modified LPA design at the SR 500 interchange is similar to the CRC LPA, although the CRC LPA would have contained future phased options to construct new direct connections between I-5 and SR 500, new on- and off-ramps, and a tunnel beneath I-5. In response to changes in local agencies' priorities, the Modified LPA does not include these connections. The CRC 2013 NEPA re-evaluation also considered a phased construction option that would have limited improvements to the existing SR 500 interchange ramps. The Modified LPA would have the same limited improvements to the SR 500 interchange.

Active Transportation

Several active transportation improvements would be made in Subarea D consistent with City of Vancouver plans and policies. At the Fourth Plain Boulevard interchange, there would be improvements to provide better bicycle and pedestrian mobility and accessibility; these include bicycle lanes, neighborhood connections, and a connection to the City of Vancouver's planned two-way cycle track on Fourth Plain Boulevard. The reconstructed overcrossings of I-5 at 29th Street and 33rd Street would provide pedestrian and bicycle facilities on those cross streets. No new active transportation facilities are proposed in the SR 500 interchange area. Active transportation improvements at the Mill Plain Boulevard interchange include buffered bicycle lanes and sidewalks, pavement markings, lighting, and signing.

What's changed with IBR?

The Modified LPA's active transportation improvements in upper Vancouver are similar to those proposed in the CRC LPA. However, the Modified LPA includes a connection to the city of Vancouver's planned two-way cycle track on Fourth Plain Boulevard that was not yet proposed when the CRC Final EIS was completed.

2.2.6 Transit Support Facilities

Ruby Junction Maintenance Facility Expansion

The TriMet Ruby Junction Maintenance Facility in Gresham, Oregon, would be expanded to accommodate the additional LRVs associated with the Modified LPA's LRT service (the Ruby Junction location relative to the study area is shown in Figure 2-25). Improvements would include additional storage for LRVs and maintenance materials and supplies, expanded LRV maintenance bays, expanded parking and employee support areas for additional personnel, and a third track at the northern entrance to Ruby Junction. Figure 2-25 shows the proposed footprint of the expansion.

What's changed with IBR?

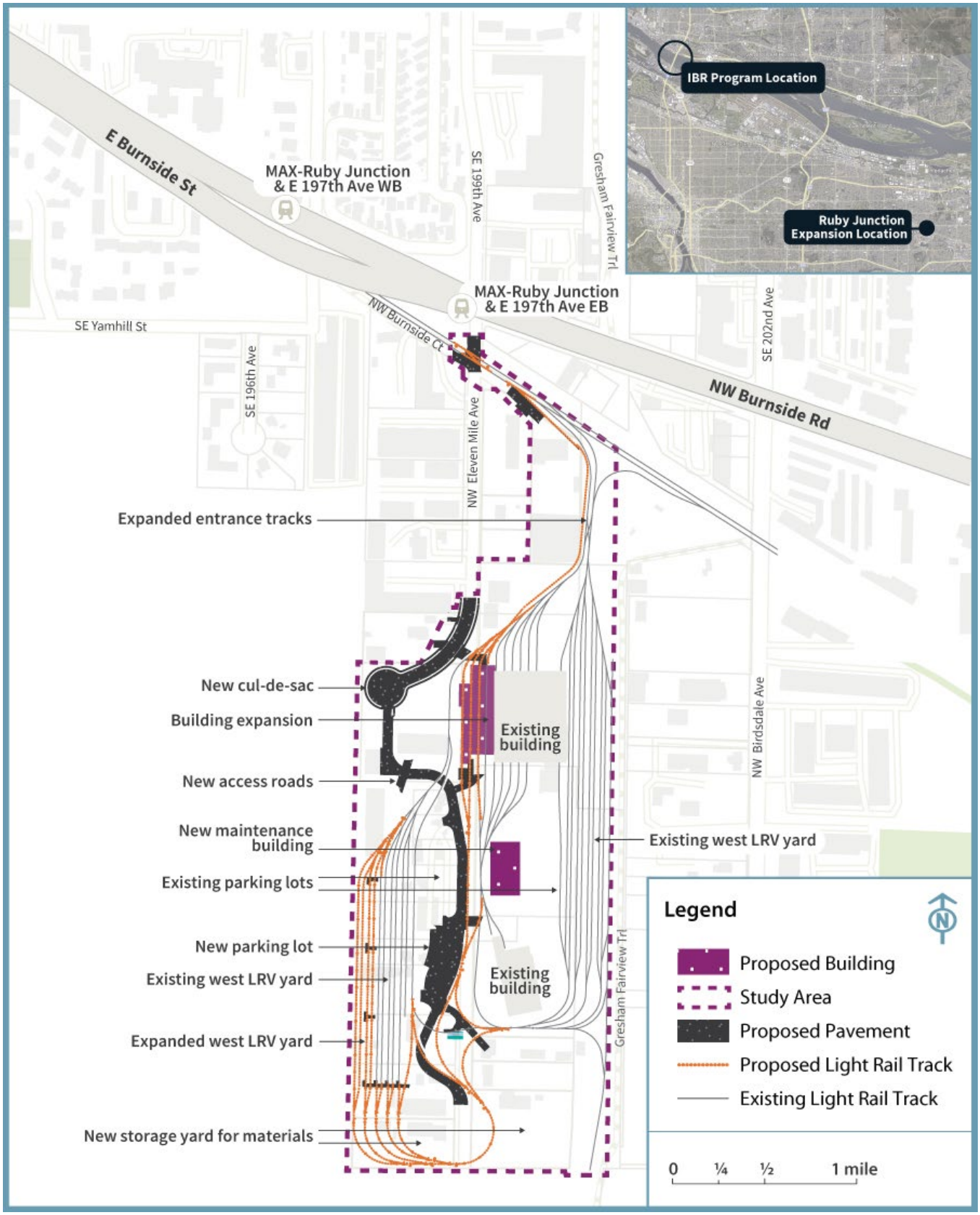
The Modified LPA would expand the TriMet Ruby Junction Maintenance Facility to accommodate additional LRVs. The CRC LPA also would have expanded Ruby Junction; some of that expansion was completed in the years following the CRC ROD. The changes described with the Modified LPA include both new and previously proposed elements that have not already been completed to accommodate planned LRT service associated with the IBR Program.

The existing main building would be expanded west to provide additional maintenance bays. To make space for the building expansion, Eleven Mile Avenue would be vacated and would terminate in a new cul-de-sac west of the main building. New access roads would be constructed to maintain access to TriMet buildings south of the cul-de-sac.

The existing LRV storage yard, west of Eleven Mile Avenue, would be expanded to the west to accommodate additional storage tracks and a runaround track (a track constructed to bypass congestion in the maintenance yard). This expansion would require partial demolition of an existing TriMet building (just north of the LRV storage) and would require relocating the material storage yard to the properties just south of the south building.

All tracks in the west LRV storage yard would also be extended southward to connect to the proposed runaround track. The runaround track would connect to existing tracks near the existing south building. The connections to the runaround track would require partial demolition of an existing TriMet building plus full demolition of one existing building and partial demolition of another existing building on the private property west of the south end of Eleven Mile Avenue. The function of the existing TriMet building would either be transferred to existing modified buildings or to new replacement buildings on site.

Figure 2-25. Ruby Junction Maintenance Facility Study Area



EB = eastbound; LRV = light-rail vehicle; WB = westbound

The existing parking lot west of Eleven Mile Avenue would be expanded toward the south to provide more parking for TriMet personnel.

A third track would be needed at the north entrance to Ruby Junction to accommodate increased train volumes without decreasing service. The additional track would also reduce operational impacts during construction and maintenance outages for the yard. Constructing the third track would require reconstruction of Burnside Court east of Eleven Mile Avenue. An additional crossover would also be needed on the mainline track where it crosses Eleven Mile Avenue; it would require reconstruction of the existing track crossings for vehicles, bicycles, and pedestrians.

Expo Center Overnight LRV Facility

An overnight facility for LRVs would be constructed on the southeast corner of the Expo Center property (as shown on Figure 2-8) to reduce deadheading between Ruby Junction and the northern terminus of the MAX Yellow Line extension. Deadheading occurs when LRVs travel without passengers to make the vehicles ready for service. The facility would provide a yard access track, storage tracks for approximately 10 LRVs, one building for light LRV maintenance, an operator break building, a parking lot for operators, and space for security personnel. This facility would necessitate relocation and reconstruction of the Expo Road entrance to the Expo Center (including the parking lot gates and booths). However, it would not affect existing Expo Center buildings.

What's changed with IBR?

An overnight LRV facility at the Expo Center was not part of the CRC LPA, which assumed additional LRVs would be accommodated through the expansion of Ruby Junction. With Modified LPA changes in Vancouver resulting from community and local agency priorities the IBR Program examined ways to reduce the long-term operations and maintenance costs on the system. This led to the consideration and inclusion of the Expo Center site as an overnight LRV facility.

The overnight facility would connect to the mainline tracks by crossing Expo Road just south of the existing Expo Center MAX Station. The connection tracks would require relocation of one or two existing LRT facilities, including a traction power substation building and potentially the existing communication building, which are both just south of the Expo Center MAX Station. Existing artwork at the station may require relocation.

Additional Bus Bays at the C-TRAN Operations and Maintenance Facility

Three bus bays would be added to the C-TRAN operations and maintenance facility. These new bus bays would provide maintenance capacity for the additional express bus service on I-5 (see Section 2.2.7, Transit Operating Characteristics). Modifications to the facility would accommodate new vehicles as well as maintenance equipment.

2.2.7 Transit Operating Characteristics

LRT Operations

Nineteen new LRVs would be purchased to operate the extension of the MAX Yellow Line. These vehicles would be similar to those currently used for the TriMet MAX system. With the Modified LPA, LRT service in the new and existing portions of the Yellow Line in 2045 would operate with 6.7-minute average headways (defined as gaps between arriving transit vehicles) during the 2-hour morning peak period. Mid-day and evening headways would be 15 minutes, and late-night headways would be 30 minutes. Service would operate between the hours of approximately 5 a.m. (first southbound train leaving Evergreen Station) and 1 a.m. (last northbound train arriving at the station), which is consistent with current service on the Yellow

Line. LRVs would be deadheaded at Evergreen Station before beginning service each day. A third track at this northern terminus would accommodate layovers.

Express Bus Service and Bus on Shoulder

C-TRAN provides bus service that connects to LRT and augments travel between Washington and Oregon with express bus service to key employment centers in Oregon. Beginning in 2022, the main express route providing service in the IBR corridor, Route 105, had two service variations. One pattern provides service between Salmon Creek and downtown Portland with a single intermediate stop at the 99th Street Transit Center, and one provides service between Salmon Creek and downtown Portland with two intermediate stops: 99th Street Transit Center and downtown Vancouver. This route currently provides weekday service with 20-minute peak and 60-minute off-peak headways.

What's changed with IBR?

Coordination with Program partners led to a transit solution that allows LRT and express bus to both operate to maximize opportunity and capacity for cross-river transit demand. The Modified LPA includes additional express bus service on I-5 between Salmon Creek and downtown Portland to provide needed capacity for carrying trips across the Columbia River. The CRC LPA ended that service at an LRT station in downtown Vancouver. The CRC LPA had more park-and-ride spaces; with fewer park-and-ride spaces at LRT stations under the Modified LPA, express bus on I-5 provides needed service for cross-river markets further into Clark County. The additional express bus service in the Modified LPA necessitated the addition of vehicles and maintenance facility capacity.

Once the Modified LPA is constructed, C-TRAN Route 105 would be revised to provide direct service from the Salmon Creek Park and Ride and 99th Street Transit Center to downtown Portland, operating at 5-minute peak headways with no service in the off-peak. The C-TRAN Route 105 intermediate stop service through downtown Vancouver would be replaced with C-TRAN Route 101, which would provide direct service from downtown Vancouver to downtown Portland at 10-minute peak and 30-minute off-peak headways.

Two other existing C-TRAN express bus service routes would remain unchanged after completion of the Modified LPA. C-TRAN Route 190 would continue to provide service from the Andresen Park and Ride in Vancouver to Marquam Hill in Portland. This route would continue to operate on SR 500 and I-5 within the study area. Route headways would be 10 minutes in the peak periods with no off-peak service. C-TRAN Route 164 would continue to provide service from the Fisher's Landing Transit Center to downtown Portland. This route would continue to operate within the study area only in the northbound direction during PM service to use the I-5 northbound high-occupancy vehicle lane in Oregon before exiting to eastbound SR 14 in Washington. Route headways would be 10 minutes in the peak and 30 minutes in the off-peak.

C-TRAN express bus Routes 105 and 190 are currently permitted to use the existing southbound inside shoulder of I-5 from 99th Street to the Interstate Bridge in Vancouver. However, the existing shoulders are too narrow for bus-on-shoulder use in the rest of the I-5 corridor in the study area. The Modified LPA would include inside shoulders on I-5 that would be wide enough (14 feet on the Columbia River bridges and 11.5 to 12 feet elsewhere on I-5) to allow northbound and southbound buses to operate on the shoulder, except where I-5 would have to taper to match existing inside shoulder widths at the north and south ends of the corridor. Figure 2-8, Figure 2-16, Figure 2-23, and Figure 2-24 show the potential bus-on-shoulder use over the Columbia River bridges. Bus on shoulder could operate on any of the Modified LPA bridge configurations and bridge types. Additional approvals (including a continuing control agreement), in coordination with ODOT, may be needed for buses to operate on the shoulder on the Oregon portion of I-5.

After completion of the Modified LPA, two C-TRAN express bus routes operating on I-5 through the study area would be able to use bus-on-shoulder operations to bypass congestion in the general-purpose lanes. C-TRAN Route 105 would operate on the shoulder for the full length of the study area. C-TRAN Route 190 would

operate on the shoulder for the full length of the corridor except for the distance required to merge into and out of the shoulder as the route exits from and to SR 500. These two express bus routes (105 and 190) would have a combined frequency of every 3 minutes during the 2045 AM and PM peak periods. To support the increased frequency of express bus service, eight electric double-decker or articulated buses would be purchased.

If the C Street ramps were removed from the SR 14 interchange, C-TRAN Route 101 could also use bus-on-shoulder operations south of Mill Plain Boulevard; however, if the C Street ramps remained in place, Route 101 could still use bus-on-shoulder operations south of the SR 14 interchange but would need to begin merging over to the C Street exit earlier than if the C Street ramps were removed. Route 101 would operate at 10-minute peak and 30-minute off-peak headways. C-TRAN Route 164 would not be anticipated to use bus-on-shoulder operations because of the need to exit to SR 14 from northbound I-5.

Local Bus Route Changes

The TriMet Line 6 bus route would be changed to terminate at the Expo Center MAX Station, requiring passengers to transfer to the new LRT connection to access Hayden Island. TriMet Line 6 is anticipated to travel from Martin Luther King Jr. Boulevard through the newly configured area providing local connections to Marine Drive. It would continue west to the Expo Center MAX Station. Table 2-4 shows existing service and anticipated future changes to TriMet Line 6.

What's changed with IBR?

The TriMet Line 6 bus route has changed since the CRC LPA. This operational change, as well as changes in local agency priorities, led to the proposal to terminate the route at the Expo Center MAX Station under the Modified LPA.

As part of the Modified LPA, several local C-TRAN bus routes would be changed to better complement the new light-rail extension. Most of these changes would reroute existing bus lines to provide a transfer opportunity near the new Evergreen Station. Table 2-4 shows existing service and anticipated future changes to C-TRAN bus routes. In addition to the changes noted in Table 2-4, other local bus route modifications would move service from Broadway to C Street. The changes shown may be somewhat different if the C Street ramps are removed.

Table 2-4. Proposed TriMet and C-TRAN Bus Route Changes

Bus Route	Existing Route	Changes with Modified LPA
TriMet Line 6	Connects Goose Hollow, Portland City Center, N/NE Portland, Jantzen Beach and Hayden Island. Within the study area, service currently runs between Delta Park MAX Station and Hayden Island via I-5.	Route would be revised to terminate at the Expo Center MAX Station. Route is anticipated to travel from Martin Luther King Jr. Boulevard through the newly configured Marine Drive area, then continue west to connect via facilities on the west side of I-5 with the Expo Center MAX Station.

Bus Route	Existing Route	Changes with Modified LPA
C-TRAN Fourth Plain and Mill Plain bus rapid transit (The Vine)	Runs between downtown Vancouver and the Vancouver Mall Transit Center via Fourth Plain Boulevard, with a second line along Mill Plain Boulevard. In the study area, service currently runs along Washington and Broadway Streets through downtown Vancouver.	Route would be revised to begin/end near the Evergreen Station in downtown Vancouver and provide service along Evergreen Boulevard to Fort Vancouver Way, where it would travel to or from Mill Plain Boulevard or Fourth Plain Boulevard depending on clockwise/counterclockwise operations. The Fourth Plain Boulevard route would continue to serve existing Vine stations beyond Evergreen Boulevard.
C-TRAN #2 Lincoln	Connects the 99th Street Transit Center to downtown Vancouver via Lincoln and Kaufman Avenues. Within the study area, service currently runs along Washington and Broadway Streets between 7th and 15th Streets in downtown Vancouver.	Route would be modified to begin/end near C Street and 9th Street in downtown Vancouver.
C-TRAN #25 St. Johns	Connects the 99th Street Transit Center to downtown Vancouver via St. Johns Boulevard and Fort Vancouver Way. Within the study area, service currently runs along Evergreen Boulevard, Jefferson Street/Kaufman Avenue, 15th Street, and Franklin Street in downtown Vancouver.	Route would be modified to begin/end near C Street and 9th Street in downtown Vancouver.
C-TRAN #30 Burton	Connects the Fisher's Landing Transit Center with downtown Vancouver via 164th/162nd Avenues and 18th, 25th, 28th, and 39th Streets. Within the study area, service currently runs along McLoughlin Boulevard and on Washington and Broadway Streets between 8th and 15th Streets.	Route would be modified to begin/end near C Street and 9th Street in downtown Vancouver.
C-TRAN #60 Delta Park Regional	Connects the Delta Park MAX station in Portland with downtown Vancouver via I-5. Within the study area, service currently runs along I-5, Mill Plain Boulevard, and Broadway Street.	Route would be discontinued.

2.2.8 Tolling

Tolling cars and trucks that would use the new Columbia River bridges is proposed as a method to help fund the bridge construction and future maintenance, as well as to encourage alternative mode choices for trips across the Columbia River. Federal and state laws set the authority to toll the I-5 crossing. The IBR Program plans to toll the I-5 river bridge under the federal tolling authorization program codified in 23 U.S. Code Section 129 (Section 129). Section 129 allows public agencies to impose new tolls on federal-aid interstate highways for the reconstruction or replacement of toll-free bridges or tunnels. In 2023, the Washington State Legislature authorized tolling on the Interstate Bridge, with toll rates and policies to be set by the Washington State Transportation Commission (WSTC). In Oregon, the legislature authorized tolling giving the Oregon Transportation Commission the authority to toll I-5, including the ability to set the toll rates and policies. Subsequently, the Oregon Transportation Commission (OTC) is anticipated to review and approve the I-5 tollway project application that would designate the Interstate Bridge as a "tollway project" in 2024. At the

beginning of 2024, the OTC and the WSTC entered into a bi-state tolling agreement to establish a cooperative process for setting toll rates and policies. This included the formation of the I-5 Bi-State Tolling Subcommittee consisting of two commissioners each from the OTC and WSTC and tasked with developing toll rate and policy recommendations for joint consideration and adoption by each state's commission. Additionally, the two states plan to enter into a separate agreement guiding the sharing and uses of toll revenues, including the order of uses (flow of funds) for bridge construction, debt service, and other required expenditures. WSDOT and ODOT also plan to enter into one or more agreements addressing implementation logistics, toll collection, and operations and maintenance for tolling the bi-state facility.

The Modified LPA includes a proposal to apply variable tolls on vehicles using the Columbia River bridges with the toll collected electronically in both directions. Tolls would vary by time of day with higher rates during peak travel periods and lower rates during off-peak periods. The IBR Program has evaluated multiple toll scenarios generally following two different variable toll schedules for the tolling assessment. For purposes of this NEPA analysis, the lower toll schedule was analyzed with tolls assumed to range between $1.50 and $3.15 (in 2026 dollars as representative of when tolling would begin) for passenger vehicles with a registered toll payment account. Medium and heavy trucks would be charged a higher toll than passenger vehicles and light trucks. Passenger vehicles and light trucks without a registered toll payment account would pay an additional $2.00 per trip to cover the cost of identifying the vehicle owner from the license plate and invoicing the toll by mail.

The analysis assumes that tolling would commence on the existing Interstate Bridge—referred to as pre-completion tolling—starting April 1, 2026. The actual date pre-completion tolling begins would depend on when construction would begin. The traffic and tolling operations on the new Columbia River bridges were assumed to commence by July 1, 2033. The actual date that traffic and tolling operations on the new bridges begin would depend on the actual construction completion date. During the construction period, the two commissions may consider toll-free travel overnight on the existing Interstate Bridge, as was analyzed in the Level 2 Toll Traffic and Revenue Study, for the hours between 11 p.m. and 5 a.m. This toll-free period could help avoid situations where users would be charged during lane or partial bridge closures where construction delays may apply. Once the new I-5 Columbia River bridges open, twenty-four-hour tolling would begin.

Tolls would be collected using an all-electronic toll collection system using transponder tag readers and license plate cameras mounted to structures over the roadway. Toll collection booths would not be required. Instead, motorists could obtain a transponder tag and set up a payment account that would automatically bill the account holder associated with the transponder each time the vehicle crossed the bridge. Customers without transponders, including out-of-area vehicles, would be tolled by a license plate recognition system that would bill the address of the owner registered to that vehicle's license plate. The toll system would be designed to be nationally interoperable. Transponders for tolling systems elsewhere in the country could be used to collect tolls on I-5, and drivers with an account and transponder tag associated with the Interstate Bridge could use them to pay tolls in other states for which reciprocity agreements had been developed. There would be new signage, including gantries, to inform drivers of the bridge toll. These signs would be on local roads, I-5 on-ramps, and on I-5, including locations north and south of the bridges where drivers make route decisions (e.g., I-5/I-205 junction and I-5/I-84 junction).

2.2.9 Transportation System- and Demand-Management Measures

Many well-coordinated transportation demand-management and system-management programs are already in place in the Portland-Vancouver metropolitan region. In most cases, the impetus for the programs comes from state regulations: Oregon's Employee Commute Options rule and Washington's Commute Trip Reduction law (described in the sidebar).

The physical and operational elements of the Modified LPA provide the greatest transportation demand-management opportunities by promoting other modes to fulfill more of the travel needs in the corridor. These include:

- Major new light-rail line in exclusive right of way, as well as express bus routes and bus routes that connect to new light-rail stations.
- I-5 inside shoulders that accommodate express buses.
- Modern bicycle and pedestrian facilities that accommodate more bicyclists and pedestrians and improve connectivity, safety, and travel time.
- Park-and-ride facilities.
- A variable toll on the new Columbia River bridges.

In addition to these fundamental elements of the Modified LPA, facilities and equipment would be implemented that could help existing or expanded transportation system management measures maximize the capacity and efficiency of the system. These include:

- Replacement or expanded variable message signs in the study area. These signs alert drivers to incidents and events, allowing them to seek alternate routes or plan to limit travel during periods of congestion.
- Replacement or expanded traveler information systems with additional traffic monitoring equipment and cameras.
- Expanded incident response capabilities, which help traffic congestion to clear more quickly following accidents, spills, or other incidents.
- Queue jumps or bypass lanes for transit vehicles where multilane approaches are provided at ramp signals for on-ramps. Locations for these features will be determined during the detailed design phase.
- Active traffic management including strategies such as ramp metering, dynamic speed limits, and transit signal priority. These strategies are intended to manage congestion by controlling traffic flow or allowing transit vehicles to enter traffic before single-occupant vehicles.

State Laws to Reduce Commute Trips

Oregon and Washington have both adopted regulations intended to reduce the number of people commuting in single-occupancy vehicles (SOVs). Oregon's Employee Commute Options Program, created under Oregon Administrative Rule 340-242-0010, requires employers with over 100 employees in the greater Portland area to provide commute options that encourage employees to reduce auto trips to the work site. Washington's 1991 Commute Trip Reduction (CTR) Law, updated as the 2006 CTR Efficiency Act (Revised Code of Washington §70.94.521) addresses traffic congestion, air pollution, and petroleum fuel consumption. The law requires counties and cities with the greatest traffic congestion and air pollution to implement plans to reduce SOV demand. An additional provision mandates "major employers" and "employers at major worksites" to implement programs to reduce SOV use.

2.3 Modified LPA Construction

The following information on the construction activities and sequence follows the information prepared for the CRC LPA. Construction durations have been updated for the Modified LPA. Because the main elements of the IBR Modified LPA are similar to those in the CRC LPA (i.e., multimodal river crossings and interchange

improvements), this information provides a reasonable assumption of the construction activities that would be required.

The construction of bridges over the Columbia River sets the sequencing for other Program components. Accordingly, construction of the Columbia River bridges and immediately adjacent highway connections and improvement elements would be timed early to aid the construction of other components. Demolition of the existing Interstate Bridge would take place after the new Columbia River bridges were opened to traffic.

Electronic tolling infrastructure would be constructed and operational on the existing Interstate Bridge by the start of construction on the new Columbia River bridges. The toll rates and policies for tolling (including pre-completion tolling) would be determined after a more robust analysis and public process by the OTC and WSTC (refer to Section 2.2.8, Tolling).

2.3.1 Construction Components and Duration

Table 2-5 provides the estimated construction durations and additional information of Modified LPA components. The estimated durations are shown as ranges to reflect the potential for Program funding to be phased over time. In addition to funding, contractor schedules, regulatory restrictions on in-water work and river navigation considerations, permits and approvals, weather, materials, and equipment could all influence construction duration and overlap of construction of certain components. Certain work below the ordinary high-water mark of the Columbia River and North Portland Harbor would be restricted to minimize impacts to species listed under the Endangered Species Act and their designated critical habitat.

Throughout construction, active transportation facilities and three lanes in each direction on I-5 (accommodating personal vehicles, freight, and buses) would remain open during peak hours, except for short intermittent restrictions and/or closures. Advanced coordination and public notice would be given for restrictions, intermittent closures, and detours for highway, local roadway, transit, and active transportation users (refer to Section 3.1, Transportation, for additional information). At least one navigation channel would remain open throughout construction. Advanced coordination and notice would be given for restrictions or intermittent closures to navigation channels as required (refer to Section 3.2, Navigation, for additional information).

Table 2-5. Construction Activities and Estimated Duration

Component	Estimated Duration	Notes
Columbia River bridges	4 to 7 years	• Construction is likely to begin with the main river bridges. • General sequence would include initial preparation and installation of foundation piles, shaft caps, pier columns, superstructure, and deck.
North Portland Harbor bridges	4 to 10 years	• Construction duration for North Portland Harbor bridges is estimated to be similar to the duration for Hayden Island interchange construction. The existing North Portland Harbor bridge would be demolished in phases to accommodate traffic during construction of the new bridges.
Hayden Island interchange	4 to 10 years	• Interchange construction duration would not necessarily entail continuous active construction. Hayden Island work could be broken into several contracts, which could spread work over a longer duration.

Component	Estimated Duration	Notes
Marine Drive interchange	4 to 6 years	• Construction would need to be coordinated with construction of the North Portland Harbor bridges.
SR 14 interchange	4 to 6 years	• Interchange would be partially constructed before any traffic could be transferred to the new Columbia River bridges.
Demolition of the existing Interstate Bridge	1.5 to 2 years	• Demolition of the existing Interstate Bridge could begin only after traffic is rerouted to the new Columbia River bridges.
Three interchanges north of SR 14	3 to 4 years for all three	• Construction of these interchanges could be independent from each other and from construction of the Program components to the south. • More aggressive and costly staging could shorten this timeframe.
Light-rail	4 to 6 years	• The light-rail crossing would be built with the Columbia River bridges. Light-rail construction includes all of the infrastructure associated with light-rail transit (e.g., overhead catenary system, tracks, stations, park and rides).
Total construction timeline	9 to 15 years	• Funding, as well as contractor schedules, regulatory restrictions on in-water work and river navigation considerations, permits and approvals, weather, materials, and equipment, could all influence construction duration.

2.3.2 Potential Staging Sites and Casting Yards

Equipment and materials would be staged in the study area throughout construction generally within existing or newly purchased right of way, on land vacated by existing transportation facilities (e.g., I-5 on Hayden Island), or on nearby vacant parcels. However, at least one large site would be required for construction offices, to stage the larger equipment such as cranes, and to store materials such as rebar and aggregate. Criteria for suitable sites include large, open areas for heavy machinery and material storage, waterfront access for barges (either a slip or a dock capable of handling heavy equipment and material) to convey material to the construction zone, and roadway or rail access for landside transportation of materials by truck or train.

Two potential major staging sites have been identified (see Figure 2-8 and Figure 2-23). One site is located on Hayden Island on the west side of I-5. A large portion of this parcel would be required for new right of way for the Modified LPA. The second site is in Vancouver between I-5 and Clark College. Other staging sites may be identified during the design process or by the contractor. Following construction of the Modified LPA, the staging sites could be converted for other uses.

In addition to on-land sites, some staging activities for construction of the new Columbia River and North Portland Harbor bridges would take place on the river itself. Temporary work structures, barges, barge-mounted cranes, derricks, and other construction vessels and equipment would be present on the river during most or all of the bridges' construction period. The IBR Program is working with USACE and USCG to obtain necessary clearances for these activities.

A casting or staging yard could also be required for construction of the overwater bridges if a precast concrete segmental bridge design is used. A casting yard would require access to the river for barges, a slip or a dock capable of handling heavy equipment and material, a large area suitable for a concrete batch plant and associated heavy machinery and equipment, and access to a highway or railway for delivery of materials. As

with the staging sites, casting or staging yard sites may be identified as the design progresses or by the contractor and would be evaluated via a NEPA re-evaluation or supplemental NEPA document for potential environmental impacts at that time.

2.4 No-Build Alternative

The No-Build Alternative illustrates how transportation and environmental conditions would likely change by the year 2045 if the Modified LPA is not built. This alternative makes the same assumptions as the Modified LPA regarding population and employment growth through 2045, and it assumes that the same transportation and land use projects in the region would occur as planned.

Regional transportation projects included in the No-Build Alternative are those in the financially constrained 2018 *Regional Transportation Plan* (2018 RTP) adopted in December 2018 by the Metro Council (Metro 2018a) and in March 2019 (RTC 2019) by the Southwest Washington Regional Transportation Council (RTC) Board of Directors is referred to as the 2018 RTP in the Draft SEIS. The 2018 RTP has a planning horizon year of 2040 and includes projects from state and local plans necessary to meet transportation needs over this time period; financially constrained means these projects have identified funding sources. The Transportation Technical Report lists the projects included in the financially constrained 2018 RTP.

The implementation of regional and local land use plans is also assumed as part of the No-Build Alternative. For the IBR Program analysis, population and employment assumptions used in the 2018 RTP were updated to 2045 in a manner consistent with regional comprehensive and land use planning. In addition to accounting for added growth, adjustments were made within Portland to reallocate the households and employment based on the most current update to Portland's comprehensive plan, which was not complete in time for inclusion in the 2018 RTP.

Other projects assumed as part of the No-Build Alternative include major development and infrastructure projects that are in the permitting stage or partway through phased development. These projects are discussed as reasonably foreseeable future actions in the IBR Cumulative Effects Technical Report. They include the Vancouver Waterfront project, Terminal 1 development, the Renaissance Boardwalk, the Waterfront Gateway Project, improvements to the levee system, several restoration and habitat projects, and the Portland Expo Center.

In addition to population and employment growth and the implementation of local and regional plans and projects, the No-Build Alternative assumes that the existing Interstate Bridge would continue to operate as it does today. As the bridge ages, needs for repair and maintenance would potentially increase, and the bridge would continue to be at risk of mechanical failure or damage from a seismic event.

2.5 Development of the Modified LPA

As described earlier in this chapter, the 2011 ROD for the CRC project included a Selected Alternative that was modified through NEPA re-evaluations in 2012 and 2013 (CRC LPA). The CRC project was suspended in 2014. In 2019, a bi-state legislative committee requested that ODOT and WSDOT restart the CRC project, renaming it the IBR Program. This section describes the 2011 Selected Alternative cleared through the CRC NEPA process, changes that have occurred since that NEPA process was completed, and the screening of new design options for the IBR Program.

2.5.1 Selected Alternative in the 2011 Record of Decision and Subsequent Modifications in 2012 to 2013

Substantial technical analysis was completed to support the development of the CRC project. During the initial screening effort for the CRC project's NEPA alternatives analysis, the CRC team conducted a two-step

screening process that narrowed the number of alternatives to be evaluated in the Draft EIS. Step A evaluated 23 river crossing and 14 transit components using a pass/fail test designed to eliminate ideas beyond the scope of the project or ideas that clearly could not address the project's Purpose and Need statement. Results of Step A are detailed in Appendix C of the CRC Draft EIS (2008) and are summarized as follows:

- Fourteen of the 23 river crossing components were eliminated from further consideration. Some of the river crossing components that were eliminated included a high-level replacement bridge, supplemental bridge, replacement tunnel, and new corridor crossings.
- Eight of the 14 transit components were eliminated. Transit components that were eliminated included high-speed rail, ferry service, monorail system, magnetic levitation railway, commuter rail in the BNSF trackage, heavy rail, personal rapid transit, and people mover/automated guideway transit.

During Step B, components were scored on the project's Vision and Values (see Chapter 1 for more information on the Purpose and Need and Vision and Values). Results from Step B concluded that each of the remaining river crossing components had their strengths and weaknesses, but none were removed from consideration based on Step B screening. The remaining options were then shared with external partners and combined into 12 multimodal alternatives. These 12 alternatives received extensive public and agency input and analysis. In November 2006, based on this input and analysis, CRC project staff recommended advancing a range of alternatives to the CRC Draft EIS that included two HCT modes and a replacement mid-level fixed-span bridge (CRC 2007). The CRC staff recommendation stated "a replacement bridge would accommodate all types of travel over the Columbia River, including vehicles, freight, public transit, bicycles, and pedestrians. The bridge would be built high enough to avoid the need for a lift span [under the then-effective Coast Guard requirements]. It also would be designed to avoid impacts to the airspace of Pearson Air Park [sic]" (CRC 2007). The results of the analyses of these build alternatives in the CRC EIS informed project planning, design, and preconstruction activities. FHWA and FTA issued the ROD for the project on December 7, 2011. After the ROD was issued in 2011, the project design was further refined, and two NEPA re-evaluations were completed in 2012 and 2013, which analyzed the bridge height[12] and phased construction, respectively.[13]

2.5.2 Updating the CRC LPA

Table 2-6 lists the components of the CRC LPA, the corresponding modifications in the Modified LPA, and the changed conditions that prompted the modifications; the sections that follow detail the changed conditions that have occurred since 2013 and how those changed conditions resulted in modifications to the CRC LPA. Figure 2-26 shows, generally, which CRC project components have been changed for the Modified LPA.

[12] The Bridge Height NEPA Re-evaluation was signed by FHWA and FTA in December 2012. This re-evaluation considered an increase in the bridge's maximum vertical navigation clearance height from 95 feet to 116 feet; no significant additional impacts were identified. This re-evaluation was prepared in response to a request from the USCG to conduct additional analysis on navigation impacts. The CRC project team prepared an updated survey of river users and vessels and published a Navigation Impact Report in 2012 that provided detailed evaluation of midlevel bridge design refinement options with vertical clearances ranging from 95 to 125 feet above zero Columbia River Datum. Based on this analysis, and to further reduce navigational impacts, the CRC project maintained a fixed-span bridge but refined the bridge design and increased the bridge height to allow a vertical clearance in the primary navigation channel of 116 feet above zero Columbia River Datum.

[13] The Phased Construction NEPA Re-evaluation was signed by FHWA and FTA in September 2013. This re-evaluation considered the effects of phasing the construction of the Selected Alternative; phasing was disclosed as an option in the Final EIS and ROD. The re-evaluation also included design refinements to the full Selected Alternative as described in the ROD to make the first phase operate better. Some of the design refinements included modifying the Hayden Island interchange in the Selected Alternative first phase to reduce the number of new bridges over North Portland Harbor and to reduce cost while still improving interchange performance. The September 2013 re-evaluation found that the impacts associated with the full Selected Alternative and the Selected Alternative first phase were similar and within the range of impacts reported in the Final EIS and ROD.

Table 2-6. Comparison of CRC LPA and Modified LPA

Component	CRC LPA	IBR Program Modified LPA	Changed Conditions
Columbia River bridges (#6 in Figure 2-26)	• Replacement on a curved alignment: – Double-deck fixed-span truss bridge with 116 feet VNC.	• Replacement on a straight alignment: – Double-deck fixed-span truss bridges with 116 feet VNC. – Single-level fixed-span with 116 feet VNC. – Single-level movable-span with 178 feet VNC.	• 2013 Bridge Permit • USCG Bridge Permit Application Guide • Design optimization
I-5 highway (#1, 2, 4, 5, 6, and 7 in Figure 2-26)	• Improvements to seven interchanges (from south to north): Victory Boulevard, Marine Drive, Hayden Island (full interchange), SR 14, Mill Plain Boulevard, Fourth Plain Boulevard, and SR 500 (with new direct connections between SR 500 and I-5, new on- and off-ramps, and a tunnel beneath I-5), as well as related enhancements to the local street network. • Two auxiliary lanes added between Interstate Avenue/Victory Boulevard to SR 500.	• Improvements to seven interchanges (from south to north): Victory Boulevard, Marine Drive, Hayden Island (half-diamond interchange), SR 14, Mill Plain Boulevard, Fourth Plain Boulevard, and SR 500 (without proposed I-5 connections, ramps, or tunnel), as well as related enhancements to the local street network. • One or two auxiliary lanes between Marine Drive and SR 500. The two auxiliary lane option has the same alignment and lane configuration as the CRC LPA from Interstate Avenue/Victory Boulevard to SR 500. • An option that shifts the I-5 mainline up to 40 feet westward in downtown Vancouver between the SR 14 interchange and Mill Plain Boulevard interchange. • An option that eliminates the existing C Street ramps in Vancouver.	• Portland land use • Vancouver land use • Freight movements • Climate change • Portland's transportation hierarchy • Design optimization
North Portland Harbor bridge (#4 in Figure 2-26)	• Improvements to seismically retrofit the existing I-5 mainline bridge over North Portland Harbor; three new bridges over this waterway associated with I-5; and one new multimodal bridge carrying LRT, local traffic, pedestrians, and bicyclists.	• Replace the existing I-5 mainline bridge over North Portland Harbor and construct six new bridges that would carry LRT, southbound I-5 off-ramp, southbound I-5 mainline, northbound I-5 mainline, northbound I-5 on-ramp, and an arterial road for local traffic, pedestrians, and bicyclists.	• Updated AASHTO LRFD Bridge Design Specifications and AASHTO Seismic Guide Specifications • Degraded seismic resiliency

Component	CRC LPA	IBR Program Modified LPA	Changed Conditions
Active Transportation (see Figure 2-26)	• Bicycle and pedestrian improvements throughout the project corridor including a multiuse path connecting to the existing active transportation system and the Community Connector over I-5, just south of Evergreen Boulevard.	• Bicycle and pedestrian improvements throughout the project corridor including a multiuse path connecting to the existing active transportation system and the Community Connector over I-5, just south of Evergreen Boulevard.	• Active transportation connections • Portland's transportation hierarchy • Design optimization
Transit (#3, 6, 7, 8, and 9 in Figure 2-26)	• Extension of LRT from the Expo Center MAX Station in Portland to Clark College in Vancouver via at-grade tracks in Downtown Vancouver and associated transit improvements. • Five transit stations: one on Hayden Island, three in downtown Vancouver, and a terminus station near Clark College. • Three park and rides: Columbia (near the SR 14 interchange), Mill Plain (in uptown Vancouver) and Clark (on McLoughlin Boulevard near Clark College). • Improvements would have been made to retrofit the existing rails and electrical system on the Steel Bridge to allow trains to travel at a higher speed. • Local bus route changes. • Expansion of the Ruby Junction LRT maintenance facility.	• Extension of LRT from the Expo Center MAX Station in Portland to Evergreen Boulevard in Vancouver via elevated tracks adjacent to I-5 and associated transit improvements. • Three transit stations: one on Hayden Island, one in downtown Vancouver (Waterfront Station), and a terminus station near Evergreen Boulevard. • Two park and rides: Waterfront Station (Columbia Way, Columbia Street/SR 14, or Columbia Street/Phil Arnold Way) and Evergreen Station (Library Square or Columbia Credit Union). • Local and express bus route changes, including bus on the I-5 shoulders. • Expansion of the Ruby Junction LRT maintenance facility and an LRT overnight facility near Expo Center. • Wider shoulders on I-5 to accommodate express bus-on-shoulder service in each direction. • Additional bus bays for new electric double-decker buses at the C-TRAN operations and maintenance facility.	• Vancouver land use • Historic resources • Transit system and service • Design optimization

Component	CRC LPA	IBR Program Modified LPA	Changed Conditions
• Transportation demand and system management measures	• Variable-rate tolling for motorists using the river crossing as a demand-management and financing tool. • Other TDM and TSM measures including variable message signage, traveling information systems, ramp metering, signal prioritization, and other traffic management tools.	• Variable-rate tolling for motorists using the river crossing as a demand-management and financing tool. • Other TDM and TSM measures including variable message signage, traveling information systems, ramp metering, signal prioritization, and other traffic management tools.	• No changes.

AASHTO = American Association of State Highway and Transportation Officials; CRC = Columbia River Crossing; C-TRAN = Clark County Public Transit Benefit Area Authority; HCT = high-capacity transit; I-5 = Interstate 5; LPA = Locally Preferred Alternative; LRFD = load and resistance factor design; LRT = light-rail transit; MAX = Metropolitan Area Express; PNCD = Preliminary Navigation Clearance Determination; SR = State Route; USCG = U.S. Coast Guard; VNC = vertical navigation clearance

Figure 2-26. IBR Program Modifications to the CRC LPA Components

IBR Program Modifications

9 Park and Rides

Modifies park-and-ride locations (design options for locations at the Waterfront and Evergreen stations)

8 Light Rail Transit

Modifies alignment through downtown Vancouver to hug I-5 and moves terminus from Clark College to near Evergreen Blvd

7 Downtown Vancouver

Modifies access to/from SR 14

Modifies Waterfront Station location (design option without a C Street ramp and design option with I-5 westward shift)

6 Columbia River Bridges

Modifies the two bridges from a curved alignment to a straight alignment (bridge configurations with a double-deck fixed-span, single-level fixed-span, and single-level movable-span)

5 Hayden Island Interchange

Modifies full interchange to half-diamond interchange

Minor modifications to local road configuration

4 North Portland Harbor I-5 Bridge

Replaces existing North Portland Harbor I-5 bridge (instead of retrofitting) and moves local access bridge to east side of I-5

3 Expo Center Overnight Facility

Adds overnight maintenance facility for TriMet light rail vehicles

2 Marine Drive Interchange

Modifies interchange access

1 Victory Boulevard Interchange

Minor modifications to access

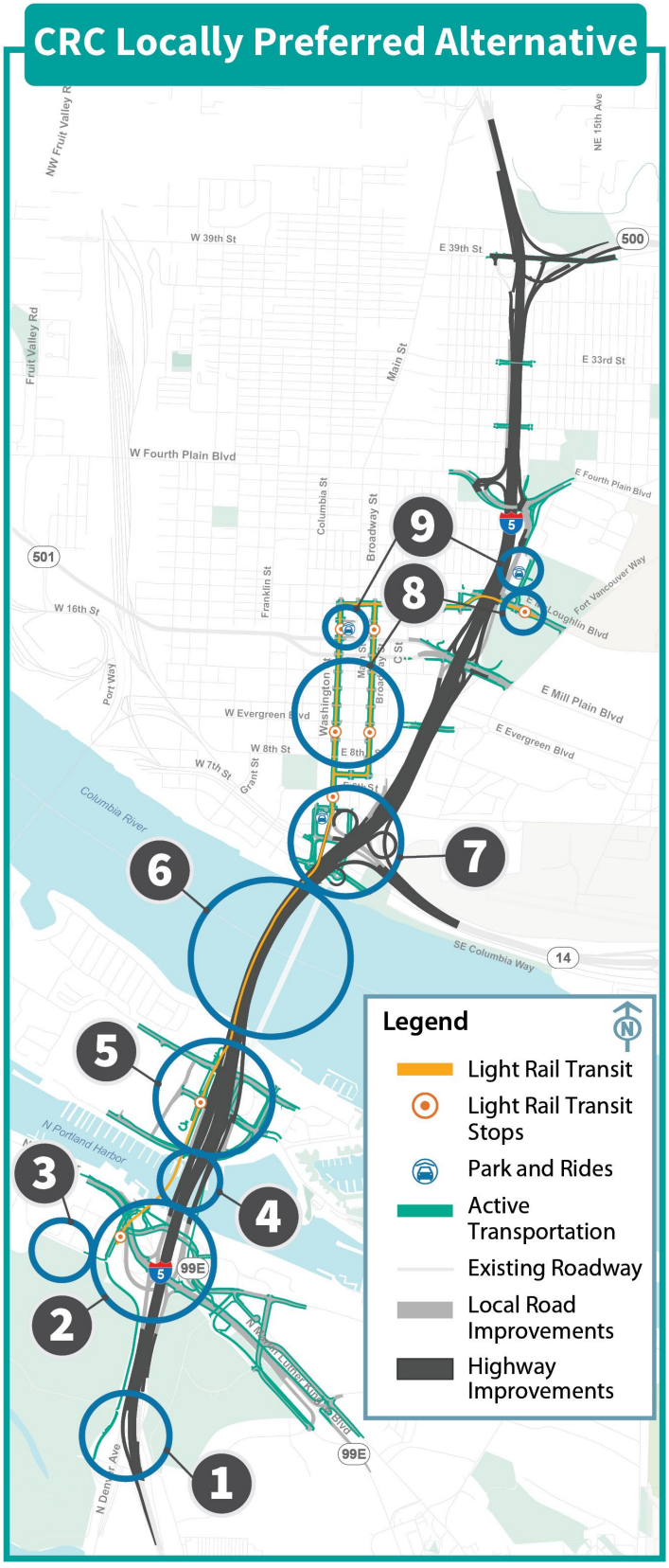
Active Transportation

Modifies alignment of shared-use path and ties in to planned projects (e.g., 40-Mile Loop Trail and two-way cycle track on Fourth Plain)

Auxiliary Lanes

Reduces number of auxiliary lanes from two to one (design option for two auxiliary lanes)

CRC Locally Preferred Alternative



Changes in Conditions since 2013

Since the issuance of the CRC ROD, as revised by the 2012 and 2013 re-evaluations (CRC LPA), existing environmental conditions have changed; these changes range from physical changes in the environment within the Program footprint to regulatory changes to changes in community priorities and interests. Many of these physical and quantifiable changes have caused agencies to adjust their preferences and priorities to better reflect the evolving needs of the communities they represent. A summary of the changes since 2013 include the following:

- **Active transportation connections.** Local agencies have made changes to active transportation planning, including both existing and planned active transportation in Portland and Vancouver. For example, currently planned or existing active transportation that was not in existence at the time of the CRC project include the 40-Mile Loop Trail in Portland and the two-way cycle track on Fourth Plain Boulevard in Vancouver. This changed condition resulted in modifications to the active transportation component of the Modified LPA.
- **2013 Bridge permit.** The USCG Bridge Permit was issued on September 27, 2013. Because the CRC project was suspended in 2014, this permit is no longer valid. The height and span of the replacement bridges need to be reexamined in accordance with the 2016 bridge permit application guidance, with input from USCG to ensure the replacement bridge design would meet reasonable needs of navigation and would obtain required permits. This changed condition resulted in modifications to the Columbia River bridge component of the Modified LPA.
- **Changes in regulations.** Many environmental regulations, procedures, and permit requirements have changed or been updated since the issuance of the CRC LPA. The discipline-specific technical reports prepared for this Draft SEIS include additional detail on specific regulations that have changed since 2013.
- **Climate change.** Since 2011, awareness and acceptance of the implications and impacts of climate change has grown. Many communities, agencies, and businesses are reassessing their behavior and operations to identify how they might be contributing to global warming and resultant climate change, and they are examining how their environment is changing due to climate change. Both Washington and Oregon have established new climate plans, policies, and legislation since 2011. Washington has established statewide greenhouse gas (GHG) reduction targets and is charging state agencies (like WSDOT) to reduce transportation emissions through investments and spending decisions. Oregon has established statewide GHG reduction targets, updated statewide planning rules to reduce emissions, and created an ODOT Climate Action Plan to reduce emissions from the transportation system and improve resilience. Local governments in the study area have also established new climate plans and polices since 2011. Additionally, recent exceptional weather events are driving changes in considerations and assumptions about climatic conditions and related community needs for climate resiliency. See Section 3.19, Climate Change, for additional information. This changed condition resulted in modifications to the I-5 highway component of the Modified LPA.
- **Degraded seismic resiliency.** With no improvements made to the existing North Portland Harbor bridge, its seismic resiliency continues to degrade as time passes. This changed condition resulted in modifications to the North Portland Harbor bridge component of the Modified LPA.
- **Demographics.** The Portland-Vancouver metropolitan area added more than a quarter of a million residents between 2010 and 2020, with the majority being Black, Indigenous, or People of Color (BIPOC) and/or Hispanic/Latino (U.S. Census Bureau 2010; U.S. Census Bureau 2020). This changed condition did not result in design modifications, but was considered in the existing conditions and environmental consequences analysis in Chapter 3.

- **Design optimization.** Engineering decisions related to the CRC LPA were revisited for some components to determine if avoidance and minimization to environmental resources, constructability improvements, or cost-reduction strategies were available. Additionally, because of the intrinsic connectivity of each of the Program elements, a change in design to one component of the CRC LPA often necessitates a design change to a connected component. This resulted in design modifications to the Columbia River bridges, the I-5 highway, active transportation, and transit components of the Modified LPA.
- **Endangered Species Act (ESA).** ESA listings and critical habitat designations have changed since the 2013 consultations with the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NOAA Fisheries) and the U.S. Fish and Wildlife Service (USFWS) (NOAA n.d.; USFWS 2021). These changes require consideration of how to best avoid and minimize impacts to species and their habitat, including the timing of the in-water work and updating run timing for salmon species. The IBR Program inititiated new Section 7 ESA consultations with NOAA Fisheries and USFWS on September 25, 2023 to bring the consultations up to date with current species listings and critical habitat designations and to reflect changes in best available science. USFWS issued a new Letter of Concurrence on December 11, 2023 and NOAA Fisheries will prepare a new biological opinion. This changed condition did not result in design modifications, but was considered in the existing conditions and environmental consequences analysis in Chapter 3.
- **Freight movements.** Freight movements by truck have changed, with less freight anticipated to be moved through the Hayden Island interchange as the Port of Portland is no longer planning to develop West Hayden Island into a port facility. Meanwhile, industrial development, much of which uses trucks delivery has grown in North Portland industrial areas, has added truck volume to the Marine Drive interchange. This changed condition resulted in modifications to the I-5 highway component of the Modified LPA.
- **General Bridge Act of 1946, as amended (USCG Bridge Permit Application Guide).** USCG issued a new bridge permit application guide (COMDTPUB P16591.3D) in July 2016 which requires the preparation and submittal of a navigation impact report to the USCG to analyze the navigational impacts from bridge design alternatives and document current and prospective navigation on a waterway. A navigation impact report is prepared early in project planning and is updated periodically during project development because waterways and waterway usage are dynamic and may change over time. The USCG then issues a PNCD to inform the NEPA alternatives analysis for the environmental documentation (USCG 2016). Also, the USCG Bridge Permit process must now be completed in accordance with the USCG -FHWA-FTA Federal-Railroad Administration Memorandum of Understanding (2014) and the USCG-FHWA Memorandum of Agreement (2014). This changed condition resulted in modifications to the Columbia River bridge component of the Modified LPA.
- **Historic resources.** Additional historic-aged structures potentially eligible for listing on the National Register of Historic Places have aged into consideration since the previous historic period survey. To thoroughly consider resources that may reach historic-age during construction, the historic resources period has been extended 15 years to consider buildings built in or prior to 1982. This changed condition resulted in modifications to the transit component of the Modified LPA.
- **Housing costs.** The cost of housing increased significantly, forcing many households with lower incomes to move to neighborhoods where housing is more affordable but that may be farther from job and activity centers (Metro 2015). The combination of longer distances traveled and limited public transit service in these areas puts an added transportation cost burden on these community members, including many who moved from Portland, Oregon, to Clark County, Washington, but still need to travel to Portland for work, medical appointments, family, or other needs (Metro 2018b). Related to rising housing costs is a growing houseless population throughout the region (Clark County Council for the Homeless 2022; Multnomah County Joint Office of Homeless Services 2022). The number of encampments has increased,

including in the highway right of way and throughout the study area. This changed condition did not result in design modifications, but was considered in the existing conditions and environmental consequences analysis in Chapter 3.

- **Levees.** USACE, in partnership with the UFSWQD, is planning improvements to the existing levees along the south side of North Portland Harbor (the Levee Ready Project). It is anticipated that the new levee design will require the IBR Program to stay above a 38-foot elevation (NAVD 88). Alterations to I-5 will require review by the USACE, UFSWQD, and the City of Portland for compliance with levee requirements associated with the Levee Ready Project. This changed condition did not result in design modifications, but was considered in the existing conditions and environmental consequences analysis in Chapter 3.
- **Portland land use.** Portland has undergone significant changes in land use policy, particularly through the adoption of the 2035 Comprehensive Plan, which emphasizes the integration of nature and green infrastructure and encourages the design and management of streets to serve as multifunctional spaces. Planned land uses on Hayden Island and near Marine Drive have changed, with a shift to less intensive uses (e.g., a marine terminal is no longer planned at the west end of Hayden Island). Portland's 2009 *Hayden Island Plan* (City of Portland 2009) calls for the development of new parks and open spaces for habitat on Hayden Island, including a potential new park west of the existing I-5 and under the replacement bridges. Portland's *2035 Comprehensive Plan* (City of Portland 2020) also anticipates several watershed restoration projects in the Delta Park area. This changed condition resulted in modifications to the I-5 highway component of the Modified LPA.
- **Portland transportation hierarchy.** The City of Portland uses a transportation hierarchy to prioritize modes when making transportation investment and design decisions. Variations of this hierarchy existed during the CRC project, but it was last updated with policy 9.6 in the City of Portland's *2035 Comprehensive Plan* (City of Portland 2020). The prioritization of modes has changed since the CRC project, including the elevation of transit to the third priority, following walking and biking. This changed condition resulted in modifications to the I-5 highway and active transportation components of the Modified LPA.
- **Project footprint.** Community and local agency feedback suggested that the project's footprint on Hayden Island was too large under the CRC LPA. Although this preference was voiced during CRC, the design was not adjusted at that time. Similar feedback was heard during the design option development phase (see Section 2.5.3, IBR Design Option Development and Screening) and was integrated into the Modified LPA. This changed condition resulted in modifications to the I-5 highway component of the Modified LPA.
- **Tolling.** Tolling programs are being studied in Oregon (ODOT n.d.). Tolling on the new Columbia River bridges was included in the CRC analysis and is included in the IBR analysis. This changed condition did not result in design modifications, but was considered in the existing conditions and environmental consequences analysis in Chapter 3.
- **Traffic.** Changes have occurred since 2013 in traffic volumes and activities (RTC n.d.). The IBR Program has updated traffic models to extend the forecast to 2045 (CRC used 2030). This changed condition did not result in design modifications, but was considered in the existing conditions and environmental consequences analysis in Chapter 3.
- **Transit system and service.** Changes in existing transit services and activities include the construction and operation of the C-TRAN Fourth Plain and Mill Plain Vine BRT routes, which began service in 2017 and 2023, respectively, and bus-on-shoulder operations on I-5 north of the Interstate Bridge, which began in 2020. A third BRT line that would extend north from downtown Vancouver along Highway 99 is in the planning stage. A Fourth Plain extension serving Fourth Plain Boulevard and 162nd Avenue is also in the

planning stage. TriMet has also expanded operations and planning for additional BRT service in the region. This changed condition resulted in modifications to the transit component of the Modified LPA.

- **Updated American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor Design (LRFD) Bridge Design Specifications and the AASHTO Seismic Guide Specifications.** The current AASHTO LRFD Bridge Design Specifications and the AASHTO Seismic Guide Specifications have been updated. This changed condition resulted in modifications to the North Portland Harbor bridge component of the Modified LPA.
- **Vancouver land use.** Localized development has occurred in downtown Vancouver and at the Vancouver waterfront that includes construction and buildings developed since issuance of the CRC ROD or building permit applications. This development is consistent with local development plans including the Vancouver City Center Vision, Waterfront Master Plan, and Terminal 1 Concept Development Plan. Design modifications are necessary to minimize property impacts and improve access. This changed condition resulted in modifications to the I-5 highway and transit components of the Modified LPA.

How the Changed Conditions Modified the CRC LPA and Resulted in the IBR Modified LPA

Many of the changed conditions listed above resulted in modifications to certain CRC LPA components and resulted in the Modified LPA. How the changed conditions led to each Modified LPA component is described below.

Columbia River Bridges

The following changed conditions contributed to modifications to the Columbia River bridges component: USCG Bridge Permit Application Guide, the 2013 Bridge Permit, and design optimization. Modifications to the Columbia River bridges include straightening the bridge alignment and adding additional bridge configuration options.

The Modified LPA has a straightened bridge alignment because of the changed conditions that prompted replacement of the North Portland Harbor bridge (described below). Previously, the North Portland Harbor bridge would have been retrofitted in place, which would have required the Columbia River bridges to have a curved alignment in order to connect to the existing North Portland Harbor bridge. Under the Modified LPA, the replacement North Portland Harbor bridges would be located west of the existing location, shifting I-5 slightly west and enabling the Columbia River bridges to have a straight alignment, which would improve constructability.

The Modified LPA has two single-level bridge configuration options. These configurations were included in response to design optimization efforts to make improvements to address ingress and egress of transit, which is located on the lower level of the double-deck fixed-span configuration.

A single-level movable-span configuration was included in response to changes to the USCG Bridge Permit Application Guide and because the 2013 Bridge Permit has expired. After following the updated USCG permit process, the USCG issued a PNCD in June 2022 that required at least 178 feet of vertical navigation clearance (VNC), which is consistent with the existing VNC of the Interstate Bridge. The single-level movable-span configuration would provide 178 feet of VNC.

I-5 Highway

The following changed conditions contributed to modifications to the I-5 highway component: Portland and Vancouver land use, freight movements, climate change, Portland's transportation hierarchy, and design optimization. Modifications to the I-5 highway include changes to interchanges and access, the addition of a one auxiliary lane option, and the addition of options to remove the C Street ramp and shift the I-5 alignment west in downtown Vancouver.

Some interchange improvements and access were modified in response to changed conditions, including changes to Portland and Vancouver land uses and changes to freight movement. For example, the Hayden Island interchange was changed from a full interchange in the CRC LPA to a half-diamond interchange in the Modified LPA due to reductions in planned freight movement on the island and changes in Portland land use.

A one auxiliary lane option was included as part of the Modified LPA to reduce the highway footprint and increase multimodal transportation use in response to community and local agency priorities, including climate change policies and the City of Portland's transportation hierarchy. To optimize the design, further modifications to interchanges were necessitated to accommodate the one auxiliary lane option.

Design optimization efforts also resulted in adding an option to shift the I-5 mainline slightly west in downtown Vancouver to evaluate another approach to minimize impacts to environmental resources on both sides of I-5. Design optimization efforts also resulted in adding an option to eliminate the C Street ramps in Vancouver to reduce the Program footprint.

North Portland Harbor Bridge

Both of the following changed conditions contributed to modifications to the North Portland Harbor component: updated AASHTO LRFD Bridge Design Specifications and AASHTO Seismic Guide Specifications and degraded seismic resiliency. Modifications to the North Portland Harbor bridge include replacing the bridge instead of retrofitting it.

The Modified LPA replaces the North Portland Harbor bridge because the bridge's seismic resiliency has continued to degrade over time, to the point that it would be cost prohibitive to retrofit the existing bridge to address seismic vulnerability. In addition, the current AASHTO LRFD Bridge Design Specifications and the AASHTO Seismic Guide Specifications have been updated and, when applied to the existing bridge, indicate an increased need to replace this seismically deficient structure to improve seismic resiliency in the corridor. Replacement bridges over North Portland Harbor and the Columbia River would be designed to the same seismic and resiliency standards to provide consistent seismic resiliency from the North Portland mainland to Vancouver, a complete river crossing.

Active Transportation

The following changed conditions contributed to modifications to the active transportation component: active transportation connections, Portland's transportation hierarchy, and design optimization. Modifications to the active transportation component include modifications in the design to connect to existing and planned active transportation systems in the Program area. Bicycle and pedestrian improvements would continue to be incorporated throughout the Program area.

Some details of the bicycle and pedestrian improvements were modified due to changes in active transportation connections and a change in the City of Porland's transportation hierarchy. For example, existing and planned active transportation projects in Portland and Vancouver that prompted design modifications to maintain connectivity include the 40-Mile Loop Trail in Portland and the two-way cycle track on Fourth Plain Boulevard in Vancouver.

Additionally, the changed conditions that prompted the replacement of the North Portland Harbor bridge (described above) allowed the IBR Program to optimize the location of the local arterial bridge to the east of I-5 under the Modified LPA (previously west of I-5 in the CRC LPA), which necessitated changes in active transportation connections in the vicinity of the Marine Drive and Hayden Island interchanges. In addition, design optimization efforts resulted in realigning active transportation facilities near modified interchanges.

Changes to transit station locations and the LRT alignment (described below) also led to changes in active transportation connections to these transit facilities.

Transit

The following changed conditions contributed to modifications to the transit components: Vancouver land use, historic resources, the existing and planned regional transit system and service, and design optimization. Modifications to the transit component include modifications to the LRT alignment, terminus, and station locations; bus-on-shoulder and express bus operations; and transit facilities.

Changes to Vancouver land use, including new development and new transit service, have increased development in downtown Vancouver, in and around the Vancouver waterfront, and along the path of the LRT alignment under the CRC LPA. In addition, there was an increase in the number of historic resources (i.e., additional historic-aged structures potentially eligible for listing on the National Register of Historic Places, as described in Section 3.8, Cultural Resources) in downtown Vancouver. These changed conditions necessitated design modifications, including shifting the LRT alignment adjacent to I-5 and elevating the LRT tracks. These modifications help minimize property impacts in Vancouver and improve access to C-TRAN bus routes.

In addition to a change in alignment, the terminus at Clark College in the CRC LPA has been modified to end near Evergreen Boulevard. Since the CRC LPA, C-TRAN has implemented a BRT system that serves the area of the CRC LPA terminus at Clark College. This new service was one of the contributing reasons for a change in LRT terminus under the Modified LPA. In the Modified LPA, a terminus near Evergreen Boulevard maximizes transfer opportunities to C-TRAN transit service as it provides direct connections to several local routes, as well as existing and planned BRT routes.

The change in LRT alignment and terminus (described above), as well as new development in downtown Vancouver (Vancouver Land Use), and transit systems and service enhancements that have been made within the Program footprint as part of C-TRAN's transportation planning, also necessitated changes to the stations and park-and-ride locations and the number of parking spaces that are planned for as part of the Modified LPA.

The CRC LPA assumed that the I-5 express bus service would be reduced between downtown Vancouver and Portland, with the I-5 route from Salmon Creek ending in downtown Vancouver and forcing a transfer to light-rail for the trip across the Columbia River. C-TRAN began express bus-on-shoulder operations in limited sections of its express routes in 2017, after the CRC project was halted. The successful implementation of express bus-on-shoulder on the southbound inside shoulder of I-5 in Vancouver—along with local agency and community priorities to minimize transfers and provide added capacity that is needed to meet cross-river demand—prompted the design modifications to I-5 shoulders through the Program area in the Modified LPA. With these changes, the Modified LPA would allow C-TRAN to continue to provide express bus service operating in shoulders in the southbound direction and add the ability to operate in shoulders in the northbound direction. The shoulder operations would extend through the entire Program area and would allow faster operational speeds than are currently possible (35 mph maximum speeds vs. 25 mph maximum speeds currently). In addition to bus-on-shoulder design modifications, service increases on I-5 express buses were needed because the lower number of proposed park-and-ride locations in Washington under the Modified LPA increased the importance of C-TRAN's connected express bus service across the Columbia River. The need for greater express bus service in turn necessitated the need for additional bus bays at the C-TRAN operations and maintenance facility.

Both TriMet and C-TRAN continually update their service in response to changing system needs. Since the CRC LPA was developed, both agencies have implemented BRT service, and C-TRAN has implemented cross-river regional service and modified how it operates its express services. Both BRT services have been updated in future year networks to reflect how these agencies currently operate and how they anticipate operating in the future, which is different from the assumptions upon which the CRC LPA was based. To accommodate current transit service and operations for both agencies, the designs of both the Waterfront

and Evergreen Stations include integration of C-TRAN BRT, express and local bus service and at the redesigned Expo Station include integration of TriMet local bus service.

An overnight LRV facility at the Expo Center was not part of the CRC LPA, which assumed that LRVs would be accommodated through the expansion of Ruby Junction. With changes to the Modified LPA in Vancouver resulting from community and local agency priorities, as discussed above, the IBR Program examined ways to reduce the long-term operations and maintenance costs on the system. This led to the consideration and inclusion of the Expo Center site as an overnight LRV facility.

Transportation Demand and System Management Measure

There were no changes to the transportation demand and system management measures from the CRC LPA to the Modified LPA.

2.5.3 IBR Design Option Development and Screening

During the early planning phase for the IBR Program, feedback from partner agencies, tribes, organizations, and the public identified changed conditions within the study area that had occurred since the selection of the CRC LPA. In response, the IBR Program identified that several components of the CRC LPA required design modifications. Potential options for each of these components went through a multitiered screening process that included input from Program partners, tribes, and community members. The screening process, including details on why design options were advanced or dropped from further screening, is included in Appendix D, Design Options Development, Screening, and Evaluation Technical Report. The components evaluated were:

- Hayden Island and Marine Drive
- Main Columbia River crossing
- Transit mode, general alignment, and termini
- Auxiliary lanes

The IBR Program held a targeted period of engagement between January and April 2021 to gather feedback from advisory groups and the public on transportation problems and to understand community priorities and values. Feedback from these groups emphasized that *equity* and *climate* considerations are high priorities for the region. The Program developed equity and climate frameworks to define performance measures and ensure that these values are reflected in Program decisions. Equity and climate considerations were included in the screening process to develop the Modified LPA (see Appendix D).

The evaluation of each component is described briefly below. For more detailed information on the process by which design modifications were required to address changed conditions since the 2011 ROD, as revised by the 2012 and 2013 re-evaluations, were developed and screened, see Appendix D, the Design Options Development, Screening, and Evaluation Technical Report.

Hayden Island and Marine Drive

The IBR Program identified the following changes in conditions since 2013 related to Marine Drive and Hayden Island through advisory group input, community feedback, and input from agency partners serving on the Hayden Island/Marine Drive Task Force[14] (refer to Appendix D, Design Options Development, Screening, and Evaluation Technical Report, for additional information). These changed conditions, detailed in Section 2.5.2,

[14] The Hayden Island/Marine Drive Task Force met 18 times between late spring 2021 and early winter 2022. There was an average of 50 participants per meeting, with staff from 10 local partner agencies and technical staff from the IBR Program.

Updating the CRC LPA, necessitated the development of design options for the Marine Drive and Hayden Island interchanges:

- Freight movements
- Levee
- North Portland Harbor bridge
- Portland land use
- Project footprint
- Portland's transportation hierarchy

The primary design considerations for Hayden Island and Marine Drive were the interchange type on Hayden Island and the resulting multimodal connections with Marine Drive and I-5. The IBR Program evaluated multiple concepts, ultimately advancing five full-, partial-, and no-interchange options for Hayden Island into the screening process. All design options included a full interchange at I-5/Marine Drive; an arterial bridge across North Portland Harbor to serve local traffic; a shared-use path for active transportation connecting North Portland, Hayden Island, and the 40-Mile Loop Trail; and the extension of Tomahawk Island Drive under I-5 to provide an additional east-west local street connection on Hayden Island.

The Hayden Island/Marine Drive Task Force identified the following five design options to advance for screening (refer to Appendix D, the Design Options Development, Screening, and Evaluation Technical Report, for a complete description of each design option):

- Design Option 1 – Full Interchange
- Design Option 2 – Partial Interchange 1
- Design Option 3 – Partial Interchange 2
- Design Option 4 – No Interchange
- Design Option 5 – Partial Interchange 3

During screening, the task force collected data for approximately 90 metrics and scored each design option against the others for a given metric. Screening metrics were categorized as climate impacts/adaptation, natural environmental, built environment, active transportation, transit access, vehicles, freight, cost, and seismic. Design Options 1 and 5 performed best out of all design options. They had a similar freight/vehicle traffic performance on Marine Drive, including at ramp terminal intersections, and were both compatible with all transit investments currently under consideration.

Tradeoffs and benefits between Design Options 1 and 5 are listed in Table 2-7 to further differentiate between the two options.

Table 2-7. Tradeoffs and Benefits Between Hayden Island/Marine Drive Design Options 1 and 5

Design Option 1 – Full Interchange	Design Option 5 – Partial Interchange
Larger footprint over North Portland Harbor.	**Smaller** footprint over North Portland Harbor.
More floating home impacts.	**Fewer** floating home impacts.
Larger scale and complexity of I-5 over Hayden Island provides **lower**-quality experience for active	**Smaller** scale and complexity of I-5 over Hayden Island provides **higher**-quality experience for active

Design Option 1 – Full Interchange	Design Option 5 – Partial Interchange
transportation and transit access on east-west streets.	transportation and transit access on east-west streets.
Hayden Island vehicle/freight access to/from Portland **via Hayden Island Drive I-5 ramps.**	Hayden Island vehicle/freight access to/from Portland **via local roads and I-5 ramps that cross under Marine Drive.**
Hayden Island vehicle/freight access to/from Vancouver via Jantzen Drive I-5 ramps.	Hayden Island vehicle/freight access to/from Vancouver via Jantzen Drive I-5 ramps.
Scores **medium-high** from a **climate** perspective.	Scores **high** from a **climate** perspective.
Scores **medium** from an **equity** perspective.	Scores **medium** from an **equity** perspective.

Based on the findings in Table 2-7, Design Option 5 (Partial Interchange) was advanced for further study and refinement and ultimately inclusion in the Modified LPA. Design Option 5 would construct a partial interchange at Hayden Island and a full interchange at Marine Drive; it was selected because it would be designed to minimize impacts while making improvements to freight and workforce traffic and active transportation on Hayden Island and Marine Drive. Refer to Appendix D, the Design Options Development, Screening and Evaluation Technical Report, for additional detail.

Main River Crossing

The IBR Program identified the following changes in conditions since 2013 related to the main river crossing through advisory group input, community feedback, and input from agency partners serving on the River Crossing Task Force[15] (refer to Appendix D, Design Options Development, Screening, and Evaluation Technical Report, for additional information). These changes, detailed in Section 2.5.2, Updating the CRC LPA, necessitated the development of design options for the river crossing. Additionally, design options for the river crossing are necessary to accommodate the potential design changes identified for the Hayden Island and Marine Drive interchanges, described above.

- Active transportation connections
- 2013 Bridge Permit
- Changes in regulations
- ESA
- Transit system and service
- Vancouver land use

The river crossing area covers the main span of the existing Interstate Bridge over the Columbia River. This component extends from where the bridge begins on Hayden Island to where the bridge touches down in Vancouver. The design options considered ways to move all modes across the river, as well as the configuration of these modes in relation to each other (e.g., the location of the shared-use path in relation to vehicle lanes and transit lines). The design options included variations designed for a two-bridge or

[15] The River Crossing task force consisted of technical staff from ODOT, WSDOT, C-TRAN, TriMet, Metro, RTC, City of Portland, City of Vancouver, Port of Portland, Port of Vancouver, and the IBR Program. The task force met 11 times between summer 2021 and winter 2022 with an average of 50 participants per meeting.

one-bridge river crossing option, and they assumed a mid-level fixed-span bridge that provides 116 feet of vertical navigation clearance.[16]

Following agency and public input, the River Crossing Task Force identified three design options to advance for screening (refer to Attachment C.C-1, River Crossing Bridge Clearance Assessment Report – Movable Span Options, in Appendix D, the Design Options Development, Screening, and Evaluation Technical Report, for a complete description of each design option):

- Design Option 1 – Two Straight Bridges (Refined 2013 Design)
- Design Option 2 – One Bridge (Double-Stacked)[17]
- Design Option 3 – One Bridge (Hybrid-Stacked)

During screening, the task force collected data for approximately 90 metrics and scored each design option against the others for a given metric. Screening metrics were categorized as climate impacts/adaptation, natural environment, built environment, active transportation, vehicles/freight, and cost. Design Options 1 and 3 performed the best of the design options during the screening.

Tradeoffs and benefits between Design Options 1 and 3 are listed in Table 2-8 to further differentiate between the two options.

Table 2-8. Tradeoffs and Benefits between River Crossing Design Options 1 and 3

Design Option 1 – Two Straight Bridges	Design Option 3 – One Bridge (Hybrid-Stacked)
Reduces shared-use path users' exposure to noise and elements.	**Increases** shared-use path users' exposure to noise and elements.
Creates **visually uncluttered** structures on Hayden Island and scales them to surroundings.	Results in **complex** bridge approaches on Hayden Island and in Vancouver.
Easier-to-fund river crossing bridge because it would allow phased construction to maintain operational traffic on I-5 across the Columbia River.	**Harder**-to-fund river crossing bridge because it would not allow for phased construction or maintenance on I-5 across the Columbia River.
No undesignated space on upper deck.	**Creates undesignated** space on upper deck.
Fewer right-of-way acquisitions and impacts to Fort Vancouver.	**More** right-of-way acquisitions and impacts to Fort Vancouver because the lower deck would be wider on the eastern side and would require additional right of way to accommodate the shared-use path ramp from the bridge to ground level.
Smaller footprint over land.	**Larger** footprint over land because the lower deck would be wider on the eastern side and would require additional right of way to accommodate the shared-use path ramp from the bridge to ground level.

[16] 116 feet of vertical navigation clearance was assumed during this screening effort because it was the same vertical navigation clearance assumed after the CRC project's 2012 re-evaluation regarding bridge height. Additional analysis regarding the consideration of a tunnel and movable-span bridge is included in Attachment C-1 of the Design Options Development, Screening, and Evaluation Technical Report (Appendix D).

[17] "Double stacked" means that both the northbound and southbound highway would be stacked, and the transit and SUP would be stacked. The upper level of the bridge would have southbound highway traffic adjacent to the shared-use path and the lower level would have northbound highway traffic adjacent to transit.

Design Option 1 – Two Straight Bridges	Design Option 3 – One Bridge (Hybrid-Stacked)
Simpler wayfinding on northbound I-5.	Overhead structure **complicates** wayfinding on northbound I-5 (requires approvals for signage smaller than standards).
Can maintain traffic on existing Interstate Bridge during construction.	**Cannot maintain** traffic on existing Interstate Bridge during construction.
Scores **medium-high** from an **equity** perspective.	Scores **medium** from an **equity** perspective.
Scores **medium-high** from a **climate** perspective.	Scores **medium-high** from a **climate** perspective.
Longer construction period.	**Shorter** construction period.
Emergency vehicles access shared-use path via **shared-use path ramps** on Hayden Island and downtown Vancouver.	Emergency vehicles access shared-use path via **northbound I-5** or **shared-use path ramps** on Hayden Island and downtown Vancouver.
Likely uses **more** construction materials (based on the footprint, not expected tailpipe emissions).	Uses marginally **fewer** construction materials (based on the footprint, not expected tailpipe emissions).
More in-water piers/obstructions: • 12 in-water piers (each pair of piers measures approximately 200 feet combined in direction of river channel).	**Fewer** in-water piers/obstructions: • 6 in-water piers (each pier measures approximately 175 feet in direction of river channel).
Larger footprint over aquatic habitat (approximately 12 acres).	**Smaller** footprint over aquatic habitat (approximately 10 acres).
Lower deck shared-use path **not visible** to vehicular traffic, does not benefit from "eyes on the path" (a safety concern for active transportation users).	**Allows some visibility** between shared-use path and vehicular traffic on lower deck.

Based on the findings in Table 2-8, Design Option 1 (Two Straight Bridges) was advanced for further study and refinement. Design Option 1 would construct two bridges from Hayden Island to Vancouver on a straight alignment. The eastern bridge would accommodate northbound highway traffic on the upper bridge deck, with a bicycle and pedestrian path underneath; the western bridge would carry southbound traffic on the upper bridge deck, with two-way transit below. Design Option 1 was selected because it would have fewer impacts, can maintain traffic during construction, and scored higher from an equity and climate perspective. Design Option 1 is referred to as the double-deck fixed-span configuration in this SEIS. Refer to Appendix D, the Design Options Development, Screening, and Evaluation Technical Report, for additional information.

The CRC project proposed to construct a bridge with a vertical navigation clearance of 116 feet because that design balanced the needs of navigation, airfield operations, and surface transportation, while minimizing additional landside and environmental impacts. In September 2013, the USCG issued a bridge permit for the construction of the replacement bridges over the main span of the Columbia River as proposed by the CRC project. That permit expired when CRC was suspended; other required permits/authorizations were not completed, mitigation was not implemented, and construction had not started within three years, so a new bridge permit would be required for the IBR Program. In November 2021 (revised in May 2022), the IBR Program prepared a navigation impact report as an update to the 2012 CRC Navigation Impact Report to reflect changed conditions and development since the original navigation impact report and to reflect the change in USCG guidance since the CRC project was suspended. The IBR Program's Navigation Impact Report

provides detailed consideration of a fixed-span bridge over the Columbia River with a vertical clearance of 116 feet to 121 feet over 0 feet Columbia River Datum because these heights and associated avoidance and mitigation strategies would be expected to support reasonable navigation.

In June 2022, USCG issued a PNCD that set a requirement for a vertical clearance of 178 feet for the reasonable needs of navigation. In response to the determination, the IBR Program developed a bridge configuration for the Modified LPA that would include a single-level movable-span bridge over the Columbia River that provides 178 feet of vertical navigation clearance. The IBR Program also added a single-level fixed-span configuration in response to physical and contextual changes since 2013 that warranted a refinement in the double-deck configuration based on current design and operational requirements. The IBR Program is carrying forward the three bridge configurations to address changes in the USCG bridge permitting process and to ensure a permittable bridge configuration is evaluated in the Draft SEIS. The IBR Program continues to refine the details supporting navigation impacts and is coordinating closely with the USCG to determine how a fixed-span bridge may be permittable. All three bridge configurations are described in Section 2.2.3, Columbia River Bridges (Subarea B) and are analyzed throughout this Draft SEIS.

Transit – Mode, General Alignment, and Termini

The IBR Program identified the following changes in conditions since 2013 related to transit through advisory group input, community feedback, and input from agency partners serving in the Transit Options Technical Session (refer to Appendix D, Design Options Development, Screening, and Evaluation Technical Report, for additional information). These changes, detailed in Section 2.5.2, Updating the CRC LPA, led to the development of transit options that were analyzed.

- Transit system and service
- Vancouver land use

The IBR Program and the agency partners serving in the Transit Options Technical Session developed 13 representative transit investments (listed in Table 2-9) to better understand how different combinations of mode (BRT and LRT), alignment, station locations, termini (end points), and park-and-ride locations could perform relative to each other. Each of the representative transit investments was modeled through the Metro/RTC regional travel demand model to arrive at forecasts for the year 2045. IBR Program partners and the IBR team developed measures to better understand how the representative transit investments would perform relative to each other.

The IBR Program's screening process confirmed the CRC decision to extend LRT into Vancouver; however, the process also led to refinements of the proposed alignment, station locations, park-and-ride facilities, and termini locations as compared to CRC. The IBR Program advanced the extension of LRT from the Expo Center MAX Station in Portland north to a new station on Hayden Island, continuing across the Columbia River on the new Columbia River bridge, following I-5 to multiple stations in Vancouver with a northern terminus at Evergreen Station. Table 2-9 describes the 13 representative transit investments that were evaluated, and the sections below describe how the Modified LPA transit mode, general alignment, and termini were selected. Also refer to Appendix D, the Design Options Development, Screening, and Evaluation Technical Report, for additional information.

Table 2-9. Representative Transit Investment Descriptions

Representative Transit Investment	General Description
No-Build	The No-Build scenario reflects planned systemwide increases in background transit service by both TriMet and C-TRAN as adopted by both Metro and RTC in their respective regional transportation plans but reflects no replacement of the existing Interstate Bridge, no reconstructed interchanges, no tolls on the Interstate Bridge, and no extension of additional high-capacity transit service north from the existing MAX Yellow Line alignment into Vancouver.
2045 CRC ROD	2013 CRC LPA, assuming fully dedicated LRT tracks extending from the Expo Center MAX Station to a terminus near McLoughlin/I-5 via the Vancouver central business district. Includes five new stations and three park and rides.
Bus on Shoulder	Express bus operates as bus on shoulder in study area (both directions). Regional route operates in the auxiliary lanes between the Vancouver central business district and Hayden Island, Delta Park. No new stations or park and rides.
BRT Turtle Place to Expo Center MAX Station	Dedicated BRT lane between the Expo Center MAX Station and a terminus at Turtle Place in downtown Vancouver. Includes three stations: Expo Center, Hayden Island, and Turtle Place.
BRT I-5 to Kiggins Bowl	Fully dedicated BRT lane between the Expo Center MAX Station and a terminus near McLoughlin Boulevard/I-5. Dedicated lane on Vancouver segment assumed to be adjacent to I-5 with a dedicated connection to Hayden Island and the Expo Center MAX Station similar to the 2013 LPA. Includes six stations: Kiggins Bowl, 33rd Street, McLoughlin Boulevard, Evergreen Boulevard, Hayden Island, and the Expo Center MAX Station.
BRT in ROD Alignment	Fully dedicated BRT lane between the Expo Center MAX Station and a terminus near McLoughlin Boulevard/I-5 to the Expo Center MAX Station with alignment and station locations similar to CRC project. Includes six stations: I-5/McLoughlin, McLoughlin and Washington Street (southbound)/16th and Broadway (northbound), 12th and Washington (southbound)/13th and Broadway (northbound), Turtle Place, Hayden Island, and the Expo Center MAX Station.
Hybrid	Fully dedicated LRT tracks between the Expo Center MAX Station and a new station at Hayden Island and fully dedicated BRT lane between Hayden Island and Turtle Place. Includes two stations: Hayden Island and Expo Center MAX Station.
LRT One Station in Vancouver	Fully dedicated LRT tracks between the Expo Center MAX Station and a terminus near Turtle Place in downtown Vancouver. Includes two stations: Hayden Island and Turtle Place.
LRT I-5 to McLoughlin	Fully dedicated LRT tracks between the Expo Center MAX Station and a terminus near McLoughlin Boulevard/I-5. Dedicated tracks on Vancouver segment assumed to be adjacent to I-5 with a dedicated connection to Hayden Island and the Expo Center MAX Station similar to 2013 LPA. Includes three stations: I-5/McLoughlin, Evergreen, and Hayden Island.

Representative Transit Investment	General Description
LRT I-5 to Kiggins Bowl	Fully dedicated LRT tracks from the Expo Center MAX Station to a terminus near I-5/Kiggins Bowl. Dedicated tracks on Vancouver segment assumed to be adjacent to I-5 with a dedicated connection to Hayden Island and Expo Center MAX Station similar to 2013 LPA. Includes five stations: Kiggins Bowl, 33rd Street, I-5/McLoughlin, Evergreen, and Hayden Island.
LRT Delta Park to McLoughlin	Fully dedicated LRT Extension from Delta Park (joint Hayden Island/Expo Center MAX Station) to a terminus near McLoughlin/I-5 on an I-5-adjacent alignment (Center/West Side of I-5). This option was eliminated from consideration early in the decision process based on partner feedback.
LRT I-5 to McLoughlin with Columbia	Fully dedicated LRT tracks between the Expo Center MAX Station to a terminus near McLoughlin Boulevard/I-5. Dedicated tracks on Vancouver segment assumed to be adjacent to I-5 with a dedicated connection to Hayden Island and the Expo Center MAX Station similar to 2013 LPA. Includes four stations: I-5/McLoughlin, Evergreen, Waterfront, and Hayden Island.
LRT I-5 to Evergreen with Columbia	Fully dedicated LRT tracks between the Expo Center MAX Station to a terminus near I-5/Evergreen. Dedicated tracks on Vancouver segment assumed to be adjacent to I-5 with a dedicated connection to Hayden Island and the Expo Center MAX Station similar to 2013 LPA. Includes three stations: Evergreen, Waterfront, and Hayden Island.

BRT = bus rapid transit; LRT = light-rail transit; RTC = Southwest Washington Regional Transportation Council

Mode

The IBR Program considered three transit modes to meet transit demand: express bus operating on the shoulder, BRT, and LRT. Bus-on-shoulder capability in the study area was included in all representative transit investments, but it was not considered as a standalone transit option since it would provide substantially less capacity than other transit options to meet demand.

Based on analysis and coordination with partner agencies, the advantages and disadvantages listed in Table 2-10 were identified for BRT and LRT. Based on these findings, and when considering the specific needs of the HCT investment for the IBR Program, LRT was advanced as the preferred transit mode. See Appendix D, the Design Options Development, Screening, and Evaluation Technical Report, for additional information on the transit mode evaluation.

Table 2-10. Summary of Transit Mode Evaluation

Light-Rail Transit	Bus Rapid Transit
• Higher vehicle capacity allows the Program to carry more people across the river. • Compared to existing conditions and BRT, would improve access to jobs and services for many residents, including BIPOC and low-income populations, in part due to the one-seat ride experience that would not involve transfers for more riders. • Allows for preservation of the current and future C-TRAN Vine and express bus system while providing convenient connections to new LRT stations.	• Lower vehicle capacity than LRT and would require a transfer to connect to the regional light-rail system. • Less competitive travel time compared to LRT due to a required transfer at the Expo Center MAX Station.

Light-Rail Transit	Bus Rapid Transit
• Offers a more competitive travel time compared with trips that require a transfer at the Expo Center MAX Station. • Extension of the MAX Yellow Line from the Expo Center MAX Station into Vancouver best integrates existing transit investment in the region in a manner that maintains both C-TRAN's and TriMet's respective approaches to operations of their transit systems. • Based on initial estimates of how investments might perform if submitted to the FTA CIG program, LRT is more competitive for FTA discretionary funding.	• Compared to existing conditions, would improve access to jobs for many residents including BIPOC and low-income populations. • Preserves the current and future C-TRAN Vine and express bus system. • Did not rate as favorably for cost effectiveness, mobility, congestion relief and environmental benefits.

Note: The information in this table is from the design option screening and evaluation conducted in 2021 and 2022 (see Appendix D).
BIPOC = Black, Indigenous, and people of color; BRT = bus rapid transit; CIG = capital investment grant; LRT = light-rail transit

Alignment

Twelve potential transit alignments were evaluated by the Program and partner agencies. These potential alignments fell into two categories: accessing downtown Vancouver or aligning with the existing I-5 corridor. Detailed conceptual design work on the potential alignments (and their impacts) was brought to the advisory groups, community groups, and partner agencies.

When selecting an alignment, a key consideration was the need to integrate new transit investments while considering the existing and planned transit networks of TriMet and C-TRAN. Since 2013, C-TRAN has developed a BRT system, The Vine, with two BRT lines in operation and two in planning. The Vine and C-TRAN express bus service provide frequent and reliable service within Clark County and to downtown Portland, respectively. The extent to which any transit investment could complement The Vine system, including existing and planned service, was evaluated.

The City of Vancouver has worked with C-TRAN to design station environments for The Vine system on Broadway and Washington Streets in the central business district. Design elements of the transit alignment could be coordinated with existing design for The Vine to provide more efficient functionality within the larger transit network and respective operating environments. The downtown Vancouver LRT alignment would impact C-TRAN's BRT alignments in the downtown area. In addition to the existing and planned transit networks, potential alignments could impact existing development in the study area. In comparison to the I-5 alignment, the downtown Vancouver alignment would require additional property and streetscape impacts.

Based on conversations with the community and partners, the I-5 general alignment was advanced for further study.

Terminus

The IBR Program evaluated terminus options for each alignment and mode (described above) based on ridership, impacts, and preservation of and connections to existing systems. These terminus options included Hayden Island in Portland and Waterfront, Turtle Place, Evergreen/I-5, McLoughlin/I-5, and Kiggins Bowl in Vancouver.

The evaluation of Hayden Island as a terminus was a hybrid option that included the extension of LRT north from the Expo Center MAX Station to Hayden Island and the extension of BRT from Turtle Place south to Hayden Island. It was an exploratory option that did not perform as well as others in the evaluation process from a ridership standpoint, and ultimately it was removed from consideration in combination with the decision to select LRT as the mode to extend into Vancouver.

On the Vancouver side, the five terminus options included two that would result in a single station just across the Columbia River (Waterfront and Turtle Place) and three that would extend farther north, including options for one additional station (Evergreen/I-5), two additional stations (McLoughlin/I-5), or four additional stations (Kiggins Bowl). The single station terminus options did not perform as well as others that extended farther into Vancouver from a ridership standpoint, regardless of which mode was considered. Alignments with stations north of Evergreen Boulevard offered more ridership, but with greater impacts to properties and increased costs.

Through analysis and conversations with partners, it was determined that an Evergreen Boulevard terminus would:

- Have fewer potential property impacts compared to other locations.
- Have lower operating and capital costs compared to other locations.
- Avoid impacts to Clark Community College as a result of the station, alignment, and park and ride that were included in options that assumed McLoughlin/I-5 as a terminus.
- Avoid impacts to C-TRAN network and The Vine service.
- Avoid impacts to the City of Vancouver's vision and downtown development.
- Provide increased transfer options to additional C-TRAN routes.
- Connect directly to downtown library, jobs, services, and amenities.
- Support transit-oriented development opportunities at Library Square and on nearby City-owned parcels.
- Maximize transfer opportunities given planned direct connections to several local routes, as well as existing and planned BRT routes.
- Provide convenient access to Evergreen Boulevard, which connects east over I-5 to the Historic Reserve, and west through downtown to Main Street and Esther Short Park via the planned 9th Street pedestrian way.

Based on evaluation during screening along with feedback from partner agencies, the IBR Program and partner agencies recommended advancing the terminus at Evergreen Boulevard for further study and refinement.

Auxiliary Lanes

Auxiliary lanes improve traffic safety and reliability by providing sufficient merge, diverge, and weaving space for vehicles entering and exiting the highway while allowing the through traffic to maintain fuel-efficient driving speeds in the adjacent through lanes. The IBR Program identified the following changes in conditions since 2013 related to auxiliary lanes through advisory group input, community feedback, and input from agency partners (refer to Appendix D, the Design Options Development, Screening, and Evaluation Technical Report, for additional information). These changes, detailed in Section 2.5.2, Updating the CRC LPA, necessitated the development of design options for auxiliary lanes.

- Climate change
- Portland's transportation hierarchy

In addition to maintaining the existing three through lanes in each direction across the bridge, the IBR Program evaluated the addition of one and two auxiliary lanes in each direction. Two options (one auxiliary lane and two auxiliary lanes) were advanced for additional analysis and consideration. The results of the auxiliary lane evaluation are summarized in Table 2-11 and described in more detail in Appendix D, the Design Options Development, Screening and Evaluation Report.

Table 2-11. Summary of Initial Auxiliary Lanes Evaluation Results

General Benefits of Auxiliary Lanes Compared to the No-Build Alternative	Specific Additional Benefits of One Auxiliary Lane Compared to the No-Build Alternative	Specific Additional Benefits of Two Auxiliary Lanes Compared to the No-Build Alternative
• Mode choice benefits (high-capacity transit, bus on shoulder, and active transportation). • Mode shift; the daily transit share is anticipated to increase from 7% to 11%. • Reduced overall congestion. • Off-peak benefits including weekends. • Less diversion to local streets. • Faster congestion recovery from crashes and incidents. • Fewer lane changes required (i.e., lane balance). • Safety improvements realized due to fewer sideswipe crashes and improved visibility. • Lane widths to allow for current vehicle widths, turning, and comfort. • Anticipated greenhouse gas reduction due to less congestion.	• Travel time improvements : – Southbound AM travel time would be reduced by 3 minutes (5% faster) between I-5/I-205 split and I-405. – Northbound PM travel time would be reduced by 11 minutes (30% faster) between Broadway Street and SR 500. • Reduced congestion: – Congestion would be reduced by 37% (southbound) and 36% (northbound) during the 8-hour AM/PM peak period.	• Travel time improvements : – Southbound AM travel time would be reduced by 6 minutes (10% faster) between I-5/I-205 split and I-405. – Northbound PM travel time would be reduced by 25 minutes (70% faster) between Broadway Street and SR 500. • Reduced congestion: – Congestion would be reduced by 48% (southbound) and 75% (northbound) during the 8-hour AM/PM peak period.

Note: The data in this table are from the design option screening and evaluation conducted in 2021 and 2022 (see Appendix D). Updated data are included in Section 3.1, Transportation.

Based on initial feedback from the partner agencies, one auxiliary lane northbound and one auxiliary lane southbound were recommended to be included in the Modified LPA. The Modified LPA includes one auxiliary lane in each direction across the new Columbia River bridges between Marine Drive and Mill Plain Boulevard, which would allow for weave, merge, and diverge movements outside the through lanes. Initial findings indicate that I-5 does not meet all transportation performance standards with this configuration, and close interchange spacing remains an issue. Therefore, a two auxiliary lane design option is also included for analysis in this Draft SEIS. The two auxiliary lane design option consists of two auxiliary lanes in both the northbound and southbound directions across the Columbia River bridges.

The addition of auxiliary lanes (one or two) can help optimize use of the existing three through lanes and allow for more efficient movement through the corridor, as well as facilitate local trips across the Columbia River, thus improving safety, helping to relieve congestion with better traffic flow, and reducing emissions from vehicles idling in congestion. Studying one or two auxiliary lanes in each direction recognizes the desire to balance all of the regional needs and priorities, including safe, efficient, and reliable travel, as well as equity and climate goals. Refer to Appendix D, the Design Options Development, Screening, and Evaluation Report, for additional information.

2.5.4 Adopting Foundational Components of the Modified LPA

The boards, councils, and commissions of each of the eight IBR Program partners—including the regional transit agencies, cities, metropolitan planning organizations, and ports—met between June 22 and July 14, 2022, to consider the IBR Program's recommendation for the Modified LPA and voted to endorse the IBR Program's Modified LPA through a resolution by each agency. In addition to the Modified LPA resolutions, many partners included conditions reflecting their priorities and requests for additional work, considerations, and analysis. The IBR Program acknowledges that the preliminary analysis to support the Modified LPA was conceptual; more design refinement, transportation and transit analysis, financial analysis, and environmental evaluation is needed to better understand the impacts and benefits of the Modified LPA as the Program continues to develop a multimodal corridor solution. Therefore, the IBR Program is committed to further refinements and analysis, as well as sharing the results to gather additional input on the Modified LPA.

Environmental analyses for this Draft SEIS have been conducted to evaluate benefits and impacts to environmental and community resources (e.g., air quality, climate, land use, transportation, etc.) and to identify potential mitigation for adverse impacts. Agencies, tribes, advisory groups, and the public will have additional opportunities to provide input and feedback on the Modified LPA, environmental analyses, and proposed mitigation. The opportunities include a public comment period, public hearings held for the Draft SEIS, and other options to be identified.

2.6 Additional Compliance Underway

There are several environmental compliance processes that are underway at the time the Draft SEIS is published. These processes are listed below; some will be completed prior to publishing the Final SEIS, and others will be completed prior to construction. Changes to the Modified LPA from ongoing environmental compliance would be coordinated across all relevant agencies.

- **ESA, Section 7.** Obtain a biological opinion from NOAA Fisheries and a concurrence letter from USFWS prior to the publication of the Final SEIS.
- **Section 4(f) of the U.S. Department of Transportation Act of 1966.** Finalize all Section 4(f) documentation with correspondence from the officials with jurisdiction and approval by FHWA and FTA.
- **Section 6(f) of the Land and Water Conservation Act and Federal Lands to Parks.** Three parklands within the study area (East Delta Park, Marshall Park, and Old Apple Tree Park) were either created or improved with grants from the Land and Water Conservation Act or through the Federal Lands to Parks (FLP) Program. Both programs require replacement of land converted out of park ownership and use. Potentially impacted Section 6(f) resources and FLP resources are disclosed in this Draft SEIS. Detailed impacts, determination of Section 6(f) and FLP parkland converted to transportation use, and potential mitigation cannot be determined until design is advanced and a park boundary determination is completed.
- **Section 106 of the National Historic Preservation Act.** The IBR Program is updating the Area of Potential Effects, updating historic property inventories, evaluating additional historic properties, assessing potential additional effects on historic properties, and coordinating with consulting parties and tribes. The IBR Program is currently coordinating with FHWA, FTA, and the National Park Service on Section 106 compliance for the Modified LPA, which is considered a new undertaking under Section 106. Given the complexities of the IBR Program and the anticipated mix of construction contract delivery methods, FHWA and FTA are developing a new programmatic agreement (PA) instead of a memorandum of agreement to resolve adverse effects for this undertaking. FHWA and FTA consultation with WSDOT, ODOT, Oregon State Historic Preservation Office, Washington Department of Archaeology and Historic

Preservation, tribes, and other consulting parties on a draft PA is ongoing. The draft PA will be made available to the public prior to publication of the Final SEIS. The executed PA will be attached to the ROD.

- **Tribal consultation.** Continue tribal consultation to identify impacts and mitigation for cultural resources and natural resources.
- **U.S. Army Corps of Engineers Section 408.** Obtain Section 408 authorizations from USACE for alterations to a USACE Civil Works project. Anticipated activities include developing and submitting design packages to address proposed alterations to the federally authorized navigation channel in the Columbia River, levees along North Portland Harbor, and other aids to navigation as well as conducting any additional environmental analysis required to support the design advancement of these alterations. In addition, the Modified LPA proposes to relocate the Columbia River primary navigation channel from its current location along the north shore to the south. The result would be generally swapping the locations of the current primary navigation channel with the barge channel (which would become the north barge channel) and expanding the vertical and horizontal navigation clearances of both channels. Authorizations would be issued by USACE following issuance of the ROD and prior to the beginning of construction.
- **U.S. Army Corps of Engineers Section 404 of the Clean Water Act.** Obtain Section 404 permits from USACE for impacts to designated waters of the United States. Program activities underway to support the permit applications include wetland delineation, coordination with USACE to provide jurisdictional determination, and evaluation of potential impacts to wetlands and other waters from development of the Modified LPA. Permits would be issued by USACE following issuance of the ROD and prior to the beginning of construction.
- **U.S. Coast Guard Bridge Permit, under the Authority of the General Bridge Act of 1946.** Obtain USCG Bridge Permits for construction of bridges across navigable waterways under the jurisdiction of USCG. USCG issued new bridge permit application guidance (COMDTPUB P16591.3D) in July 2016. The IBR Program prepared a new navigation impact report, which resulted in the USCG issuance of PNCDs (2022) for new bridges over the Columbia River and North Portland Harbor. The IBR Program will submit new bridge permit applications for bridges proposed over these waterways in accordance with the 2016 Bridge Permit Application Guidance. In addition, the IBR Program will comply with the 2014 USCG-FHWA-FTA-Federal Railroad Administration Memorandum of Understanding (2014) and the 2014 USCG-FHWA Memorandum of Agreement (2014). The bridge permits would be issued after issuance of the ROD and prior to the start of construction. If the single-level movable-span configuration is advanced, the IBR Program will also coordinate with USCG to alter the current bridge lift opening timing restrictions to optimize openings for vessels while minimizing delays to highway and transit operations via the federal rulemaking process. Consideration of the three bridge configurations involves coordination with the USACE and USCG regarding multiple navigation related items. Table 2-12 summarizes the current and future actions necessary to reach resolution on an acceptable bridge configuration for the IBR Program.

Table 2-12. Navigation Considerations

Navigation Consideration	Decision Authority	Steps to Resolve	Timing
Vertical Navigation Clearance. The PNCD was issued with 178 feet of vertical navigation clearance, and the Modified LPA fixed-span bridge configurations provide 116 feet of vertical navigation clearance.	USCG	IBR Program coordinates with affected river users to resolve vertical navigation clearance requirements and enter into agreements.	Current/ongoing.
		IBR Program prepares updated navigation impact report as new information is available to inform reconsideration of the PNCD.	Upon completion of coordination with river users.
		USCG to evaluate updated navigation impact report and reissue the PNCD. [a]	Prior to Final SEIS.
		IBR Program to prepare and submit application for USCG Bridge Permit.	Ongoing and following updated PNCD.
		USCG to issue Bridge Permit.	Prior to construction.
Primary Navigation Channel Location (Vancouver to The Dalles). The Modified LPA would move the channel south.	USACE	IBR Program to conduct ship/tug simulations and other studies evaluating channel configurations as part of a multiphase review to obtain Section 408 Authorization to modify the federal navigation channels.	Current/ongoing.
		USACE to determine required process (Section 408 Authorization or U.S. Congressional action through the Water Resources Development Act) needed to relocate the channel.	Current/ongoing.
		Obtain Section 408 Authorization to change the channel location.	Prior to construction.
Horizontal Navigation Clearance.	USCG/USACE	If the movable-span configuration is identified as the preferred alternative in the Final SEIS, the IBR Program would coordinate with USACE to optimize the horizontal clearance for navigation, channel maintenance, design feasibility, and cost.	Following identification of the preferred alternative in the Final SEIS.
		If necessary, USCG to reissue PNCD to reflect modified horizontal navigation clearance.	Prior to construction.
		IBR Program to include information reflecting horizontal navigation clearance in USCG Bridge Permit and USACE Section 408 Authorization applications.	Prior to construction.
		USCG to issue bridge permit. USACE to issue Section 408 Authorization.	Prior to construction.

Navigation Consideration	Decision Authority	Steps to Resolve	Timing
Movable-Span Opening Restrictions (timing).	USCG	IBR Program to evaluate the impacts from daytime and nighttime bridge openings to vehicular traffic, transit service, and maritime operations as part of the movable-span opening restriction request (refer also to Section 3.1, Transportation).	Prior to Final SEIS and ROD.
		If the movable-span configuration is identified as the preferred alternative in the Final SEIS, the IBR Program would prepare a request for movable-span operating limitations for USCG consideration.	Following Final SEIS and ROD.
		USCG to evaluate the IBR Program request and determine the need for review or rulemaking including the need to obtain information from the navigation community on movable-span restrictions.	Following submittal of request from the IBR Program.
		USCG to complete rulemaking process including public review.	Prior to completion of the bridge.

a If a movable span is selected as a Modified LPA, an updated navigation impact report and revised PNCD are not anticipated as this option would meet the horizontal and vertical navigation clearances specified in the issued PNCD.

PNCD = preliminary navigation clearance determination; ROD = record of decision; SEIS = supplemental environmental impact statement; USACE = U.S. Army Corps of Engineers; USCG = U.S. Coast Guard

2.7 Anticipated Permits and Approvals

Table 2-13 lists the federal, state, and local permits, clearances, and approvals that are anticipated to be required to construct the Modified LPA.

Table 2-13. Anticipated Permits and Approvals

Permit or Approval	Issuing Agency
7460 permits for permanent and construction obstructions	FAA
23 USC 129(a)(1)(E), Federal Tolling Authority	FHWA
Access revision report approval	FHWA
Design analysis approval	FHWA
Design approval	FHWA
Real estate acquisition review	FHWA
Right-of-way (interstate) approval	FHWA
Right-of-way (railroad) approval	BNSF Railway
Air quality conformity determination	FTA
ESA Section 7 consultation	NOAA Fisheries, USFWS
Magnuson-Stevens Fishery Conservation Management Act	NOAA Protected Resources Division
Marine Mammal Protection Act	NOAA Fisheries
National Historic Preservation Act Section 106	FHWA, FTA, National Park Service (NPS), Oregon State Historic Preservation Office (SHPO), Washington State Department of Archaeology and Historic Preservation (DAHP)

Permit or Approval	Issuing Agency
Archaeological Resources Protection Act permit	NPS
Section 4(f) of the U.S. Department of Transportation Act of 1966 evaluation	FHWA, FTA
Section 6(f) of the Land and Water Conservation Fund Act documentation	FHWA, FTA, NPS
Bridge permit in accordance with the General Bridge Act of 1946	USCG
Section 404 of the CWA permit	USACE
Section 14 of the Rivers and Harbors Appropriation Act of 1899, as amended and codified in 33 USC 408 (Section 408)	USACE
Section 10 of the Rivers and Harbors Appropriation Act of 1899, as amended and codified in 33 USC 401 et seq.	USACE
Sole Source Aquifer Protection Act approval	U.S. Environmental Protection Agency (EPA)
Migratory Bird Treaty Act	USFWS
FLP Program	U.S. General Services Administration (GSA), NPS
Approval of rail crossing, intersection, signals, and right-of-way encroachment permit	ODOT, WSDOT
Voluntary Cleanup Pathway approval	Oregon Department of Environmental Quality (DEQ)
CWA National Pollutant Discharge Elimination System construction stormwater permits	DEQ, Washington State Department of Ecology (Ecology)
CWA Section 401 water quality certifications	DEQ, Ecology
Air quality permits	DEQ, Ecology
Removal-Fill Permit	Oregon Department of State Lands (DSL)
Aquatic land use (aquatic lands lease) authorization	DSL
Oregon Fish Passage Act approval	Oregon Department of Fish and Wildlife (ODFW)
Archaeological Excavation Permit	SHPO, DAHP
Aquatic use authorization	Washington State Department of Natural Resources (DNR)
Hydraulic Project Approval	Washington Department of Fish and Wildlife (WDFW)
City of Portland local permits and approvals (design review/land use review, historic resources review, noise variance, improvements in right of way, building permit – site development, sign permit, trade permits, non-park use permit)	City of Portland
City of Vancouver local permits and approvals (public facilities master plan [hybrid approach], transportation development review, traffic impact analysis, shoreline substantial development permit, critical areas permit, noise permit, waiver of certificate of appropriateness, building permit, trade permits, temporary use permit, access closure, sign permit [temporary])	City of Vancouver

Permit or Approval	Issuing Agency
Right-of-way permit for any encroaching in public right of way or City easements, tree permit, design review	City of Gresham

CWA = Clean Water Act; DAHP = Washington State Department of Archaeology and Historic Preservation; DEQ = Oregon Department of Environmental Quality; DNR = Washington State Department of Natural Resources DSL = Oregon Department of State Lands; Ecology = Washington State Department of Ecology; EPA = U.S. Environmental Protection Agency; ESA = Endangered Species Act; FAA = Federal Aviation Administration; FHWA = Federal Highway Administration; Fisheries = National Marine Fisheries Service; FLP = Federal Lands to Parks; FTA = Federal Transit Administration; GSA = U.S. General Services Administration; NOAA = National Oceanic and Atmospheric Administration; NPS = National Park Service; ODFW = Oregon Department of Fish and Wildlife; ODOT= Oregon Department of Transportation; SHPO = Oregon State Historic Preservation Office; USACE = U.S. Army Corps of Engineers; USFWS = U.S. Fish and Wildlife Service; WDFW = Washington Department of Fish and Wildlife; WSDOT = Washington State Department of Transportation

3. EXISTING CONDITIONS AND ENVIRONMENTAL CONSEQUENCES

Each section in this chapter summarizes key findings for one or more elements of the environment. Following a brief discussion of new information or changes in existing conditions since the NEPA evaluation for the Columbia River Crossing project, each section identifies the benefits and effects of the No-Build Alternative and the Modified LPA, including how benefits or effects would differ across the various design options.

Each section includes a detailed discussion of the long-term benefits and effects (those that will remain after construction of the Modified LPA is completed), the short-term benefits and effects (those that would occur during construction), and the indirect effects (those caused by the Modified LPA and that occur later in time but are still reasonably foreseeable). In addition, each section identifies the potential mitigation measures that can address the identified effects. Mitigation will be finalized in the Final SEIS. Cumulative effects, which are the incremental effects of the Modified LPA when added to those of other past, present, and future actions, are analyzed in Section 3.23. The analysis of the Modified LPA includes all design options described in Chapter 2, Description of Alternatives, and listed in Table 3-1. If there is a difference in effects among design options, those differences are identified and described specifically.

The findings summarized in this chapter are based on detailed technical reports prepared for the Draft SEIS. The technical reports are cited throughout the chapter, as appropriate, and are incorporated by reference into the Draft SEIS. All technical reports are listed in Appendix H and published with the Draft SEIS. All projections and forecasts are for the design year of 2045 unless otherwise stated.

A summary of the components of the Modified LPA analyzed in the Draft SEIS is shown in Table 3-1.

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3.23 Cumulative Effects

Table 3-1. Summary of Components of the Modified LPA

Component	Modified LPA
Columbia River Bridges	• Two bridges built west of the existing Interstate Bridge (which would be removed). – Three bridge configuration options: double-deck fixed-span (truss bridge type); single-level fixed-span (girder, extradosed, or finback bridge type); or single-level movable-span (vertical lift bridge type). The effects and benefits analysis of a particular bridge configuration would be the same for each bridge type, unless otherwise specified. • Variable-rate tolling for motorists using the river crossing as a demand-management and financing tool.
I-5	• One auxiliary lane in each direction from Marine Drive to Mill Plain Boulevard or two auxiliary lanes in each direction (one from Marine Drive to Mill Plain Boulevard and one from Interstate Avenue/Victory Boulevard to SR 500/39th Street) • Improvements to seven interchanges between Victory Boulevard in Portland and SR 500 in Vancouver. – An option to eliminate the existing C Street ramps. – An option to shift I-5 to the west in downtown Vancouver near the SR 14 interchange. • Reconfiguration of some local streets to complement the new interchange designs.
LRT	• Extension of the MAX Yellow Line from Expo Center Station in North Portland to a terminus near Evergreen Boulevard in Vancouver.[a] • Modifications to the existing Expo Center Station and new stations at Hayden Island, Vancouver Waterfront, and near Evergreen Boulevard. • Up to two park and rides in Vancouver along the light-rail alignment: one near the Waterfront Station (three site options) and one near the Evergreen Station (two site options). • Associated LRT improvements such as traction power substations, signal and communications support facilities, an overnight light-rail vehicle facility at the Expo Center, and an expanded maintenance facility at Ruby Junction.
Associated Bus Improvements	• Wider inside shoulders on I-5 from Victory Boulevard to SR 500 to accommodate express bus-on-shoulder service. • Improvements to local bus transit service to integrate the proposed new LRT service and local bus routes.
Active Transportation	• A variety of improvements for people who walk, bicycle, and roll, including a shared-use path over the Columbia River and North Portland Harbor, enhanced wayfinding, and facility improvements to comply with the Americans with Disabilities Act.
North Portland Harbor Bridges	• Replacement bridges that would carry LRT, I-5 through traffic, traffic to/from N Marine Drive, and an arterial bridge for local traffic to and from Hayden Island.

Note:
a TriMet, which operates the MAX system, would also operate the Yellow Line extension.
Key: I-5 = Interstate 5; LRT = light-rail transit; MAX = Metropolitan Area Express; N/A = not applicable; SR = State Route; TriMet = Tri-County Metropolitan Transportation District of Oregon

3.1 Transportation

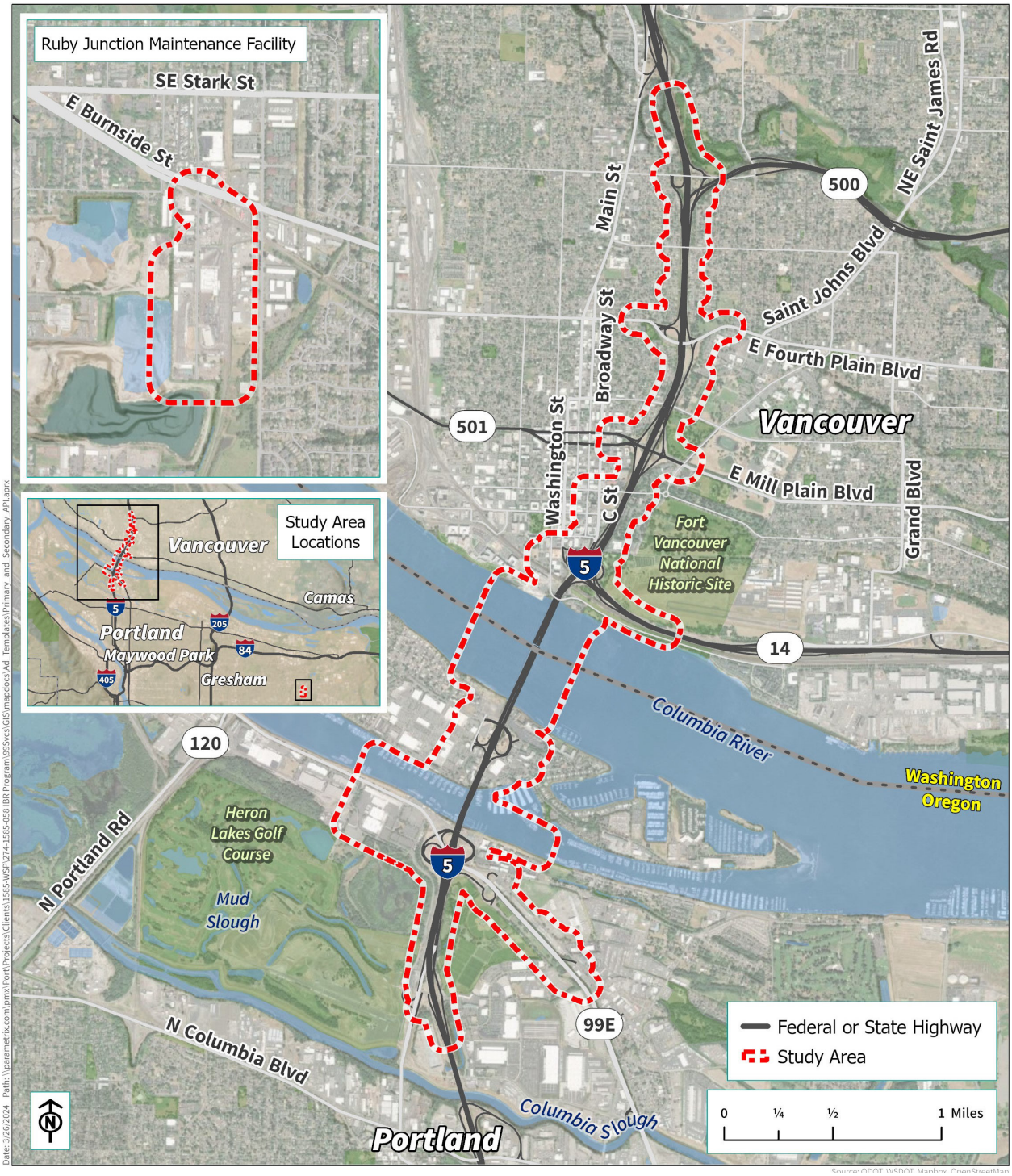
This section describes how the No-Build Alternative and the Modified LPA and options would affect travel patterns and mobility for cars, trucks/freight, transit vehicles, transit riders, pedestrians, and bicyclists. New information developed since 2013 is identified, and anticipated long-term, temporary, and indirect effects of the Modified LPA and options compared to the No-Build Alternative are summarized. Potential measures to avoid, minimize, and/or mitigate impacts, as well as to increase the mobility benefits of the IBR Program, are presented.

The IBR Program study area, shown in Figure 3.1-1, is centered on Interstate 5 and the bridge crossing of the Columbia River between Oregon and Washington. This study area also encompasses other interstate and state highways, transit, local roadways, bicycle and pedestrian facilities, and other facilities that serve the study area and influence travel behavior and conditions.

The information presented in this section is based on the Transportation Technical Report, which provides additional details on the following aspects of transportation:

- Regional transportation, including major freeway and highway facilities, vehicle miles of travel, vehicle hours of travel, vehicle hours of delay, and mode share.
- Freeway operations, including I-5 vehicle and person-trip volumes, bottlenecks, level of service (LOS), volume-to-capacity (V/C) ratios, travel times, and speeds.
- Freight mobility and access.
- Bridge openings and gate closures, including yearly and hourly frequency as well as average event duration.
- Arterial and local streets, including corridor analysis, intersection operations, and impacts to local roadways caused by freeway congestion.
- Transit, including regional and local transit services, corridor and station ridership, and transit operations.
- Sufficiency and quality of active transportation (bicycle and pedestrian facilities) around stations as well as circulation/connections to existing networks.
- Safety.
- Transportation demand management (TDM) and transportation system management (TSM).
- Tolling and diversion.

Figure 3.1-1. IBR Program Study Area



3.1.1 Changes and New Information Since 2013

The Columbia River Crossing (CRC) Final Environmental Impact Statement and Record of Decision were completed in 2011. Since then, due to changes that have occurred in the study area since the previous planning effort and NEPA evaluation, several design modifications have been made as

described in Chapter 2, Section 2.5. These include changes to the design of interchanges and access configurations and in the routing of light-rail transit through downtown Vancouver. Several design options for the Modified LPA are also being evaluated, including three bridge configurations, two auxiliary lane configurations (i.e., either one or two auxiliary lanes in specified portions of the I-5 mainline), potential elimination of the C Street ramps, a westward shift of I-5 near the SR 14 interchange, and options for park-and-ride locations near the light-rail stations in Vancouver. See Chapter 2 for additional details on the proposed modifications from the CRC Selected Alternative to address changed conditions and the design options being considered for the IBR Program.

3.1.2 Existing Conditions

The COVID-19 pandemic that began in 2020 altered travel patterns and trends, traffic volumes, and transit ridership in the region and in the transportation study area for the IBR Program. Traffic volumes and transit ridership dropped below historical levels, and then began to increase as health emergency restrictions gradually eased over the following 3 years. As of March 2023, according to traffic count data from both WSDOT and ODOT (WSDOT 2022a; ODOT 2021), traffic volumes were close to pre-pandemic levels for auto and freight traffic within the study area. Transit has been slower to recover, with 2023 ridership levels approximately 62% of ridership levels in the fall of 2019 for the four-county region, but according to both the Clark County Public Transportation Benefit Area Authority (C-TRAN) and the Tri-County Metropolitan Transportation District of Oregon (TriMet), transit service levels and ridership continue to see increases as more time goes by since the start of the pandemic (C-TRAN n.d.; TriMet n.d.).

Transportation analyses generally incorporate the most recently available data. However, due to the influence of the COVID-19 pandemic on travel patterns between 2020 and 2023 as explained above, the most recently available data is not representative of standard conditions. Therefore, the IBR Program is following industry standards and using 2019 as the baseline year for the existing conditions instead since it most closely resembles standard conditions. Exceptions to this include the following:

- Outputs that rely on the Metro/RTC[1] regional travel demand model that had not yet updated its base year model from 2015 to 2020.
- Safety data which summarize 5 years of data from 2015–2019.
- Bridge lift/gate closure data which summarize 12 years of data (2012–2023) which is consistent with the data summarized for the Navigation Impact Report.

The Metro/RTC regional travel demand model outputs summarize 2015 data based on 2015 land use, population, and employment data. Following standard practices for NEPA evaluation of transportation projects, the analysis methods for the IBR Program apply the Metro/RTC travel demand model to replicate some of the regional existing conditions. These regional data provide the basis for predicting future conditions and travel demand in the year 2045. Additional details on the transportation analysis methods are presented in the Transportation Technical Report and its appendices.

[1] Metro = Oregon Metro; RTC = Southwest Washington Regional Transportation Council

Regional Roadways

Regional roadways within the study area include Interstate 5 (I-5), SR 500, SR 14, and Martin Luther King Jr. Boulevard (Highway 99E), all of which are limited-access corridors. Table 3.1-1 summarizes their characteristics in the study area.

Table 3.1-1. Existing Regional Roadways in Study Area

Regional Roadway	Roadway Classification	Number of Travel Lanes	Speed Limit (mph)	Average Weekday Daily Traffic [a]	Bicycle Facilities [b]	Pedestrian Facilities [b]
I-5	Interstate	4–9	50–60	60,000–146,500	Yes	Yes
SR 500	State Highway (Washington)	4–6	55	35,000–52,000	No	No
SR 14	State Highway (Washington)	4–6	60	58,000–73,000	No	No
MLK Jr. Boulevard (Hwy 99E)	State Highway (Oregon)	4	30–55	16,200–18,400	Yes	No

Source: WSDOT Online Map Center Historic Traffic Counts. ODOT Traffic Volume Tables for State Highways 2019

a A range of average weekday daily traffic volumes is shown, as the volumes differ along freeway segments in the Portland metropolitan region.

b Shared-use paths exist on the Interstate Bridge over the Columbia River.

MLK = Martin Luther King

The study area covers a 5-mile section of I-5 between the Interstate Avenue/Victory Boulevard interchange in Portland and the SR 500/39th Street interchange in Vancouver. It includes seven interchange areas: Interstate Avenue/Victory Boulevard, Marine Drive, Hayden Island, City Center/SR 14, Mill Plain Boulevard, Fourth Plain Boulevard, and SR 500/39th Street.

Most of the traffic (between 77% and 86%) crossing the Interstate Bridge in peak directions during the AM and PM peak periods is entering and/or exiting I-5 at one of these seven interchanges.

Regional Travel Measures

The typical measures of travel performance on a regional level are vehicle miles traveled (VMT), vehicle hours traveled (VHT), and vehicle hours of delay (VHD). These measures are calculated using the Metro/RTC regional travel demand model. As noted above, 2015 is the current base year available from the Metro/RTC regional travel demand model.

Table 3.1-2 shows existing (2015) VMT, VHT, and VHD at two regional scales, both of which extend beyond the study area (see the Transportation Technical Report for figures of these study areas). The first includes the entire region covered by the Metro/RTC regional travel demand model. The second is a smaller traffic subarea within the most densely developed areas of Portland and Vancouver, covering a triangle around I-5 from I-205 to I-84 on the west, I-205 from I-5 to I-84 on the east, and I-84 from I-5 to I-205 on the south.

Table 3.1-2. Regional Travel Measures – Existing 2015 Daily Vehicle Miles Traveled, Vehicle Hours Traveled, and Vehicle Hours of Delay

Area	Vehicle Miles Traveled	Vehicle Hours Traveled	Vehicle Hours of Delay [a]
Portland Metropolitan Region	43,115,600	1,225,400	19,400
Traffic Subarea (I-5, I-205, and I-84)	11,277,600	326,900	10,100

Source: Metro/RTC regional travel demand model

a Delay is measured as time spent in congestion on network links that exceed 0.9 volume/capacity ratio.

Traffic Volume

The analysis of traffic volumes uses several measures to describe existing conditions and allow comparisons to future conditions. These measures (screenlines, I-5 mainline and ramp volumes, and daily person throughput) are described below.

Screenlines

Screenlines are imaginary lines drawn across major roadways (highways and arterials) within the study area to measure the total amount of traffic moving in each direction across multiple facilities. These north/south and east/west screenlines are a snapshot of typical existing AM and PM peak traffic conditions. The Transportation Technical Report includes figures and lists of the screenlines used for this traffic analysis.

I-5 Mainline and Ramp Vehicle Volumes

The IBR team collected data from ODOT and WSDOT for 2019. ODOT and WSDOT maintain permanent traffic counters throughout their freeway and highway systems that collect hourly traffic counts 365 days a year, 24 hours a day. This information was used to estimate average weekday daily traffic volumes in 2019 for the I-5 mainline and ramps in the study area.

Daily Person Throughput

Person throughput measures the number of people that a transportation facility serves within a given time frame. The number of vehicles (passenger cars, freight trucks, and buses) crossing the Interstate Bridge was multiplied by average vehicle occupancy assumptions to calculate total person throughput. Southbound, daily person throughput across the Interstate Bridge is 93,400 people. Northbound, the daily person throughput is 92,400 people. Consistent with historical traffic counts on the Interstate Bridge, the northbound and southbound traffic volumes are slightly different due to external through-trip patterns and different transit routing between the AM and PM peak periods.

I-5 Operations

As noted above, the IBR study area is the approximately 5-mile section of I-5 between the SR 500/39th Street interchange in Vancouver and the Interstate Avenue/Victory Boulevard interchange in Portland. Because traffic volumes and congestion within and outside of the study area influence each other, these interactions were captured by analyzing a longer section of I-5. This section (referred to as the freeway

analysis area) consists of a 17-mile length of I-5 between the I-205 interchange north of Vancouver and the Marquam Bridge in Portland.

Existing conditions for freeway operations for I-5 within the freeway analysis area were evaluated using VISSIM microsimulation models. The models were developed and calibrated for all travel modes to simulate the observed and regularly occurring traffic operations along northbound and southbound I-5 during the 6 to 10 a.m. and 3 to 7 p.m. peak periods. These models incorporate average traffic volumes and simulate the recurring congestion that occurs when vehicle volumes approach the capacity of the facility at a given location or bottleneck. They account for the effects of on- and off-ramps, merging/diverging segments, weaving segments, lane adds and drops, and design constraints such as curves, grades, underpasses, and narrow or nonexistent shoulders. However, the models do not account for non-recurring congestion caused by traffic incidents, work zones or lane closures, bad weather, special events, or bridge closures or openings.

ODOT and WSDOT define congestion as speeds below a certain threshold. ODOT has historically defined congestion as when speeds drop below 75% of the posted speed limit due to constrained conditions (for example, speeds slower than 45 mph in an area with a posted speed 60 mph). ODOT has recently refined its measures of congestion into two levels, with congestion defined as speeds below 45 mph and severe congestion defined as speeds below 35 mph. Therefore, the IBR Program has defined congestion as speeds below 45 mph. Table 3.1-3 shows the critical bottleneck locations under existing conditions and summarizes the hours of congestion at bottlenecks according to this definition.

Table 3.1-3. Weekday AM and PM Peak-Period Bottleneck Locations When Speeds Are below 45 mph – 2019 Existing Conditions

Direction	Location	Time of Day	Duration (hours)	Maximum Extent (miles)
Southbound	Interstate Bridge	6–9 a.m.	3 hours	3 miles
	I-5/I-405 Split in North Portland	6:30 a.m.–1 p.m.	6.5 hours	3 miles
	Rose Quarter	7:15 a.m.–7:45 p.m.	12.5 hours	3 miles
Northbound	Interstate Bridge	11:15 a.m.–8:00 p.m.	8.75 hours	10+ miles

Source: IBR Transportation Technical Report

Southbound Congestion

In the southbound direction, the Interstate Bridge experiences 3 hours of congestion between 6 and 9 a.m. The congestion extends from the Interstate Bridge back to the SR 500/39th Street interchange, and vehicle speeds vary from zero to 10 to 20 mph for much of that time. The congestion is caused by approaching traffic that is above the bridge's limited capacity, limited sight distance, substandard shoulders, short merge and diverge locations north and south of the bridge, heavy on- and off-ramp flows north of the river, and heavy truck volumes.

Southbound travel in the study area is also affected by backups from regional bottlenecks south of the IBR Program study area such as the I-5/I-405 split in North Portland, which results in 6.5 hours of congestion between 6:30 a.m. and 1 p.m. that can extend north and combine with the Interstate

Bridge bottleneck. Another southbound regional bottleneck is near the Rose Quarter, where I-5 is reduced from three to two travel lanes, congestion occurs for 12.5 hours from 7:15 a.m. to 7:45 pm.

Northbound Congestion

In the northbound direction, the Interstate Bridge bottleneck lasts for 8.75 hours between 11:15 a.m. and 8 p.m. The congestion extends south from the Interstate Bridge and influences traffic flows south of the study area, back to I-405 and I-84. The northbound congestion at the Interstate Bridge occurs for similar reasons as the southbound congestion, including limited bridge capacity; limited sight distance; substandard shoulders; short merge and diverge locations north and south of the bridge; heavy merging, diverging, and weaving flows of traffic; and heavy freight flows. As with southbound conditions, northbound speeds through the congested segments of the corridor vary between 0 and 20 mph.

Peak-Period Travel Times

The VISSIM traffic operations model was used to determine AM and PM peak-period travel times along the I-5 corridor, northbound and southbound. Table 3.1-4 shows travel times on I-5 between I-205 in Vancouver and I-405 in North Portland in the AM and PM peak periods for both northbound and southbound travel. Southbound AM peak-period travel times are the most affected by congestion, while southbound PM peak-period travel times are similar to free-flow conditions. Northbound peak-period travel times are free flow during the AM peak period and affected by congestion during the PM peak period.

Table 3.1-4. I-5 Average Weekday AM and PM Peak-Period Travel Times between I-205 and I-405 in North Portland – 2019 Existing Conditions

Direction	Metric [a]	6 AM	7 AM	8 AM	9 AM	3 PM	4 PM	5 PM	6 PM
Southbound	Hourly Average Travel Time	24	38	32	21	13	13	14	13
	Peak 2-hour Average Travel Time	-	35	35	-	-	14	14	-
Northbound	Hourly Average Travel Time	13	13	13	13	36	40	31	19
	Peak 2-hour Average Travel Time	-	13	13	-	-	35	35	-

Source: IBR Transportation Technical Report

a Travel time metric is minutes.

Level of Service and Volume-to-Capacity Ratios

As described in the Transportation Technical Report, WSDOT uses LOS as its standard for highway performance, while ODOT uses volume-to-capacity (V/C) ratios to set mobility standards and performance targets. WSDOT's LOS standard for I-5 in Washington is LOS D. ODOT's performance standard for I-5 in Oregon is a V/C ratio of 1.1 for the highest peak hour and 0.99 for all other hours.

The Transportation Technical Report and its appendices provide more information on how these standards are defined and evaluated.

Table 3.1-5 and Table 3.1-6 list the I-5 study area highway segments with below-standard performance (shown with bold text) for southbound and northbound traffic during peak periods. Results for Washington segments are shown in terms of LOS, and results for Oregon segments are shown in terms of V/C. At the Interstate Bridge freeway segment, both LOS and V/C ratios are reported. The Transportation Technical Report provides additional information, including maps of the segments.

Impacts to Local Roads

During the AM peak period, I-5 mainline congestion affects the ability of vehicles to enter the freeway on southbound on-ramps. This routinely affects the operations of local roads and intersections, including interchanges at Washington Street, SR 14, Mill Plain Boulevard, Fourth Plain Boulevard, and SR 500.

During the PM peak period, congestion on I-5 northbound and backups on northbound on-ramps impact the operations of local roads and intersections at Marine Drive, Martin Luther King Jr. Boulevard, and the Victory Boulevard/Interstate Avenue on-ramps.

Freight Mobility and Access

The I-5 crossing is critical to national and international freight flow. I-5 serves direct international land connections to Mexico and Canada. The Portland-Vancouver region is the fourth largest freight hub for domestic and international trade on the West Coast behind Los Angeles/Long Beach, Seattle/Tacoma, and San Francisco/Oakland. National, West Coast, and regional freight flows depend on the efficient functioning of I-5 within the study area.

I-5 is the primary truck route for local, regional, national, and international movement of goods through the Portland-Vancouver region. Trucks carry 55% of all freight in Clark County and 74% of all freight in the Portland-Vancouver region. Approximately $133 million in commodity value was transported daily across the Interstate Bridge in 2019.

Approximately 14,000 heavy and medium trucks crossed the Interstate Bridge on an average weekday in 2019, accounting for approximately 10% of all bridge traffic. About 70% of the truck trips using the Interstate Bridge either start or end in the Portland-Vancouver metropolitan area. Freight traffic does not peak during typical commute hours (6 to 9 a.m. and 3 to 6 p.m.). Instead, the highest freight volumes occur during the middle of the day as freight truck operators try to avoid the most congested periods.

The busiest interchanges for truck traffic are at Mill Plain Boulevard, City Center/SR 14, and Marine Drive, which all provide access to the Ports of Vancouver and Portland and surrounding industrial areas.

Table 3.1-5. I-5 Highway Performance for Southbound AM and PM Peak – 2019 Existing Conditions

Location	Segment Type	6 AM	7 AM	8 AM	9 AM	3 PM	4 PM	5 PM	6 PM
Main St on-ramp to 39th St off-ramp	Weave	C	**E** [a]	B	B	B	B	B	B
39th St off-ramp to SR 500/39th St on-ramp	Basic	**F** [a]	**F** [a]	D	C	B	C	C	B
SR 500/39th St on-ramp to Fourth Plain off-ramp	Weave	**F** [a]	**F** [a]	**E** [a]	B	B	B	B	B
Fourth Plain off-ramp to Fourth Plain on-ramp	Basic	**F** [a]	**F** [a]	**E** [a]	B	B	B	B	B
Fourth Plain on-ramp to Mill Plain off-ramp	Weave	**F** [a]	**F** [a]	**E** [a]	B	B	B	B	B
Mill Plain off-ramp to Mill Plain on-ramp	Basic	**F** [a]	**F** [a]	**F** [a]	C	B	C	C	B
Mill Plain on-ramp to SR 14 off-ramp	Weave	**F** [a]	**F** [a]	**F** [a]	C	C	C	C	B
SR 14 off-ramp to SR 14/Washington St on-ramp	Basic	**F** [a]	**F** [a]	**F** [a]	C	C	C	C	B
SR 14/Washington St on-ramp merge	Merge	**F** [a]	**F** [a]	**F** [a]	C	B	C	C	B
Interstate Bridge	Basic	**0.90-1.0 E** [a]	**0.90-1.0 E** [a]	**>1.1 F** [a]	0.50-0.75 D	0.50-0.75 C	0.50-0.75 C	0.50-0.75 D	0.50-0.75 C
Hayden Island off-ramp to Hayden Island on-ramp		0.75-0.80	0.75-0.80	0.90-1.0	0.50-0.75	0.25-0.50	0.50-0.75	0.50-0.75	0.25-0.50
Hayden Island on-ramp to Marine Dr off-ramp	Weave	0.50-0.75	0.50-0.75	**>1.1** [a]	0.50-0.75	0.25-0.50	0.25-0.50	0.25-0.50	0.25-0.50
Marine Dr off-ramp to Marine Dr on-ramp	Basic	0.50-0.75	0.75-0.80	**>1.1** [a]	0.50-0.75	0.25-0.50	0.25-0.50	0.25-0.50	0.25-0.50
Marine Dr on-ramp to Interstate Ave off-ramp	Weave	0.50-0.75	**1.0-1.1** [a]	**>1.1** [a]	0.75-0.80	0.25-0.50	0.25-0.50	0.25-0.50	0.25-0.50
Interstate Ave off-ramp to Victory on-ramp	Basic	0.50-0.75	**>1.1** [a]	**>1.1** [a]	**>1.1** [a]	0.25-0.50	0.25-0.50	0.25-0.50	0.25-0.50

Source: IBR Transportation Technical Report
Note: Performance standards are shown as LOS for locations in Washington and V/C for locations in Oregon. Both metrics are shown for the Interstate Bridge.
a Cells with text in bold do not meet performance standard.
Ave = Avenue; Dr = Drive; St = Street

Table 3.1-6. I-5 Highway Performance for Northbound AM and PM Peak – 2019 Existing Conditions

Location	Segment Type	6 AM	7 AM	8 AM	9 AM	3 PM	4 PM	5 PM	6 PM
Victory off-ramp to Marine Dr off-ramp	Diverge	<0.75	<0.75	<0.75	<0.75	**>1.1** [a]	**>1.1** [a]	**>1.1** [a]	**>1.1** [a]
Marine Dr off-ramp to Int./Victory on-ramp	Basic	<0.2.5	0.25-0.50	0.25-0.50	<0.25	**>1.1** [a]	**>1.1** [a]	**>1.1** [a]	**>1.1** [a]
Int./Victory on-ramp Merge	Merge	0.25-0.50	0.25-0.50	0.25-0.50	0.25-0.50	**>1.1** [a]	**>1.1** [a]	**>1.1** [a]	**>1.1** [a]
Int./Victory on-ramp to Marine Dr on-ramp	Merge	0.25-0.50	0.25-0.50	0.25-0.50	0.25-0.50	**>1.1** [a]	**>1.1** [a]	**>1.1** [a]	**>1.1** [a]
Marine Dr on-ramp to Hayden Island off-ramp	Weave	0.25-0.50	0.25-0.50	0.25-0.50	0.25-0.50	**>1.1** [a]	**>1.1** [a]	**>1.1** [a]	**>1.1** [a]
Hayden Island off-ramp to Hayden Island on-ramp	Basic	0.25-0.50	0.25-0.50	0.25-0.50	0.25-0.50	**>1.1** [a]	**>1.1** [a]	**>1.1** [a]	**>1.1** [a]
Hayden Island on-ramp merge	Merge	0.25-0.50	0.25-0.50	0.25-0.50	0.25-0.50	**>1.1** [a]	**>1.1** [a]	**>1.1** [a]	**>1.1** [a]
Interstate Bridge	Basic	0.25-0.50 B	0.50-0.75 C	0.50-0.75 C	0.25-0.50 C	**1.0-1.1 F** [a]	**1.0-1.1 F** [a]	**1.0-1.1 F** [a]	**0.90-1.0 E** [a]
SR 14 off-ramp to C St off-ramp	Diverge	B	B	B	B	C	C	C	C
C St off-ramp to SR 14 on-ramp	Basic	A	B	B	B	C	C	C	C
SR 14 on-ramp to Mill Plain/Fourth Plain off-ramp	Weave	B	B	B	B	C	C	C	C
Mill/Fourth Plain off-ramp to Mill Plain on-ramp	Basic	A	B	B	B	C	C	C	C
Mill Plain on-ramp merge	Merge	A	A	A	A	B	C	B	B
Mill Plain on-ramp to Fourth Plain on-ramp	Merge	A	B	B	B	C	C	C	B
Fourth Plain on-ramp merge	Weave	A	A	A	B	B	C	C	B
Fourth Plain on-ramp to SR 500/39th St off-ramp	Weave	A	B	B	B	C	D	C	B

Location	Segment Type	6 AM	7 AM	8 AM	9 AM	3 PM	4 PM	5 PM	6 PM
SR 500/39th St off-ramp to 39th St on-ramp	Basic	A	B	A	B	C	C	C	B
39th St on-ramp to Main St off-ramp	Weave	A	A	A	B	B	C	B	B

Source: IBR Transportation Technical Report
Note: Performance standards are shown as LOS for locations in Washington and V/C for locations in Oregon. Both metrics are shown for the Interstate Bridge.
a Cells with text in bold do not meet performance standard.
Ave = Avenue; Dr = Drive; St = Street

Bridge Openings and Gate Closures

Bridge openings occur when the movable spans are physically raised for the passage of commercial and non-commercial maritime vessels that exceed the available vertical clearance between the water level and the bridge in its closed position. When bridge openings occur, all forms of both northbound and southbound traffic, freight, transit, and active transportation users on the Interstate Bridge are stopped.

The maximum vertical navigation clearance under the Interstate Bridge at any time depends on the water level in the Columbia River (higher river levels result in less clearance) and which of the three navigation channels a ship is using (the primary navigation channel, the barge channel, or the alternate barge channel). The alternate barge channel, which is aligned with the highest point of the bridge, has a vertical clearance of up to 72 feet above the Columbia River. The primary navigation channel, which aligns with the Interstate Bridge lift spans, provides a maximum vertical navigation clearance of 39 feet when the lift spans are in the closed position and 178 feet when the spans are fully raised.

In addition to vertical clearance, vessels passing beneath the bridge must also consider horizontal clearance between the Interstate Bridge piers and the piers of the BNSF Railway Bridge located approximately 0.9 miles downstream. The existing horizontal clearances for the Interstate Bridge are approximately 263 feet for the primary channel, 511 feet for the barge channel, and 260 feet for the alternate barge channel. The alignments of the navigation channels factor into vessel passage of both the Interstate Bridge and the BNSF bridge; due to the proximity of the two, vessel operators typically plan their route based on navigation factors associated with both bridges. Vessels needing less than 33 feet of vertical navigation clearance to pass the BNSF Railway Bridge may take a route other than the primary navigation channel, while vessels needing additional vertical navigation clearance require the BNSF Railway Bridge swing span to be opened and must use the primary navigation channel. More information on clearances and navigation channels can be found in Section 3.2, Navigation.

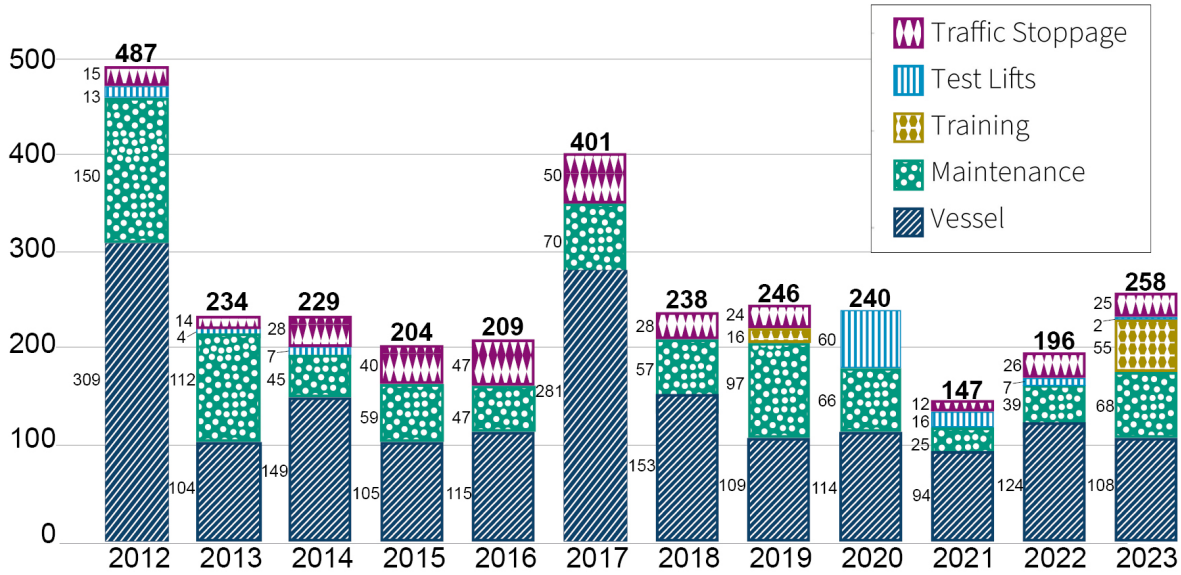
Frequent river traffic (tug and tows, river cruise ships, and recreational craft) typically does not require a bridge opening, as these vessels often opt to pass the bridge using either the alternate barge channel or the barge channel. However, bridge openings are needed for some government vessels, tall ships and sailboats, floating construction equipment, larger ocean-going tugs or vessels, and specialty shipments from area fabricators that require more than 72 feet of vertical navigation clearance. A bridge opening is also needed if a vessel requiring more than 39 feet of clearance must use the primary navigation channel to pass through the Interstate Bridge and the BNSF Railway Bridge for maneuverability and safety considerations. Additional detail on river traffic and existing navigation considerations is provided in Section 3.2, Navigation.

In addition to bridge openings, traffic on the bridge is affected by gate closure events, where traffic is stopped to allow for bridge-related activity without the bridge being raised. These gate closure events occur for several reasons, including bridge maintenance and on-site training of department of transportation personnel. Training and practice openings are performed during the day and overnight periods. Depending on the reason for the event, traffic may be stopped in one or both directions.

For the 12-year period from January 1, 2012, to December 31, 2023, there were 3,089 bridge openings and gate closure events. On average, the bridge was opened/gate closed 257 times per year, with the range over the 12-year period fluctuating between 147 and 487 bridge openings and gate closures per year. Above average high-water levels occurred in 2012 and 2017, resulting in more bridge openings in

those two years. Figure 3.1-2 displays bridge opening and gate closure events for each year, by reason, from 2012 to 2023.

Figure 3.1-2. Interstate Bridge Opening and Gate Closure Events 2012–2023



Source: ODOT, WSDOT

The average bridge opening and gate closure duration during this period was 13.2 minutes. While bridge openings are not allowed during peak periods on Monday to Friday (except in emergency situations), they are allowed before and after the peaks. Depending on the closure time and duration as well as traffic levels, it can take between 5 and 110 minutes for traffic to recover from a bridge opening and gate closure. A closure just before the peak period can last even longer, affecting conditions throughout the peak.

Arterial and Local Street Network and Intersection Operations

In addition to the regional roadways that connect population and employment centers, the study area contains ODOT and WSDOT highways and City of Portland and City of Vancouver arterials and local streets that serve travel to and from the regional network, as well as providing for local access and circulation. Many of these roads and highways include bicycle and pedestrian facilities.

The study area includes 80 intersections: 58 in Vancouver and 22 in Portland. See the Transportation Technical Report for a list and graphic identifying the study intersections. These include intersections originally evaluated in the CRC Final EIS and additional intersections that were identified for analysis in this Draft Supplemental EIS (SEIS) based on data reviews, consultations with partner agency staff, and the potential for intersection operations to be affected by I-5 operations or IBR Program improvements. More information on how study area intersections were identified can be found in the Transportation Technical Report. The study intersections were categorized into four subareas, based on their proximity to interchange areas and because different partner agencies have different

performance standards. The four subareas include three in Vancouver (subareas 1-3) and one in Portland (subarea 4):

1. SR 500/Main Street/39th Street/Fourth Plain Boulevard (17 study intersections).
2. Mill Plain Boulevard (18 study intersections).
3. SR 14/City Center Interchange/Columbia Way (23 study intersections).
4. Hayden Island/Marine Drive/Victory Boulevard/Columbia Boulevard (22 study intersections).

Under existing conditions, four intersections in the study area do not meet the applicable agency performance standards. The three Vancouver area intersections that do not meet agency standards under existing conditions are listed in Table 3.1-7, and the one Portland area intersections that does not meet agency standards is listed in Table 3.1-8. The detailed existing conditions information in the Transportation Technical Report includes information on peak-hour intersection volumes as well as intersection operations.

Table 3.1-7. Vancouver Intersections Not Meeting Agency Standards (2019 Existing Conditions)

Peak	Intersection	Control Type	Standard	LOS	Delay (seconds)	ICU / V/C	Meets Standard
AM	I-5 SB Ramp and 39th Street (#5)	TWSC	LOS D WSDOT	F	> 300	1.25	No
PM	Main Street and 39th Street (#3)	Signal	LOS E COV	F	106	0.53	No
PM	I-5 SB Ramp and 39th Street (#5)	TWSC	LOS D WSDOT	F	203	0.90	No
PM	Columbia Shores Boulevard and Columbia Way (#58)	Signal	LOS E COV	F	> 300	0.51	No

Source: IBR Transportation Technical Report
Note: Study intersections were analyzed without considering the impacts of freeway congestion spilling back into local roadways and may operate worse than shown.
COV = City of Vancouver; ICU = intersection capacity utilization for signalized and all-way stop-controlled intersections; LOS = level of service; NB = northbound; SB = southbound; TWSC = two-way stop-control; V/C ratio = volume-to-capacity ratio for worse movement in two-way stop-controlled intersections; WSDOT = Washington State Department of Transportation

Table 3.1-8. Portland Intersections Not Meeting Agency Standards (2019 Existing Conditions)

Peak	Intersection	Control Type	Standard/ Target	LOS	Delay (seconds)	ICU / V/C	Meets Standard
AM	Marine Drive/Martin Luther King Jr. Boulevard and I-5 NB/SB on/off-ramps (#68)	Signal	V/C = 0.85 ODOT	F	140	1.04	No

Source: IBR Transportation Technical Report
Note: Study intersections were analyzed without considering the impacts of freeway congestion spilling back into local roadways and may operate worse than shown.
ICU = intersection capacity utilization; LOS = level of service; NB = northbound; ODOT = Oregon Department of Transportation; SB = southbound

Transit

Transit Providers and Systems

Transit service in the region and study area is provided by TriMet and C-TRAN.

To serve its three-county service area in metropolitan Portland, TriMet has a bus fleet of approximately 700 vehicles and operates the 60-mile-long Metropolitan Area Express (MAX) light-rail transit (LRT) system. The MAX system has five lines that operate at frequencies of 15 minutes or less between approximately 5 a.m. and 1 a.m., 7 days a week. This includes the Yellow Line, also known as Interstate MAX, which runs northbound and southbound from downtown Portland (Portland State University) to the Expo Center. South of downtown, the Yellow Line transitions to the Orange Line and continues south to Milwaukie. The TriMet MAX system does not currently provide service across North Portland Harbor to Hayden Island or across the Columbia River into Clark County. TriMet has five operations and maintenance facilities: three for buses and two for rail.

C-TRAN is the transit provider in the Clark County service area, with a fixed-route fleet of approximately 122 buses that serve 28 bus lines and The Vine bus rapid transit (BRT) service. The Vine service began operations in 2017 between downtown Vancouver and the Vancouver Mall Transit Center, primarily along Fourth Plain Boulevard. New Vine BRT service along Mill Plain Boulevard began in October 2023. (Note that, for consistency with existing data reflecting 2019 conditions, this service is not included in BRT summaries for existing conditions in the Draft SEIS, but it is reflected in future year forecasts for both the No-Build Alternative and the Modified LPA.) In addition to local bus and BRT service, C-TRAN operates three regional routes that provide transit service crossing the Columbia River to connect with the TriMet rail system and Portland International Airport, as well as seven express routes that provide connections between regional park-and-ride locations, downtown Vancouver, and the downtown Portland area. C-TRAN has a fleet of 64 demand-responsive vehicles and 40 vanpool vehicles. C-TRAN currently operates one bus operations and maintenance facility.

Several transit centers and park-and-ride facilities are used for travel between Clark County and Portland. These are served by various combinations of local, express, and regional bus routes as well as MAX. Tables detailing each of these facilities and routes that serve them are available in the Transportation Technical Report.

Transit Service in the Study Area

There are 27 bus routes and one MAX light-rail line that serve the study area, including BRT, local, express, and regional service provided by C-TRAN and local bus and LRT service provided by TriMet. Both C-TRAN and TriMet provide special access and shared mobility services (i.e., paratransit, on-demand ridesharing, neighborhood shuttles, and vanpools) in the study area. Tables detailing each of these routes and their service assumptions (headways) are available in the Transportation Technical Report.

Table 3.1-9 shows the existing 2019 transit trips served by C-TRAN and TriMet in the study area. Approximately 4,800 people travel across the Columbia River via bus each weekday on routes using either I-5 or I-205. For transit trips between Vancouver and Portland on I-5, buses operate along with other vehicles in general-purpose travel lanes. On I-205, C-TRAN buses operate on the shoulder when peak-period congestion warrants. As a result, congestion impacts bus travel times and the reliability of trips, which are key measures of service quality for transit systems.

Table 3.1-9. Existing 2019 Average Weekday Transit Ridership

Organization	Transit Service	Regional System	Study Area Routes [a]
TriMet	Local Bus	189,200	50,400
	Light-Rail	122,000	13,200
	Westside Express Service (Commuter Rail)	1,400	N/A
	Total	312,600	63,600
C-TRAN	Local Bus	10,400	7,100
	The Vine BRT	4,500	4,500
	Regional Bus	2,100	1,500
	Express Bus	2,900	2,400
	Total	19,900	15,500

Source: TriMet Spring 2019 Route Ridership Report, C-TRAN 2019 April Boarding Report
a Includes boardings for entire route, not just the portion within the study area.
BRT = bus rapid transit; N/A = not applicable

Transit travel time within the study area varies by time of day. For all trips between Vancouver and Portland, congestion on I-5 affects both transit travel time and the reliability of transit trips. Currently, only transit trips destined for downtown Portland have the possibility of a one-seat ride (i.e., a single ride with no transfers) on express buses that operate in mixed traffic on I-5. Total transit travel times (including in-vehicle, walking, and waiting) range between 38 and 65 minutes southbound during the AM peak period and between 46 and 71 minutes northbound during the PM peak period. Nearly all of the transit travel times currently require a transfer to complete the trip exclusively on transit. Transfer time is included in the travel times as walk and wait time but is generally perceived as being more onerous than initial walk and wait or in-vehicle time.

Active Transportation

Active transportation facilities in the study area include sidewalks, on-street bicycle facilities, and shared-use paths. The analysis of these facilities extended over 3 miles beyond the study area to account for local network conditions and the potential for active transportation modes to reach the Interstate Bridge from locations outside of the study area.

In Portland, the width and condition of active transportation facilities vary. Most existing sidewalks are between 4 and 6 feet wide, but there are areas with no sidewalks, as well as segments with missing connections. The Portland bicycle network in the study area comprises a mixture of bike lanes and off-street shared-use paths. Part of the 40-Mile Loop Trail, which is planned to create a route around the Portland region, runs through the study area on the south edge of the Columbia River but has a gap within the study area.

Land uses in the area south of North Portland Harbor (e.g., the Columbia Slough Watershed, Delta Park, the Expo Center, and industrial lands) have limited the overall roadway network development. As a result of large block spacing and historically lower standards, there are limited sidewalk connections. An incomplete network of shared-use paths connects to and through this portion of the study area, with some non-standard segments.

Bike lanes connect North and Northeast Portland with the North Portland Harbor bridge via N Denver Avenue, Martin Luther King Jr. Boulevard, and N Marine Drive. Access to the shared-use path on the North Portland Harbor bridge is circuitous and non-continuous on both ends of the structure (in North Portland and on Hayden Island). On Hayden Island, the path connecting the bridge with mainland Portland is narrow and does not meet applicable standards. The pedestrian network on the island is largely absent despite the grid-like nature of the street network.

The existing Interstate Bridge over the Columbia River between Vancouver and Hayden Island has substandard shared-use paths on the outside edges of the northbound and southbound bridge structures. While the design of each path is different, neither meets the American Association of State Highway and Transportation Officials (AASHTO) standards for shared-use paths. The "clear" (or unobstructed) widths of the paths on the existing bridges are less than 4 feet. The mixing of pedestrians and bicycles in this constrained space can result in safety conflicts and an uncomfortable traveling environment for many users. Still, an estimated 410 bicyclists and pedestrians, on average, make trips across the bridge daily.

In Vancouver, sidewalks are present in the downtown core and on most major arterials west of I-5, but gaps or non-standard facilities are present on several major routes. I-5 is a major barrier to pedestrian travel between Vancouver neighborhoods and destinations on the east and west sides of the freeway. Pedestrian facilities are provided at some I-5 crossing locations, but not consistently. The bicycle network in Vancouver comprises a mixture of shared roadways (designated bikeways in which people biking share the road space with cars and other vehicles), bike lanes, and off-street paved paths providing access to the Interstate Bridge.

Safety

For existing safety-related conditions in the study area, the IBR Program collected crash data records from WSDOT and ODOT from January 2015 to December 2019 (pre-pandemic). Within the study area, there were 2,270 total crashes on the I-5 mainline, ramps, and at study area intersections for the 5-year period evaluated, with rear-end crashes comprising about half of the total. Most crashes occurred between 6 and 9 a.m. and 12 to 7 p.m. About 38% of total crashes resulted in injury, with 2% fatal or serious. The analysis also found that crashes in both northbound and southbound directions are approximately two times more likely when a bridge opening and gate closure occurs than when it does not. The Transportation Technical Report details existing crash data by type, severity, and location, including crashes occurring during bridge openings and gate closures.

Transportation Demand Management and Transportation System Management

A variety of demand- and system-management programs and measures are currently in use in the study area. Demand-management programs can be categorized according to four basic strategies to alter transportation choices:

- Programs to improve public awareness of transportation choices.

- Programs to improve access to or availability of alternative transportation choices.
- Incentives and disincentives that cause changes in transportation choices by individuals.
- Institutional and organizational approaches, including employer-based or area-based programs, as well as transit-oriented or land use-based programs.

System-management measures and actions are used to increase the operational efficiency of the transportation system, especially the street and highway network, including signals and signal systems. These systems are owned or operated by the local agencies and the states and include:

- System monitoring and traveler information systems (e.g., web-based information systems, variable message signs).
- Facility management systems (e.g., active traffic management system, bus-on-shoulder operations, optimized signal systems, ramp meters, signal priority for special users, such as transit).
- Incident management systems (e.g., incident response and recovery teams).

3.1.3 Long-Term Effects

The long-term effects described in this section are for the year 2045. All regional travel demand modeling data is from the 2018 Regional Transportation Plan[2] (2018 RTP), jointly developed and adopted by Metro in 2018 and by Southwest Washington Regional Transportation Council (RTC) in 2019. Regional transportation plans identify and prioritize long-range transportation needs for all modes in the region. These plans serve as the blueprint for how transportation resources are invested and projects are selected for implementation and are the basis for planning efforts in the region. Year 2045 conditions incorporate the 2040 Financially Constrained assumptions adopted by both Metro and RTC with updates to extend the forecasts to 2045. Included in these updates are transit capacity constraints to better represent feasible transit ridership relative to transit investments described in the 2018 RTP.[3]

The evaluation of effects is organized by element of the transportation system for the No-Build alternative and Modified LPA and options. The Modified LPA is discussed in comparison to the No-Build Alternative. The base scenario modeled for the Modified LPA is a double-deck, fixed-span configuration, with one auxiliary lane and ramps at C Street. Three of the Modified LPA design options—those that would remove the C Street ramps, add a second auxiliary lane, and replace the Interstate Bridge with a new movable-span configuration—would operate differently than the Modified LPA in some categories and are discussed below where their impacts would differ. The other design options (i.e., single-level fixed-span configuration, centered I-5, I-5 shifted west, and park-and-ride site options) described in Chapter 2 of this Draft SEIS would not differ from the Modified LPA in terms of transportation impacts and are not discussed further.

[2] The transportation analysis for the No-Build Alternative and Modified LPA is based on the anticipated regional highway and transit networks and service levels for 2045 as informed by the 2018 Regional Transportation Plan jointly developed and adopted by Metro (Metro 2018) and RTC (RTC 2019). The traffic model applied to this analysis reflects pre-COVID conditions. New surveys and model development efforts that include post-COVID travel behavior are planned to be incorporated in the 2028 RTP update.

[3] The 2018 Regional Transportation Plan was jointly developed and adopted by Metro (Metro 2018) and RTC (RTC 2019).

Regional Transportation Impacts in 2045

Table 3.1-10 shows the daily measures of travel demand (VMT, VHT, and VHD) in year 2045 for the No-Build Alternative, the Modified LPA, and the Modified LPA (two auxiliary lane design option), based on the results from the regional travel demand model. The other design options under consideration have the same regional travel demand results as the Modified LPA and are not shown separately. Further details on the key elements of the design options can be found in Chapter 2, Description of Alternatives. The Transportation Technical Report has additional information on the regional model's assumptions. The regional model is based on the Metro and RTC Regional Transportation Plans with adjustments to better represent future conditions. This includes the underlying population and employment growth, land use factors, tolling, fare policies, parking, transit and highway capacity constraints, and other regional system investments that are based on the region's adopted regional transportation plans. All these factors influence the forecasts of future travel demand conditions, including the results for vehicle and transit demand in this corridor and across the region. Regional travel demand model assumptions are described in more detail in the Transportation Technical Report Appendix H.

Table 3.1-10. 2045 Weekday Daily Vehicle Miles Traveled, Vehicle Hours Traveled, and Vehicle Hours of Delay

Alternative	Study Area	Vehicle Miles Traveled	Vehicle Hours Traveled	Vehicle Hours of Delay
No-Build Alternative	Portland Metropolitan Region	59,042,000	1,803,600	65,500
	Traffic Subarea	14,349,500	439,600	24,900
Modified LPA	Portland Metropolitan Region	58,950,700	1,792,300	58,300
	Traffic Subarea	14,270,500	428,000	17,400
Modified LPA (Two Auxiliary Lane Design Option)	Portland Metropolitan Region	58,960,800	1,791,900	58,000
	Traffic Subarea	14,279,300	427,400	17,000
Change between No-Build and Modified LPA	Regional Difference	-91,300 (<-1%)	-12,100 (<-1%)	-7,300 (-11%)
	Subarea Difference	-79,000 (<-1%)	-11,600 (-3%)	-7,500 (-30%)
Change between No-Build and Modified LPA Two Auxiliary Lane Design Option	Regional Difference	-83,300 (<-1%)	-12,600 (-1%)	-7,600 (-11%)
	Subarea Difference	-70,900 (<-1%)	-12,200 (-3%)	-7,900 (-32%)
Change between Modified LPA and Modified LPA Two Auxiliary Lane Design Option	Regional Difference	10,100 (<1%)	-400 (<-1%)	-300 (<-1%)
	Subarea Difference	8,800 (<1%)	-600 (<-1%)	-400 (-2%)

Source: Metro/RTC Regional Travel Demand Model

Compared to the No-Build Alternative, the Modified LPA would decrease motor vehicle travel (measured by VMT) and travel times (measured by VHT) by 1% in the Portland metropolitan region and up to 3% in the traffic subarea (The traffic subarea includes a triangular area around I-5 from I-205 to I-84 on the west, I-205 from I-5 to I-84 on the east, and I-84 from I-5 to I-205 on the south). This is due to the transit improvements and the tolls assumed with the Modified LPA, with transit accommodating a larger share of the daily trips compared to the No-Build Alternative (see the section Daily Person Throughput). The Modified LPA with either one or two auxiliary lanes would result in an 11% decrease in delay (measured in VHD) in the Portland metropolitan region. The one and two auxiliary lane design options would result in a 30% and 32% decrease in delay in the traffic subarea, respectively, compared to the No-Build Alternative. The Transportation Technical Report includes more information on the modeling analysis and results.

Screenline Peak-Hour Traffic Volume Forecasts in 2045

The AM and PM peak-hour screenline volumes within the study area were analyzed using the regional travel demand model to determine the relative differences in traffic volumes between the No-Build Alternative and the Modified LPA. Below is a high-level summary of results from the screenline analysis. The Transportation Technical Report includes detailed figures and lists of the screenlines used for this traffic analysis.

- For the Vancouver east-west screenlines, the Modified LPA would result in increased volumes in the peak directions (southbound in the AM peak and northbound in the PM peak) for all screenlines compared to the No-Build Alternative (+4% to +11%). These forecast increases would be primarily on I-5 rather than on surrounding north-south arterial facilities, which for the most part would see decreases in volumes with the Modified LPA. These changes reflect the ability for more vehicles to be accommodated on I-5 during the peak period with the Modified LPA compared to the No-Build Alternative.
- Most eastbound and westbound screenlines in Vancouver would experience increases in both the AM and PM peak hours with the Modified LPA compared to the No Build Alternative (+2% to +31%). This is, in part, because of additional traffic using these facilities to access I-5 which shows up as higher volumes on I-5 for the north-south screenlines. Contributing to these increases, specifically, are SR 500 east of I-5 which has increases of just under 300 vehicles (approximately +20%) in the peak direction in both the AM and PM peak, and SR 14 east of I-5 which has increases of just under 200 vehicles (+7%) in the peak direction of the AM peak. SR 14 in the peak direction of the PM peak has less than 50 (+2%) vehicle difference.
- Compared to the No-Build Alternative, the Modified LPA and options would not see large changes in vehicle volumes on I-205 on any screenline location in the peak period (-3% to + 12%). Because there is not a significant shift to I-205 in the Modified LPA other east-west facilities such as SR 14, SR 500 and US 30/Lombard Street do not see significant increases either.
- For Portland screenlines capturing vehicles traveling north and south, the Modified LPA would increase vehicle volumes compared to the No-Build Alternative in the peak direction, but total changes are below 10%. The increases would occur on I-5 as well as on the arterials. Some of the changes would be related to Hayden Island area access and circulation changes that would occur with the Modified LPA. In a number of cases, the volumes would be lower than with the No-Build Alternative, particularly in the off-peak direction.

- For Portland screenlines capturing vehicles traveling east and west, nearly every facility in the peak and off-peak directions in the AM and PM peak have differences of fewer than 50 vehicles in the Modified LPA compared to the No-Build Alternative.
- The volumes in the peak and off-peak would not differ among the design options.

At a screenline level, these findings suggest that differences between the No-Build Alternative and Modified LPA are not substantial. Traffic volumes have been analyzed at an individual facility and intersection level as well and are summarized in the Arterials and Local Streets section of this chapter.

I-5/I-205 Travel Forecasts in 2045

Year 2045 volumes were developed using the four-step Metro/RTC regional travel demand model, with adjustments reflecting differences between observed existing traffic counts and the traffic volumes simulated by the Metro/RTC regional travel demand model. Year 2045 forecast volumes were developed for the No-Build Alternative and the Modified LPA. The forecast volumes would not differ among the design options. The Transportation Technical Report has additional information on the methods used and the results predicted.

Daily and Peak-Period Cross-River Demand Volume Forecasts in 2045

Both daily and during peak periods, the regional travel demand model predicts increased trips across the Columbia River by 2045, driven in large part by continued urban growth. Table 3.1-11 shows year 2045 average weekday traffic demand volumes for I-5, I-205, and total Columbia River crossings.

Table 3.1-11. 2045 Forecast Average Weekday Daily Traffic Volumes on I-5 and I-205

Location	Existing AWDT	2045 No-Build AWDT [a]	2045 Modified LPA AWDT [b]
Total River Crossing	313,000	400,000 (+28%)	389,000 (-3%)
I-5 Bridge	143,400	180,000 (+26%)	175,000 (-3%)
I-205 Bridge	169,600	220,000 (+30%)	214,000 (-3%)

Source: ODOT/WSDOT, Metro/RTC Regional Travel Demand Model, IBR Transportation Technical Report
a Percentages reflect change from existing conditions.
b Percentages reflect change from 2045 No-Build Alternative.
AWDT = average weekday daily traffic

In the 2045 No-Build Alternative, average weekday daily traffic volumes are forecast to increase 26% over 2019 conditions for the Interstate Bridge. Similar but slower growth is predicted during the peak periods.

The forecasts indicate that 45% of daily traffic would use the I-5 bridge and 55% would use the I-205 bridge in both the No-Build Alternative and the Modified LPA. The bridge splits would be similar for the No-Build Alternative and the Modified LPA and options due to the improvement in I-5 operations, congestion on both freeway corridors, addition of variable-rate tolling on I-5, addition of high-capacity transit in the I-5 corridor, and addition of active transportation facilities in the I-5 corridor.

The Modified LPA would have 3% lower traffic volumes crossing the river on I-5 and I-205 than the No-Build Alternative in 2045. This reduction is due to more investment in high-capacity transit to connect across the river into central Vancouver (LRT, express bus on shoulder, new park-and-ride lots and increased transit service levels), variable-rate tolls would be implemented on the I-5 Columbia

River bridges, and active transportation facilities would be improved. As noted above, average weekday daily traffic volumes are forecast to be similar across the design options. The Transportation Technical Report has additional description of the factors involved in forecasts of reduced traffic across the river, including tolling, shifts in travelers' choice of mode, or the potential for diversion.

In some locations, screenline vehicle volumes are slightly higher on I-5 and reduced on adjacent facilities under the Modified LPA compared to the No-Build Alternative. There are small changes to vehicle volumes on I-205 in the southbound peak direction (involving -50 to +200 vehicles) and slightly higher changes on I-205 in the off-peak direction (+450 to +500 vehicles) in the peak hour. The volumes would not differ among the design options.

I-5 Peak-Period Mainline and Ramp Volumes in 2045

The regional demand model was also used to predict peak-period mainline and ramp volumes by location, with refinements based on observed traffic volumes under current conditions. In general, ramps that have the highest proportion of demand relative to others in the existing condition would continue to have the highest proportion of demand relative to other ramps under the No-Build Alternative and the Modified LPA. Further detail about the forecast volumes at individual mainline locations and ramps can be found in the Transportation Technical Report.

No-Build Alternative

For southbound travel during the AM peak period and northbound travel during the PM peak period, hourly demand volume crossing the Interstate Bridge would increase between 17% and 30% under the No-Build Alternative compared to existing conditions. Hourly demand volume crossing the Interstate Bridge in the reverse commute period and direction would increase between 34% and 58% compared to existing conditions. Overall, the southbound mainline and ramp travel demand volumes would continue to be highest during the AM peak, and northbound mainline and ramp travel demand volumes would continue to be highest during the PM peak. However, in some locations near downtown Vancouver, such as Mill Plain Boulevard and the SR 14 ramps, there would be more balanced AM and PM peak volumes, with some on-ramps slightly higher during the off-peak period versus the peak period.

Modified LPA

Similar to the 2045 No-Build Alternative, southbound mainline and ramp volumes under the Modified LPA would be highest during the AM peak period and northbound mainline and ramp volumes would be highest during the PM peak period, except for some locations near downtown Vancouver, including Mill Plain Boulevard and the SR 14 ramps, which would see higher volumes (10% to 85%) during the off-peak period versus the peak period.

Hourly traffic volumes crossing the I-5 and I-205 Columbia River bridges in the peak period and peak direction (southbound during the AM peak period and northbound during the PM peak period) would be up to 10% higher in the Modified LPA compared to No-Build Alternative. Hourly traffic volumes crossing the bridges in the reverse commute direction (northbound during the AM peak period and southbound during the PM peak period) would be between 4% and 6% lower in the Modified LPA compared to the No-Build Alternative. The reason that the number of vehicles crossing the bridges would increase in the peak direction and decrease in the off-peak direction under the Modified LPA during the peak period is the cost of variable-rate tolls and the forecast congestion levels on both river

crossings. In the No-Build Alternative, congestion in the peak period and peak direction would continue to limit the traffic volumes on the Columbia River bridges.

Under the Modified LPA, the regional travel demand results reflect the additional person-moving capacity offered by transit and the improvements in traffic operations from the addition of an auxiliary lane in each direction. Tolling is predicted to reduce the *daily* demand volume crossing the river on the I-5 corridor, but the forecasts still assume growth in commute trips during peak periods in the peak direction, because these trips are less affected by tolls than periods with more discretionary trips. The result would be an increase in vehicle demand volume during the peak periods in the peak direction even though daily volume demand crossing the river on the I-5 corridor is decreasing.

All other design options would have similar peak-period traffic volumes as the Modified LPA, with the exception of the design option that would remove the C Street ramps. The design option which removes the C Street ramps would add between 300 and 600 vehicles per hour to the collector-distributor (C-D)[4] roadways and the Mill Plain Boulevard ramps during the peak periods.

Daily Person Throughput in 2045

Person throughput measures the number of people (as opposed to the number of vehicles) that a transportation facility carries. The number of vehicles (passenger cars and freight trucks) crossing the Interstate Bridge was multiplied by average vehicle occupancy assumptions to calculate total person throughput in vehicles. For all vehicle modes, the same average vehicle occupancy used to calculate existing (2019) daily person throughput was applied to future year vehicle volumes. The number of people crossing the bridge in transit (buses and light-rail) and via active transportation was included in the total number of people crossing the bridge to calculate 2045 daily person throughput for the No-Build Alternative and the Modified LPA.

The Interstate Bridge is forecast to carry 241,900 people under the No-Build Alternative and 251,100 people under all design options of the Modified LPA.

Daily person throughput across the I-5 Interstate Bridge is forecast to increase by 30.5% with the 2045 No-Build Alternative compared to the 2019 Existing Conditions. The person throughput with the Modified LPA and design options is forecast to increase an additional 3.8% compared to the No-Build Alternative. High-capacity transit, improved active transportation facilities, and variable-rate tolling under the Modified LPA would increase the number of people crossing the I-5 Columbia River bridges using transit or active transportation while reducing the daily number of vehicles. The increase in the number of transit and active transportation users compared to the No-Build Alternative would be greater than the decrease in the number of people crossing the Columbia River bridges in vehicles, resulting in a net increase in the number of people crossing the Columbia River bridges with the Modified LPA compared to the No-Build Alternative.

I-5 Operations in 2045

The 2045 I-5 operations analysis includes congestion estimates, peak-period speeds, peak-period travel times, LOS and V/C ratios, and impacts to local roads.

[4] A collector-distributer roadway parallels and connects the main travel lanes of a highway and frontage roads or entrance ramps.

Bottlenecks and Speeds in 2045

I-5 traffic performance within the freeway analysis area was evaluated using VISSIM during the 4-hour peak periods and estimated speeds during midday. Key information about forecast bottlenecks, including the location, time of day, duration, and extent of the congestion when speeds are below 45 mph, is summarized in Table 3.1-12 for the No-Build Alternative, Modified LPA, Modified LPA without C Street ramps, and the Modified LPA with two auxiliary lanes. This analysis shows the maximum levels of congestion at the peaks, but congestion levels would build over time and then dissipate as traffic demand volumes begin decreasing after peak periods.

To show the results in more detail, the Transportation Technical Report has maps of average vehicle speeds by segment and location, and it also shows the hours of congestion.

No-Build Alternative

In the southbound direction, the Interstate Bridge would be congested throughout the 4-hour AM and PM peak periods. Congestion at the bridge would continue to be caused by overall high traffic volumes, the structure's limited capacity, limited sight distance, substandard shoulders, short merge and diverge locations north and south of the bridge, high-volume on- and off-ramp flows north of the river, and high truck volumes.

Southbound congestion would span both peaks, from 5 a.m. until 9 p.m. (16 hours). This is an increase of 13 hours, compared to the 3 hours of southbound congestion under 2019 existing conditions. At times, congestion from the Interstate Bridge would extend north from the bridge beyond the I-5/I-205 interchange north of Vancouver, a distance of over 8 miles.

Beyond the study area, a regional southbound bottleneck at the I-5/I-405 split in North Portland would continue to affect I-5 operations backing up traffic toward the Interstate Bridge and into the Interstate Bridge congestion throughout the AM peak period and into midday from 5 a.m. to 1 p.m. (8 hours).

In the northbound direction under the No-Build Alternative, the Interstate Bridge bottleneck would remain the primary bottleneck and would be congested for most of the 4-hour AM peak period and all of the 4-hour PM peak period. The northbound congestion on the bridge is caused by similar factors as the southbound congestion and would last from 6 a.m. until 9 p.m. (15 hours). This is an increase of 6.25 hours over the 8.75 hours of congestion that exist in 2019. Congestion from the Interstate Bridge would extend south of the study area beyond the Marquam Bridge (over 10 miles) and combine with other northbound I-5 bottlenecks near downtown Portland.

Table 3.1-12. Future Year 2045 Average Weekday Bottleneck Summary When Speeds Are below 45 mph

Location	Metric	No-Build Alternative	Modified LPA	Modified LPA Without C Street Ramps	Modified LPA with Two Auxiliary Lanes
Northbound Existing Interstate Bridge/New Columbia River Bridges	Time of Day	7 a.m.–9 p.m.	12–9 p.m.	Same as Modified LPA	1:30–7:30 p.m.
	Duration of Congestion	14 hours	9 hours	Same as Modified LPA	6 hours
	Extent of Congestion	10+ miles	5 miles	Same as Modified LPA	0.75 miles
Southbound Existing Interstate Bridge/New Columbia River Bridges	Time of Day	5 a.m.–9 p.m.	6-10:45 a.m.	Same as Modified LPA	6:15–10:45 a.m.
	Duration of Congestion	16 hours	4.75 hours	Same as Modified LPA	4.5 hours
	Extent of Congestion	8+ miles	4.5 miles	Same as Modified LPA	1 mile
Mill Plain/SR 14 Collector/Distributor	Time of Day	N/A	6 a.m.–12 p.m.	6 a.m.–12 p.m.	7-11 a.m.
	Duration of Congestion	N/A	6 hours	6 hours	4
	Extent of Congestion	N/A	4 miles	4.5 miles	1.5 miles
I-5/I-405 Split in North Portland	Time of Day	5 a.m.–1 p.m.	5 a.m.–1:30 p.m.	Same as Modified LPA	Same as Modified LPA
	Duration of Congestion	8 hours	8.5 hours	Same as Modified LPA	Same as Modified LPA
	Extent of Congestion	5 miles	6 miles	Same as Modified LPA	Same as Modified LPA

Location	Metric	No-Build Alternative	Modified LPA	Modified LPA Without C Street Ramps	Modified LPA with Two Auxiliary Lanes
Rose Quarter	Time of Day	1:30–9 p.m.	Same as No-Build	Same as No-Build	Same as No-Build
	Duration of Congestion	7.5 hours	Same as No-Build	Same as No-Build	Same as No-Build
	Extent of Congestion	1 mile	Same as No-Build	Same as No-Build	Same as No-Build

Source: IBR Transportation Technical Report
C-D = collector-distributor; N/A = not applicable

Modified LPA

During the AM peak period, overall congestion southbound would be reduced compared to the No-Build Alternative, but congested conditions would still occur. For the AM peak period, most segments of I-5 would operate with less congestion than No-Build, but congestion in North Portland would worsen approaching the downstream I-5/I-405 bottleneck in North Portland because traffic would no longer be as constrained by a bridge bottleneck. The combined congestion from the I-5/I-405 bottleneck in North Portland plus the bridge volumes would extend back into the study area as far north as the C-D system in Vancouver between Mill Plain Boulevard and SR 14. While traffic congestion on southbound I-5 through North Portland would be worse with the Modified LPA compared to the No-Build Alternative, the traffic volume demand forecasts are similar between the Modified LPA and the No-Build Alternative south of the IBR study area, and the Modified LPA would provide multimodal choices for users to avoid the downstream bottleneck near the I-5/I-405 split in North Portland via enhanced high-capacity transit, express bus options, and active transportation improvements connecting to the current active transportation system through North Portland.

During the PM peak period, there would be no southbound congestion at the bridge or to the north.

During the PM peak period, the northbound bottleneck at the Columbia River bridges would be reduced with the Modified LPA compared to the No-Build Alternative, improving northbound traffic flow at the bridges. However, the Columbia River bridges would still be a bottleneck for northbound traffic for 9 hours, with congestion forecast to occur between the Columbia River bridges and the I-5/I-405 split in North Portland with the Modified LPA. During the AM peak period, there would be no northbound congestion at the bridge.

Modified LPA Without C Street Ramps

Under the Modified LPA without C Street ramps, congestion would be the similar to the Modified LPA except for the southbound congestion at the C-D system in Vancouver. The removal of the C Street ramps would result in higher volumes at the Mill Plain Boulevard on-ramp to southbound I-5, and thus in higher demand volumes through the southbound C-D system. The higher demand through the southbound C-D would cause the congestion at the C-D off-ramp to extend further north (4.5 miles compared to 4 miles) than under the Modified LPA.

Modified LPA With Two Auxiliary Lanes

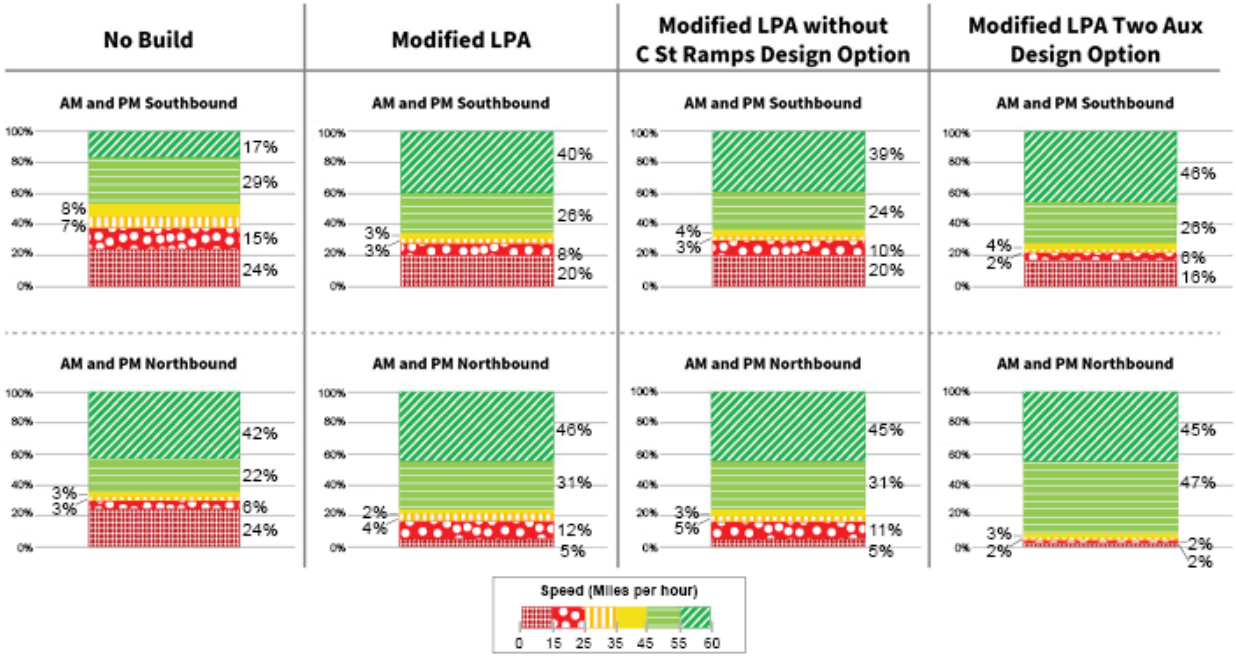
Under the Modified LPA with two auxiliary lanes, forecasted congestion during the AM peak would be reduced compared to the Modified LPA for the southbound direction. Within the areas where auxiliary lanes would be added approaching and across the new Columbia River bridges, operations would improve compared to the Modified LPA at the on- and off-ramps and there would be fewer hours of congestion and shortened backups. Peak-period AM congestion would last for 4 hours (compared to 6 hours with the Modified LPA) and would extend 1.5 miles (compared to 4 miles with the Modified LPA). Similar to the Modified LPA, no southbound congestion is forecast during the PM peak period.

Northbound PM peak-period congestion would be substantially reduced compared to both the Modified LPA and No-Build Alternative. Northbound PM peak congestion would be reduced from 9 to 6 hours but would only extend back less than 0.75 miles to Hayden Island, rather than 4.5 miles to the I-5/I-405 merge in North Portland under the Modified LPA. Similar to the Modified LPA, no northbound congestion is forecast during the AM peak period.

Congestion Index in 2045

Figure 3.1-3 provides a congestion index for No-Build Alternative, the Modified LPA, and the design options without C Street ramps and with two auxiliary lanes. The index aggregates the levels of congestion on I-5 during the 8 peak hours, including the 4-hour AM peak (6 to 10 a.m.) and the 4-hour PM peak period (3 to 7 p.m.). These indices are a summary of northbound and southbound congestion and how long any given section of I-5 in the analysis area is operating at a particular speed. Overall, all Modified LPA design options would improve conditions compared to the No-Build Alternative, and the addition of a second auxiliary lane would offer the highest level of improvement in reducing congestion, particularly for northbound travel.

Figure 3.1-3. Forecast I-5 2045 Peak Period Congestion Index



2045 Forecast Peak-Period Travel Times

I-5 travel time comparisons from I-405 in North Portland to I-205 generally mirror the congestion results described above, but they also provide an additional measure of how different the travel experience would be by alternative and design option, based on the time of day.

Table 3.1-13 through Table 3.1-16 show the 2045 forecast southbound and northbound I-5 average travel times between I-205 and I-405 in North Portland in the AM and PM peak periods. Southbound travel time differences are less varied than northbound travel differences, largely due to the constraints caused by backups at the I-5/I-405 split in North Portland.

- The southbound travel times during the 2-hour AM peak period would be 7% faster than the No-Build Alternative under the Modified LPA and the design option without C Street Ramps, while the two auxiliary lane design option would be 14% faster than the No-Build Alternative.

- The southbound PM peak period 2-hour travel time on I-5 between I-205 and I-405 in North Portland would be 52% faster than the No-Build Alternative under the Modified LPA and design options.
- The northbound AM peak period 2-hour travel time on I-5 between I-405 in North Portland and I-205 would be 28% faster than the No-Build Alternative under the Modified LPA and design options.
- The northbound travel times during the 2-hour PM peak period would be 38% to 40% faster than the No-Build Alternative under the Modified LPA and the design option without C Street ramps, while the two auxiliary lane design option would be 67% faster than the No-Build Alternative.

The Transportation Technical Report has hour-by-hour details, which provide more comparisons, including for periods when travel is closer to free-flow conditions.

Table 3.1-13. 2045 Forecast I-5 Weekday Southbound AM Peak-Period Average Travel Times

Alternative/Design Option	Peak 2-hour Average Travel Time (minutes)
No-Build Alternative	58
Modified LPA	54 (7% reduction)
Modified LPA without C Street Ramps	54 (7% reduction)
Modified LPA with Two Auxiliary Lanes	50 (14% reduction)

Source: IBR Transportation Technical Report

Table 3.1-14. 2045 Forecast I-5 Weekday Southbound PM Peak-Period Average Travel Times

Alternative/Design Option	Peak 2-hour Average Travel Time (mins)
No-Build Alternative	29
Modified LPA	14 (52% reduction)
Modified LPA without C Street Ramps	14 (52% reduction)
Modified LPA with Two Auxiliary Lanes	14 (52% reduction)

Source: IBR Transportation Technical Report

Table 3.1-15. 2045 Forecast I-5 Weekday Northbound AM Peak-Period Average Travel Times

Alternative/Design Option	Peak 2-hour Average Travel Time (minutes)
No-Build Alternative	18
Modified LPA	13 (28% reduction)
Modified LPA without C Street Ramps	13 (28% reduction)
Modified LPA with Two Auxiliary Lanes	13 (28% reduction)

Source: IBR Transportation Technical Repot

Table 3.1-16. 2045 Forecast I-5 Weekday Northbound PM Peak-Period Average Travel Times

Alternative/Design Option	Peak 2-hour Average Travel Time (minutes)
No-Build Alternative	42
Modified LPA	26 (38% reduction)
Modified LPA without C Street Ramps	25 (40% reduction)
Modified LPA with Two Auxiliary Lanes	14 (67% reduction)

Source: IBR Transportation Technical Report

Forecast 2045 Level of Service and Volume-to-Capacity Ratios

As described in the Transportation Technical Report, WSDOT uses LOS for its highway performance standard, and ODOT uses V/C ratios for mobility standards and performance targets. The ODOT performance standard depends on the implementation of project improvements. ODOT sets the V/C standard for acceptable performance for the No-Build Alternative at 1.1 for the peak hour and 0.99 for all other hours. For segments of I-5 in Oregon that are reconstructed as part of an infrastructure improvement project ODOT sets the V/C standard for acceptable performance at 0.75.

In general, the VISSIM freeway analysis performance measures (LOS and V/C ratios) show results similar to other measures (see the previous sections Bottlenecks and Speeds, Congestion Index, and 2045 Forecast Peak-Period Travel Times). Where bottlenecks are predicted and speeds and travel times are slow, the LOS and V/C ratios would be below standards. More detail on measures and locations is available in the Transportation Technical Report.

AM Peak Period

- Southbound I-5 approaching the Interstate Bridge would not meet WSDOT's mobility standard under the No-Build Alternative due to over-capacity conditions at the bridge. Similarly, the Modified LPA (including all design options) would not meet ODOT performance standards due to congestion spilling back from the downstream bottleneck at the I-5/I-405 split in North Portland.
- While northbound I-5 approaching the Interstate Bridge would not meet ODOT's mobility standard under the No-Build Alternative due to over-capacity conditions at the Interstate Bridge the Modified LPA and the design options would improve conditions on Northbound I-5 to meet design standards.
- Although the southbound C-D system between Mill Plain Boulevard and SR 14 in Vancouver would not meet performance standards in the southbound direction with the Modified LPA and all design options, the northbound C-D between SR 14 and Mill Plain Boulevard would meet performance standards.

PM Peak Period

- Southbound I-5 at the Interstate Bridge in the No-Build Alternative would not meet the WSDOT mobility standard, but the Modified LPA and the design options would improve conditions to meet design standards.
- Northbound I-5 in the No-Build Alternative, the Modified LPA, and the Modified LPA without C Street ramps would not meet ODOT's mobility standard. The Modified LPA with two auxiliary

lanes would improve most segments of I-5 to meet ODOT's mobility standard, but some segments near the Columbia River bridges would continue to not meet ODOT's mobility standard.

- Similar to the operations during the AM peak period, the southbound C-D system between Mill Plain Boulevard and SR 14 in Vancouver would not meet performance standards during the PM peak period with the Modified LPA and all design options but the northbound C-D between SR 14 and Mill Plain Boulevard would meet performance standards.

Freight Mobility and Access in 2045

Freight transportation in the Portland-Vancouver metropolitan region is estimated to increase substantially in the next 25 to 30 years, based on the 2022 *Washington Freight System Plan* (WSDOT 2022b) and the 2022 *Oregon Freight Plan* update (ODOT 2023). The Metro/RTC regional travel demand model forecasts increasing truck volumes, which are expected to exacerbate many challenges the state freight system currently faces, including those associated with traffic congestion and safety. Data from the Metro/RTC regional travel demand model forecasts that by 2045, trucks will comprise almost 15% of total trips across the new Columbia River bridges, which is an increase of 50% in truck traffic compared to 2019. This means that freight truck traffic would grow more quickly than general traffic under all alternatives and design options.

With the No-Build Alternative, trucks would be subject to the same delays as general-purpose traffic on I-5, as described above in the I-5 Operations section, as well as in the following discussion in the Arterials and Local Streets section.

Under the Modified LPA and the design options, I-5 in the study area would be improved to meet current design standards. While the elevation of the freeway lanes above the river would be higher than on the existing Interstate Bridge, the grades would still meet design standards for freight vehicles. Lane and shoulder widths would be increased, and highway ramps and interchanges would be rebuilt to meet current design standards. The one to two added auxiliary lanes would also better accommodate freight movements to and from the mainline lanes, especially at the interchanges serving the ports and industrial areas near the bridge. All of these factors were accounted for in the traffic operations models, which assumed a mix of freight and other vehicles. Overall, the Modified LPA would improve access, mobility, and safety for freight. The Modified LPA without C Street ramps would shift additional general-purpose traffic to the Mill Plain interchange, causing additional delay and congestion that could impact freight traffic traveling on the Mill Plain corridor compared to the Modified LPA. The Modified LPA with two auxiliary lanes would provide additional space on the I-5 mainline for trucks to get up to speed and merge with traffic in through lanes on the I-5 mainline, reducing disruptions to flows on I-5 mainline compared to the Modified LPA.

Bridge Openings and Gate Closures in 2045

No-Build Alternative

Under the No-Build Alternative, bridge openings and gate closures would occur at a frequency and for durations similar to existing conditions, assuming no major changes to the U.S. Coast Guard Bridge Permit. Bridge openings would avoid high traffic volume periods, but training and bridge maintenance activities would occur similar to existing conditions during the midday and overnight periods. However, as the durations of future congestion events would increase compared to existing conditions, the recovery periods associated with gate closures would be similarly extended, exacerbating overall congestion within the study area.

Modified LPA

The Modified LPA and all design options, except the single-level movable-span configuration, would eliminate the lift spans on the Columbia River bridges. Gate closures required for bridge openings and traffic stoppage events would no longer occur. Recovery times associated with bridge openings and gate closures would no longer contribute to the number and duration of congestion events.

The single-level movable-span configuration would require periodic bridge openings and gate closures that would interrupt traffic operations. For the years 2012-2023, the average number of bridge openings/gate closures was 257 per year with a range of 147 to 487 openings/bridge closures per year. Clearance of the bridge in the closed position would be higher in the single-level movable-span configuration than under the No-Build Alternative, thus allowing more vessels to pass without a bridge opening. There would likely be additional timing restrictions on when the bridge would be opened. Based on existing marine vessels transiting the Interstate Bridge, the number of bridge openings would be reduced to approximately 60 per year for marine vessels, 12 per year for maintenance, and between 0 and 55 openings per year for training purposes; however, this number of bridge openings could vary over time as maritime activities evolve over the 100+ year service life of the bridge. The total number of resulting openings would be less than with the No-Build Alternative, assuming that the U.S. Coast Guard would approve further restrictions on when bridge openings would be allowed.

Similar to the No-Build Alternative, daytime bridge openings under the Modified LPA with a movable-span configuration could impact traffic congestion for an hour or more; nighttime bridge openings would have less impact to traffic congestion. Transit and active transportation trips would also be affected. For transit, the openings would cause a system-level disruption in service, affecting operations for the Yellow Line to downtown Portland and other lines serving downtown Portland. Bus and rail connections would also be disrupted, increasing overall travel times for riders. Depending on when the disruptions occur, it could take hours for the system to recover.

Arterials and Local Streets in 2045

This section covers impacts to roadway network traffic patterns, study intersections, peak-hour volumes, and intersection operations under the No-Build Alternative and Modified LPA and design options. The Transportation Technical Report provides more detail on the analysis, while this section focuses on areas where impacts or benefits differ between the No-Build Alternative and the Modified LPA and design options.

Changes to Local Traffic Patterns

No-Build Alternative

Under the No-Build Alternative, other projects would be implemented that would modify interchange and arterial geometries in the study area, but no major changes affecting traffic patterns and circulation would occur. The No-Build Alternative would continue to require all Hayden Island traffic to access I-5, because no other local access route would be available.

Modified LPA

Within Oregon, all design options of the Modified LPA would similarly affect local traffic patterns within the Hayden Island, Bridgeton, and north and northeast Portland neighborhoods in the study area. The changes to local traffic patterns would primarily result from the revised Hayden Island and

Marine Drive interchanges and the proposed arterial bridge over North Portland Harbor. These improvements would alter access and circulation routes and patterns for the Hayden Island and Bridgeton neighborhoods but would also allow local access to be accommodated without requiring trips on I-5.

Within Washington, the Modified LPA would change local traffic patterns compared to the No-Build Alternative, primarily in the Esther Short and Arnada neighborhoods in downtown Vancouver. These changes would be the result of modifications to the interchanges in this area. Effects would be similar across design options except for the option without the C Street ramps, which would cause additional changes to traffic patterns by eliminating an access point to the downtown area.

The Transportation Technical Report includes a detailed description of local traffic pattern changes in the study area.

Intersection Operations

The local traffic analysis evaluated 80 intersections for the No-Build Alternative and 86 intersections for the Modified LPA. Due to interchange and access changes under the Modified LPA, some of the No-Build intersections would no longer exist, and other intersections would be added. The Transportation Technical Report provides details on these intersections, including the changes to traffic volumes, while discussion in this section focuses on locations where intersections would not meet agency standards in 2045.

The following summary identifies intersections that would operate below the applicable performance standards in 2045.

No-Build Alternative

All 80 study intersections would operate at or better than the intersection performance standards except for nine intersections. The first five intersections are in Vancouver and the four remaining intersections are in Portland.

1. Intersection #3 – 39th Street and Main Street (PM).
2. Intersection #5 – 39th Street and I-5 southbound on-/off-ramps (AM and PM).
3. Intersection #11 – Fourth Plain Boulevard and Main Street (AM).
4. Intersection #57 – Columbia Shores Boulevard and SR 14 eastbound off-ramp (AM and PM).
5. Intersection #58 – Columbia Shores Boulevard and Columbia Way (PM) .
6. Intersection #66 – Marine Drive and OR 120 (Portland Road) (PM).
7. Intersection #67 - Marine Drive and Force Avenue (PM).
8. Intersection #68– Marine Drive/Martin Luther King Jr. Boulevard and I-5 northbound/southbound on-/off-ramps (AM and PM).
9. Intersection #79 – Columbia Boulevard and Vancouver Way (PM).

Modified LPA and Modified LPA with Two Auxiliary Lanes

Under the Modified LPA with either one or two auxiliary lanes, there are 86 study intersections. All 86 study intersections would operate at or better than the intersection performance standards except for

eight intersections. The first five intersections are in Vancouver and the three remaining intersections are in Portland.

1. Intersection #3 – 39th Street and Main Street (PM).
2. Intersection #5 – 39th Street and I-5 southbound on-/off-ramps (AM and PM).
3. Intersection #11 – Fourth Plain Boulevard and Main Street (AM).
4. Intersection #57 – Columbia Shores Boulevard and SR 14 eastbound off-ramp (AM and PM).
5. Intersection #58 – Columbia Shores Boulevard and Columbia Way (PM).
6. Intersection #66 – Marine Drive and OR 120 (Portland Road) (PM).
7. Intersection #68 – Marine Drive/ Martin Luther King Jr. Boulevard and I-5 northbound/southbound on-/off-ramps (AM and PM).
8. Intersection #79 – Columbia Boulevard and Vancouver Way (PM).

In most of these cases, although the Modified LPA or Modified LPA with two auxiliary lanes would not meet the standard, it would perform the same as or better than the No-Build Alternative in terms of LOS or V/C ratio.

The park-and-ride options in downtown Vancouver would not notably alter the operating conditions for the Modified LPA under any of the design options.

Modified LPA Without C Street Ramps

If the C Street ramps were removed, a total of 14 study area intersections would operate below agency standards during the AM and/or PM peak hours compared to the Modified LPA, which would retain the C Street ramps. The removal of the C Street ramps would redirect all trips between downtown Vancouver and I-5 to the Mill Plain Boulevard interchange. The additional six intersections that would not meet agency standards in addition to those already identified in the Modified LPA are located in Subarea 2 and include:

1. Intersection #22 – Franklin Street & Mill Plain Boulevard (PM).
2. Intersection #24 – Washington Street and 15th Street (AM).
3. Intersection #25 – Main Street and 15th Street (AM).
4. Intersection # 28 – Columbia Street & Mill Plain Boulevard (PM).
5. Intersection #31 – Mill Plain Boulevard and Broadway Street (PM).
6. Intersection #34 – Mill Plain Boulevard at I-5 Northbound Ramps (PM).

In addition to the intersection-level impacts, the elimination of C Street ramps would increase queuing through the Mill Plain Boulevard and 15th Street couplet, affecting eastbound and westbound flows through the 15th Street/Mill Plain Boulevard couplet.

Transit in 2045

The long-term effects described in this section are for the year 2045. All regional travel demand modeling data is from the 2018 Regional Transportation Plan,[5] adopted by Metro in 2018 and by Southwest Washington Regional Transportation Council (RTC) in 2019 (2018 RTP).[6] Year 2045 conditions incorporate the 2040 Financially Constrained assumptions adopted by both Metro and RTC in the 2018 RTP, with land use updates to extend the forecasts to 2045. Included in these updates are transit capacity constraints to better represent feasible transit ridership relative to transit investments described in the 2018 RTP. Without accounting for capacity constraints of the regional transit system, the model would have generated estimates of transit ridership that could only be supported if additional capital investment projects were added to the 2018 RTP. The transit capacity constraint analysis is described in more detail in the Transportation Technical Report, Appendix H, Section 3.8.

The following section summarizes transit service effects in 2045 for the No-Build Alternative and the Modified LPA, including transit routing, ridership, station area mode of access, and transit transfer rates. Additional details about the transit networks, service and routing changes, and facilities are provided in the Transportation Technical Report. The report also has information on maintenance facilities, annual operating costs, and related factors.

For the purposes of this analysis, it is assumed the transit networks and service assumptions—except for those that are components of the IBR Program, including new LRT service and more frequent higher capacity express bus service on I-5—are the same for both the No-Build Alternative and Modified LPA. As described in more detail in Chapter 2, the Modified LPA would include service modifications and improvements in the study area—including new LRT and express bus service and facilities—as well as modifications to local transit service that would connect to these. A detailed description of the Modified LPA transit elements is in Chapter 2 of this Draft SEIS.

The effects of the Modified LPA on transit service would not differ substantially between the design options, with two exceptions. The design option without C Street ramps would result in small transit routing changes to access downtown Vancouver that would result in additional travel time for the express route in and out of downtown Vancouver as compared to the Modified LPA, and the two auxiliary lane design option would result in transit travel time improvements for all bus routes operating through the study area. The other design options are not discussed in this subsection because they would not affect transit service differently than the Modified LPA.

Amount of Service

The amount of service provided in the transit system can be measured by VHT in revenue service, daily VMT in revenue service, and daily place-miles of service. Table 3.1-17 shows average weekday totals

[5] The IBR Program used the Oregon Metro (Metro) regional travel demand model that is developed, maintained and implemented for projects in the Portland metropolitan region. The model is jointly developed between Metro, the Portland, Oregon metropolitan planning organization (MPO) and the Southwest Washington Regional Transportation Commission (RTC), the MPO for southwest Washington, The version of the model being used for the IBR Program, including planned regional highway and transit networks and service levels, was developed for the Regional Transportation Plan adopted in 2018 by Metro and in 2019 by RTC. The traffic model applied to this analysis reflects pre-COVID conditions. New surveys and model development efforts that include post-COVID travel behavior are planned to be incorporated in the 2028 RTP update.

[6] Regional transportation plans—such as the 2018 RTP—identify and prioritize long-range transportation needs for all modes in the region. These plans are the basis for planning efforts in the region, serving as the blueprint for how transportation resources are funded and projects are selected for implementation.

for all three of these measures for the model base year (2015) as well as for the 2045 No-Build Alternative and Modified LPA. Transit service assumptions (e.g., routes, headways) would not vary for the Modified LPA design options as compared to the Modified LPA except for a routing change on the Line 101 under the design option without C Street ramps which would change how this line enters and exits downtown Vancouver. The base year is included to provide a point of comparison of service levels under the No-Build Alternative and Modified LPA. As shown in Table 3.1-17, transit miles and hours in the No-Build Alternative increase over 50% as compared to existing conditions and place-miles increase just under 50%. This increase reflects the changes in the transit system planned in the 2018 RTP that are not part of the IBR Program. The Transportation Technical Report, Section 4.7 (and its appendix with the Travel Demand Modeling Methods Report), has further details on the factors driving the forecasts for increased ridership levels by 2045. Daily VHT and VMT are measured as time and distance, respectively, for transit vehicles in service on an average weekday. VMT would increase in 2045 with both the No-Build and the Modified LPA, with the additional growth for the Modified LPA due primarily to the extension of LRT and more frequent express service operating in bus-on-shoulder mode in the study area. Also, under the Modified LPA, VHT would decrease on local bus and increase on LRT and express bus by a similar number of hours, resulting in approximately the same total VHT compared to the No-Build Alternative.

Place-miles reflect the carrying capacity of the vehicles in service (seated and standing) for each bus or train and are calculated by multiplying the vehicle capacity by the VMT. Place-miles can highlight differences in total available capacity between alternatives as shown in Table 3.1-17. The Modified LPA would have more place-miles than the No-Build Alternative, in part because of the extension of LRT across the Columbia River and in part because additional express bus service between Vancouver and Portland would be provided under the Modified LPA.

The Transportation Technical Report Section 5.8 has additional discussion.

Table 3.1-17. 2015 and 2045 Average Weekday Corridor [a] Transit Service Characteristics

Measure	Mode	Existing (2015)	2045 No-Build Alternative	2045 Modified LPA
Transit VMT (miles)	Local Bus	9,250	13,500	11,900
	Express Bus	5,450	3,900	7,650
	LRT [b]	800	850	1,300
	BRT	0	5,300	5,250
	Total	**15,500**	**23,550**	**26,050**
	% Change [c]	**N/A**	**51.0%**	**9.5%**
Transit VHT (hours)	Local Bus	650	850	750
	Express Bus	200	150	250
	LRT	50	50	75
	BRT	0	300	300
	Total	**850**	**1,400**	**1,400**
	% Change [c]	**N/A**	**58.8%**	**0%**

Measure	Mode	Existing (2015)	2045 No-Build Alternative	2045 Modified LPA
Place-miles [d] (miles)	Local Bus	602,100	879,100	773,200
	Express Bus	545,300	388,900	763,300
	LRT[2]	225,400	247,300	380,300
	BRT	0	530,200	524,500
	Total	**1,372,800**	**2,045,500**	**2,441,300**
	% Change [c]	**N/A**	**49.0%**	**19.3%**

Source: Metro/RTC Regional Travel Demand Model, IBR Transportation Technical Report

a Excludes Portland central business district.

b For LRT, transit VMT is measured in train miles rather than in car miles.

c For the No-Build Alternative, the percentage change is the change compared to existing conditions; for the Modified LPA the percentage change is compared to the No-Build Alternative.

d Place-miles = transit vehicle capacity (seated and standing) multiplied by VMT. Bus capacity = 55, BRT and express bus capacity = 100, LRT capacity = 288 (LRT consists of two-car trains; each car can carry 144 people).

BRT = bus rapid transit; LRT = light-rail transit; N/A = not applicable; VHT = vehicle hours traveled; VMT = vehicle miles traveled

Regional Transit Ridership

The regional travel demand model for 2045, based upon the 2018 RTP, which was adopted by Metro in 2018 and by RTC in 2019 was used to produce estimates of ridership for both the No-Build Alternative and the Modified LPA. Included in the model for both the No-Build Alternative and Modified LPA are transit-capacity constraints to better represent feasible transit ridership relative to transit investments described in the 2018 RTP. The Transportation Technical Report has more details on the capacity constraint implementation along with a variety of ridership performance measures, including station boardings; the comparison here in the Draft SEIS focuses on the primary differences between the alternatives.

Travel Demand and Mode Choice

Table 3.1-18 shows the 2045 daily person trips and transit trips for the No-Build Alternative and the Modified LPA, including corridor and systemwide totals. Compared to existing conditions, the future growth rates for transit show higher use of transit for both the No-Build Alternative and the Modified LPA. The daily systemwide and corridor transit trips would be the same for all of the design options under the Modified LPA. The Transportation Technical Report Section 4.7 has further details on ridership levels and the services assumed, including total trips across the river on both I-5 and I-205. It also identifies the other system investments and regional planning assumptions related to the regional system ridership forecasted for both the No-Build Alternative and the Modified LPA.

Table 3.1-18. 2045 Weekday Daily Systemwide and Corridor Transit Trips

Measure	No-Build Alternative	Modified LPA
Total Regional Person Trips (all modes)	11,905,000	11,905,000
Total Regional Linked Transit Trips [a]	626,300	638,800
Regional Transit Mode Share	5.26%	5.37%

Measure	No-Build Alternative	Modified LPA
Total Regional Daily Unlinked Transit Boardings [b]	991,900	1,021,100
Percentage Change from No-Build	N/A	2.9%
Total Daily Regional Unlinked Light-Rail Boardings [b]	335,600	362,200
Percentage Change from No-Build	N/A	7.9%
Total Corridor Person Trips (All Modes)	3,249,500	3,250,200
Total Corridor Linked Transit Trips [a]	351,300	363,300
Percentage Change from No-Build	N/A	3.3%

Source: Metro/RTC Regional Travel Demand Model, IBR Transportation Technical Report

a Transit trips count each passenger only once between the origin and destination of their trip. Transit trips include all trips on any transit mode.

b Boardings count each time a passenger boards a transit vehicle; passengers who transfer between transit lines in a single "linked" trip count as multiple transit boardings.

LRT Station Use Levels and Mode of Access/Egress

Light-rail stations are accessed by transit (local, regional, and express bus, BRT, LRT) and by active transportation modes including walking, biking, and rolling. Trips by automobile are also reflected, primarily based on park-and-ride trips, but can also include drop-off or pick-up activities. The primary mode of access by station reflects key differences in the location of the station and the surrounding land uses served. Table 3.1-19 summarizes the predicted station use and mode of access and egress to the new LRT stations with the Modified LPA. The LRT station usage by mode of access for the design options would be the same for all Modified LPA design options. The Evergreen Station is expected to be the most-used station and the one with the highest level of access by transit. This reflects the station's connections to the C-TRAN system serving downtown, including BRT lines.

Table 3.1-19. 2045 Modified LPA Light-Rail Transit Station Usage (Boardings and Alightings) by Mode of Access and Egress, Year 2045

Station Location	Station Boardings/Alightings	Percentage of Total Boardings/Alightings	Percentage Non-Motorized [a]	Percentage Transfer	Percentage Park and Ride [b]
Hayden Island	3,300	15%	100%[c]	N/A	N/A
Waterfront	5,200	24%	25%	60%	15%
Evergreen/I-5	13,100	61%	16%	75%	10%

Source: Metro/RTC Regional Travel Demand Model, IBR Transportation Technical Report

a Non-motorized includes walking, biking and rolling.

b Analysis assumes park-and-ride facilities at Waterfront and Evergreen Stations. Park-and-ride numbers do not include numbers for drop-off (private vehicle, taxi, rideshare) or C-TRAN microtransit trips on The Current.

c 100% of trips are shown to come from non-motorized access because there was no transit connection or formal park and ride assumed in the Modified LPA for this station. As noted in footnote b to this table, the model does not include explicit assumptions about drop-off so while there will likely be some trips that come via that mode of access it is not reflected in the modeling.

Transit Travel Time

Transit travel times for both the AM and PM peak periods were calculated for the No-Build Alternative, the Modified LPA, and the Modified LPA with two auxiliary lanes. The other design options under the Modified LPA would have similar travel times to the Modified LPA.

The travel time summary in Table 3.1-20 shows the total transit travel time (including in-vehicle, walking, waiting, and transfer time) for trips between downtown Vancouver and four locations in Portland, including Hayden Island, Lombard Transit Center, Rose Quarter, and downtown Portland. The latter three locations in Portland provide access to connections for travel to other regional locations via transfer to and from the TriMet system. The Modified LPA and Modified LPA with two auxiliary lanes travel times are provided for both express bus and LRT where they both would provide service.

Express bus travel times include delays identified through the I-5 operational analysis above in the section, I-5 Operations in 2045, for both the No-Build Alternative and Modified LPA. This is especially notable for southbound trips in the AM peak hour through the area approaching the I-5/I-405 split in North Portland. Improved traffic flow under both the Modified LPA and the two auxiliary lane design option would allow more southbound vehicles to cross the new Columbia River bridges. This would result in more vehicles reaching the bottleneck at the I-5/I-405 interchange during the peak period, meaning that southbound buses running in traffic would experience higher levels of congestion approaching the bottleneck. As a result, southbound express bus travel times would be higher compared to the No-Build Alternative, which would continue to constrain vehicle trips at the Interstate Bridge. Differences in travel time between the Modified LPA and the two auxiliary lane design option would be primarily in the PM peak period in the northbound direction, where the Modified LPA with two auxiliary lanes would result in faster travel times (12 minutes) than the Modified LPA. LRT travel times would be similar for all Modified LPA design options.

The Transportation Technical Report includes additional information on the transit travel time analysis.

Table 3.1-20. 2045 Average Weekday AM and PM Peak Total Transit Travel Time for Selected Corridor Locations (minutes)

Origin/Destination	No-Build Alternative AM Peak SB	No-Build Alternative PM Peak NB	Modified LPA[a] AM Peak SB	Modified LPA[a] PM Peak NB	Modified LPA With Two Auxiliary Lanes AM Peak SB	Modified LPA With Two Auxiliary Lanes PM Peak NB
Between downtown Vancouver and Hayden Island	36[b]	21	17[c]	17[c]	17[c]	17[c]
Between downtown Vancouver and Lombard Transit Center	43[d]	41[d]	25[c]	25[c]	25[c]	25[c]

Origin/Destination	No-Build Alternative AM Peak SB	No-Build Alternative PM Peak NB	Modified LPA[a] AM Peak SB	Modified LPA[a] PM Peak NB	Modified LPA With Two Auxiliary Lanes AM Peak SB	Modified LPA With Two Auxiliary Lanes PM Peak NB
Between downtown Vancouver and Rose Quarter: • Express Bus[e] (no stops between downtown Vancouver and Rose Quarter)	43	62	52	38	52	26
Between downtown Vancouver and Rose Quarter: • LRT (includes 13 stations between downtown Vancouver and Rose Quarter)	N/A	N/A	37	37	37	37
Between downtown Vancouver and Pioneer Square (Portland central business district): • Express Bus[e] (includes two stops between downtown Vancouver and Pioneer Square)	48	67	59	45	59	33
Between downtown Vancouver and Pioneer Square (Portland central business district): • LRT (includes 16 stops between downtown Vancouver and Pioneer Square)	N/A	N/A	47	47	47	47

Sources: Metro/RTC Regional Travel Demand Model, IBR Transportation Technical Report
Note: Total transit travel times include 10 minutes of walk access (1/4 mile walk on either end of the trip at 3 mph average walk speed) in addition to initial and transfer (if applicable) wait time. Wait times are based on half the headway.
a Removal of the C Street ramps would require express bus transit to be rerouted to access downtown Vancouver via Mill Plain Boulevard. This would add travel time for express bus transit trips in and out of downtown Vancouver.
b Route 60 does not stop at Hayden Island southbound, so a trip from Vancouver to Hayden Island travels south to Delta Park and then back north to stop on Hayden Island.
c Travel time is on Yellow Line LRT.
d Route includes 60 Vancouver – Delta Park with transfer to Yellow Line LRT.
e Route includes Route 101 from downtown Vancouver – Rose Quarter or Pioneer Square.
LRT = light-rail transit; N/A = not applicable; NB = northbound; SB = southbound

Transit Reliability

Table 3.1-21 summarizes three measures of transit reliability in the corridor: (1) miles of exclusive or reserved right of way, (2) the number of passenger miles that would occur in the right of way, and (3) the percentage of passenger miles that would occur in the right of way. Under the Modified LPA, the extension of the Yellow Line from the Expo Center north to the new terminus at the Evergreen/I-5 station would be completely in its own guideway, and new shoulders proposed as part of the Modified LPA would provide bus-on-shoulder operations that are reserved for express buses. These both would

contribute to the increase in average weekday passenger miles in the Modified LPA as compared to the No-Build Alternative.

Table 3.1-21. 2045 Measures of Transit Reliability in the I-5 Corridor

Right-of-Way Measure	2045 No-Build Alternative	2045 Modified LPA
Miles of Exclusive/Reserved Right of Way	20.07	26.88
Average Weekday Passenger Miles	69,500	213,000
Percentage of Total Corridor Passenger Miles	12%	31%

On-time performance is an additional measure of reliability, particularly for multiline rail systems such as MAX. As part of ongoing regional system planning, TriMet previously conducted analysis using the Rail Traffic Controller model in 2018, which showed that on-time performance of the regional light-rail system would remain in an acceptable range under TriMet's performance policy when up to 56 trains per hour travel through the system where all lines converge at the Rose Quarter.

Key assumptions in the No-Build Alternative and Modified LPA that would affect on-time performance are defined below:

- To meet demand in the peak periods when ridership is highest under the No-Build Alternative, the Yellow line is assumed to operate at 10 minute frequencies. When combined with other LRT lines operating through the Rose Quarter (Blue, Red, and Green Lines), this results in 52 to 54 trains per hour (fewer than the 56 trains per hour threshold target at the Rose Quarter that has been identified as acceptable for on-time performance by TriMet).
- To meet demand in the peak periods when ridership is highest under the Modified LPA—with extension of the Yellow Line across the Columbia River to a terminus near Evergreen Boulevard in Vancouver—6.7-minute frequencies are assumed. When combined with other LRT lines operating through the Rose Quarter (Blue, Red, and Green Lines), this results in 58 to 60 trains per hour, which is 2 to 4 trains per hour over the target threshold at the Rose Quarter that was identified as acceptable for on-time performance by the TriMet-conducted Rail Traffic Controller model analysis. Because 6.7-minute headways under the Modified LPA would result in 2 to 4 more trains per hour over the threshold target, this would likely result in lower on-time performance.

Active Transportation in 2045

No-Build Alternative

As the region experiences increased population growth and development intensifies, more pressure would be placed on the Interstate Bridge's deficient existing active transportation facilities, including the shared-use path for walking, rolling, and riding between the two cities. For the bridge crossing itself, an increase in the volume of people traveling on the narrow and constrained paths would result in increased conflict between users sharing space along the paths, which are not wide enough for two-way travel or for people to pass each other. This deterioration in user experience would limit the potential for active transportation trips over the bridge and further reinforce the bridge as a barrier to active travel. Therefore, to be conservative, the No-Build evaluation assumes future average daily bridge trips would be the same as the existing 2019 conditions (410 daily trips).

Modified LPA

With the Modified LPA, future active transportation trips across the new Columbia River bridges are estimated to range between 740 and 1,600 trips per day. The Modified LPA would offer improved conditions for active transportation, improving capacity, access, safety, and user experience for trips across the bridge. These improvements would combine with the transit improvements offered by the Modified LPA to further improve mobility. Trains and buses would accommodate bicycle trips and allow active transportation travelers to use the new stations to reach a wider array of destinations on both sides of the river, compared to the No-Build Alternative. Measures for evaluating the perceived stress active transportation travelers experience would also improve.

The Modified LPA would include bicycle and pedestrian improvements for all ages and abilities on the new Columbia River bridges, as well as facilities to access these bridge connections. All Modified LPA design options would include a two-way shared-use path, approximately 25 feet wide in total, which would be designed to meet Americans with Disabilities Act (ADA) standards and would include other features to optimize user experience, safety, comfort, and directness. To prevent conflicts between path users traveling at varying speeds, the shared-use path would provide separate spaces for people walking and biking. The design elements of the path would buffer it from vehicle traffic, noise, and exposure to street debris and stormwater to provide a well-lit, attractive, and comfortable environment for all users. On each end of the bridge, the shared-use path would include improvements to existing and proposed network facilities and would also provide new connections that do not exist today.

In the Modified LPA, the shared-use path would be on the lower deck of the I-5 northbound bridge. The path would be at an elevation of 163 feet above the Columbia River due to waterway clearance requirements, compared to 90 feet for the existing Interstate Bridge. The path transition from the I-5 northbound bridge down to Columbia Way in Vancouver would require extensive ramp lengths to span the vertical distance at a grade that meets or exceeds ADA requirements. The design incorporates a helix ramp to make this transition, but this introduces considerable additional path length. Co-locating the shared-use path with the proposed Waterfront Station to provide additional elevator access down to Columbia Street/Columbia Way is a potential design solution that is being considered.

With the single-level fixed-span configuration, the shared-use path would be at an elevation of 135 feet above the river, while with single-level movable-span configuration it would be 120 feet above the river. While lower than the Modified LPA with the double-deck configuration, the paths in these design options would still be higher than under the No-Build Alternative; thus, all users must climb over a longer distance to get over the peak. The maximum grade for the fixed-span configuration would be 1.5% on the Washington side and 3% on the Oregon side; for movable-span configuration, these grades would be 4% and 1%, respectively.

All Modified LPA design options would include substantial bicycle and pedestrian improvements at reconstructed I-5 interchanges and crossings throughout the study area, as well as in areas around new transit stations. Where roadways are replaced or modified or where new roadways are developed (such as the new arterial bridge proposed over North Portland Harbor), active transportation facilities including sidewalks and bike facilities would meet applicable standards, at a minimum. These changes would reduce many of the perceived barriers to bicycle and pedestrian travel and would improve the connectivity of the active transportation network in North Portland and Vancouver within the study area.

The Transportation Technical Report has detailed listings and maps of the individual locations and facilities that would improve active transportation conditions with the Modified LPA.

Safety in 2045

The Enhanced Interchange Safety Analysis Tool (ISATe) was used to calculate the predicted frequencies of vehicle crashes on the I-5 mainline, ramps, and ramp terminal intersections within the IBR study area for the No-Build Alternative and the Modified LPA, including the design options. ISATe is based on the *Highway Safety Manual* (AASHTO 2010) predictive methodology for freeway facilities. The Transportation Technical Report includes additional detail on the results of the ISATe analysis, including predicted crash frequencies by design option.

No-Build Alternative

Crash patterns along the I-5 mainline, along ramps, and at ramp terminals within the IBR study area for the No-Build Alternative are anticipated to be similar to existing conditions, but crash frequencies are predicted to increase due to increased traffic volumes and increased hours during which I-5 is operating at capacity. The total number of crashes in the study area is predicted to increase by up to 28% by 2045 under the No-Build Alternative compared to existing conditions.

Modified LPA

ISATe was used to calculate the predicted crash frequency for the I-5 mainline, ramps, and ramp terminal intersections for the Modified LPA based on the proposed roadway geometry and estimated future traffic volumes. The results of this analysis can be compared directly to the No-Build Alternative analysis results to determine the change in predicted crash frequency.

The Modified LPA proposes substantial changes to the configuration of the network within the study area, including but not limited to new or removed ramps, reconfigured interchanges, and access point changes. These changes would make I-5 more consistent with modern design standards and would reduce weaving, thereby improving safety. As a result, the Modified LPA is predicted to reduce total crashes by 13% compared to the No-Build Alternative. The Modified LPA with the fixed-span configurations would also eliminate the movable span from the Columbia River bridges, the openings of which are correlated with an increased likelihood of crashes, while the No-Build Alternative would maintain the movable span. However, the effect of eliminating the movable span cannot be quantified within the predictive analysis, and it is likely that the predicted number of crashes within the study area is underestimated in the No-Build Alternative predictive analysis. Therefore, the fixed-span configurations would likely result in a larger reduction in crashes (above 13%) by reducing the congestion that would result from bridge openings.

The Modified LPA without C Street ramps design option would eliminate access between I-5 and C Street, removing two ramps and a ramp terminal intersection. The vehicles that would have previously used the C Street ramps would instead use the Mill Plain Boulevard interchange. While more traffic traveling through the Mill Plain Boulevard interchange could increase the likelihood of crashes at the Mill Plain Boulevard interchange ramps and intersections, the removal of the C Street northbound off-ramp and southbound on-ramp would reduce the number of crashes at the C Street interchange ramps and intersections due to the removal of the interchange.

The Modified LPA with two auxiliary lanes design option is predicted to reduce crashes over the Modified LPA with one auxiliary lane by up to 4% as a result of reduced congestion. This reduction in crashes assumes a fixed-span configuration.

The Modified LPA with a single-level fixed-span configuration would have similar safety performance to the Modified LPA.

The Modified LPA with a single-level movable-span configuration would maintain movable-span operations, but otherwise it would have the same geometry and traffic volumes as the Modified LPA. As described previously, while the safety effects of the movable-span configuration cannot be quantified, this configuration is associated with a higher likelihood of crashes. It is therefore likely that the movable-span configuration would perform slightly worse (i.e., experience more crashes) than the Modified LPA, but it would perform better (i.e., would experience fewer crashes) than the No-Build Alternative due to the reduction in traffic congestion.

Transportation Demand Management and Transportation System Management in 2045

TDM and TSM systems would continue to be available to reduce travel demand and maximize system efficiency, and are generally already incorporated in the analysis of impacts and performance for all alternatives and design options discussed in the preceding section.

Under the No-Build Alternative, existing TDM and TSM programs would continue to support trip reduction and shifts from single-occupancy vehicle use to more transit and active transportation. Existing established TSM programs including system monitoring and traveler information systems, facility management systems, and incident management systems would be maintained and advancements in technologies and infrastructure programs identified in the 2018 RTP.

The Modified LPA, under all design options, would develop physical infrastructure and provide operations that support non-single-occupancy vehicle modes for travel needs in the study area. These would include:

- Expanded connections and more frequent transit service via the extension of the MAX Yellow Line with three new stations in the study area, plus new express bus and more frequent feeder routes, and I-5 median shoulders that accommodate bus-on-shoulder operations through the study area between Victory Boulevard in Portland to State Route (SR) 500 in Vancouver (5 miles).
- New and improved bicycle and pedestrian facilities that accommodate more bicyclists and pedestrians and improve connectivity, safety, and travel time.
- Variable-rate tolling on the Columbia River bridges.

The Modified LPA would also include facilities and equipment that could support or expand TSM programs, including:

- Replacement or expansion of traveler information systems.
- Active traffic management system expansion.
- Expanded use of ramp meters.
- Queue jumps or bypass lanes for transit vehicles at freeway ramp meters or bus-on-shoulder operations.
- Preferential traffic signal priority.
- Incident management.

Tolling and Diversion

The Modified LPA assumes that time-of-day variable-rate tolling on a set schedule would be in place for vehicles using the new I-5 Columbia River bridges. This means that tolls would vary by time of day, with higher rates during peak travel periods and lower rates at other times based on a set schedule. Medium and heavy trucks would be charged a higher toll than passenger vehicles. While final toll rates will be set by the Washington State Transportation Commission and Oregon Transportation Commission and may be different than what was assumed for this technical analysis, the rates used in the analysis are a reasonable approximation of values that would support the revenue-generation and congestion-management needs of the IBR Program.

Tolling on a highway often leads to diversion where drivers opt for alternative routes or transportation modes to avoid paying tolls. These diversion effects can result in several outcomes including reduced traffic congestion on tolled routes, increased traffic on parallel roads, or potential shifts to transit or active transportation modes, as well as changing where, or if, a trip is even made.

Total daily vehicle volumes crossing the Columbia River would be reduced by approximately 3% with all Modified LPA design options compared to the No-Build Alternative, resulting in fewer total crossings on both the I-5 and I-205 bridges. Along with tolling, high-capacity transit investments (even with transit capacity constraints applied to the model) in the Modified LPA would contribute to a higher number of transit trips crossing the Columbia River, resulting in an increase of 97% compared to the No-Build Alternative.

An assessment of the shift in traffic between the No-Build Alternative and the Modified LPA was completed to understand whether there would be diversion impacts to other facilities under the Modified LPA. These findings are discussed above under screenline analysis, and more details are found in the Transportation Technical Report and Appendix B to the Transportation Technical Report where individual facility changes are provided.

To assess the potential for diversion of traffic from I-5 to I-205 as a result of tolling the Columbia River bridges, the IBR Program completed a tolling diversion analysis. The analysis found that the addition of a toll to the Columbia River bridges in conjunction with IBR Program implementation would divert approximately 7,000 vehicles per day to I-205, compared to a scenario in which the IBR Program was implemented but the Columbia River bridges were not tolled. Because implementation of the IBR Program without tolling on the Columbia River bridges is not a potential scenario, this sensitivity test was only intended to provide information necessary to understanding how people would travel if the Modified LPA was implemented without tolling on the Columbia River bridges. In both scenarios (not tolling and tolling), traffic on I-205 would be reduced overall compared to the No-Build Alternative (a reduction of approximately 15,000 vehicles and 8,000 vehicles, respectively). This occurs because the number of new transit trips (as a result of the LRT extension to downtown Vancouver along with frequency and operational improvements to C-TRAN express bus) would exceed the number of trips that would choose to divert to I-205 to avoid the toll. This means there would not be diversion impacts to east-west routes that would have to be used to divert between I-5 and I-205 (SR 14, SR 500, US 30/Lombard Street). Additional details on the tolling diversion analysis are documented in the Travel Demand Modeling Report, which is an appendix to the Transportation Technical Report.

3.1.4 Temporary Effects

This section summarizes potential construction impacts for transportation modes and facilities affected by the construction of the Modified LPA, which includes construction of the new bridges and removal of the existing bridges. Impacts would be similar across all design options.

Regional Travel

Construction of the Modified LPA is anticipated to last 9 to 15 years, impacting all modes of transportation within the study area as well as adjacent corridors. In addition to I-5, several regional roadway facilities including I-205, SR 500, SR 14, I-405, and I-84 would be affected by construction as drivers may temporarily reroute I-5 trips to these other highways. The Modified LPA could require nighttime closure of regional roadways, interchanges, and local roads during construction. Construction-related truck traffic for delivery of materials, equipment and for removal of materials/debris from demolition could also increase congestion and delays, particularly during periods of major construction. Table 2-5 in Chapter 2 lists the expected durations of Modified LPA construction components.

All modes of travel on the I-5 mainline and interchanges within the study area would be affected by changes associated with construction (e.g., temporary detours, lane closures, reduced shoulder and lane widths, reduced speeds).

Freight Mobility and Access

Impacts of the Modified LPA to freight truck movements on mainline I-5 would be similar to impacts to general traffic. Temporary closures, detours, or restrictions on primary truck traffic access corridors between I-5 and the Ports of Portland and Vancouver container terminals and to other industrial/commercial locations could result in delays to freight traffic. Affected designated freight corridors include Marine Drive, Mill Plain Boulevard and Fourth Plain Boulevard.

Temporary access closures or access modifications for businesses could also occur, affecting freight (such as deliveries). If driveway closures are required, access to these properties would be maintained to the extent possible. With driveway closures, detours for freight would cause similar impacts compared to what is described for general-purpose traffic impacts.

During construction across active rail lines, there could be temporary closures that result in delays to freight train traffic. Coordination plans with the rail operators would be required.

Bridge Openings and Gate Closures

All highway and active transportation users would be affected during construction by ongoing bridge openings and gate closures of the existing Interstate Bridge, similar to existing conditions. This would include bridge openings for maintenance activities until traffic is shifted onto the new Columbia River bridges, but it could also include additional openings to accommodate construction equipment.

Arterials and Local Streets

Construction of the Modified LPA would require local road closures, lane closures, traffic detours, and property access modifications and closures. Construction staging plans would include coordination with local jurisdictions to minimize the effect of closures, including detour routes. If driveway closures are required, access to these properties would be maintained to the extent practical. If access to a

business could not be maintained during construction, the specific construction activity would be conducted during non-business hours where feasible.

Construction truck traffic would use approved truck routes, and where necessary, local roadways to access the construction areas. This could result in increased congestion, queues, and delays for local traffic and access. Delivery of large items would occur via truck routes. There would be limited direct access to construction areas via the I-5 mainline, although trucks may use I-5 to access construction areas. During construction there may be some short-term closures (night/weekend) to on- and off-ramps to accommodate construction activities. As the design and construction plans are advanced, there could be a need for direct access between I-5 and construction areas. If direct access is required, the IBR Program would coordinate with WSDOT, ODOT, and FHWA.

Transit Operations

Construction of the Modified LPA could involve lane closures, bus stop relocations, light-rail station closures, partial or full temporary closures of park-and-ride facilities, schedule adjustments, and sidewalk and bicycle lane impacts that could affect transit operations and/or access to transit within the study area.

Buses on existing routes could experience delays from increased congestion due to potential roadway or interchange closures. Buses that travel through downtown Vancouver may encounter temporary closures and reroutes as LRT guideway is installed and I-5 is reconstructed.

The existing TriMet MAX Yellow Line could be adversely affected during construction. The current Yellow Line travels along Denver/Expo Road and has two stations in the south end of the IBR study area. Construction along Expo Road and as part of the Marine Drive interchange may require temporary relocation or closure of the Yellow Line's station near Delta Park and its terminus station near the Expo Center. These temporary relocations, closures, or schedule adjustments could take place intermittently for up to 4 years.

Active Transportation

Construction of the Modified LPA could temporarily close sidewalks, bicycle facilities, and/or shared-use paths or reduce facility widths within construction areas. Active transportation travel could be affected within the study area, including in the Expo Center and Delta Park light-rail station area, during station and guideway construction. Limited opportunities are available for active transportation crossings of I-5, but existing crossings would be maintained to the extent practical. Active transportation facilities would be temporarily rerouted during intermittent and temporary closures.

Safety

Many of the construction modifications to facilities, routes and services would involve temporary conditions where safety would be an increased concern. Maintaining safety for travelers as well as construction workers is one of the primary elements of construction plans, including for traffic control. Traffic diversion caused by construction would lead to higher traffic volumes on detour streets. The higher traffic volumes could lead to a potential increase in collision frequency. In locations where there is no physical change to the roadway, the types of crashes would remain similar to existing conditions.

Transportation Demand Management and Transportation System Management

During construction of the Modified LPA, the impacts to facilities, traffic, transit and other modes would affect TDM and TSM programs and operations, and modifications would be needed.

Tolling and Diversion

During construction of the Modified LPA, pre-completion tolling would commence on the existing Interstate Bridge. During the pre-completion period while the new bridges are under construction, the existing Interstate Bridge is assumed to operate toll-free between 11 p.m. and 5 a.m. Diversion could occur during construction as people try to avoid pre-completion tolling or congestion from construction impacts. Depending on the origin and destination of the trip, this could increase travel times, modify the time of day a trip is made, or potentially change the route or mode that is chosen.

3.1.5 Indirect Impacts

The No-Build Alternative would not provide multimodal improvements assumed in regional transportation and land use plans, which seek to manage growth through coordinated land use and transportation actions that encourage transit-oriented development patterns in areas such as downtown Vancouver and Hayden Island. These multimodal improvements are intended to manage travel demand through higher use of transit, walking and biking as alternatives to vehicle use. As noted in Section 3.4, Land Use and Economic Activity, the complementary patterns of land use and transportation systems would be less likely to be achieved if the multimodal improvements of the IBR Program were not in place.

Under the No-Build Alternative, without these multimodal improvements, population and employment may not reach anticipated levels or occur within districts planned for higher density growth. Although denser growth patterns are already occurring in areas such as downtown Vancouver, future growth under the No-Build Alternative is expected to be more limited and less dense than under the Modified LPA, where development is expected to be focused around centers of multimodal activity like high-capacity transit stations. The lack of multimodal improvements under No-Build would also reduce the options available for travel via transit or active transportation. Thus, an indirect effect of the No-Build Alternative is that future trips would be more likely to continue to rely on driving rather than other modes. This continued high reliance on driving would, over time, tend to encourage more dispersed patterns of development, often referred to as urban sprawl. A sensitivity analysis was completed to assess whether a change in land use between the No-Build Alternative and the Modified LPA would result in a change to the transportation analysis. The analysis showed that a change in land use would not change the transportation analysis. See Section 3.4.4 for more discussion of indirect effects on land use.

Other potential indirect effects of the No-Build Alternative related to transportation include:

- Delays in local and regional freight transportation as a result of increased congestion on I-5, with potential economic implications (see Chapter 3.4, Land Use and Economic Activity).
- Increased pressure on bus service in Vancouver and rail service in Portland as demand increases without corresponding growth in infrastructure.
- Potential for severe regional congestion, with resulting economic and social effects, particularly if the existing bridge spans were damaged in an earthquake or other catastrophic event.

Completion of the Modified LPA, including improved highway facilities and safety on I-5, enhanced transit solutions (light-rail service and increased express bus service), and improved active transportation facilities, would improve regional transportation between Vancouver and Portland. Predicted improvements in congestion and travel times would help to reduce current impediments to freight mobility and provide greater travel time reliability for trucks crossing the bridge. Because of the importance of I-5 in West Coast freight transport, improved freight mobility across the Columbia River bridges could contribute to more efficient, reliable, and predictable operations at local, regional, and national ports as well as more reliable freight deliveries to local businesses and residences. These operational improvements could result in positive economic effects such as increased employment and tax revenues within the Portland-Vancouver metropolitan area.

Areas in proximity to new LRT stations could experience new development and/or redevelopment. This development would facilitate growth and increased land use density, as encouraged by local and regional land use plans. As described in Section 3.4.4, the provision of high-capacity transit is expected to support development in already urbanized areas of Hayden Island and downtown Vancouver, while reducing the potential for urban sprawl. The growth that would occur in these areas is accounted for in current growth targets, which anticipate the extension of high-capacity transit service. Thus, the indirect effects of the Modified LPA would be consistent with local and regional planning.

Increased development in areas near the IBR Program stations is anticipated in the regional travel demand model, which includes changes to overall transit ridership beyond the study area. The mode of access to and from stations may shift as a result of increased development near the IBR Program stations. This may result in a greater percentage of active transportation or transit transfers and a lower percentage of automobile access as population and employment densities increase within station area walksheds and bikesheds. Increased active transportation trips to stations, particularly if higher-density residential and commercial development occurs in surrounding areas, may involve increased travel along streets that lack ADA accessibility or facilities to accommodate active transportation. However, increased development and transportation activity along these streets could encourage infrastructure improvements by local jurisdictions.

Safety conditions and effects on TDM and TSM would be similar to those described under direct effects because the direct effects analysis already incorporates projected urban growth and increased transportation activity.

Tolling the new Columbia River bridges would result in changes to traffic and travel by alternative modes. Variable-rate tolling would be higher in the peak periods, and this, along with the improvements made on both the highway and transit components of the IBR Program, would result in less congestion on I-5 through the study area. Variable-rate tolling would include lower rates during times of day that are less congested, which would help minimize potential traffic diversion to the I-205 Glenn Jackson Bridge as well as arterial facilities in and around I-5 during these time periods. The potential for tolling diversion is discussed in Section 3.1.3 and in the Travel Demand Modeling Report, which is an appendix to the Transportation Technical Report.

3.1.6 Potential Avoidance, Minimization, and Mitigation Measures

Long-Term Effects

Regulatory Mitigation

When traffic operations on new highway facilities and at local intersections do not meet the applicable agency standards, mitigation may be required. Mitigation measures are typically negotiated between the project sponsor (in this case, the IBR Program) and the transportation agencies with jurisdiction over the affected facilities. As possible mitigations are identified and considered, the IBR Program will determine whether additional environmental analysis is necessary. Because mitigation is developed on a program-specific level, potential mitigation for each category of transportation effects is discussed below.

Program-Specific Mitigation

I-5 Operations

Traffic impacts were determined for I-5 mainline and ramp segments in the freeway analysis area by comparing freeway and ramp operations for the No-Build Alternative and Modified LPA and the other design options against agency performance standards for the 2045 design year.

WSDOT maintains a performance standard of LOS D. Mitigation could be required for the study area freeway and ramp segments in Washington if (1) the Modified LPA or the other design options caused I-5 operations to degrade below this standard, or (2) this standard was not met under the No-Build Alternative, but the Modified LPA or the other design options caused I-5 operations to degrade by more than 10% compared to the No-Build Alternative.

ODOT's performance standard for new or rebuilt highway facilities is a 0.75 V/C ratio, compared to a 1.1 and 0.99 V/C ratio (highest hour and second highest hour respectively) for existing facilities. Therefore, freeway and ramp mitigation could be required if the Modified LPA or the other design options did not meet ODOT's 0.75 V/C ratio performance standard in Oregon.

Areas where I-5 operations would not meet ODOT's and/or WSDOT's standards include:

- With the Modified LPA and the other design options except the two auxiliary lane design option, I-5 northbound approaching the Columbia River bridges would not meet ODOT's mobility standard during the PM peak period due to over-capacity conditions at the new Columbia River bridges. Congestion from the bottleneck at the bridges would back up to the I-5/I-405 interchange and would last for approximately 9 hours.
- With the two auxiliary lane design option, I-5 northbound approaching the Columbia River bridges would improve compared to the other design options but would not meet ODOT's mobility standard during the PM peak period due to over-capacity conditions at the Columbia River bridges. Congestion from the bottleneck at the bridges would back up 0.75 miles to Hayden Island and last for approximately 6 hours.
- With all Modified LPA design options, I-5 southbound through the study area would not meet WSDOT's or ODOT's mobility standards during the AM peak period due to congestion spilling back from the I-5/I-405 bottleneck in North Portland. Congestion from the I-5/I-405 bottleneck in North

Portland would extend 6 miles north to the C-D roadway in Vancouver and last for approximately 8.5 hours.

- With all Modified LPA design options, the southbound C-D roadway between the Mill Plain and SR 14 interchanges would not meet WSDOT's mobility standard during the AM or PM peak periods. The congestion from the C-D roadway would reach I-5, but the extent to which this would vary depends on the design option. Congestion in the Modified LPA would extend 4 miles and last approximately 6 hours. Congestion with the two auxiliary lane design option would extend 1.5 miles and last approximately 4 hours.

Potential mitigation to meet ODOT's and/or WSDOT's performance standards on I-5 could include the following:

Modified LPA

- Provide an additional auxiliary lane northbound and southbound within the IBR Program limits, and/or the program and partners could implement more intensive demand-reduction and system-management strategies beyond what the IBR Program already includes (variable-rate tolling, improved transit and active transportation systems, and enhanced TDM and TSM systems).

Modified LPA and the Other Design Options

- ODOT will continue to work with partners to study the downstream bottleneck at the I-5/I-405 split in North Portland. This downstream bottleneck is a separate project that ODOT is looking into to understand causes and identify potential solutions.
- The southbound C-D roadway would be impacted by congestion spilling back from I-5 during the AM peak period, but even during the PM peak period when no downstream congestion is present, the C-D roadway would not meet WSDOT's mobility standards. Potential mitigation measures could include braiding the Mill Plain on-ramp and SR 14 off-ramp and possibly providing a slip lane to continue providing access for trips traveling from the Mill Plain interchange to SR 14.

Final mitigation measures will be determined and agreed upon with the appropriate agencies and partners. Where applicable, the IBR Program would work with these agencies to identify and obtain approvals for design exceptions. The Final SEIS and Record of Decision will include all mitigation commitments that have been finalized by the time of publication; however, some mitigation measures may not be finalized until further along in the project design process.

Bridge Openings and Gate Closures

Measures to minimize disruptions to I-5 operations, transit service, and active transportation associated with bridge openings and gate closures under the Modified LPA with a single-level movable-span configuration could include the following:

- Establish new bridge opening and gate closure timing limitations, which could include scheduled days and/or times that avoid peak periods for passenger vehicles and trucks, in coordination with the USCG.
- Incorporate bridge opening and gate closure limitations into transit service schedules.
- Disseminate information concerning bridge openings and gate closures to the public, businesses, travel organizations, freight industry, and mariners.

Arterials and Local Streets

Traffic impacts were determined for arterials and local streets by comparing the overall intersection operations (LOS or V/C ratios) for the No-Build Alternative, the Modified LPA and design options against the agency operational standards. Mitigation could be required for study intersections that would meet agency performance standards under the No-Build Alternative but would operate below agency performance standards under the Modified LPA and design options. Mitigation could also be required if intersection operations that did not meet agency standards under the No-Build Alternative were degraded by more than 10% under the Modified LPA and design options.

Any potential mitigation measures will be determined and agreed upon with the appropriate agency. ODOT and WSDOT could contribute a proportionate share toward identified mitigation to improve intersection performance as agreed to with the local jurisdiction. The Final SEIS and Record of Decision will include all mitigation commitments that have been finalized by the time of publication; however, some mitigation measures may not be finalized until later in the project design process.

Local traffic impacts and mitigation would be similar among the Modified LPA design options except for the Modified LPA design option without C Street ramps, as described below.

Modified LPA and Two Auxiliary Lanes Design Option

No intersections in the Modified LPA or two auxiliary lane design option would require mitigation improvements because intersection operations are not worsened compared to the No-Build Alternative. As part of final design, a traffic analysis would be conducted to confirm the SEIS analysis and identify any mitigation measures, if necessary. Final mitigation will be determined and agreed upon by the IBR Program and the affected agency.

Modified LPA Without C Street Ramps

Six intersections in the Modified LPA design option without C Street ramps could require mitigation improvements and are summarized below. The impacts are caused by the additional traffic volumes accessing the Mill Plain Boulevard/15th Street east-west couplet due to the elimination of I-5 access via the C Street ramps.

1. Mill Plain Boulevard and Franklin Street.
2. 15th Street and Washington Street.
3. 15th Street and Main Street.
4. Mill Plain Boulevard and Columbia Street.
5. Mill Plain Boulevard and Broadway Street.
6. Mill Plain Boulevard and I-5 northbound on-/off-ramps.

Mitigation of this congestion could include retaining the C Street ramps or adding additional lanes or turn-pockets at study intersections. As part of final design, additional traffic analysis would be conducted to confirm the SEIS analysis and refine mitigation and design measures, as needed. Final mitigation will be determined and agreed upon by the IBR Program and the affected agency.

Transit Reliability

In the course of considering mitigation, an updated on-time performance analysis in the Rose Quarter may be completed. Final mitigation measures will be determined and agreed upon with the

appropriate agency and partners as needed. The IBR Program could contribute a proportionate share toward identified mitigation to improve on-time performance at the Rose Quarter. The Final SEIS and Record of Decision will include all mitigation commitments that have been finalized by the time of publication; however, some mitigation measures may not be finalized until later in the project design process.

Tolling and Diversion

Analysis indicates that the Modified LPA and options with tolling included would not result in permanent adverse impacts to other modes or cause diversion to other facilities that would require mitigation. If toll rates set by the Washington State and Oregon Transportation Commissions are different than what has been evaluated, impacts to other facilities or modes have the potential to increase.

Temporary Effects

Regulatory Mitigation

Construction activities would comply with ODOT and WSDOT requirements for maintenance of traffic. More specific measures related to maintenance of traffic are discussed in the Program-Specific mitigation section below. The Transportation Technical Report identifies additional potential mitigation measures and best practices such as for signage, traffic plans and control, access, communications, and safety.

Program-Specific Mitigation

Study Area Travel

- The IBR Program would develop a work zone transportation management plan (TMP) and a maintenance of traffic plan to address facilities and their modes of transportation. These plans would be prepared during subsequent design and construction phases for agency approvals. The plans would describe staging, access, facility, lane or shoulder closures and transitions, hauling, traffic management (including general-purpose traffic, transit, bicycle, and pedestrian traffic), detours, lane modifications, incident management, traffic control, closure details, and coordination and communications plans and would cover other construction zones or activities. Plans would be developed to meet applicable agency standards. The Program would coordinate with agencies with jurisdiction for review and applicable approvals.

Freight Mobility and Access

- Mitigation for freight and mobility would be an element of the work zone TMP identified above. In addition, the IBR Program would coordinate with all facility owners to notify them of facility or access closures. Construction information would be provided to affected jurisdictions. Similar information would be provided to WSDOT and ODOT for use in the states' freight notification systems. The IBR Program would provide information in formats required by WSDOT and ODOT.
- To minimize impacts to freight rail operations, the Program would coordinate with the railroad owners and rail operators and would obtain all applicable required permits. Construction would be limited to the times approved and coordinated with freight rail operators.

Bridge Openings

- During IBR construction, the IBR Program would coordinate with the U.S. Coast Guard, the ports, and other jurisdictions to minimize bridge openings and gate closures to minimize the impact to vehicles, active transportation, and transit. The work zone TMP would include coordination and communication with agencies, mariners, and the public for bridge openings and gate closures.

Arterials and Local Streets

- All minimization measures associated with constructing the Modified LPA would comply with local regulations governing construction traffic control and construction truck routing. The IBR Program would finalize detailed work zone TMPs in close coordination with local jurisdictions during the final design and permitting phases of the Program.

Transit Operations

- Transit service and facility modifications would be coordinated with TriMet and C-TRAN to minimize temporary impacts and disruptions to bus and light-rail facilities and service during construction. Detailed work zone TMPs and coordination/communication plans would be developed. This would include support for public information and communication throughout the construction period, including for periods where alternative routes, facilities or services would be needed to maintain service.

Active Transportation

- The work zone TMP would include specific measures to maintain access to active transportation facilities and users. The Transportation Technical Report has additional detail on potential measures for construction areas, signage, lighting, communications, safety and maintenance.

Safety

- The IBR Program would implement the latest safety technology during construction.

Transportation Demand Management and Transportation System Management

- The IBR Program would work with partner agencies on adapting and implementing TDM and TSM treatments during construction. Potential strategies could include the following:
  - Expanded transit service.
  - Vanpool/carpool program.
  - Telecommuting options.
  - Compressed work week/flexible work schedules.
  - Active transportation improvements and enhancements.

Tolling and Diversion

- The IBR Program would work with partner agencies to develop a detailed program and schedule for pre-completion tolling during construction.
- Diversion impacts during construction will be evaluated and potential mitigation will be discussed with partner agencies to offset any impacts.

3.2 Navigation

An important goal of the IBR Program is to meet the reasonable needs of navigation on the Columbia River for the 100+ year service life of the new Columbia River bridges. This section discusses existing river navigation conditions and evaluates the associated beneficial and adverse effects of the Modified LPA and the No-Build Alternative.

The Columbia River and North Portland Harbor are designated as federal navigable waterways. This designation signifies that all construction or alteration of bridges crossing these waterways must first receive approval from the U.S. Coast Guard (USCG), pursuant the General Bridge Act of 1946, as amended. Additionally, a Memorandum of Agreement (MOA) between USCG and FHWA and a Memorandum of Understanding (MOU) among the USCG, FHWA, FTA, and Federal Railroad Administration (FRA) state that environmental documentation must include a discussion of potential project impacts to navigation and a summary of ongoing coordination with USCG.

The information presented in this section is based on analyses found in the Navigation Impact Report (IBR 2022) and the Navigation Simulation Study (Appendix H).

3.2.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision, as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRA LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with navigation has been updated in this Draft SEIS to include:

- Changes to existing and prospective marine vessel navigation and marine freight shipments in both the main channel of the Columbia River and North Portland Harbor.
- Changes to USCG policy with 2016 updates to the USCG Bridge Permit Application Guide.
- 2014 MOU among the USCG, FHWA, FTA, and FRA to coordinate and improve bridge planning and permitting.
- 2014 MOA between USCG and FHWA to coordinate and improve bridge planning and permitting.
- New bridge configurations added for evaluation due to changed conditions, one of which would provide increased vertical navigation clearance (VNC).

The replacement bridges over the Columbia River and North Portland Harbor are the main Program component relevant to navigation considerations. The CRC LPA and IBR Modified LPA would both include a pair of double-deck fixed-span replacement bridges with 116 feet of VNC and 400 feet of horizontal navigation clearance (HNC) (a 300-foot channel plus 50 feet on either side for channel maintenance). The Modified LPA also includes two additional bridge configuration design options: a pair of single-level fixed-span bridges and a pair of single-level movable-span bridges. Consideration of the three bridge configurations involves coordination with the U.S. Army Corps of Engineers (USACE) and USCG regarding multiple navigation-related items; see Section 2.6 for a discussion of current and future actions necessary to reach resolution on an acceptable bridge configuration for the IBR Program.

Table 3.2-1 compares the impacts and benefits between the CRC LPA and the IBR Modified LPA and the changes listed above. Based on this analysis, the Modified LPA with fixed-span bridge configurations would have the same or similar effects as the CRC LPA on navigation; the Modified LPA with a movable-span bridge

configuration would provide more VNC than the CRC LPA. A detailed description of impacts and benefits to navigation from the Modified LPA and associated design options follows.

Table 3.2-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects on Navigation

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects as Identified in the Draft SEIS	Explanation of Differences
River Navigation Clearance	Reduced vertical clearance in the Columbia River primary navigation channel (from 178 feet [during a bridge lift] to 116 feet). Increased horizontal clearance in the Columbia River primary navigation channel (from 263 feet to 400 feet [a 300-foot channel plus 50 feet on either side for channel maintenance]). Vertical and horizontal clearances for North Portland Harbor would remain unchanged.	Vertical and horizontal clearances on Columbia River navigation channels are the same as CRC for the double-deck fixed-span and single-level fixed-span configurations. Same horizontal clearance with an increased vertical navigation clearance to 178 feet with the single-level movable-span configuration. Vertical and horizontal clearances for North Portland Harbor would remain the same or similar.	A movable-span configuration design option was added to the Modified LPA to meet the USCG Preliminary Navigation Clearance Determination (2022). The I-5 bridge over North Portland Harbor would be replaced under the Modified LPA due to continued aging of the seismically obsolete existing bridge.
Federally Authorized Navigation Channel Location	Proposed changes to the location of the Columbia River primary navigation and barge channels.	Same as CRC.	N/A

Note: The CRC LPA and Modified LPA effects are as compared to a No-Build Alternative, unless otherwise noted.
CRC = Columbia River Crossing; LPA = Locally Preferred Alternative; N/A = not applicable; SEIS = Supplemental Environmental Impact Statement; USCG = U.S. Coast Guard

3.2.2 Existing Conditions

Columbia River

As one of the largest rivers in North America, the Columbia River is among the defining geographic features of the Pacific Northwest. It serves as an important part of the U.S. Maritime Transportation System corridor, and its resources have provided, and continue to provide, the economic and cultural foundations of Native American and western settlements.

The Columbia River headwaters are located in British Columbia, Canada, through which the river flows for approximately 425 miles before entering the continental U.S. in northeast Washington. From the U.S./Canada border it flows generally south to its confluence with the Snake River, where it turns west and forms the boundary between Washington and Oregon for the remainder of its course to the Pacific Ocean.

The Columbia River is an important natural resource and serves a vital role for power generation, irrigation, navigation, and recreational purposes. It is navigable for deep-draft vessels from its mouth to Portland, Oregon, and Vancouver, Washington, and for shallow-draft vessels to Lewiston, Idaho via the Snake River. The Columbia River's deep-draft navigation system provides for a 43-foot-deep by 600-foot-wide channel from inside the Columbia River Bar upriver to ports on both the Washington and Oregon sides of the river at

approximately river mile (RM) 106. The upriver end of this section of the channel, known as the Columbia and Lower Willamette, is just downriver from the existing Interstate Bridge.

From just downstream of the Interstate Bridge to the Snake River confluence near Pasco, Washington, the Columbia River is maintained as a shallow-draft system predominantly supporting tug and tow vessel traffic. The shallow-draft system has a maintained depth of approximately 17 feet. Just east of The Dalles is a BNSF Railway Bridge at Celilo Falls with a VNC of 79 feet, which is notably less than the bridge heights under consideration for the IBR Program.

Between the Interstate Bridge and the Celilo Falls BNSF Railway Bridge 95 miles to the east, many shoreline land uses are dependent on the Columbia River. Today, the Columbia River shoreline is often identified by local jurisdictions as a resource to be leveraged for river-dependent uses such as recreational, environmental, habitat, or economical purposes than with industrial marine, water-dependent uses.

Historically, the Columbia River for many Native Americans living in the Pacific Northwest was central to culture, sustenance, trade, and transportation. As EuroAmerican settlement traveled to the Pacific Northwest, river transport, commercial fishing and associated canneries, and agriculture developed along the Columbia River (OHS 2024a). When dams were constructed along the Columbia and Snake rivers in the 1900s, increased industrialization occurred and corresponded to increased movement of freight and agricultural products up and downriver. Shipbuilding operations, supporting industries, and employees were established along the Columbia River during World War II, including three Kaiser Shipyards in the Vancouver and Portland areas (OHS 2024b). Additionally, new and affordable hydroelectric power ushered in aluminum smelting operations, and new U.S. Bureau of Reclamation (USBR) irrigation projects spurred increased agriculture production in central/eastern Oregon and Washington. Navigation along the Columbia and Snake rivers grew tremendously during this time to support these economies. Over the 107 years of service life of the Interstate Bridge (northbound span opened in 1917 and southbound span opened in 1958), numerous bridge lifts have been conducted for mariners with large VNC requirements, including those requiring openings for clearances over 116 feet and up to 178 feet. Over time, industries along the river changed to a mix of marine and non-marine enterprises with a decreasing trend of commercial vessels on the Columbia River (USACE, USBR, BPA 2020); however, the capacity of the Columbia River to support marine development and transport remains similar to conditions after the dams were constructed.

The intrinsic value of the Columbia River is largely in its natural beauty, especially within the Columbia River Gorge located east of the Interstate Bridge. The most significant land use control is the 85-mile-long Columbia River Gorge National Scenic Area, which protects the natural beauty of the gorge and severely limits industrial development outside of existing incorporated communities in Oregon and Washington from roughly Troutdale, Oregon to Wishram, Washington.

Federally Authorized Navigation Projects

I-5 crosses the Columbia River via the existing Interstate Bridge and the North Portland Harbor bridge. Within the vicinity of the Interstate Bridge, there are four federally authorized navigation projects on the Columbia River: three federally authorized navigation channels that pass beneath the Interstate Bridge (the primary navigation channel, barge channel, and alternate barge channel) and the federally authorized Upper Vancouver Turning Basin located immediately downstream of the Interstate Bridge. This turning basin has historically provided a turning location for deep-draft ships navigating up to, but not beyond, the Interstate Bridge.

The primary navigation channel was authorized to accommodate ocean-going vessels past Bonneville Dam to The Dalles. This traffic never materialized, and the channel is currently maintained to a shallower depth consistent with current traffic. There is no federally authorized navigation channel within North Portland

Harbor in the vicinity of the Interstate Bridge. Table 3.2-2 summarizes the widths and depths of the federally authorized navigation projects within the study area.

Table 3.2-2. Widths and Depths of Federally Authorized Navigation Projects in the Study Area

Federally Authorized Navigation Channel	Authorized Width (feet)	Existing Horizontal Clearance (feet)	Authorized Depth (feet)	Maintained Depth (feet)	Current Waterway Depth (feet)
Primary Columbia River Navigation Channel (Vancouver to The Dalles)	300	263	27	17	30
Barge Channel	300	511	15	15	~21 to 25
Alternate Barge Channel	200	260	17	15	~21 to 25
Upper Vancouver Turning Basin	800	N/A[a]	35	35	~20 to 30

Source: IBR 2022

a Not applicable. The federal authorization for the Upper Vancouver Turning Basin includes dimensions of 2,000 feet long and 800 feet wide. Horizontal clearance as referenced for the other federally authorized projects in this table relates to distance between bridge piers for ships navigating beneath the bridge and therefore does not apply to the turning basin.

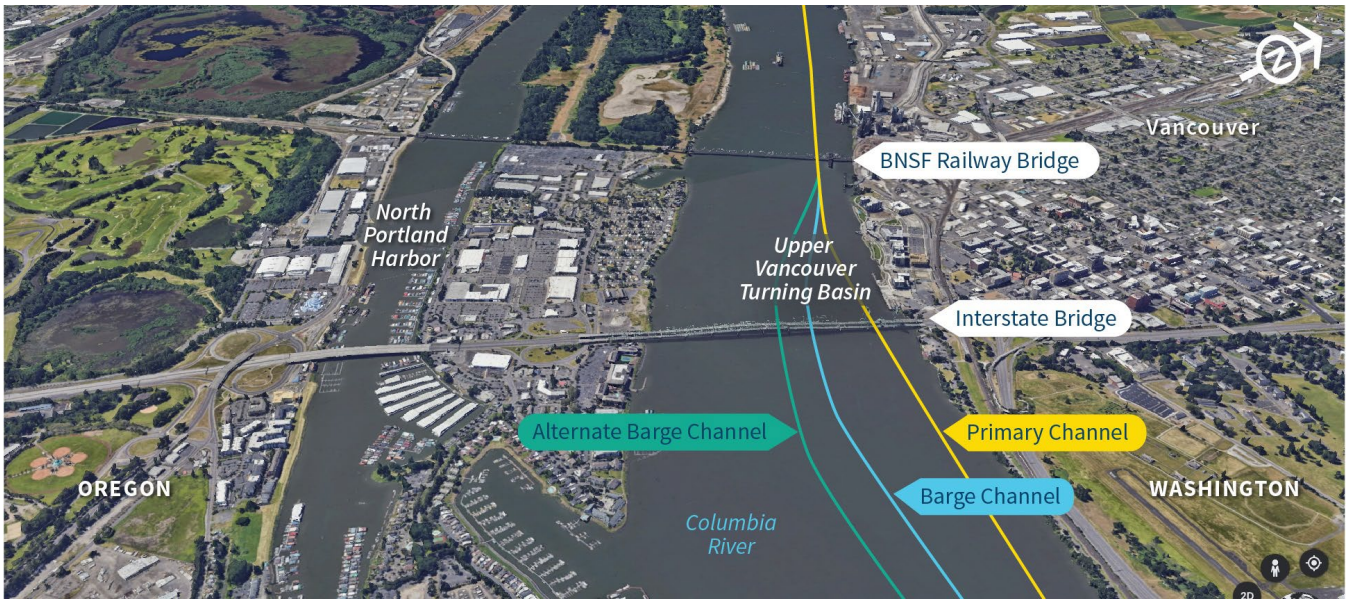
Vessel Operations and Navigation Clearance

Vessels that currently operate near and/or navigate beneath the Interstate Bridge include tugs and barges, recreational sailboats and powerboats, marine contractor barges with construction cranes and materials, cruise and passenger boats, dredges, government vessels, vessels transporting manufactured and fabricated goods, and others. More than 232,000 boat use days[1] occurred in 2017 in the Columbia River from the Interstate Bridge to the Bonneville Dam (approximately 39.5 river miles upstream).

Columbia River navigation is limited by horizontal and vertical clearances associated with the Interstate Bridge and North Portland Harbor bridge, the BNSF Railway Bridge that crosses the Columbia River to the west (downstream) of the Interstate Bridge, and a second BNSF Railway Bridge that crosses North Portland Harbor (see Figure 3.2-1). The alignments of the navigation channels factor into vessel passage of both the Interstate Bridge and the BNSF Railway Bridge. Figure 3.2-1 illustrates these alignments with different magnitudes of curvature between the two bridges. A variety of navigation factors, such as downstream or upstream transit, vessel/cargo load, vessel size and draft, weather conditions, water flow velocities, wind/wave conditions, and more are important considerations for vessel maneuverability and safety.

[1] Boat use days are calculated by multiplying the number of boats that use the river by the number of days of use. Therefore, one boat using the river 200 days would equal 200 boat use days, as would 200 boats each using the river for one day.

Figure 3.2-1. Existing Navigation Channels Under the Interstate Bridge and BNSF Railway Bridge



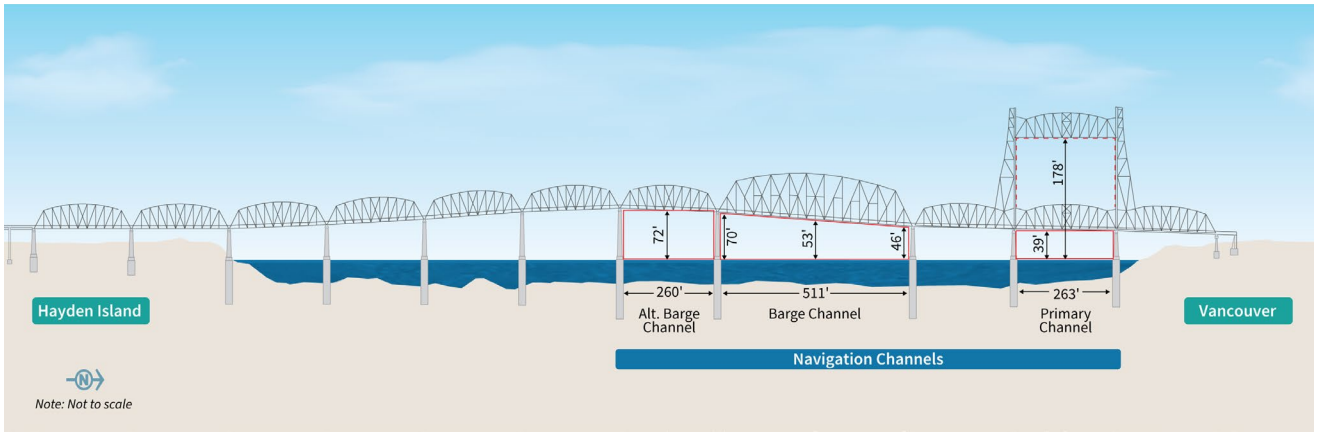
Due to the proximity of the Interstate Bridge and the BNSF Railway Bridge, vessel operators typically plan their route in consideration of navigation factors associated with both bridges. VNC and vessel cargo play a role in route options because USCG regulations specify that movable-span bridge openings are only allowed for vessels that are otherwise unable to pass under the bridge via alternate channels. For example, vessels that need less than 33 feet VNC (including adjustments for weather, water level, and other conditions) to pass the BNSF Railway Bridge may take a route outside the primary navigation channel. Vessels needing additional VNC require the BNSF Railway Bridge swing span to be opened and must use the primary navigation channel. This route is near the Washington shore (shown in Figure 3.2-1).

Figure 3.2-2 shows that when the Interstate Bridge lift spans are in the closed position, the vertical clearance within the primary navigation channel is 39 feet (as measured above 0 Columbia River Datum [CRD]).[2] When the lift spans are raised, the maximum vertical clearance is 178 feet. The barge channel lies under the wide span of the bridge and has an HNC of 511 feet and a vertical clearance ranging from 46 to 70 feet; however, vessels tend to use the southern half of this channel where the vertical clearance is the highest. The alternate barge channel has a HNC of 260 feet and a vertical clearance of 72 feet. Water levels dictate the available clearance at a specific time. Water levels vary seasonally based on flows and daily based on tidal influence. The average daily high is approximately 10 feet CRD and typically occurs in late spring. The average daily low is approximately 2 feet CRD and typically occurs in early fall.

For passage through the Interstate Bridge, vessels requiring more than 72 feet VNC must use the primary navigation channel with the opened lift spans; vessels that can pass with less than 72 feet of VNC can use one or more of the three channels without a bridge lift depending on vessel size and pilot choice. Interstate Bridge lift openings are currently restricted to avoid weekday peak highway traffic operations between 6:30 a.m. and 9:00 a.m. and between 2:30 p.m. and 6:00 p.m., excluding emergency bridge lifts. Thus, vessels that require a bridge lift must schedule their passage time outside these restricted time periods.

[2] Columbia River Datum is the plane of reference from which river stage is measured on the Columbia River from the lower Columbia River up to Bonneville Dam, and on the Willamette River up to Willamette Falls. Equals 1.82 feet above mean sea level (equivalent to National Geodetic Vertical Datum [NGVD]) at Vancouver, Washington (USACE 2014).

Figure 3.2-2. Existing Interstate Bridge Navigation Clearances



Note: all vertical VNCs shown are measured in feet above 0 CRD.

With the exception of some specialized vessels that use the Columbia River infrequently, most vessels require vertical clearances of less than 90 feet (see Table 3.2-3). As detailed in the IBR Program Navigation Impact Report (IBR 2022) issued in May of 2022, required openings of the Interstate Bridge declined by 45% from an average of 289 per year between 1997 and 2011 to 157 per year between 2012 and 2020. From 2012 to 2020, 58% of the bridge openings were for tugs, 17% for sailboats, and the remainder for other vessel types. These openings of the Interstate Bridge represent 5% to 7% of total river traffic based on openings of the downstream BNSF Railway Bridge and use of the locks at the upstream Bonneville Dam.

Table 3.2-3. Summary of Vertical Clearance Requirements and Frequency of Use

Vessel Type	Approximate Vertical Clearance Requirement	Approximate Annual Frequency
Tugs, Tows, and Barges	48 feet to 80 feet	> 500 trips
Sailboats/Recreation	63 feet to 90 feet	> 75 trips
Marine Contractors	40 feet to >175 feet	Varies
Dredges (U.S. Army Corps of Engineers dredge *Yaquina*)	102 feet	24
Marine Industrial	54 to >175 feet	Varies
Cruise/Passenger	50 feet to 80 feet	> 500 trips

Source: IBR 2022
Note: Vertical clearance requirements are based on vessel air draft (distance from water surface to highest point on a vessel) plus a 10-foot additional air gap (extra height allowance beyond the upper limit of air draft to allow a safety factor for vessel movements due to wind and waves). For marine contractors and marine industrial vessels, required clearance can vary based on the height of the cargo and/or construction equipment contained on the vessel.

For the Interstate Bridge, USCG has stated future navigation conditions clearance should not be less than existing conditions. In a June 17, 2022, Preliminary Navigation Clearance Determination, USCG stated that "any proposed new bridge would need to meet or exceed the existing VNC of the current I-5 twin bridges, 178 feet, and would preferably have unlimited VNC over the USACE-approved main navigation channel/project. Any side channels would require vertical clearances equal to or greater than 72 feet." Additionally, the Preliminary Navigation Clearance Determination states that any proposed bridge would

have an HNC requirement greater than or equal to that of the current or future permitted USACE federal navigation channel projects, and notes USACE may have additional requirements.

The federal navigation channels have various authorized widths. The authorized width of the Vancouver to The Dalles channel (i.e., the primary Columbia River navigation channel) is 300 feet. The authorized widths of the two side channels are 300 feet and 200 feet, respectively. The existing 263-foot HNC for the primary navigation channel beneath the Interstate Bridge, which is a function of bridge pier locations within the Columbia River, is less than the USACE-authorized channel width of 300 feet. The existing HNC was established when the original Interstate Bridge (current northbound span) was constructed, which was prior to federal authorization of the primary navigation channel.

Navigation is further affected by other bridges and structures that present obstructions to vessels. Upstream of the Interstate Bridge, this includes the following vertical clearances:

- I-205/Glenn L. Jackson Bridge, 136 feet (144 feet at center)
- Bridge of the Gods, 135 feet
- Hood River Bridge, 148 feet[3]
- The Dalles Bridge, 100 feet
- The Dalles Lock and Dam, 100 feet
- BNSF Railway Celilo Bridge, 79 feet

Downstream of the Interstate Bridge, this includes the following vertical clearances:

- BNSF Railway Bridge, Unlimited (39 feet when swing span closed)
- Lewis & Clark Bridge, 187 feet
- Astoria-Megler Bridge, 193 feet (205 feet at center)

North Portland Harbor

The North Portland Harbor, previously known as the Oregon Slough, is a 5-mile-long side channel of the Columbia River, located between Hayden Island and mainland Oregon. The waterway is bounded by a federal levee on the south bank and urban development and infrastructure on both shorelines.

North Portland Harbor supports marinas of floating homes and primarily noncommercial boats. North Portland Harbor does not include a designated navigation channel. It is largely traveled by recreational boaters and those accessing the water-oriented uses along the harbor. The HNC beneath the existing North Portland Harbor bridge is approximately 215 feet and a vertical clearance is approximately 35 feet. Farther west (downstream), large ocean-going cargo ships use North Portland Harbor to reach Port of Portland Terminal 6. However, they cannot travel farther upstream due to the depth of the waterway.

3.2.3 Long-Term Effects

No-Build Alternative

With the No-Build Alternative, navigation conditions would not change. Vessels requiring more than 72 feet of VNC would need to schedule passage through the Interstate Bridge around existing restrictions on lift-span operation. No additional timing restrictions on bridge lifts would be anticipated since the No-Build Alternative

[3] The Hood River Bridge, currently with a lift span providing up to 148 feet VNC, is proposed to be replaced with a fixed span that would allow for 90 feet VNC.

would not include light-rail transit. The primary navigation channel would remain in its current location and vessels would continue to use the same channels available today.

For navigation safety considerations, the No-Build Alternative would have the same safety considerations for mariners as existing conditions because the pier locations and navigation clearances would remain unchanged. Navigation simulations were conducted to evaluate existing, proposed future, and construction conditions for a variety of vessels (deep draft and shallow draft); upbound and downbound directions; daytime and nighttime conditions; various water flow conditions; loaded, light and unloaded cargo; and wind conditions. For additional detail on the navigation simulations, see Appendix H, List of Technical Reports, Navigation Simulation Study.

The mariners who participated in the vessel simulations indicated existing conditions can require careful maneuvering, especially with downbound direction and loaded cargo, to pass through both the Interstate Bridge and BNSF Railway Bridge due to the horizontal clearances of each bridge and the distance between the bridges.

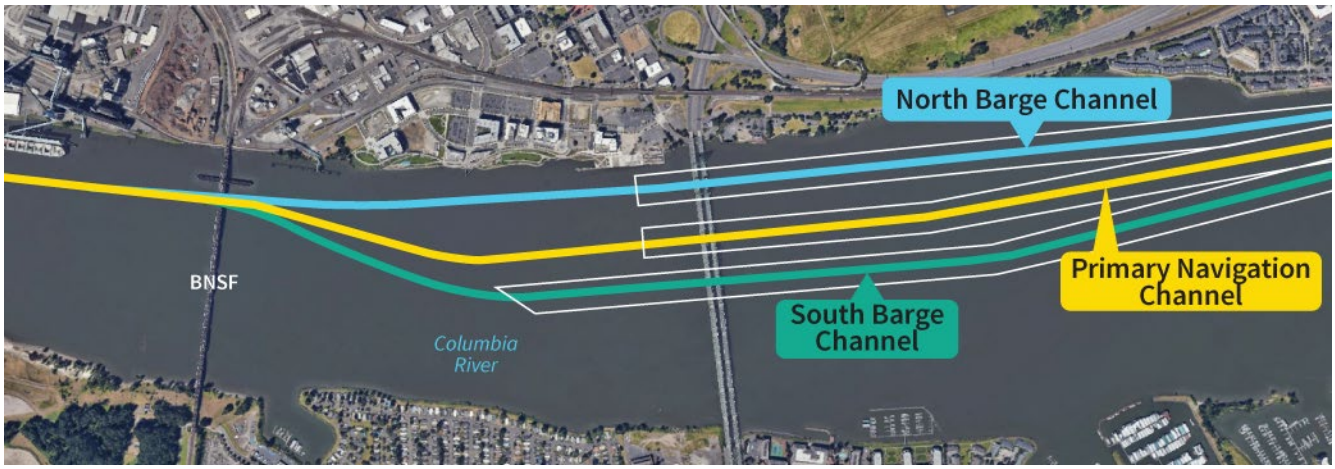
Without the seismic upgrades to the Interstate Bridge, a major earthquake could collapse or seriously damage one or both bridges, temporarily restricting or preventing navigation. Similar impacts to vessels navigating North Portland Harbor could occur if the bridge over North Portland Harbor is not replaced.

Modified LPA

Columbia River Navigation Channels

For all bridge design options under consideration for the Modified LPA, the routes that vessels would be required to take to pass through both the new Columbia River bridges and BNSF Railway Bridge would change due to the proposed relocations of the primary navigation channel and north barge channel (see Figure 3.2-3). All bridge configuration design options would modify the federally authorized navigation channels, switching the relative positions of the primary navigation channel and the barge channel from those shown in Figure 3.2-1. The north barge channel would be located closest to the Washington shore, while the primary navigation channel would be located one bridge span south at the bridge's highest point of vertical clearance. The south barge channel would continue to be in approximately the same location as the existing alternative barge channel.

Figure 3.2-3. Proposed Columbia River Navigation Channels under the Modified LPA



Navigation Clearance

The navigation clearance would change for all channels on the Columbia River:

- The north barge channel dimensions would be 100 feet VNC (fixed-span configurations) or 99 feet VNC (movable-span configuration) with 400 feet HNC. Most vessels and cargo would be able to pass under the new Columbia River bridges using the north barge channel with all bridge configurations. With a wider opening and higher vertical clearance, the north barge channel would provide improved navigation for most users compared to the existing primary navigation channel of the Interstate Bridge, except for vessels or cargo loads that require greater than 100 feet of clearance with the fixed-span configurations or 99 feet with the movable-span configuration and need to use the new primary navigation channel.
- The new primary navigation channel (center location) dimensions would be 116 feet VNC with 400 feet HNC (fixed-span configurations) and 92 feet VNC (closed position) to 178 feet VNC (open position) with 400 feet HNC for the movable-span configuration. Vessels that require more than 100 feet VNC (fixed-span configurations) or 99 feet VNC (movable-span configuration) would use this channel.
- The south barge channel dimensions would be 110 feet VNC (fixed-span configurations) or 90 feet VNC (movable-span configuration) with 400 feet HNC.

Currently, there are no planned new marine-dependent developments upstream of the Interstate Bridge; however, the Modified LPA with either the double-deck fixed-span or single-level fixed-span configuration would limit future navigation by introducing a permanent and complete obstruction to navigation upstream of the new Columbia River bridges for vessels or cargo loads with vertical clearance requirements greater than 116 feet. The Modified LPA with a single-level movable-span configuration would continue to provide unobstructed navigation for vessels requiring up to 178 feet of VNC.

Replacement bridges over North Portland Harbor would retain the same VNC as the existing I-5 bridge.

Navigation Safety

Columbia River navigation safety was evaluated by simulating future navigation conditions with varying vessel types, cargo loads, water flow conditions, wind conditions, transit direction, and other elements (Appendix H, Navigation Simulation Study). Simulations for deep-draft vessels were conducted with a vertical lift-span configuration in the open position; simulations for shallow-draft vessels were conducted with a vertical lift-span configuration in both open and closed positions. Simulations conducted for shallow-draft vessels would apply to the fixed-span configurations unless specialty cargo requiring greater than 100 feet VNC was transiting.

Because the construction of the new bridges would be to the west (downstream) of the existing Interstate Bridge, the distance between the BNSF Railway Bridge and the new Columbia River bridges would be reduced, resulting in a shorter available distance for vessels to align with the openings of the two bridges. However, the Modified LPA would include fewer bridge piers in the water and a greater distance between the piers and thus would provide greater HNC. This increased HNC would provide an opportunity for mariners headed downstream to position earlier to begin turning movements as they are transiting the new Columbia River bridges, compared to the current situation that does not allow them to begin turning until they have fully transited the Interstate Bridge. In addition, realigning the primary navigation channel from the north to the center channel would allow a greater passing distance between cruise vessels docked at Terminal 1 and transiting vessels. Overall, ship pilots and tug masters conducting the navigation simulations described the Modified LPA as providing more HNC to maneuver and reducing the number of direction changes to navigate between the new Columbia River bridges and the BNSF Railway Bridge. Specific pilot and tug master observations from the simulations are presented in Table 3.2-4. The Modified LPA for the double-deck fixed-span, single-level fixed-span, and vertical lift-span configuration design options includes spans of 465 feet, which meets the federally authorized channel width. Because the Modified LPA would require fewer

piers than the No-Build Alternative (six sets of in-water piers versus nine sets for the No-Build Alternative), the spans between pier sets would provide greater HNC and create fewer obstacles to navigation for all river users than would the No-Build Alternative.

Navigation safety for vessels transiting North Portland Harbor would remain unchanged as VNC and HNC with the replacement bridges would not decrease. However, the Modified LPA would increase the number of bridges crossing the North Portland Harbor from the single I-5 bridge that currently spans the harbor to five new bridges; thus, there would be additional piers in the water for vessels to navigate.

Table 3.2-4. Columbia River Navigation Simulation Pilot Observations for the Modified LPA

Draft	Direction	Pilot and Tug Master Observations
Deep-draft Vessels	Upbound	• Navigation channels were a significant improvement in the transition between the BNSF Railway Bridge and new Columbia River bridges as a result of a steady heading through the BNSF bridge toward where the pilot wants to be positionally approaching the Columbia River bridges. • With the proposed channel/bridge there is a single turn point between the BNSF Railway Bridge and Columbia River bridges compared to two corrections with the existing Interstate Bridge. • With the new Columbia River bridge piers, there is more maneuvering area compared to the existing Interstate Bridge piers where the clearance is more restrictive. • Passing through the existing Interstate Bridge, vessels come close to Vancouver and any vessels docked at Terminal 1 and are constrained from maneuvering on one side. Pilots expressed they had to “dig out” from the existing bridge channel. These conditions were mitigated with the proposed bridge span and center channel alignment for the deep-draft vessels (same observation made for downbound transit).
Deep-draft Vessels	Downbound	• The Modified LPA navigation channels and bridge piers allowed for more natural transition from the new Columbia River bridges to the BNSF Railway Bridge. The existing Interstate Bridge required a turn to the south and then another turn to the north, while the proposed bridge just required a single turn to the north to line up for the BNSF Railway Bridge. • Transit in the existing primary navigation channel with the existing bridge required a lot of rudder commands to maintain the intended track. • Increased clearance between bridge piers allowed more maneuvering room and allowed the pilots to start their turn earlier on the downbound passage (started the turn under the bridge) to set up for passage through BNSF Railway Bridge.
Shallow-draft Vessels	Upbound	• The approach to the north barge channel at the new Columbia River bridges is easier and improved from the existing conditions due to the new bridge piers shifting south, allowing the stern of the tug room to stay south rather than having to hold position on the north bank in existing conditions. • The additional width of the new bridge piers is an improvement from existing conditions. • The center channel (new primary navigation channel) was run with fog and nighttime conditions, independently, and no concerns were raised. This proposed center channel felt like a typical transit performed today.

Draft	Direction	Pilot and Tug Master Observations
		• For the south barge channel, it was noted the new channel was preferred over the existing due to the enhanced visibility from the higher low chord elevation of the bridges, a more gradual turn from the BNSF Railway Bridge to the new Columbia River bridges, and wider channel between the bridge piers.
Shallow-draft Vessels	Downbound	• The north barge channel transit at the new Columbia River bridges felt easier than existing conditions due to the proposed bridge piers shifting south making the transition to the BNSF Railway Bridge more natural. Additionally, with the new Columbia River bridges there would no longer be the need to wait for a bridge opening, which is a concern of the mariners as the new vertical clearance is sufficient for all 2-barge by 2-barge tows. • The center channel (new primary navigation channel) and bridge would be a substantial improvement from existing conditions both visually and spatially. The new center channel would limit the course correction needed between the new Columbia River bridges and BNSF Railway Bridge. The tug masters stated this channel would be the preferred channel to transit for both upbound and downbound transits. • For the south barge channel, it was noted that the proposed channel/bridge was easier than the existing conditions due to an easier transition from the new Columbia River bridges to the BNSF Railway Bridge, improving overall safety of the transit. • For specialty barges, tug masters thought maneuvers for the new Columbia River bridges and existing conditions were comparable with a preference for the new channel/bridge due to increased channel width.

Vessel and Operational Adjustments Associated with Columbia River Fixed-Span Bridge Configurations

The Modified LPA with either the double-deck or single-level fixed-span configuration would reduce the maximum VNC of the primary navigation channel from 178 to 116 feet. The IBR Program collected information on vessels traveling this section of the Columbia River to assess the existing clearance needs; the results were discussed and verified with vessel operators and the USCG. Vessel types, owners, names, and specifications were collected and analyzed to determine whether the Modified LPA with fixed-span configurations with a VNC of 116 feet would result in adverse impacts to these river users. In addition, information was also collected from marine industries along the Columbia River about large freight shipments that would be constrained by a fixed-span bridge.

Information on vessels that would be restricted by a 116-foot bridge under the Modified LPA is summarized in Table 3.2-5 and represents vessels transiting the Interstate Bridge during the 2012–2023 period. Five vessels and three industrial fabricators with large freight shipments may have vertical clearance requirements greater than the clearance provided by the Modified LPA with either fixed-span configuration. With the proposed fixed-span VNC of 116 feet, two marine contractor vessels (crane or derrick barges) would be unable to navigate beneath a fixed-span bridge. Two additional derrick barges and the USACE Dredge *Yaquina* would be restricted when the river level is at the ordinary high water level of 16 feet above CRD, which is approximately 1% of days in a typical year. If adjustments to taller vessels, large cargo, or business operations would be infeasible, then the fixed VNC of 116 feet would adversely affect the navigation capabilities of these vessel owners, as well as vessels and industrial businesses that ship cargo and require greater vertical clearance.

Table 3.2-5. River Users Restricted by a 116-foot Bridge under the Modified LPA Fixed-Span Configurations [a]

Type of Affected River Users	Number of Affected River Users	Limiting Factor	Required Clearance (feet CRD) [b]	Approximate Trip Frequency
Industrial fabricators	3	Fabricated materials shipped by barge	140–175	Less than 1 one-way trip per year
Marine contractors unable to pass all times of year	2	Crane boom heights	129–141	1–10 round trips per month
Marine contractors able to pass except during high water conditions (16 feet CRD)	2 [c]	Crane boom or gantry height	102–103	1–2 round trips per month
USACE Dredge *Yaquina*	1	Antenna height	102	1 round trip per month October through July; 2 round trips per month August and September

Source: IBR 2022

a Restrictions on vessel navigation beneath the new bridges were determined based on an OHWL of 16 feet above CRD. This level was exceeded at the Interstate Bridge less than 1.2% of days over the data period between 1972 and 2020.

b Required clearance includes a 10-foot air gap above a vessel's highest point, which provides a safety factor due to wave- and wind-induced movements in the vertical plane when vessels are transiting under the bridges.

c Both vessels have accommodations to lower crane booms/gantries and could implement them to transit during OHWL conditions.

CRD = Columbia River Datum; OHWL = ordinary high-water line; USACE = U.S. Army Corps of Engineers

Compliance with USCG Preliminary Navigation Clearance Determination

The Modified LPA with the single-level movable-span configuration over the Columbia River would continue to provide 178 feet or greater VNC. This configuration would meet the Preliminary Navigation Clearance Determination for the Columbia River issued by the USCG on June 17, 2022.

None of the bridge design options over the Columbia River with the fixed-span configurations would comply with the 2022 Preliminary Navigation Clearance Determination; thus, an updated Navigation Impact Report would need to be submitted and a revised Preliminary Navigation Clearance Determination from the USCG would be required to advance these design options (see Section 2.6, Additional Compliance Underway, for more discussion on this process).

The USCG issued a Preliminary Navigation Clearance Determination for North Portland Harbor on July 12, 2022, with which the Modified LPA is consistent.

Timing Restrictions on Columbia River Movable-Span Bridge Openings

Movable-span operations, and therefore Columbia River navigation, would potentially need to be restricted to minimize impacts to highway traffic and light-rail transit operations (see Section 2.6, Additional Compliance Underway, for more discussion on the rulemaking process to establish timing restrictions on movable-span openings). This would likely be more restrictive than the No-Build Alternative, as bridge openings are currently restricted during peak commute hours Monday through Friday to reduce impacts to highway traffic. The Modified LPA would include light-rail transit; thus, additional timing restrictions for this service would be considered. A factor to consider in determining changes to timing restrictions, is the number of projected

bridge openings. The increased HNC and VNC of the movable-span configuration would allow standard barges to transit all three of the navigation channels, including during high water conditions, without needing to request a bridge opening, thereby reducing the number of bridge openings. Extended timing restrictions on bridge openings could require vessel owners and cargo shipments to be scheduled at earlier or later times of day than are used today and under the No-Build Alternative. For more information on impacts to highway traffic and transit service from movable-span bridge openings, see Section 3.1, Transportation.

Future Maritime Transportation System demands and the associated need for bridge openings for the 100+ year service life of the bridge are difficult to predict because vessel traffic and river-level conditions vary from year to year and economic trends for maritime commerce may change over time. Under the Modified LPA with the double-deck fixed-span or single-level fixed-span configurations, future vessel traffic would be restricted to vessels that could navigate the 116-foot fixed-span, height-restricted navigation of the waterway. The Modified LPA with a single-level movable-span configuration would retain 178 feet VNC; all vessels and cargo that transit the existing Interstate Bridge would continue to transit in the future.

Upper Vancouver Turning Basin

Under the Modified LPA, the proposed Columbia River bridges would be constructed to the west of the existing Interstate Bridge. Consequently, all of the bridge configurations would shift the Upper Vancouver Turning Basin west by approximately 300-350 feet compared to the No-Build Alternative. This shift would continue to provide horizontal distance and vertical depth for vessels that have historically used this turning basin, allowing them to make similar turning movements in the future.

Summary of Long-Term Effects

Table 3.2-6 compares the long-term effects to navigation on the main stem of the Columbia River of the Modified LPA to the No-Build Alternative.

The new North Portland Harbor bridges proposed under the Modified LPA would not reduce or increase vessel navigation clearance from current conditions. In addition, mariners transiting the North Portland Harbor would continue to have an alternate route via the main channel of the Columbia River. Therefore, no long-term effects to navigation are expected to result from the new North Portland Harbor bridges.

Table 3.2-6. Summary of Long-Term Effects to Columbia River Navigation from the No-Build Alternative and Modified LPA

Navigation Component	No-Build Alternative	Modified LPA with Double-Deck or Single-Level Fixed-Span (Girder, Extradosed, Finback) Configurations	Modified LPA with Single-Level Movable-Span Configuration
Primary Navigation Channel	Location: North Width: 263 feet Height: 39 feet (closed) to 178 feet (open)	Location: Center Width: 400 feet Height: 116 feet	Location: Center Width: 400 feet Height: 92 feet (closed) to 178 feet (open)
North Barge Channel	Location: Center Width: 511 feet Height: 46–70 feet	Location: North Width: 400 feet Height: 100 feet	Location: North Width: 400 feet Height: 99 feet
South Barge Channel	Location: South Width: 260 feet Height: 72 feet	Location: South Width: 400 feet Height: 110 feet	Location: South Width: 400 feet Height: 90 feet
Navigation Safety	Primary navigation channel (north location) would provide straightest route to/from the BNSF Railway Bridge compared to existing barge (center) and alternate barge (south) channels	Wider HNC for all channels Reduced VNC for new primary navigation channel Increased VNC for the north barge channel and south barge channel Improve alignment with the BNSF Railway Bridge Increased visibility	Wider HNC for all channels Same or increased VNC for all channels Improved alignment with the BNSF Railway bridge Increased visibility
Number of In-water Pier Sets	9	6	6
Bridge Opening Restrictions	No lifts allowed on weekdays: 6:30 a.m. to 9:00 a.m. and 2:30 p.m. to 6:00 p.m.	N/A	Potentially more restrictions on openings allowed during weekday daytimes and early evenings [a]
Upper Vancouver Turning Basin	Approximately 2,000 feet long	Maintained length with an approximately 300-325-foot shift west	Maintained length with an approximately 350-foot shift west

Navigation Component	No-Build Alternative	Modified LPA with Double-Deck or Single-Level Fixed-Span (Girder, Extradosed, Finback) Configurations	Modified LPA with Single-Level Movable-Span Configuration
Seismic Resilience	Continued risks of impacts to navigation from potential earthquake events including the potential for the bridge failing and blocking or obstructing the navigation channels.	Increased seismic resiliency in event of potential earthquake reducing risk of bridge failure or collapse and blocking or obstructing the navigation channels.	Increased seismic resiliency in event of potential earthquake reducing risk of bridge failure or collapse and blocking or obstructing the navigation channels.
Demolition	N/A	Existing bridge foundation elements would be removed to a depth determined by the USACE to not pose a hazard to current or future dredging operations.	Existing bridge foundation elements would be removed to a depth determined by the USACE to not pose a hazard to current or future dredging operations.

a New bridge opening restrictions would require coordination with USCG and mariners. Federal rulemaking process would need to occur to modify current restrictions for long-term operations of the Modified LPA with a single-level movable-span configuration.

HNC = horizontal navigation clearance; LPA = Locally Preferred Alternative; N/A = not applicable; USACE = U.S. Army Corps of Engineers; USCG = U.S. Coast Guard; VNC = vertical navigation clearance

3.2.4 Temporary Effects

No-Build Alternative

No Program-related construction activities would take place under the No-Build Alternative that would have temporary effects to navigation.

Modified LPA

Construction of the Modified LPA includes the construction of the new bridges and removal of the existing Interstate Bridge. Construction activities would result in temporary effects to navigation on the Columbia River. During construction of the Modified LPA, some of the new piers, which are located outside of the current navigation channel, would not line up with the existing piers. Construction of the new bridge pier sets would occur one-by-one, resulting in changes to the three navigation channels at different points in time. For the estimated 4- to 7-year duration of construction, the existing Interstate Bridge would still be operational, and channels would be restricted by the presence of both the existing and constructed piers until demolition of the existing piers could occur. HNC could be further affected due to crane barges and other equipment present in the vicinity of the channel during pier construction. Smaller vessels and most recreational craft, which have limited horizontal and vertical clearance needs, would not be restricted from passing.

Construction would be staged so that at least one navigation channel would be open at a given time. A minimum unobstructed navigation clearance of 72 to 75 feet (vertical) by 150 to 200 feet (horizontal) would be maintained during construction. This clearance would meet vessel clearance needs of most waterway users; however, accommodations would be implemented to maintain safe passage through the construction area. Pilot and tug master feedback during the navigation simulations provided the following observations for the construction conditions:[4]

- The north barge channel/existing primary navigation channel felt like a typical transit through the existing north channel with more obstacles due to passing through two pairs of bridges. Overall, the mariner had limited concerns with this channel during construction.
- The navigation clearance limitations on the south barge channel, pilots/tug masters noted the channel is tight. As a result, until mariners are familiar with transiting this channel the 2-barge (length) by 2-barge (abreast) tows should be broken into a narrower 2-barge (length) by 1-barge (abreast) tow. For specialty barges, maneuvers should happen during daylight to have greatest visibility. Additionally, the deckhand would need to be on the barge constantly giving the tug captain distances throughout this transit, an assist tug would be required, and environmental conditions would need to be evaluated for each transit.
- All construction barges should have an active Automatic Identification System (AIS) signal and construction channel lines should be updated on the published navigation charts.

For vessels requiring greater than 72 to 75 feet VNC, advance coordination would be undertaken to seek opportunities to accommodate larger vessels and cargo with construction activities. Closures or restrictions on river traffic would need to be approved by the USCG and communicated in advance, enabling river users to accommodate their schedules without undue interruption. The majority of vessels currently using the navigation channel would be able to continue their use throughout most of the construction period. Larger

[4] The new primary navigation channel (center location) was assumed to have a minimum width of 200 feet and be limited to a vertical clearance of 43 feet during the simulated construction scenario. Thus, this channel would be closed as none of the design vessels would have sufficient clearance (see Appendix H, List of Technical Reports, Navigation Simulation Study, for additional details on the modeling assumptions for simulations).

vessels may require a tug to assist their navigation of the construction area, particularly if a vessel is traveling downriver with cargo.

The VNC restrictions during construction would prevent the *Yaquina* from navigating above the Interstate Bridge to conduct yearly maintenance dredging of the federal navigation channel. Without yearly maintenance dredging portions of the river could shoal and reduce the ability of vessels to navigate the federal navigation channel or could require reduced loads and vessel drafts. Modifications to the *Yaquina*, such as converting the fixed mast to a lowerable mast, use of alternative vessels, or changing dredging methods would be required to fulfill the USACE's navigation missions during these time periods.

While the size of vessels transiting the North Portland Harbor is more limited than those using the mainstem of the Columbia River, construction staging schemes would be devised for the Modified LPA to minimize adverse impacts to the vessels using North Portland Harbor. Construction in North Portland Harbor is not expected to occur at the same time as the Columbia River; thus, many vessels that typically transit North Portland Harbor could use the Columbia River as an alternate route. Restrictions and temporary closures of the navigation channel and the availability of the alternate route would be communicated to marinas and moorages on North Portland Harbor, as these are the primary users.

Temporary navigation effects under the single-level movable-span configuration would be similar in character to those described above but would be more pronounced because of the larger footings and piers on either side of the primary navigation channel and the additional construction time, materials, and equipment needed to construct this option compared to the fixed-span configurations.

See Section 3.2.6 for more discussion of staging and related construction-phase mitigation.

3.2.5 Indirect Effects

Under the Modified LPA with fixed-span configurations, vessels or cargo that would be height-limited and unable to transit beneath the new Columbia River bridges could have potential indirect effects on upstream marine-dependent uses. Based on state, port, and local jurisdictions' land use plans, these potential indirect effects would be expected to have limited, at most, impact on future upriver economic activity since there are few upstream opportunities for new or expanded commercial and industrial developments dependent on height-constrained vessels service (Appendix H. Navigation Impact Report). The Modified LPA with movable-span configuration would have no indirect effects to upstream marine-dependent uses.

The Columbia River waterway is currently authorized to a depth of 27 feet from the Interstate Bridge to The Dalles, approximately 83 river miles upstream, and could support greater navigation upriver from the Interstate Bridge than it currently does if the waterway were deepened from the currently maintained depth of 17 feet. However, no new marine-dependent developments are currently known to be planned upstream of the Columbia River bridges.

Constraints related to land use controls and business demand, rather than reducing the VNC from 178 feet (No-Build Alternative) to 116 feet (Modified LPA with fixed-span configurations), represent the primary factors that could potentially impact future commercial and industrial development upstream. Land use restrictions imposed by the Columbia River Gorge National Scenic Area, along with topography, transportation access parallel to shorelines (SR 14, I-84, the BNSF Railway, and the Union Pacific Railroad), and existing protected open spaces, are the limiting factors for future water-dependent commercial and industrial development. Overall, the Modified LPA is expected to result in little to no indirect impact to upstream marine-dependent land uses. See Section 3.4, Land Use and Economic Activity, for further discussion on indirect effects to land uses and the economy.

3.2.6 Potential Avoidance, Minimization, and Mitigation Measures

Long-Term Effects

Regulatory Requirements

- Standards and regulatory measures to avoid or minimize long-term effects on navigation have been evaluated and screened. These measures have been incorporated during the development of the Modified LPA to the extent possible and will continue to be refined as the design progresses.

Avoidance Measures

The Modified LPA with a fixed-span configuration would have long-term effects to marine-based operations currently operating on the Columbia River, including five vessels and three upstream fabricators when shipping large cargo requiring VNC over 116 feet. Under the double-deck and single-level fixed-span configurations, these vessels and cargo shipments would be unable to transit beneath the new Columbia River bridges in either some conditions when river levels approach or exceed ordinary high water levels or be permanently precluded from transiting the bridge. The IBR Program would continue to coordinate with the affected vessel owners and river users to reach mutually acceptable decisions and agreements to avoid impacts through adjustments to vessels or business operations prior to publication of the Final SEIS.

Program-Specific Mitigation

In addition to regulatory requirements, potential Program-specific mitigation measures have been identified and will be developed with the Modified LPA design.

Specific mitigation for navigation includes:

- Provide obstruction marking and lighting to make the river crossing structures visible to river traffic. Design roadway or accent lighting on the bridges and surrounding interchanges to limit light or glare that could affect river navigation.
- Update navigation charts and other navigation publications to reflect changes to VNC and HNC for future river users.

Temporary Effects

Regulatory Requirements

To protect and minimize temporary effects on navigation during construction, standard and regulatory mitigation measures such as best management practices (BMPs) would be implemented. Construction BMPs applicable to the Modified LPA are discussed in Section 3.14, Water Quality and Hydrology.

Standard and regulatory mitigation measures for navigation include:

- Develop construction phasing and staging plans to help ensure that construction activities would be planned to maintain a minimum channel for navigation. The Construction Staging Plan would be reviewed and approved by the USCG Captain of the Port prior to construction. Coordination and approval by the USCG Captain of the Port would occur for changes to the three navigation channels at each of the different times bridge pier sets would be constructed. Closures or restrictions on river traffic would be communicated in advance, enabling river users to accommodate their schedules, tug and barge configurations, requirements for assist tugs, shipping marine freight by other modes (e.g., truck, rail), use of different vessels with lower vertical clearance, and other options during construction activities that disrupt navigation and enable USACE to fulfill its navigation missions.

- Provide Local Notice to Mariners throughout construction to provide information to tug operators, pilots, and the public.

Program-Specific Mitigation

- Make available an assist tug(s) to support safe navigation when vertical or horizontal clearances are reduced and assistance is needed to safely navigate the restricted channel.
- Conduct outreach to inform the navigation community, recreational boaters, and other river users of waterway restrictions and other construction activities that may restrict or otherwise change local navigation conditions.
- Provide information via local maritime publications, social media, local media, and other similar platforms.
- Provide signage and notices at boat ramps, water access points, marinas, and other locations frequented by river users to inform them of the construction activities and where additional information can be found on the Program.
- Notify individual vessel owners where information indicates they could be specifically impacted during construction.
- Require all construction barges to have active AIS signals and construction channel lines be updated on the published navigation charts.
- Modify the USACE Dredge *Yaquina* to have a lowerable mast or other feature to enable passage of the Interstate Bridge during construction.

3.3 Property Acquisitions and Displacements

This section identifies, describes, and evaluates short-term and long-term property and property rights effects for the Modified LPA. It also describes measures to help avoid, minimize, or mitigate adverse effects. The information presented in this section is based on the analysis described in the Acquisitions Technical Report, which provides information about each property acquisition and displacement.

3.3.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with property acquisitions and displacements has been updated in this Draft SEIS to include:

- Changes in land use as a result of new development and redevelopment in the area (e.g., closure of the Safeway on Hayden Island, new residential development, and development at the Vancouver Waterfront).
- Changes in the project footprint necessitated by changed conditions resulted in shifting the LRT alignment and modifying interchange designs.

Table 3.3-1 compares the impacts and benefits of the CRC LPA and the IBR Modified LPA. Based on the analysis described in this section, the effects of the Modified LPA would be similar to, but less than, the effects of the CRC LPA. Changes to the design of the CRC LPA have reduced the number of acquisitions and displacements. Key modifications that led to this reduction include replacing the full interchange on Hayden Island with a partial interchange and moving the LRT alignment adjacent to I-5 rather than along local streets in downtown Vancouver.

Table 3.3-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects Identified in this Section [a]	Explanation of Differences
Total Acquisitions (Full and Partial Acquisitions) [b]	217 parcels	Between 178 and 180 parcels	The reduction results from changes in land uses and design modifications necessitated by other changed conditions. Design modifications include replacing the full interchange on Hayden Island with a partial interchange and moving the LRT alignment adjacent to I-5 rather than in downtown Vancouver. One design option (Waterfront Park-and-Ride Site #3 Option) would result in the acquisition of 180 parcels, while the other design options would result in 178 acquisitions.

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects Identified in this Section [a]	Explanation of Differences
Total Residential Displacements [c]	59 units	Between 43 and 76 units	See above; one design option (Modified LPA with I-5 mainline westward shift) would result in the loss of 76 residential units, while the other design options would displace 43 units.
Total Commercial Displacements	69 businesses	Between 36 and 39 businesses [d]	See above; one design option (Modified LPA with I-5 mainline westward shift) would result in the loss of 39 businesses, while the other design options would displace 36 businesses. The Waterfront Park-and-Ride Site #3 Option would result in one additional business displacement.
Total Public Use Displacements	2 sites	1 sites	The reduction results from changes in land uses and design modifications necessitated by other changed conditions.

a Acquisition and displacement totals could vary slightly depending on design option chosen. Refer to Section 3.3.3 for more information.

b Does not include ODOT-owned property or right of way or City-owned right of way.

c Does not include the displacement of houseless individuals.

d Does not include the displacement of a billboard and a cellular phone tower.

CRC = Columbia River Crossing; EIS = environmental impact statement; LPA = locally preferred alternative; LRT = light-rail transit

3.3.2 Existing Conditions

This section describes vacancy and rental rates for residential, commercial, and industrial properties in the study area (Figure 3.3-1), which are indicators of the potential for finding viable sites for relocating displaced residents and businesses.

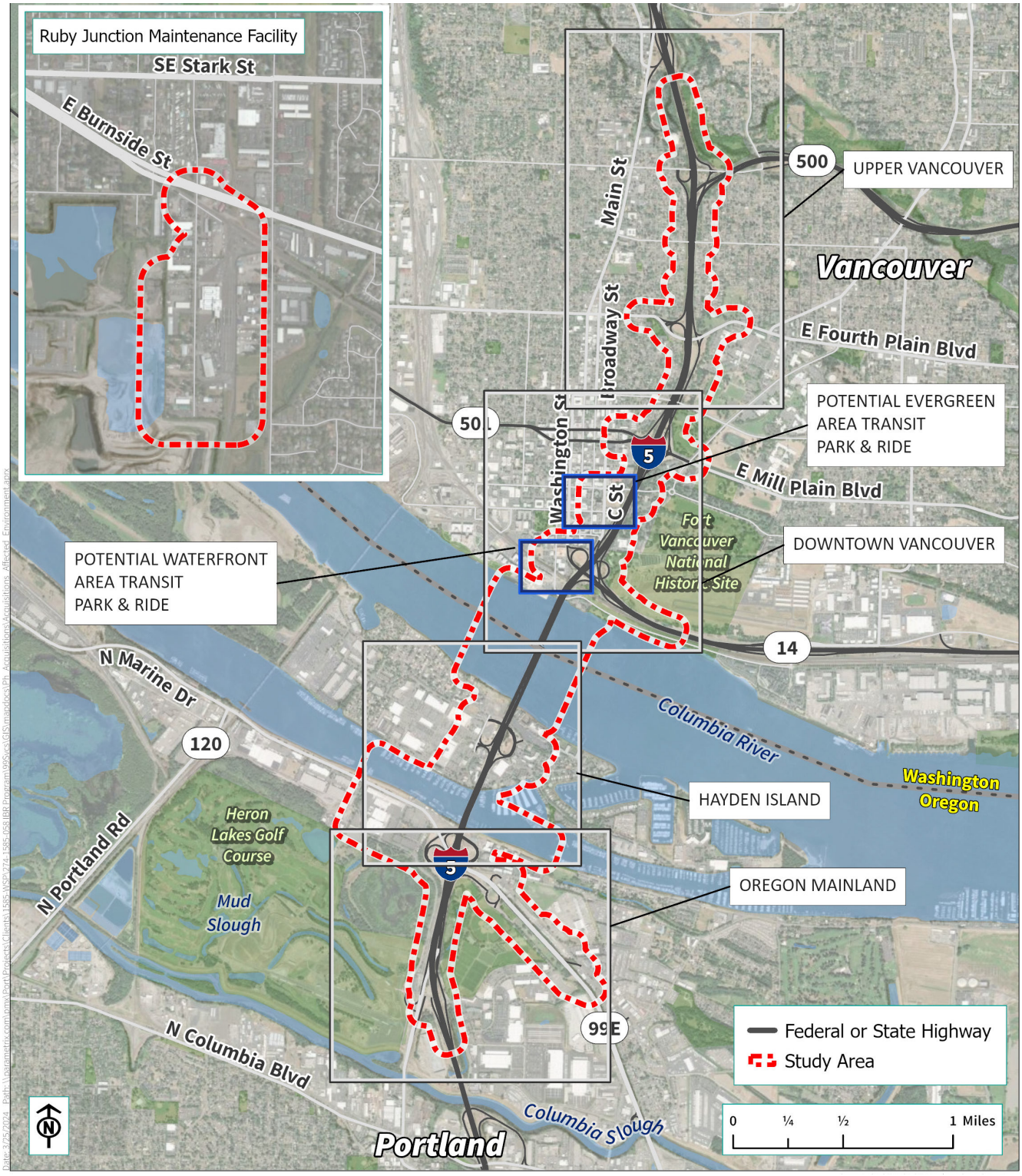
Portland-Vancouver Area

According to the Regional Multiple Listing Service, in July 2023 the Portland area (including Oregon suburbs but excluding communities in Washington) had a 2.5-month supply of homes for sale and a year-to-date median home sale price of $532,000. In the same month, Clark County had a 1.7-month home supply and a year-to-date median home sale price of $515,000.

In the second quarter of 2023, Vancouver had a 6.2% multifamily residential vacancy rate, with a rental rate averaging $1.81 per square foot per month (CoStar 2023). North Portland had a vacancy rate of 8.5% for multifamily residential rental units and a rental rate averaging $2 per square foot per month, while Northeast Portland had a vacancy rate of 6.9% and a $2.41 average rental rate per square foot per month.

Office space in the greater Portland-Vancouver metropolitan area was more available (22.2% vacancy rate) than either retail (4.5%) or industrial (2.6%) space (CBRE 2023). In the second quarter of 2023, the North Portland subarea, which includes Hayden Island, experienced an estimated 9.7% retail building vacancy rate, while the Vancouver subarea experienced an estimated vacancy rate of 5.8% (CBRE 2023).

Figure 3.3-1. Primary Study Area and Subareas



Portland-Vancouver metropolitan area vacancy rates were projected to decrease for retail and industrial space through 2025 and to increase for office space (SVN Bluestone & Hockley 2021b). The trend in increasing office space vacancies is likely due to more employees working from home rather than in traditional office settings. Additional office and retail spaces planned and currently under construction along the Vancouver waterfront could shift both vacancy and rental rates for the Vancouver subareas as they are completed.

North Portland Harbor, Portland, Oregon

In the North Portland Harbor area, a search of the active Regional Multiple Listing Service listings in August 2023 showed approximately 78 housing units listed for sale in the study area. Of that number, 34 were floating homes, 28 were condos, 6 were mobile homes, and 10 were conventional homes.

Gresham, Oregon

An analysis of vacancy rates was also performed for the area around the Ruby Junction Maintenance Facility in Gresham, Oregon (Figure 3.3-1). According to the Regional Multiple Listing Service, in August of 2023, the Gresham-Troutdale subarea had a median year-to-date sale price of $480,000. In the second quarter of 2023, the area had a 3.8% multifamily residential vacancy rate and an average rental rate of $1.49 per square foot for rentals (CoStar 2023).

3.3.3 Long-Term Benefits and Effects

No-Build Alternative

Under the No-Build Alternative, the existing interstate, local roads, and associated infrastructure would remain as they are today, and there would be no temporary or permanent acquisitions of properties.

Modified LPA

Property, including space underground (subsurface)[1] or in the air (airspace),[2] would be required to accommodate the proposed transportation facilities and their long-term operation and maintenance. Long-term operation and maintenance would require permanent acquisition, where the agency obtains complete ownership of the property, or a permanent easement, where the agency would obtain some rights to the land, air, or subsurface, but not would not assume full ownership. Both full and partial acquisitions could result in the displacement of residences, businesses, or public facilities from the parcel. Acquisition of property would typically occur through negotiated purchase or eminent domain.[3]

Construction and long-term operation and maintenance of the Modified LPA, including all design options, would permanently acquire approximately 47 acres of property, including approximately 4.3 acres in permanent subsurface easements, which are required for the potential installation of tie-back anchors associated with retaining walls. Under the Modified LPA with all design options, except the I-5 westward shift, this permanent property acquisition would be from a total of 178 parcels, with 46 full acquisitions and 132 partial acquisitions (Table 3.3-2 and Table 3.3-3). The I-5 westward shift would result in one less total acquisition. Figure 3.3-2 shows the potential property acquisitions for the Modified LPA in both Oregon and Washington, while Figure 3.3-3 shows a more detailed view of how acquisitions in downtown Vancouver would differ among design options. Acquisitions in Oregon would be the same for all design options. Detailed maps and a list of all properties identified for acquisition are included in Appendix A and Appendix B of the Acquisitions Technical Report.

[1] Subsurface lease requirements are preliminary and will be updated prior to construction.

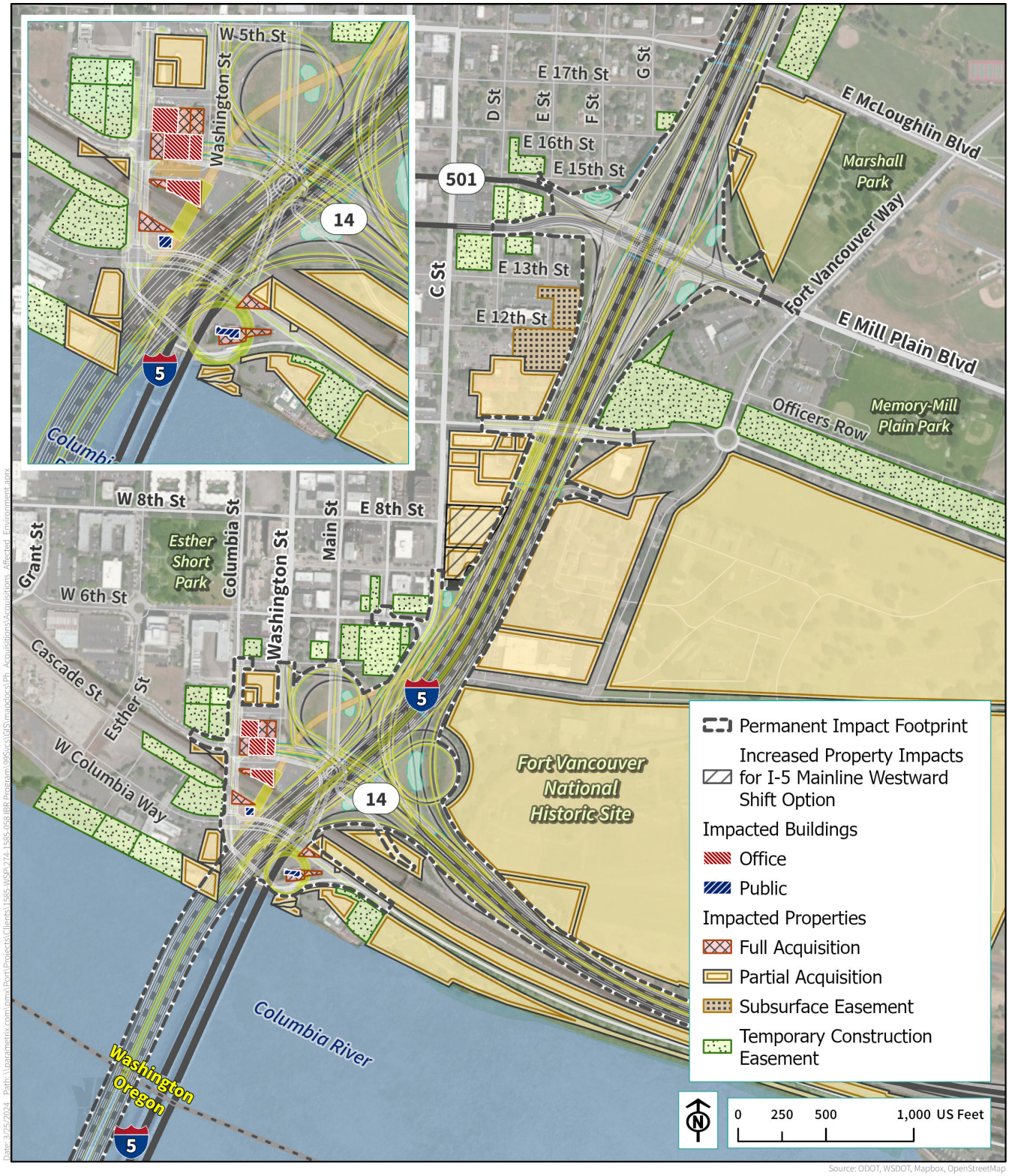
[2] Airspace leases have not been determined but will be identified prior to construction.

[3] In Washington, eminent domain is defined as the right of a government to acquire private property for public purpose following payment of just compensation to the property owner. In Oregon, "an authority may acquire, by the exercise of the power of eminent domain, any real property which it deems necessary for its purposes after adoption by it of a resolution declaring that the acquisition of the real property described therein is necessary for such purposes." Just compensation is required in both states.

Figure 3.3-2. Potential Property Acquisitions

Note: All design options would have similar impacts except the I-5 westward shift option. The increased property impacts associated with the I-5 westward shift option are denoted with a diagonal cross-hatched overlay, as shown in the legend. More detail is visible in Figure 3.3-3.

Figure 3.3-3. Detail of Property Acquisitions in Downtown Vancouver



Note: All design options would have similar impacts except the I-5 westward shift option. The increased property impacts associated with the I-5 westward shift option are denoted with a diagonal cross-hatched overlay, as shown in the legend.

Table 3.3-2. Summary of Permanent Property Acquisitions and Displacements for the Modified LPA in Oregon

Property Acquisition and Displacements	Type	Modified LPA Totals [a,b]
Parcels (count)	Full Acquisitions	25
	Partial Acquisitions	43
	Total	**68**
Displacement: Residential (number of dwellings)	Single-family	36
	Multifamily	0
Displacement: Commercial (number of businesses)	Retail, Services	23
	Office, Professional, Healthcare	1
	Lodging	0
	Other [c]	2
Displacement: Public Use (number of sites)	Public Service with Employees	0
	Religious/Community Center	0
	Park, Historic Site, Museum	0
	School	0
Permanent Acquisitions	Area Acquired	36.5 acres
Permanent Easements	Subsurface Easements [d]	0.1 acres
	Property Easements [e]	0 acres
Total of Permanent Acquisitions and Easements	**Total Area Acquired**	**36.6 acres**

a Parcel impacts, displacements, or total acreage, are only counted once when more than one mode (highway, transit, or bicycle and pedestrian) would result in the same or overlapping acquisition.

b Does not include ODOT-owned property or right of way or City-owned right of way.

c Includes a billboard at the Marine Drive interchange and a cellular phone tower.

d Subsurface easement requirements are preliminary and will be updated prior to construction.

e Airspace easements have not been determined but will be identified prior to construction.

LPA = locally preferred alternative

Table 3.3-3. Summary of Permanent Property Acquisitions and Displacements for the No-Build Alternative and the Modified LPA in Washington

Property Acquisitions and Displacements	Type	No-Build	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5 [a,b]	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Centered I-5, without C Street Ramps	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Westward Shift [a,b]	Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5 [c]	Modified LPA with Single-Level [d] Fixed-Span or Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5 [e]
Parcels (count)	Full Acquisitions	0	21	21	23	21	21
	Partial Acquisitions [f]	0	89	89	86	89	89
	Total	**0**	**110**	**110**	**109**	**110**	**110**
Displacement: Residential (number of dwelling units)	Single-family	0	7	7	7	7	7
	Multifamily	0	0	0	33	0	0
Displacement: Commercial (number of businesses)	Retail/Services	0	0	0	3	0	0
	Office/ Professional/ Healthcare	0	10	10	10	10	10
	Lodging	0	0	0	0	0	0
	Other	0	0	0	0	0	0
Displacement: Public Use (number of sites)	Public Service with Employees	0	1	1	1	1	1
	Religious/Community Center	0	0	0	0	0	0
	Park/Historic Site/ Museum	0	0	0	0	0	0
	School	0	0	0	0	0	0
Permanent Acquisitions	Area Acquired	0	5.4 acres	5.4 acres	6.3 acres	5.5 acres	5.7 acres

Property Acquisitions and Displacements	Type	No-Build	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5 [a,b]	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Centered I-5, without C Street Ramps	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Westward Shift [a,b]	Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5 [c]	Modified LPA with Single-Level [d] Fixed-Span or Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5 [e]
Permanent Easements	Airspace Easements [g]	0	Less than 1 acre	Less than 1 acre	Less than 1 acre	Less than 1 acre	Less than 1 acre
	Subsurface Easements [h]	0	4.2 acres	4.2 acres	3.6 acres	4.2 acres	4.2 acres
	Property Easements	0	0 acres	0 acres	0 acres	0 acres	0 acres
Total of Permanent Acquisitions and Easements [i]	**Total Area Acquired**	**0**	**10.6 acres**	**10.6 acres**	**10.9 acres**	**10.7 acres**	**10.9 acres**

a Parcel impacts, displacements, or total acreage, are only counted once when more than one mode (highway, transit, or bicycle and pedestrian) result in the same or overlapping acquisition.

b Does not include WSDOT-owned property or right of way or City-owned right of way.

c If coupled with the I-5 westward shift and a single-level fixed- or movable-span configuration, the two auxiliary lane option could require up to 11.1 acres of permanent acquisitions and easements.

d A single-level fixed-span or movable-span configuration would require partial acquisition of 0.2 acres from properties at the bridge approaches that would not be acquired with a double-deck bridge configuration.

e Reflects impacts for both the single-level fixed-span and movable-span configurations, regardless of bridge type.

f Properties requiring subsurface easements are included in the count of partial acquisitions.

g Airspace easements have been rounded up to 1 acre.

h Subsurface easement requirements are preliminary and will be updated prior to construction.

i The inclusion of the park-and-ride options would result in up to 1.5 additional acres of permanent acquisitions and easements at the Waterfront Park and Ride facility (Site 3) and up to 3.16 additional acres of permanent acquisitions and easements at the Evergreen Park and Ride facility (Site 1).

Aux = auxiliary; LPA = locally preferred alternative

Table 3.3-2 summarizes the permanent property acquisitions and displacements required for the Modified LPA in Oregon, and Table 3.3-3 summarizes property impacts for the Modified LPA design options in Washington. The design options within Washington would differ slightly in their impacts, as follows:

- The Modified LPA with double-deck bridge configuration, one auxiliary lane, with or without the C Street ramps, and centered I-5 would result in a total of 10.6 acres of permanent acquisitions and easements.
- The Modified LPA with two auxiliary lanes would require an additional 0.1 acres of permanent acquisition from the Fort Vancouver property on the east side of I-5 beyond what would be needed for the option with one auxiliary lane. The total permanent acquisition and easement area would be 10.7 acres. If coupled with the I-5 westward shift and a single-level fixed-span or movable-span configuration (regardless of bridge type), the Modified LPA with two auxiliary lanes could require up to 11.1 acres of permanent acquisitions and easements, which would be the highest-impact combination of the design options. The inclusion of the park-and-ride options would result in up to 1.5 additional acres of permanent acquisitions and easements at the Waterfront Park and Ride facility (Site 3) and up to 3.16 additional acres of permanent acquisitions and easements at the Evergreen Park and Ride facility (Site 1).
- The Modified LPA with a single-level fixed-span or movable-span configuration, regardless of bridge type, would require partial acquisition of 0.2 acres from properties at the bridge approaches that would not be acquired with a double-deck bridge configuration. Total permanent acquisitions and easements for this option would be 10.9 acres.
- In downtown Vancouver, the Modified LPA with I-5 mainline shift west would require the permanent acquisition of additional properties and associated displacements beyond those identified for the centered I-5 option. The shift would result in the full displacement of a multifamily property with 33 residential units on the northeast corner of E 7th Street and C Street. The property directly north of the apartment complex, which includes three commercial businesses, would also be fully acquired and the three businesses would be displaced. Total permanent acquisitions and easements would be 10.9 acres.

As described in Chapter 2, there are three site options for a new park and ride facility near the proposed Waterfront Station. Two of these sites (Sites 2 and 3) would require the acquisition of additional property beyond that needed for the highway and transit facilities. Site 2 would require full acquisition of one commercial parcel and no displacements. Site 3 would require full acquisition of four commercial parcels and displacement of one business. Site 1 would not require any acquisitions or displacements. Property impacts associated with the Waterfront Station park-and-ride options are shown in Table 3.3-4 and are in addition to the impacts identified in Table 3.3-3.

Two site options are being considered for a new park-and-ride facility near the proposed Evergreen Station. One of these sites (Site 1) would make use of an existing parking structure through a lease agreement; it would require the full acquisition of five commercial properties adjacent to the Vancouver Community Library, but no displacements. Site 2 would not require any acquisitions or displacements. Property acquisitions associated with the Evergreen Station park-and-ride facility are shown in Table 3.3-5 and are in addition to the impacts identified in Table 3.3-3.

Property owners, business owners, and residents affected by property acquisition and residential or business displacements would receive compensation and relocation assistance, as described in Section 3.3.6, Potential Avoidance, Minimization, and Mitigation Measures. Several types of properties or businesses may be difficult to relocate based on location and/or property type. These include small restaurants and taverns on Hayden Island, which rely on local patronage and may be difficult to reestablish elsewhere, as well as marine-oriented businesses adjacent to North Portland Harbor that require a waterfront location. Floating homes may also be difficult to relocate due to limited nearby moorage opportunities.

Table 3.3-4. Summary of Permanent Property Acquisitions and Displacements for the Waterfront Park-and-Ride Facility in Downtown Vancouver

Property Acquisitions and Displacements	Type	Site 1 [a,b,c]	Site 2 [a,b]	Site 3 [a,b]
Parcels (count)	Full Acquisitions	0	1	4
	Partial Acquisitions	0	0	0
	Total	**0**	**1**	**4**
Displacement of Use	Residential	0 units	0 units	0 units
	Office/Professional/Healthcare	0 businesses	0 businesses	1 business
Permanent Acquisitions	Area Acquired	0 acres	0.1 acres	1.5 acres
Permanent Easements	Property Easements [d, e]	0 acres	0 acres	0 acres
Total of Permanent Acquisitions and Easements	**Total Area Acquired**	**0 acres**	**0.1 acres**	**1.5 acres**

a Parcel impacts, displacements, or total acreage, are only counted once when more than one mode (highway, transit, or bicycle and pedestrian) result in the same or overlapping acquisition.

b Does not include WSDOT-owned property or right of way or City-owned right of way.

c Properties associated with Site 1 would be affected by IBR Program roadway and pedestrian improvements regardless of whether the site is developed as a park and ride.

d Airspace easements have not been determined but will be identified prior to construction.

e Subsurface easement requirements are preliminary and will be updated prior to construction.

Table 3.3-5. Summary of Permanent Property Acquisitions and Displacements for the Evergreen Park-and-Ride Facility in Downtown Vancouver

Property Acquisitions and Displacements	Type	Site 1 [a,b,c]	Site 2 [a,b,d]
Parcels (count)	Full Acquisitions	5	0
	Partial Acquisitions	0	0
	Total	**5**	**0**
Displacement of Use	Residential/Commercial	None	None
Permanent Acquisitions	Area Acquired	3.16 acres	0 acres
Permanent Easements	Property Easements [e,f]	0 acres	0 acres

Property Acquisitions and Displacements	Type	Site 1 [a,b,c]	Site 2 [a,b,d]
Total of Permanent Acquisitions and Easements	**Total Area Acquired**	**3.16 acres**	**0 acres**

a Parcel impacts, displacements, or total acreage, are only counted once when more than one mode (highway, transit, or bicycle and pedestrian) result in the same or overlapping acquisition.

b Does not include WSDOT-owned property or right of way or City-owned right of way.

c Properties associated with Site 1 would be developed as a joint venture between the IBR Program and the City of Vancouver.

d The existing parking structure would be used via lease with the existing owner.

e Subsurface easement requirements are preliminary and will be updated prior to construction.

f Airspace easements have not been determined but will be identified prior to construction.

- **Floating Homes in North Portland Harbor.** Up to 35 floating homes in North Portland Harbor would be displaced by the Modified LPA. Floating homes would be treated as personal property and would be relocated to moorages within the area if available. If the relocation study determines that sufficient replacement sites are not available, the floating homes would be purchased at fair market value and the occupants would be provided relocation assistance, which may include payments, if necessary, to acquire decent, safe, and sanitary replacement housing.

Acquisition of DOT-Owned Property

Construction of the Modified LPA would expand into existing WSDOT and ODOT (DOTs) right of way adjacent to I-5. The highway and transit improvements would also require the transfer of other DOT-owned properties located outside of the I-5 right of way. As this land is already owned by the DOTs, it is not counted as an acquisition in the total acreage requirements, although the displacement of the publicly owned facilities *is* included and disclosed in this document.

- **Businesses on Hayden Island.** More than one-quarter of the commercial businesses that would be displaced by the Modified LPA are located on Hayden Island. Although there are multiple vacant buildings on Hayden Island, including those in and around the Jantzen Beach Center, the island has limited capacity to accommodate the 15 businesses that would be displaced. As a result, while some of the displaced businesses would be able to reestablish on Hayden Island or nearby, many may have to relocate outside Hayden Island. Due to natural resource areas and zoning, small restaurants and taverns may not be able to find replacement sites on or near Hayden Island.
- **Marine Businesses in North Portland Harbor.** The marine businesses that would be displaced from the south shore of North Portland Harbor may be difficult to relocate given the limited waterfront space available and the in-water infrastructure these businesses need. These businesses may have to relocate to available sites upstream or downstream on the Columbia River or to sites on the Willamette River.
- **Shared Light Industrial and Residential Uses in Ruby Junction.** Three light industrial businesses would be displaced by the Ruby Junction Maintenance Facility expansion. Although replacement industrial property is available in the Gresham area, some of these displaced parties may have to relocate outside the Gresham area.

The Acquisitions and Displacements Technical Report includes more information on relocation considerations for various property types.

3.3.4 Temporary Effects

Construction of the Modified LPA would include the construction of the new bridges and removal of the existing Interstate Bridge. Constructing the highway, transit, and bicycle and pedestrian facilities of the Modified LPA would require acquisitions, easement, and leases beyond the permanent right-of-way needs. Temporary rights likely would be required for construction, staging areas, and potentially casting yards.

No-Build Alternative

Under the No-Build Alternative, the existing interstate, local roads, and associated infrastructure would remain as they are today. With no new infrastructure, there would be no temporary impacts to properties.

Modified LPA

Construction Easements

Construction easements beyond the permanent acquisitions and displacements reported in Section 3.3.3, Long-Term Benefits and Effects, would be required for the temporary staging of equipment and materials. Property used temporarily during construction would be returned to its owner once construction is complete. Table 3.3-6 summarizes temporary construction easements that would be needed in Oregon and Washington. Temporary easements would not differ among the design options.

Table 3.3-6. Summary of Temporary Construction Easements

State	Residential Properties	Commercial and Industrial Properties	Public Properties	Vacant/Parking Properties	Total Properties
Oregon [a]	1	8	3	3	**15**
Washington	35	16	11	9	**71**

a Expansion at the Ruby Junction Maintenance Facility would not require temporary construction easements.

Staging and Casting Areas

Regardless of the design options selected, staging areas include areas outside of the state or city right of way that could be temporarily acquired for uses such as material or equipment storage, stockpiling soils, or providing employee parking or temporary construction offices. Two sites have been identified as possible major staging areas, including a former I-5 WSDOT rest area (5 acres) and the vacant Thunderbird Hotel site on Hayden Island (3.5 acres).

Casting yards, if used, would be areas outside the state or city right of way that could be temporarily acquired for pre-casting of concrete segments for construction of the bridges and ramps. These areas would require barge access, in addition to road and/or rail access, and could also be used for storage of materials or equipment. The need for casting yards has not yet been determined and would depend on the bridge type and construction methods selected. The need for casting sites would be identified during later phases of project design or by a contractor, and the necessary environmental evaluation and permitting would be completed at that time.

3.3.5 Indirect Effects

Regardless of the design options selected, land uses and properties not directly impacted by the Modified LPA could experience indirect effects. Project elements such as realigned streets, active transportation improvements, and the addition of light-rail could change the viability of and demand for uses within and around the project footprint. Examples of such indirect effects could include denser, multiuse development around transit stations on Hayden Island and downtown Vancouver and additional commercial uses along newly developed roads near the Marine Drive interchange, on Hayden Island, and in downtown Vancouver. As described in Section 3.4, Land Use and Economic Activity, such development would be consistent with current local land use plans, which anticipate and encourage increased density in these areas. Indirect impacts to property could also occur during project construction as a result of road closures, noise, or other construction activities. Properties directly adjacent to acquired properties and to areas of active construction would be most likely to experience these types of impacts.

For additional information on potential Program-related indirect effects, see the Land Use and Economic Activity, Visual Quality, Parks and Recreation, and Noise and Vibration sections of this Draft SEIS.

3.3.6 Potential Avoidance, Minimization, and Mitigation Measures

Long-Term Effects

Regulatory Requirements

Where property acquisition and residential or business displacements are unavoidable, those affected would receive compensation and relocation assistance from ODOT or WSDOT, depending on location. Property would be purchased at fair market value, and residential occupants displaced by the Modified LPA would be provided decent, safe, and sanitary replacement housing. Displaced households and businesses would be relocated per the Uniform Relocation and Real Property Acquisitions Policies Act of 1970, as amended (see sidebar). The Acquisitions and Displacements Technical Report includes more information on the provisions of the Uniform Act and the processes used to value properties and provide relocation assistance.

Providing Relocation Assistance

The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Uniform Act) provides important protections and assistance for people affected by federally funded projects. Congress enacted it to ensure that people whose real property is acquired, or who have to move as a result of projects receiving federal funds, are treated fairly and equitably and receive assistance in moving from the property they occupy. The IBR Program and all project partners will follow the requirements of this act.

The Uniform Act provides measures to minimize the hardships of relocation for the occupants. For example, individuals cannot be displaced from their residences unless a comparable replacement residence is available, and individuals cannot be required to move less than 90 days after an offer to purchase has been made. Homeowners and tenants may receive payments for moving expenses and, if necessary, the increased cost of replacement housing. Businesses are also eligible for moving expenses and certain costs to reestablish their businesses. In addition, displaced individuals are offered advisory services to help them successfully relocate. This includes assistance in determining relocation needs, information concerning replacement properties, and timely written notifications of payment eligibility.

After the issuance of the Record of Decision for the SEIS, a Relocation Acquisition Management Plan would be prepared. The Relocation Acquisition Management Plan would contain a detailed analysis of available replacement properties and means for providing replacement housing for residential occupants displaced by the Modified LPA.

Program-Specific Mitigation

No Program-specific mitigation measures are proposed for long-term effects related to property acquisitions and displacements.

Temporary Effects

Regulatory Requirements

There are no specific regulatory requirements for mitigation of temporary property impacts.

Program-Specific Mitigation

As design progresses, the IBR Program would develop approaches to managing temporary construction easements as part of the overall right-of-way plan. The plan would identify measures that contractors would take to avoid, minimize, and mitigate impacts to property temporarily used for construction. Program-specific measures that may be included in the plan to minimize and mitigate for temporary effects related to property acquisition and displacements include:

- Mitigation for construction easements could include payment to property owners in exchange for the use of their property during construction. For example, one method for compensation would be to pay the equivalent of a rental based on the property valuation. Site impacts from temporary construction uses would be restored or compensated according to fair market or contributory value.
- Mitigation may be needed in areas where construction of the Modified LPA could block or impede access to residences or businesses. Continued access to properties during construction would be maintained to the extent possible. Specific provisions may include signage to let the public know that businesses are open and conducting construction during non-peak business hours.

3.4 Land Use and Economic Activity

Jurisdictions in the Portland-Vancouver region integrate transportation and land use planning to help ensure that major transportation improvements do not create unintended or unforeseen effects on land use patterns and the economy. Both Oregon and Washington have growth management laws to regulate land use and growth. The Modified LPA has been designed to accommodate the travel needs of existing land uses and support the region's anticipated growth and economic development. This section evaluates the potential effects of the Modified LPA on the region's land use planning goals and economic activity.

The information in this section is based on data in the Land Use and Economics Technical Reports (Appendix H), which contain greater detail and analysis of the information that follows.

3.4.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with land use and economic activity has been updated in this Draft SEIS to include:

- Updates to land use plans, policies, and regulations at the federal, state, regional, and local levels; updated zoning regulations for the Cities of Vancouver and Portland; updated environmental guidance for ODOT and WSDOT.
- Changes in businesses (e.g., closure of Safeway grocery store on Hayden Island).
- Land use changes in the study area, including development at the Vancouver Waterfront, changes in planned uses on Hayden Island, and recently constructed, altered, or removed buildings.
- Changes in the project footprint necessitated by changed conditions resulted in shifting the light-rail transit alignment and modifying interchange designs.

Table 3.4-1 compares the impacts and benefits of the CRC LPA to those of the IBR Modified LPA. There are no impacts from the Modified LPA that would differ substantially from those of the CRC LPA.

Table 3.4-1. Comparison of CRC LPA Effects and Modified LPA Effects

Technical Considerations	CRC Effects Identified in the 2011 Final EIS	Modified LPA Effects	Explanation of Differences
Direct land use impacts (conversion of a land use to a transportation use)	Approximately 90 acres total (approximately 70 acres in Oregon and 20 acres in Washington).	Approximately 47 acres total (approximately 37 acres in Oregon and approximately 10 acres in Washington, including approximately 4 acres of subsurface easements). Totals would vary slightly among the Modified LPA design options, primarily in downtown Vancouver.	The reduction is due to both changes in land uses and design modifications necessitated by changes in land uses and other changed conditions, including replacing the full interchange on Hayden Island with a partial interchange and moving the light-rail transit alignment along I-5 (removing the proposed couplet in downtown Vancouver).
Consistency with land use plans and policies	Consistent.	Consistent.	N/A
Business displacements	Approximately 70 businesses and 900 employees displaced.	Between 35 and 39 businesses (depending on design option) and up to 758 employees displaced.	The reduction in business displacements and decrease in employee displacement are due to changes in existing businesses as well as design modifications necessitated by changes in land uses and other changed conditions, including replacing the full interchange on Hayden Island with a partial interchange and moving the light-rail transit alignment along I-5 (removing the proposed couplet in downtown Vancouver).
Regional economy	The CRC LPA was determined to be highly beneficial to the regional economy. Some larger vessels would no longer be able to pass under the proposed fixed-span configuration; however, the CRC project worked with those river users to develop measures to avoid economic impacts. With the suspension of the CRC	The Modified LPA would result in benefits to the trucking industry by reducing labor costs, improving safety, potentially improving vehicle operating costs, and reducing scheduling uncertainty. New transit connections in downtown Vancouver would improve travel time accessibility and broaden the pool of labor available along the corridor and in the region. For the Modified LPA with any of the three bridge configurations, marine commerce would be slightly improved for many vessels because	Although the terminology is different, the findings are generally consistent between the CRC LPA and the Modified LPA.

Technical Considerations	CRC Effects Identified in the 2011 Final EIS	Modified LPA Effects	Explanation of Differences
	project, these measures were cancelled.	the new Columbia River bridges would allow most vessels to pass without timing restrictions, providing more flexibility in operating schedules and reducing wait times. Passage of vessels or cargo that require more than 116 feet of vertical navigation clearance would be permanently eliminated under either of the two fixed-span configurations. The IBR Program is coordinating with these existing river users to develop measures to avoid economic impacts through vessel or cargo modifications and other accommodations. No permanent, adverse effects to vessels and cargo shipments would occur with the movable-span configuration. Potential economic effects to businesses and river users that could be constrained by the new Columbia River bridges' height could include increased costs from changes to production, additional freight shipment costs, increased assembly costs, and lost potential for future revenue from projects.	
Estimated reduction in property tax due to business displacement	Approximately $255,300 in Oregon (approximately $326,000 in 2022 dollars [a]). Approximately $12,100 in Vancouver (approximately $21,800 in 2022 dollars [a]).	Approximately $646,200 in Portland in 2022 dollars. Approximately $217,100 in Vancouver in 2022 dollars.	Property values and property tax revenues have increased across the region; hence, the estimated reduction in property tax revenues is larger for the Modified LPA even though fewer properties would be acquired.

Technical Considerations	CRC Effects Identified in the 2011 Final EIS	Modified LPA Effects	Explanation of Differences
Tolling	Variable-rate tolls would range from $1.00 to $2.00 in 2006 dollars. Tolling would likely be beneficial for freight-dependent businesses and businesses that rely on just-in-time deliveries because the predictability of travel times would improve. The collection of tolls would reduce the demand for vehicular capacity.	Variable-rate tolls would range from $1.50 to $3.15 in 2025 dollars/Fiscal Year 2026 dollars (Scenario B – Lower Tolls). Similar to CRC, tolling is expected to be beneficial for freight-dependent businesses and to result in an overall reduction in bridge crossings.	The Scenario B toll rates being evaluated for the Modified LPA are generally comparable to the Scenario 1 toll rates from the 2011 Final EIS after considering the effects of inflation.

a 2022 dollars were estimated using the Bureau of Labor Statistics Consumer Price Index inflation calculator.
CRC = Columbia River Crossing; EIS = final environmental impact statement; LPA = locally preferred alternative

3.4.2 Existing Conditions

Study Areas

Oregon's Statewide Planning Goals and Washington's Growth Management Act agree on general principles of compact urban form, preservation of rural areas, use of urban growth boundaries, and multimodal transportation systems. Regional plans tailor these goals for the Portland-Vancouver region, and local plans further refine these goals and implement them through zoning and development regulations.

The Portland-Vancouver region is located at the confluence of two navigable rivers—the Columbia and the Willamette—and is served by BNSF Railway and Union Pacific Railroad transcontinental rail lines, Portland International Airport, and marine terminals at the ports of Portland and Vancouver. The region's economic competitiveness depends in large part on its role as a gateway and distribution center for domestic and international markets.

The land use analysis considered primary and secondary study areas, shown in

Figure 3.4-1. The primary study area represents the area that would experience direct impacts from construction and operation of the Modified LPA. Because major transportation projects can affect regional growth trends and patterns, the secondary study area was identified to evaluate where indirect effects (e.g., traffic and development changes) could occur. The secondary study area extends from the I-5/I-84 interchange in the south to approximately where I-5 and I-205 meet in the north.

The potential for land use changes that could affect marine commerce is evaluated in the Navigation Impact Report. Appendix A of the Navigation Impact Report assesses existing commercial and industrial development and land uses along the Columbia River upstream of the Interstate Bridge to evaluate the potential for future development that could result in different vessels using the waterway. The appendix identifies properties along the Columbia River that currently have marine facilities available or have the potential for future development of such facilities. It concludes that there are few opportunities for new or expanded commercial and industrial development that would require the use of vessels too large to pass beneath the proposed new

Columbia River bridges. Section 3.4.5, Indirect Effects, provides more information on the potential for upriver marine facility development.

Figure 3.4-1. Land Use Primary and Secondary Study Areas and Existing Land Uses

Like the land use analysis, the economics analysis also considered two study areas (Figure 3.4-2). The primary study area is the same as the land use study area, while the secondary study area is composed of the seven-county Portland-Vancouver Primary Metropolitan Statistical Area (PMSA), which includes the counties of Clackamas, Columbia, Multnomah, Washington, and Yamhill in Oregon, and Clark and Skamania Counties in Washington. This larger area allowed the analysis to consider the potential regional economic effects of the Modified LPA.

Land Use

Oregon

The primary study area is largely composed of commercial land uses with smaller amounts of vacant land, multifamily residential, and parks/open space. The Oregon portion of the secondary study area is largely residential, with commercial activity on the major transportation corridors such as Interstate Avenue and Martin Luther King Jr. Boulevard. The southern portion of the secondary study area (Figure 3.4-3) includes the Lloyd District, which is a mix of residential and commercial land uses and includes regional facilities such as the Moda Center, the Veterans Memorial Coliseum, and the Oregon Convention Center. This area is a major employment center for the region, with several large office buildings housing the Bonneville Power Administration, State of Oregon, Metro and TriMet offices, the Lloyd Center Mall, and various small businesses.

The area of North Portland between N Columbia Boulevard and the Columbia River (Figure 3.4-4) is primarily industrial and commercial uses, but also includes multifamily housing, parks, public facilities, and open space. Some regionally important land uses in this area are the Portland International Raceway, the Expo Center, and an Amazon delivery facility that occupies the site of the former Portland Meadows horse racing track. This area includes the Columbia Slough, Hayden Island, and Delta Park, which contains large wetlands west of I-5 as well as a variety of recreational facilities. Currently, the TriMet MAX light-rail line ends at the Expo Center, just south of the Columbia River. Historically, the city of Vanport was located south of the Expo Center (see Section 3.8, Cultural Resources).

Hayden Island is only accessible via I-5, and N Hayden Island Drive is the main road within the island. The primary land use within this portion of the study area is commercial and includes the Jantzen Beach Center shopping mall and surrounding retailers. Residential land uses on Hayden Island include multifamily residential developments, manufactured homes, and floating homes in small marinas. The Columbia River, the boundary between Oregon and Washington, is lined on both sides by marinas, homes, hotels, restaurants, and public facilities.

The Land Use Technical Report contains a list with additional detail on recent and pending development within the Oregon primary study area. Since publication of the CRC Final EIS, six developments have been completed within the Oregon primary study area, while three are proposed and in various early stages of development permit review. Projects consist of retail commercial, multifamily residential, light industrial, and hotel uses.

Figure 3.4-2. Economic Analysis Primary and Secondary Study Areas

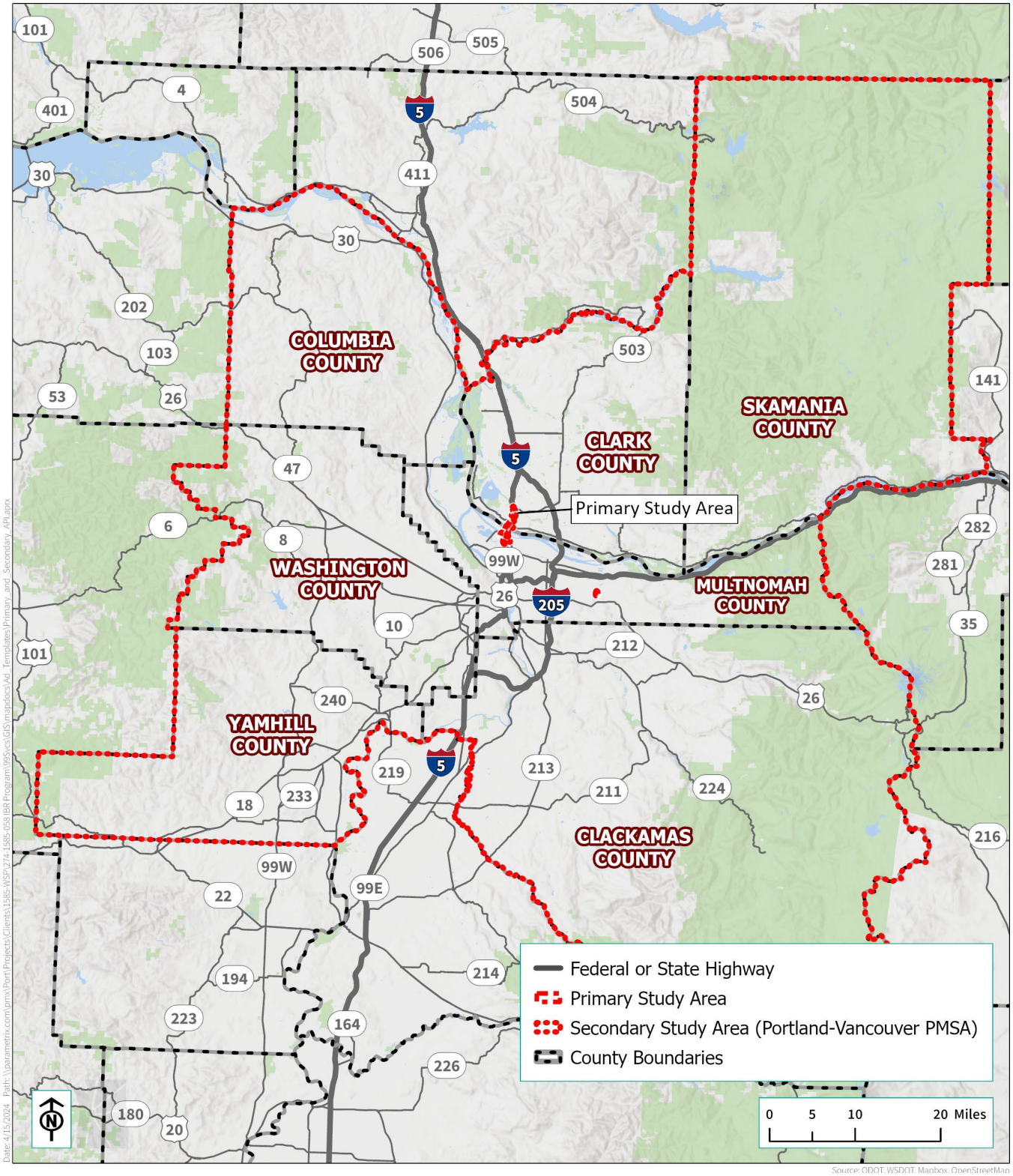


Figure 3.4-3. Existing Land Uses – Southern Portion of the Secondary Study Area

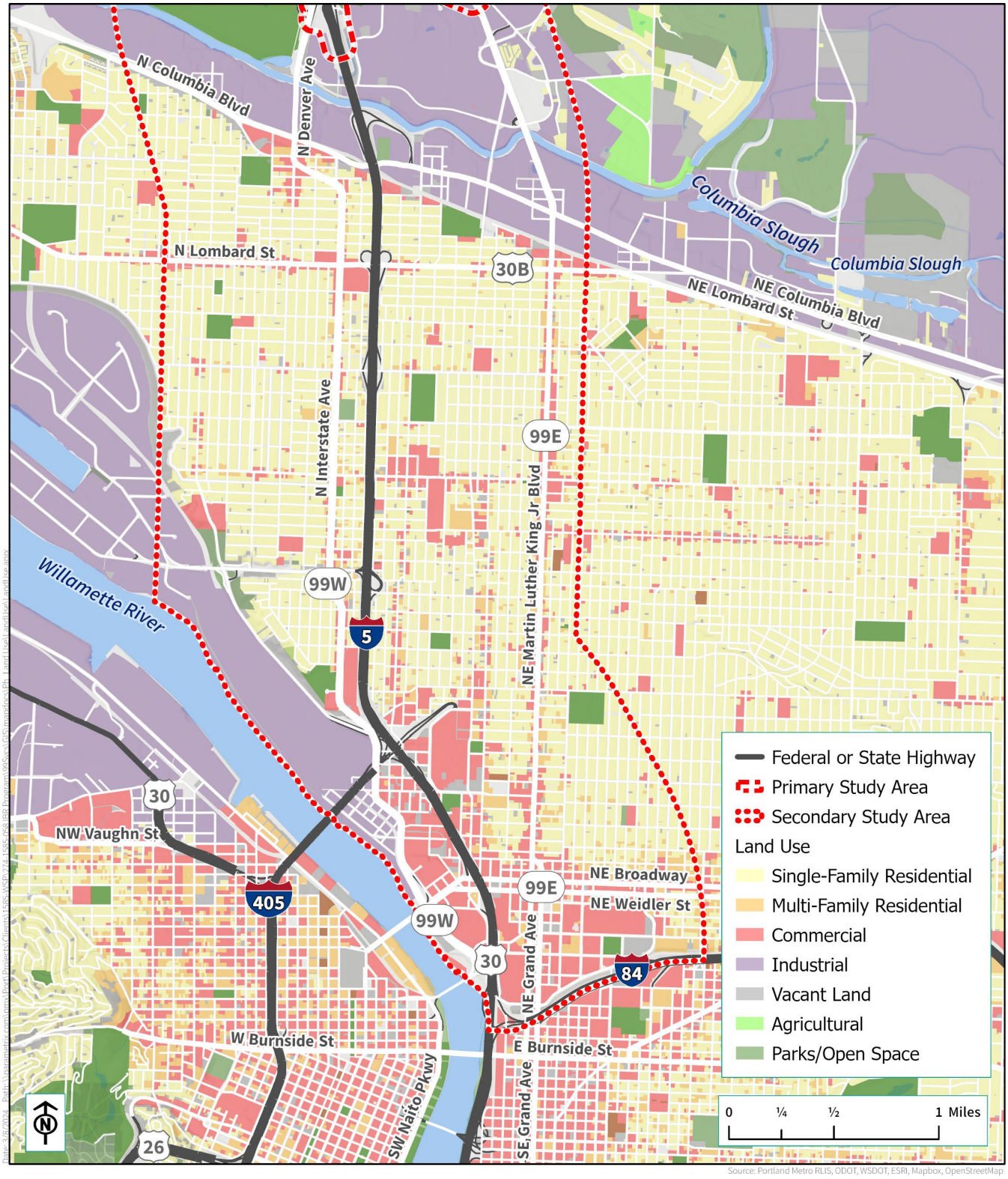
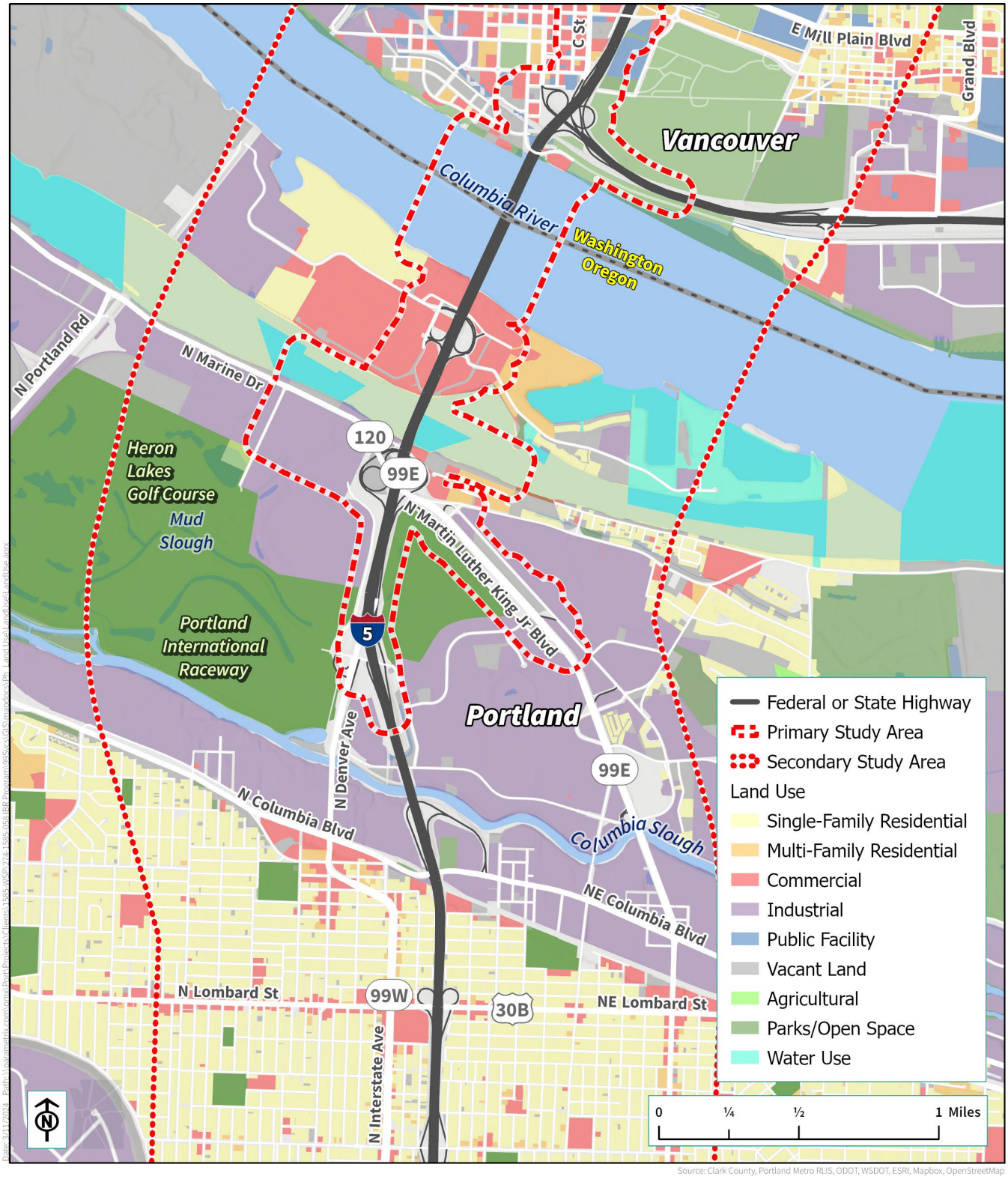


Figure 3.4-4. Existing Land Uses in North Portland, Hayden Island, and the Columbia River



Washington

The Washington portion of the study area includes downtown Vancouver, residential areas, and the National Park Service property and the Vancouver National Historic Reserve (see Figure 3.4-5). Land uses are primarily commercial (including retail, offices, industrial, governmental) and residential. Community facilities include an Amtrak train station, C-TRAN bus rapid transit facilities (including Turtle Place Transit Station), Esther Short Park, the Vancouver Waterfront, and various government offices. The current I-5 corridor divides the downtown area, with the commercial/office center on the west and the Vancouver National Historic Reserve and Clark College on the east. E Evergreen Boulevard and E Mill Plain Boulevard provide east-west connections across I-5.

North of the central city, commercial development is centered on I-5 and Highway 99 (Figure 3.4-6). East and west of I-5, much of the secondary study area is single-family residential with some multifamily districts along major roadways. Public facilities, parks, and open spaces are located throughout the secondary study area. The Vancouver urban growth boundary is just north of the secondary study area, at the intersection of I-5 and approximately 209th Street.

The uptown commercial district (between Mill Plain and Fourth Plain Boulevards on Main Street) is a transitional area between downtown and the lower-density land to the north. The area contains primarily residential uses, with major transportation corridors supporting commercial uses. The current municipal boundary of the City of Vancouver is roughly along 63rd Street.

North of 63rd Street, and south of Salmon Creek and 119th Street, residential areas consist of large-lot single-family uses. The commercial areas (along Highway 99 and Hazel Dell Avenue) have frequent bus service but are primarily auto-oriented. Infill development of single housing units and very small subdivisions is being built on lots previously used as farmland. Commercial areas along 134th Street and Highway 99 are auto-oriented. This area includes a number of regional facilities: the Clark County Fairgrounds, the Clark County Amphitheater, and Legacy Salmon Creek Hospital. The Washington State University Vancouver campus is located just outside the secondary study area. I-5 and I-205 come together in this area, as do 134th Street, Salmon Creek Avenue, and Highway 99. Congestion from these major roadways has twice led to development moratoria in the area.

The Columbia Business Center is an industrial park located approximately 1.2 miles upriver from the Interstate Bridge. It was once the location of the Henry J. Kaiser Vancouver Shipyard established in 1942 as an emergency shipyard to build vessels for World War II. The last ship was delivered in 1946 and the shipyard was closed thereafter. The Columbia Business Center includes approximately 2.3 million square feet of space in 27 buildings and approximately 1.0 million square feet of leasable space. The Columbia Business Center provides both barge and rail access. The BNSF Railway mainline borders the north side of the property. The East Barge Slip is used to receive and ship fabricated steel products, construction materials, and supplies. The West Barge Slip is not active and as of 2021 there were no plans to improve it. There is a dock located just to the west of the West Slip, which is used by a marine shipyard services company.

The Land Use Technical Report contains additional detail on recent and pending development within the Washington primary study area. Since publication of the CRC Final EIS, 10 or more projects have been completed within the Washington primary study area, while 5 are under construction and 3 are proposed or in various stages of development permit review. These projects consist of several multifamily residential and mixed-use multifamily residential/commercial developments, along with commercial office, hotel, and public projects including a library and an elementary school.

Figure 3.4-5. Existing Land Uses in Downtown Vancouver

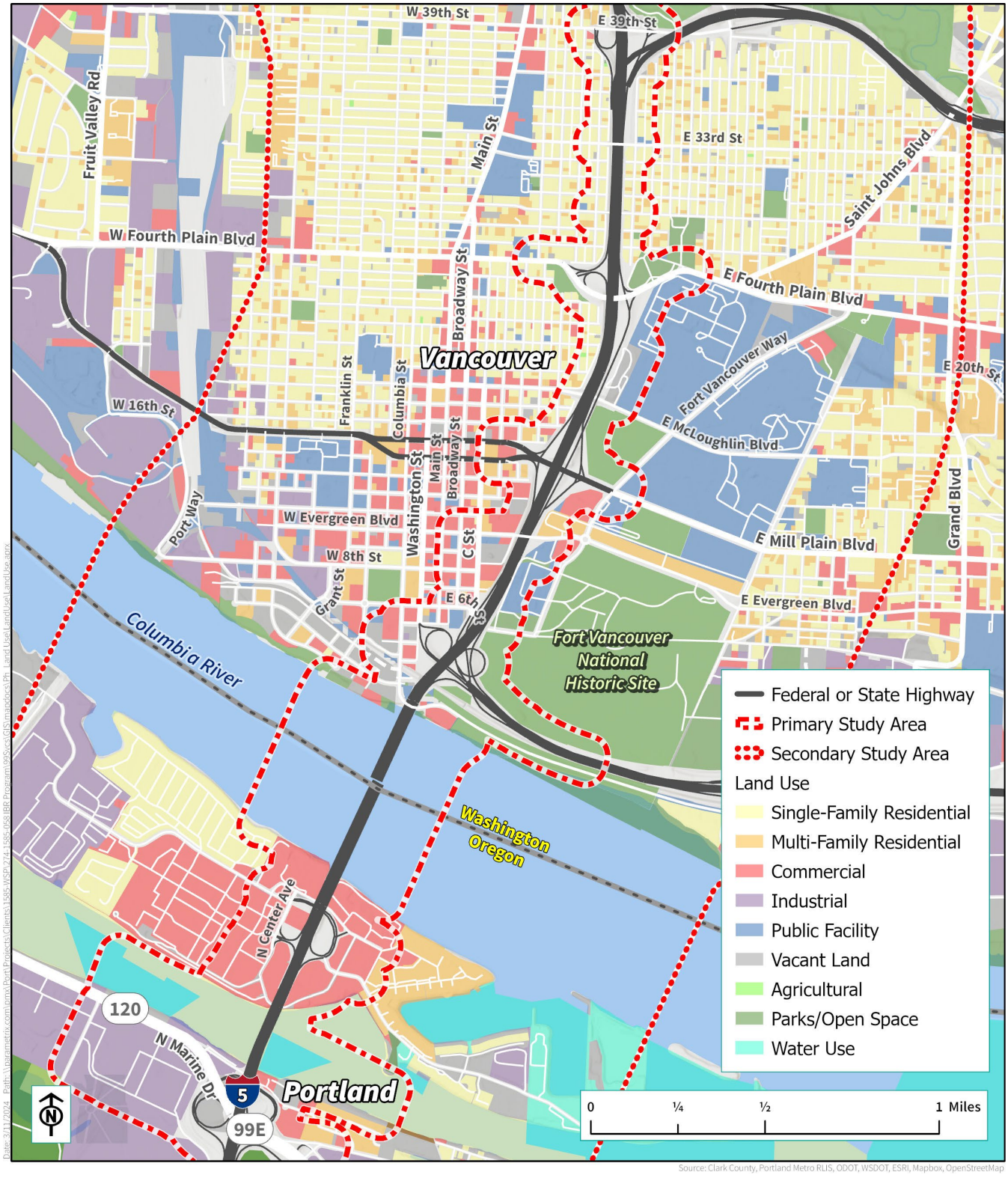
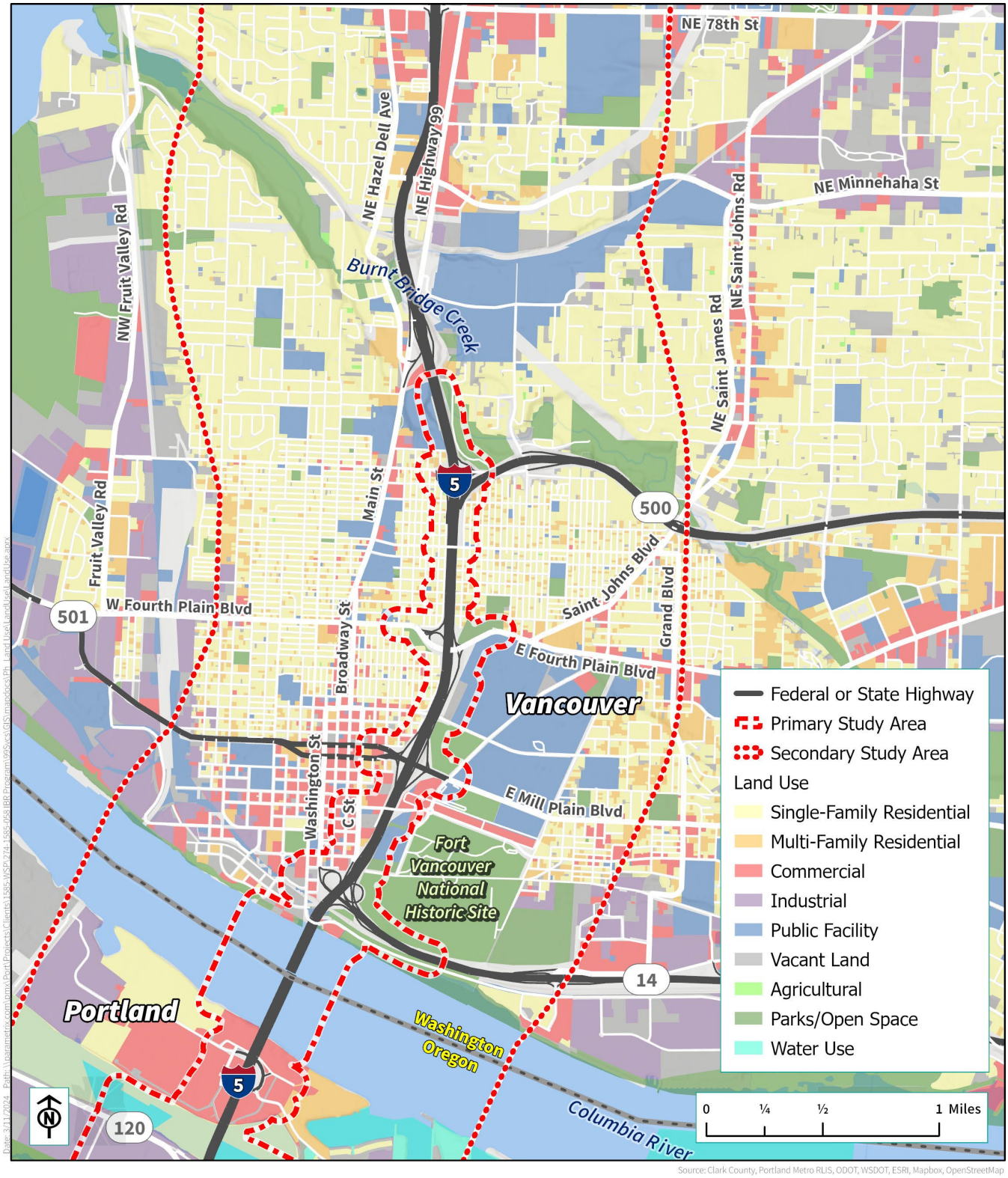


Figure 3.4-6. Existing Land Uses in North Vancouver and Clark County



Economics

Regional Conditions

Many of the region's industries, including private marine facilities, depend on the movement of freight and reliable freight access to stay competitive locally and internationally.

From 2015 to 2020, the unemployment rate for the Portland-Vancouver PMSA, which includes Clark, Clackamas, Multnomah, Yamhill, Columbia, and Skamania Counties, trended lower than overall rates in Washington, Oregon, and the nation (BLS 2021). Unemployment spikes in 2009 to 2011 and in 2020 were caused by the economic recession and the pandemic, respectively. The most recent unemployment information (2021) shows a positive trend of economic recovery from the COVID-19 pandemic. Data on unemployment rates show 3.9% for the region, 4.7% for Oregon, 4.9% for Washington, and 4.8% nationally.

The number of jobs in the Portland-Vancouver PMSA increased by 301,160 (or 33.5%) between 2002 and 2019 (U.S. Census Bureau 2019); the largest increases were in health care and social assistance (3.2% increase) and professional, scientific, and technical services (1.5% increase). In the same time period, the largest decreases in employment share were in manufacturing (2.9% decrease) and retail trade (1.3% decrease). Of the Interstate Bridge commuters, 79% are residents of Clark County who work in the Oregon PMSA counties, and 21% are Oregon PMSA residents working in Clark County (U.S. Census Bureau 2018).

Table 3.4-2 lists the 10 largest employers in the Portland-Vancouver Metropolitan Statistical Area (MSA), which includes Clackamas, Multnomah, Washington, and Clark counties (as of September 2023). Each of these businesses depends on the region's transportation system to provide reliable movement of goods and services, and on the I-5 corridor to connect to Mexico, California, and Canada.

Table 3.4-2. Largest Employers in the Portland-Vancouver Metropolitan Statistical Area

Rank	Employer	No. of Employees
1	Providence Health System	23,100
2	Intel Corp.	22,328
3	Oregon Health & Science University	19,603
4	Nike, Inc.	15,522
5	Legacy Health System	13,087
6	Kaiser Permanente	12,514
7	Fred Meyer Stores	9,000
8	Portland Public Schools	7,111
9	City of Portland	6,753
10	Multnomah County	6,317

Source: Portland Business Journal 2023

In the Portland-Vancouver MSA, the median household income increased from $56,000 in 2010 to $75,000 in 2019, below the Washington median of $78,687 but above the Oregon and national medians, $67,058 and $65,712 respectively.

In 2012, the most recent year for available data, retail sales totaled $40.4 billion per year in the Portland-Vancouver MSA (U.S. Census Bureau 2012).

The ports of Portland and Vancouver are critical to the economic growth and prosperity of the region. The total annual tonnage moving through the two ports is expected to double from approximately 300 million tons in 2007 to almost 600 million tons in 2040 (Cambridge Systematics 2015). Commodities moved by trucks are expected to grow from about 200 million tons to about 400 million tons, though the percentage of total freight transported by truck is expected to remain roughly the same at 67%.

Approximately $133 million in commodity value was transported by trucks daily across the Interstate Bridge in 2019. The projected growth in truck traffic, along with passenger travel, has implications for the roadway network and capacity needs, as efficient and safe movement of products to and from the ports is needed to maintain their competitiveness. See the Economics Technical Report for more detail on the transport of commodities by mode through the Port of Portland and the Transportation Technical Report for more detail on freight moved by truck. Commodity transport by ship and tug/tow is also important to the regional economy. Inland navigation along the 360-mile Columbia Snake River System, Portland/Vancouver to Lewiston, Idaho, carried over 8.3 million tons of commercial cargo in 2020 (PNWA 2024). Recreational vessels, such as sailboats, powerboats, personal watercraft, and yachts modestly contribute to the regional economy.

As described in Chapter 2, the existing Interstate Bridge provides a maximum vertical clearance of 72 feet when closed and a maximum vertical clearance of 178 feet when the lift span is opened. Apart from a small number of specialized vessels that use the river infrequently, the majority of vessels require vertical clearances of less than 90 feet from the surface of the water to the bottom of the bridge deck. Required openings of the Interstate Bridge have declined from an average of 289 per year between 1997 and 2011 to 157 per year between 2012 and 2020. Approximately 58% of the bridge openings were for tugs, 17% were for sailboats, and the remainder were other vessel types. These openings are required for 5% to 7% of the total river traffic, based on openings of the BNSF Railway Bridge just downstream of the Interstate Bridge and use of the locks at the Bonneville Dam. Currently, bridge openings are restricted to non-peak commute hours to minimize stopping traffic on I-5.

Because the Portland-Vancouver region depends on the distribution of goods to broader regional, national and global markets, it is susceptible to long-term economic losses from traffic congestion.

Local Conditions

Table 3.4-3 presents Metro's recent and forecast population data for the primary study area, by state and for the four-county Portland-Vancouver Standard Metropolitan Statistical Area (SMSA).[1] Between 2015 and 2045, Metro forecasts that Portland-Vancouver SMSA will grow by an annual 1.4%, lower than the projected 2.7% growth for the Oregon portion of the study area, but slightly higher than the 1.1% forecast for the Washington portion.

Table 3.4-3. Population Forecast in the Primary Study Area

Area	2015	2045	Average Annual Growth Rate
Oregon (study area only)	61,362	110,128	2.7%
Washington (study area only)	60,228	80,323	1.1%
Portland-Vancouver SMSA	2,006,417	2,850,534	1.4%

Source: Metro 2021

[1] Forecast data provided by Metro includes the four-county SMSA, which includes Clark, Clackamas, Multnomah and Washington counties. The PMSA includes these four counties and also includes Yamhill and Columbia Counties in Oregon and Skamania County in Washington.

Between 2015 and 2045, the number of households in the Portland-Vancouver SMSA is forecast to grow approximately 1.5% per year; this is lower than the 2.7% projected for Oregon but higher than the 1.2% projected for Washington. Forecast household growth in the Portland-Vancouver SMSA is similar to population. However, the Metro forecast predicts a slight decrease in persons per household, declining from 2.36 in 2015 to 2.32 in 2045 (assuming no change in housing vacancy rates). Table 3.4-4 presents recent and forecast household data.

Table 3.4-4. Household Forecast in the Primary Study Area

Area	2015	2045	Average Annual Growth Rate
Oregon (study area only)	26,023	47,469	2.7%
Washington (study area only)	25,542	34,622	1.2%
Portland-Vancouver SMSA	850,898	1,228,679	1.5%

Source: Metro 2021

Table 3.4-5 presents employment forecast data for the Oregon and Washington portions of the primary study area and the Portland-Vancouver SMSA. Between 2015 and 2045, Metro forecasts total employment in the SMSA to grow by approximately 1.6% per year, slightly higher than the 1.1% forecast for Oregon and the 1.0% forecast for Washington.

Table 3.4-5. Employment Forecast in the Primary Study Area

Area	2015	2045	Average Annual Growth Rate
Oregon (study area only)	55,251	73,186	1.1%
Washington (study area only)	36,647	47,914	1.0%
Portland-Vancouver SMSA	1,072,925	1,592,290	1.6%

Source: Metro 2021

Both the City of Portland and the City of Vancouver rely on tax revenues to fund general services. Portland's largest source of revenue is property taxes (49%), as Oregon does not have a sales tax. In Vancouver, the largest source of revenue is business and occupation taxes (32%), followed by property tax and then sales tax.

Marine Commerce

The Columbia River has been a commerce route from time immemorial for Native Americans. European and European American contact with the Columbia River occurred around 1800 and prompted further exploration, trade, and settlement activities. The Interstate Bridge (existing northbound span) was built and opened in 1917, replacing a ferry system to transport people and goods across the river. The original bridge included a lift span to accommodate navigation for vessels and cargo with heights up to 178 feet. In 1958, a second bridge (existing southbound span) was completed and opened for traffic; this bridge was designed as a twin to the original bridge, including a lift span to accommodate navigation. For over 100 years, the Interstate Bridge has supported navigation on the Columbia River for commerce, recreation, and government agency missions.

Commercial vessels on the Columbia River include cruise vessels, tugs, tows, barges, and marine contractors' vessels. Several passenger cruise lines host tours up and down the Columbia and Snake Rivers and require frequent passage under the Interstate Bridge during the cruise season. Commercial tugs and barges have the highest share of river usage and transit year-round and accounted for approximately 54% of the bridge opening events across a 35-year study period. Tugs and barges are usually able to use the barge channel or alternate barge channel unless river and weather conditions are a factor or cargo requires additional vertical clearance. Tugs and barges will request an opening of the Interstate Bridge to provide sufficient vertical clearance or minimize safety hazards between the Interstate Bridge and the BNSF Railway Bridge downstream.

Marine contractors use vessels such as crane barges, dredges, and other construction equipment transported on the Columbia River. Transits of the Interstate Bridge are not limited to a particular time of year or frequency, as construction work is typically performed on an as-needed or contract basis. Whether the transport of construction equipment requires a bridge opening event depends upon the contractor's location and the location of the construction project. Construction equipment used by marine contractors accounted for an average of 17% of bridge opening events, ranging from no lifts (2013) to a high of 32% (1989 and 2000).

Existing horizontal and vertical obstructions limit the size of vessels on the Columbia River upriver of the Interstate Bridge. The BNSF Railway Bridge at Celilo Falls, located 95 miles upstream of the Interstate Bridge, has a vertical clearance of 79 feet in the raised position. Upstream from Celilo, several bridges and other obstructions such as power cables further limit the vertical clearance on the river to less than 79 feet. In addition, the Bonneville Locks and all other locks on the Columbia/Snake River system constrain navigation uses to a maximum width of 86 feet, which prohibits passage by ocean-going barges.

3.4.3 Long-Term Benefits and Effects

Table 3.4-6 summarizes the effects of the No-Build Alternative and the Modified LPA, and its design options, on land use and economics. Effects were evaluated for the Program analysis year of 2045. Additional information on the effects is provided in the sections that follow.

No-Build Alternative

Land Use

The No-Build Alternative would not address current deficiencies in the Interstate Bridge structure, design, or capacity. Existing land uses that rely on I-5 to travel within the region would remain vulnerable to high levels of congestion, unsafe conditions, and potential earthquake-induced failure. There would also be no high-capacity transit service to connect the regional centers of downtown Vancouver and downtown Portland, which would be inconsistent with the stated policies and goals of applicable regional transportation plans.

Under the No-Build Alternative, increased growth in the region by 2045 would result in traffic congestion that would impair road-based freight movement and reduce the region's productivity. This could indirectly impede the effective implementation of land use plans and hinder goals for economic development. A loss in the growth of local jobs could have impacts such as decreased property values, increased commercial vacancies, and reduced demand for downtown revitalization. Refer to Section 3.1, Transportation, of this Draft SEIS for more information on the No-Build Alternative traffic conditions.

Table 3.4-6. Summary of No-Build Alternative and Modified LPA Effects on Land Use and Economics

1	2	3	4	5	6	7	8
No-Build Alternative	**Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5**	**Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5**	**Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Westward Shift**	**Modified LPA with Single-Level Fixed-Span Configuration, [a] One Auxiliary Lane, C Street Ramps, Centered I-5**	**Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5**	**Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, without C Street Ramps, Centered I-5**	**Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, Park-and-Ride Site Options**
• Existing land uses would remain vulnerable to high levels of congestion, unsafe conditions, and potential earthquake-induced failure. • No high-capacity transit, which is inconsistent with the stated policies and goals of regional transportation plans. • Congestion would impair freight movement and reduce area productivity, which could indirectly impact the implementation of land use plans and goals for economic development. • Loss in job growth could lead to decreased housing prices, increased commercial vacancies, and reduced demand for downtown revitalization.	• Converts approximately 47 acres of land to transportation use; currently primarily zoned industrial or commercial, with some land zoned residential. • High-capacity transit is consistent with state, regional, and local plans and policies. • Higher toll rates during peak periods would support regional and local policies for congestion and are not expected to change land use patterns. • Property tax revenues would be reduced compared to the No-Build Alternative. • Business displacements have the potential to impact 616 employees; affected businesses would be provided relocation assistance. • Bridge height would exclude up to eight existing users/vessels that require more than 116 feet of vertical clearance from passage underneath the new Columbia River bridges.	Similar to Column 2, except: • Slightly more acquisition of property at the Fort Vancouver National Historic Site. • Improved traffic operations (shorter duration and length of congestion, reduced travel times, and improved mobility options) compared to design options with a single auxiliary lane would result in improved mobility and access for freight and employment.	Similar to Column 2, except: • Larger areas of properties would be permanently acquired. • Additional 1 acre of permanent acquisition. • Additional three business displacements. • Potential to impact 142 additional employees.	Similar to Column 2, except: • Lower maximum bridge height and reduced highway grade would benefit freight vehicle speed compared to double-deck bridge, with corresponding economic benefits.	Similar to Column 2, except: • Bridge openings could interrupt vehicle and truck highway travel, transit service, and active transportation across the new Columbia River bridges. • No existing or future maritime vessels or cargo freight would be excluded from passage. • Lower bridge height compared to fixed-span configurations would allow fewer existing marine users/vessels to pass without a bridge opening. Movable-span operations, and thus river navigation operations, may have increased restrictions on bridge openings, which could impact marine commerce by restricting the times of day for large vessel movements.	Similar to Column 2, except: • Removal of the C Street ramps would result in traffic delay and increased travel times near the Mill Plain Boulevard interchange and in downtown Vancouver, which would have an economic impact on local businesses.	Similar to Column 2, except: Waterfront Station Locations: • Site1: Additional 0.1 acres acquired. • Site 3: Additional 1.5 acres of permanent acquisition; Potential to impact 53 additional employees. Evergreen locations: • Site 1: Additional 3.16 acres acquired, no displacement. • Site 2: No acquisition or displacement.

a The effects associated with the single-level fixed-span configuration would be the same for all bridge type options.

Economics

The No-Build Alternative would retain the existing Interstate Bridge and would only make minor preservation improvements to I-5 within the study area. Several local road projects are planned to improve freight mobility, access, and safety in the study area, and those would continue. The Interstate Bridge would increasingly serve as a bottleneck for southbound traffic, including freight traffic. Traffic operations forecasts indicate that congestion on the bridge on weekdays would last from 5 a.m. to 9 p.m., a total of 16 hours. In the northbound direction, congestion on the bridge would last 14 hours, from 7 a.m. until 9 p.m.

Under the No-Build Alternative, no businesses in Oregon or Washington would be displaced by right-of-way acquisition, and there would be no resulting decrease in property or sales tax revenues or jobs. However, increasing congestion on I-5 could result in significant economic effects, as planned economic development may occur more slowly with business owners reluctant to locate in an area with poor access and mobility for employees and customers. Freight reliability would decrease as congestion would continue to spread throughout the day. Customers could elect to shop in areas with better access and mobility.

Modified LPA

Most long-term effects on land use and economics would not differ among the Modified LPA design options. Where differences would occur, they are described in the subsections below.

Land Use

Long-term direct land use impacts are defined as converting land from its existing use to a transportation use. This analysis of direct impacts is based on acquisition data developed for the Modified LPA, as described in Section 3.3, Property Acquisitions and Displacements.

Approximately 47 acres of property would be permanently acquired for the construction and long-term operation and maintenance of the Modified LPA. The exact total would vary between approximately 47.1 acres and 47.5 acres, depending on the design option; variations in acquisition among the design options would occur only in the Washington portion of the study area. All design options would include approximately 4.3 acres in permanent subsurface easements, which are required for the potential installation of tie-back anchors associated with retaining walls.

Most of the land that would be acquired is currently zoned industrial or commercial, with some land zoned residential in upper Vancouver. Although these conversions would reduce the area of land available for non-transportation uses, they would comprise only a small portion of the total land in the Portland-Vancouver area and would not be substantial in a regional context. The acquisition of new right of way, displacement of active land uses, and other impacts would not lead to a significant change in the mix of land uses, land use patterns, zoning, or land use plans in the study area.

The transportation infrastructure associated with the Modified LPA, such as the extension of light-rail transit, would be consistent with the goals and policies of adopted land use plans as described in the “Consistency with Plans and Policies” section below and summarized in Table 3.4-10. Consistency with applicable land use plans and policies is also detailed in the Land Use Technical Report.

Oregon

Table 3.4-7 shows the change in land use from acquisitions in Oregon by zoning designation. The extent of direct land use impacts from property acquisitions would be the same for all of the design options. A total of 68 parcels, comprising over 37 acres, would be affected; 25 of these parcels would be fully acquired and 43 would be partially acquired. Partial acquisitions may not require the acquisition of buildings or affect the current use of the property. Partially acquired properties which require displacement of buildings or businesses may still leave a portion of the parcel available for redevelopment.

As described in Chapter 2, the construction activities associated with the Modified LPA would likely require both temporary and permanent modifications to portions of the Portland Metro Levee System, which is a system of federal flood control levees located along the south bank of the Columbia River/North Portland Harbor within the primary study area. Modifications may include activities to restore temporarily disturbed portions of the levees, permanent modifications where proposed infrastructure would intersect with the existing levees, or changes in access to the levees as a result of roadway reconfiguration. Modifications or improvements would be coordinated for consistency with the planned future condition of the levees under the Columbia Corridor Drainage Districts Joint Contracting Authority's Levee Ready Columbia project. The assessment of long-term effects to land use and economics associated with the Modified LPA presented in this section includes those associated with potential modifications to the federal levee system.

Table 3.4-7. Oregon Right-of-Way Acquisitions by Zoning Designation

Area	Zoning [a]	Acquisition Type	Parcel Count	Total Permanent Land Use Acquired (acres)
Oregon Mainland	CE	Full	1	1.59
	CM2	Partial	3	0.06
	IG2	Full	1	1.02
	IG2	Partial	13	7.42
	OS	Partial	4	2.13
Subtotal (Oregon Mainland)	N/A	N/A	**22**	**12.22**
Ruby Junction	HI	Full	4	4.41
	HI	Partial	2	0.26
	SC-RJ	Partial	1	0.31
Subtotal (Ruby Junction)	N/A	N/A	**7**	**4.98**
Hayden Island	CE	Full	17	10.88
	CE	Partial	11	7.26
	CM1	Full	2	0.27
	CM1	Partial	9	1.47
Subtotal (Hayden Island)	N/A	N/A	**39**	**19.88**
Totals	**N/A**	**N/A**	**68**	**37.08**

a Zoning designations shown for Ruby Junction are City of Gresham zoning designations; Oregon Mainland and Hayden Island are City of Portland designations.

CE = commercial employment; CM1 = commercial mixed use 1; CM2 = commercial mixed use 2; HI = heavy industrial; IG2 = general industrial 2; N/A = not applicable; OS = open space; SC-RJ = Ruby Junction Station Center – Ruby Junction Overlay; sq ft = square feet

Washington

Table 3.4-8 shows land use changes that would result from acquisitions in Washington according to zoning designation and design option. Each of the Modified LPA design options would affect approximately

110 parcels in Washington, but the number of acres acquired would vary by design option. Totals for each design option are shown below, with more detail provided in Table 3.4-8. See Section 3.3, Acquisitions, and the Acquisitions Technical Report for information on the locations of acquired properties.

- The Modified LPA with double-deck fixed-span configuration, one auxiliary lane, C Street ramps, and centered I-5 and the Modified LPA without C Street ramps would each acquire 10.6 acres of property, including 21 full acquisitions, 48 partial acquisitions, and 41 subsurface easements.
- The two auxiliary lane design option would have the same number of full and partial acquisitions and subsurface easements, but would require an additional 0.1 acres of property east of I-5 for a total of 10.7 acres of acquisition.
- The Modified LPA with any of the single-level bridge configurations or bridge types would also have 21 full and 48 partial acquisitions and 41 subsurface easements, but would require a total of 10.9 acres of acquisition to accommodate wider bridge abutments on the Vancouver shoreline.
- The Modified LPA with mainline westward shift would require 23 full acquisitions and 45 partial acquisitions as well as 41 subsurface easements. The total acquisition area would be 10.9 acres.

Up to two proposed park-and-ride facilities could be added to the Modified LPA in downtown Vancouver: one would be near Waterfront Station and one would be near Evergreen Station. Three sites are being considered for the Waterfront Station and two sites for Evergreen Station. Table 3.4-9 illustrates the potential land use changes by site option based on the acquisitions that would be required for each proposed park-and-ride facility.

Table 3.4-8. Washington Right-of-Way Acquisitions by Zone and Design Option

Zone [c]	Acquisition Type	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, Parcels (Acres)	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Centered I-5, Without C Street Ramps, [a] Parcels (Acres)	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Westward Shift, Parcels (Acres)	Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5, Parcels (Acres)	Modified LPA with Single-Level Fixed-Span [b] or Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, Parcels (Acres)
CPX (Downtown Vancouver)	Full	0 (0)	0 (0)	0 (0)	0(0)	0 (0)
	Partial	7 (1.3)	7 (1.3)	7 (0.7)	7 (1.4)	7 (1.4)
CX (Downtown Vancouver)	Full	14 (2.4)	14 (2.4)	16 (3.7)	14 (2.4)	14 (2.4)
	Partial	20 (0.4)	20 (0.4)	18 (0.7)	20 (0.4)	20 (0.5)
	Subsurface Easement [d]	2 (1.2)	2 (1.2)	2 (0.6)	2 (0.6)	2 (0.6)
Park (Downtown Vancouver)	Partial	1 (0.08)	1 (0.08)	0 (0)	1 (0.1)	1 (0.1)
Water (Downtown Vancouver)	Partial	1 (0.3)	1 (0.3)	1 (0.3)	1 (0.3)	1 (0.4)
Subtotal (Downtown Vancouver)	Full	14 (2.4)	14 (2.4)	16 (3.7)	14 (2.4)	14 (2.4)
	Partial	29 (2.1)	29 (2.1)	26 (1.7)	29 (2.2)	29 (2.4)
	Subsurface Easement	2 (1.2)	2 (1.2)	2 (0.6)	2 (1.2)	2 (1.2)
	Subtotal	**45 (5.7)**	**45 (5.7)**	**44 (6.0)**	**45 (5.8)**	**45 (6.0)**
R-22 (Upper Vancouver) [e]	Full	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	Partial	1 (>0.1)	1 (>0.1)	1 (>0.1)	1 (>0.1)	1 (>0.1)
	Subsurface Easement	4 (0.5)	4 (0.5)	4 (0.5)	4 (0.5)	4 (0.5)
R-9 (Upper Vancouver)	Full	7 (0.8)	7 (0.8)	7 (0.8)	7 (0.8)	7 (0.8)
	Partial	18 (0.1)	18 (0.1)	18 (0.1)	18 (0.1)	18 (0.1)
	Subsurface Easement	35 (2.5)	35 (2.5)	35 (2.5)	35 (2.5)	35 (2.5)

Zone [c]	Acquisition Type	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, Parcels (Acres)	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Centered I-5, Without C Street Ramps, [a] Parcels (Acres)	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Westward Shift, Parcels (Acres)	Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5, Parcels (Acres)	Modified LPA with Single-Level Fixed-Span [b] or Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, Parcels (Acres)
Subtotal (Upper Vancouver)	Full	7 (0.8)	7 (0.8)	7 (0.8)	7 (0.8)	7 (0.8)
	Partial	19 (0.1)	19 (0.1)	19 (0.1)	19 (0.1)	19 (0.1)
	Subsurface Easement	39 (3.0)	39 (3.0)	39 (3.0)	39 (3.0)	39 (3.0)
	Subtotal	**65 (3.9)**	**65 (3.9)**	**65 (3.9)**	**65 (3.9)**	**65 (3.9)**
Totals	Full Acquisitions	21 (3.2)	21 (3.2)	23 (4.5)	21 (3.2)	21 (3.2)
	Partial Acquisitions	48 (2.2)	48 (2.2)	45 (1.8)	48 (2.3)	48 (2.5)
	Total Permanent Acquisitions	**69 (5.4)**	**69 (5.4)**	**68 (6.3)**	**69 (5.5)**	**69 (5.7)**
	Subsurface Easement	**41 (4.2)**	**41 (4.2)**	**41 (3.6)**	**41 (4.2)**	**41 (4.2)**
	Air Space	**0 (1)**	**0 (1)**	**0 (1)**	**0 (1)**	**0 (1)**
	Total Permanent Acquisitions and Easements	**110 (10.6)**	**110 (10.6)**	**109 (10.9)**	**110 (10.7)**	**110 (10.9)**

a Modified LPA with and without C Street Ramps would have the same impacts. The footprint removed by removing the C Street Ramp is entirely within existing right of way.

b The Washington right-of-way acquisitions associated with the single-level fixed-span configuration would be the same for all bridge type options.

c (CPX) Central Park Mixed-Use; (CX) City Center; (R-9) Low-Density Residential District; (R-22) Higher-Density Residential District.

d A subsurface easement is a right given a party to use space underground, such as for buried electrical, cable, water or sewage line.

e For Upper Vancouver, all design options have the same impacts.

Table 3.4-9. Acquisition Impacts by Park-and-Ride Option

Property Acquisitions	Type	Waterfront Site 1 [a, b]	Waterfront Site 2 [a]	Waterfront Site 3 [a]	Evergreen Site 1 [a, c]	Evergreen Site 2 [a, d]
Parcels (count)	Full	0	1	4	5	0
	Partial	0	0	0	0	0
	Total	0	1	4	5	0
Area Acquired (acres)		0	0.1	1.5	3.16	0
Permanent Easements	Property Easements [e, f]	0	0	0	0	0
Total of Permanent Acquisitions and Easements		0 acres	0.1 acres	1.5 acres	3.16 acres	0 acres

a Does not include WSDOT-owned property or right of way or City-owned right of way.
b Properties associated with Waterfront Site 1 would be affected by IBR Program roadway and pedestrian improvements regardless of whether the site is developed as a park and ride.
c Properties associated with Evergreen Site 1 would be developed as a joint venture between the IBR Program and the City of Vancouver.
d The existing parking structure (Evergreen Site 2) would be used via lease with the existing owner.
e Subsurface easement requirements are preliminary and will be updated prior to construction.
f Airspace easements have not been determined but will be identified prior to construction.

Consistency with Plans and Policies

The Modified LPA's implementation of high-capacity transit would be consistent with state, regional, and local plans and policies and would help the region achieve anticipated development without expanding urban growth areas. In Oregon, state law requires ODOT to involve planning officials from affected jurisdictions in planning for transportation projects that require an environmental assessment or EIS. The Oregon Transportation Commission must also adopt a finding that the project is compatible with applicable comprehensive plans before the project design can be approved. Washington state law, while not explicitly requiring a consistency finding from the state's transportation commission, requires WSDOT to cooperate with city and county governments, planning agencies, transit agencies, and other appropriate local planning entities when planning improvements to highways of statewide significance, including the Interstate system. Appendix A, Agency and Tribal Coordination, provides detail on how the IBR Program has coordinated and collaborated with planning and regulatory agencies as part of the NEPA process. Table 3.4-10 summarizes relevant land use and transportation plans and policies that would apply to the IBR Program and discusses their compatibility with the Program. See the Land Use Technical Report for additional details on compatibility with applicable land use and transportation plans and policies.

Table 3.4-10. IBR Program Consistency with Relevant Land Use and Transportation Plans

	Plan	Description	IBR Program Consistency
State	Statewide Planning Goals (Oregon)	Directs all Oregon cities and counties to implement comprehensive land use plans that comply with statewide goals and guidelines.	Consistent with Goal 12, Transportation, which requires cities, counties, and the state to create a transportation system plan that addresses mass transit, air, water, rail, highway, bicycle, and pedestrian transportation. Among other objectives of Goal 12, the Modified LPA would: • Serve statewide, regional, and local transportation needs. • Serve the mobility and access needs of those who cannot drive and other underserved populations. • Provide for affordable, accessible and convenient transit, pedestrian, and bicycle access and circulation, with improved connectivity. • Help to reduce pollution from transportation to meet statewide goals to reduce climate pollution. • Facilitate the safe flow of freight, goods, and services within regions and throughout the state.
	Growth Management Act (Washington)	Requires local jurisdictions to implement a land use policy framework that reduces conversion of rural land to urban development.	Supports stated goals pertaining to transportation and infrastructure, including encouraging efficient multimodal transportation systems that are based on regional priorities and coordinated with county and city comprehensive plans. Also consistent with the Act's goals for providing infrastructure to urban areas and for directing high-density growth to urbanized locations.
Regional	2040 Growth Concept (Metro)	Defines regional growth and development in the Portland metropolitan region. Policies encourage efficient use of land, protection of farmland and natural resources, a balanced transportation system, a healthy economy, and diverse housing options.	Supports Metro's stated policy goals of providing a balanced transportation system and contributing to a healthy economy.

	Plan	Description	IBR Program Consistency
	Regional Framework Plan (Metro)	Identifies regional policies to implement the 2040 Growth Concept. Provides overall guidance for more detailed policies regarding several topics including regional transportation and mass transit systems, and coordination, to the extent feasible, of Metro growth management and land use planning policies with those of Clark County.	Includes IBR-related goals of developing a connected region through an integrated system of throughways, arterial streets, freight routes and intermodal facilities, transit services and bicycle and pedestrian facilities.
	2018 Regional Transportation Plan (Metro)	Establishes policies and priorities for all forms of transportation and anticipates the region's current and future transportation needs. Focuses on ensuring the region's transportation system works effectively, recognizing the importance of the movement of goods and services for the regional economy. The RTP adopted by Metro in December 2018 includes the same land uses and transportation projects as the RTP adopted by Clark County in March 2019 (as described below).[2]	The "I-5 Replacement project" is included on the financially constrained project list. This is earlier terminology used to reference the project now known as the IBR Program.
	Climate Smart Strategy (Metro)	States a regional strategy to realize local visions for land use and transportation while also reducing greenhouse gas emissions.	Seek opportunities to advance local and regional projects that best combine the most effective greenhouse gas emissions reduction strategies.
	Transportation Improvement Plan (TriMet)	Establishes transit improvement priorities and possible funding allocations. Includes a 5-year roadmap for the rollout of future services and programs to improve service in low-income communities.	Expands public transportation services with the extension of light-rail transit to Hayden Island and Vancouver, improved bus transit service, and station infrastructure improvements.
	20-Year Transit Development Plan (C-TRAN)	Plans for transit services in Clark County. Includes high-capacity transit planning, capital and technology improvements, and a financial plan.	Includes the IBR elements of light-rail transit and bus rapid transit improvements.

[2] The financially constrained *Regional Transportation Plan* adopted by the Metro Council in December 2018 (Metro 2018a) and adopted by the Southwest Washington Regional Transportation Council (RTC) Board of Directors in March 2019 is referred to as the "2018 RTP."

	Plan	Description	IBR Program Consistency
	2019 Regional Transportation Plan for Clark County (RTP)	Identifies future regional transportation system needs and outlines transportation plans and improvements necessary to maintain mobility within and through the region and access to land uses within the region. The RTP adopted by Clark County in March 2019 includes the same land uses and transportation projects as the as RTP adopted by Metro in December 2018 (as described above).	Includes IBR-related goals of providing reliable mobility for personal travel and freight movement by addressing congestion and transportation system bottlenecks
Local (Oregon)	Multnomah County Comprehensive Plan and Transportation System Plan	Describes policies that guide decisions made by the Land Use Planning Division, as well as the relationship between Multnomah County land use decisions and the policies adopted by the Metro Council and statewide planning agencies. The Transportation System Plan guides decisions about transportation system improvements over the next 20 years or more.	Supports the plan's goals of providing a safe and efficient transportation network.
	2035 Comprehensive Plan (Portland)	Continues the commitment to linking land use and transportation decisions. Seeks to improve Portland as a place that is walkable, bikeable, and transit-friendly with active main streets. Continues Portland's commitment to compact development with active employment centers, expanded housing choice, and access to parks and open space.	The IBR Program advances multiple goals articulated by the Transportation component of the Comprehensive Plan, including: • Create a coordinated, efficient, more affordable multimodal transportation system. • Reduce service disparities and achieve equitable access to all types of facilities and transportation modes. • Ensure safety of the most vulnerable users (people with disabilities, young people, the elderly). • Guide the location and design of new street, pedestrian, bicycle, and trail infrastructure.
	2035 Transportation System Plan (Portland)	Guides Portland's transportation system functions and investments. Ensures that new development and allowed land uses are consistent with the identified function and capacity of, and adopted performance measures for, affected transportation facilities.	Lists the I-5 Columbia River bridge replacement and interchange improvements as a financially constrained project to be completed within 1 to 10 years.

	Plan	Description	IBR Program Consistency
	City of Portland and Multnomah County Climate Action Plan	Sets a goal of achieving a 40% reduction in carbon emissions by 2030 and an 80% reduction by 2050 Identifies objectives and actions to be completed or significantly underway in the next 5 years, focusing principally on major actions to be taken to accelerate emission reductions.	Increases public transit opportunities, which is one of the overarching carbon reduction actions referenced throughout the plan.
Neighborhood or Area-Specific (Oregon)	Hayden Island Neighborhood Plan	Addresses the unique situation of the island while considering the best plan for its future. Recommends preserving existing uses while promoting new mixed-use development to meet future needs. Developed concurrently with the CRC project and specifically incorporates guidance for the CRC project.	The Modified LPA is consistent with the plan, supporting specific goals such as: • Light-rail transit to, and a station on, Hayden Island. • A light-rail transit alignment adjacent to the west side of I-5 instead of a separate alignment in order to minimize the barrier effects. • Access to local street systems south of North Portland Harbor without using the freeway.
	Bridgeton Neighborhood Plan	Addresses the neighborhood development challenges. Development consists largely of houseboats, rowhouses, and detached single-family homes. Significant wetland and riparian resources exist throughout the neighborhood as well.	Supports specific recommendations in the plan, including providing access to transit and providing for connectivity within the neighborhood and to the rest of the transportation network.
	Kenton Neighborhood Plan (as amended by the Kenton Downtown Plan)	Focuses on bringing back the Denver Avenue business district as a retail corridor.	Supports transportation recommendations including increasing the extent of the neighborhood's light-rail transit connectivity.
	Portland International Raceway Plan District	Sets a goal to preserve and enhance the special character and opportunities of the area, which includes natural areas to the west and "special event" uses to the east.	IBR development taking place within the district would be consistent with Chapter 33.566 of the Portland Zoning Code.
	East Columbia Neighborhood Natural Resources Management Plan	Promotes a consistent approach to development within this environmentally sensitive area. Prioritizes preservation of wetlands and wildlife habitats.	Modified LPA design would support policies concerning water quality, protection of wetlands/natural resource areas, and buffering of resources from development.

	Plan	Description	IBR Program Consistency
	Natural Resources Management Plan for Peninsula Drainage District No. 1	Promotes a consistent approach to development within the environmentally sensitive areas of the district.	Supports a MAX light-rail transit station for West Delta Park.
	Portland Interstate Corridor Urban Renewal Plan	Sets goals and objectives to improve livability, increase job opportunities, assist small businesses, and benefit from major infrastructure projects, including the Interstate MAX light-rail line.	Supports extension of light-rail.
Local (Washington)	Clark County Comprehensive Growth Management Plan	Represents the coordinated land use and transportation system plans for the county and seven cities.	Supports transportation and land use goals by providing a balance of transportation modes through the incorporation of bicycle and pedestrian facilities and high-capacity transit.
	City of Vancouver Comprehensive Plan	Guides growth for Vancouver. Encourages compact urban centers, transit, and supportive development regulations for areas along the defined high-capacity transit corridors identified along I-5 and SR 500.	Supports plan goals of connectivity, accessibility, and providing a range of transportation options.
	City of Vancouver Transportation Plan	Includes vision statements for the City's evolving transportation system emphasizing accessibility, system efficiency, connectivity, multimodalism, and a walkable community.	Increases public transit and provides greater multimodal opportunities.
	City of Vancouver Strategic Plan	Helps guide the City's decision-making and resource allocation.	Supports goals of developing and maintaining a safe, balanced, and innovative transportation system that will meet the needs of future generations.
	Vancouver City Center Vision and Subarea Plan	Divides the downtown into six planning areas with goals and guiding principles. Land use goals include focusing waterfront redevelopment on residential uses, with significant public access, recreation, cultural, hospitality, entertainment, and limited commercial uses.	Supports goals of ensuring that expansion of I-5 and Columbia River crossing improvements improve access to the city center and minimize potentially negative effects. Includes specific direction for the IBR Program, including a directive to integrate all modes of transportation, including high-capacity transit, bicycle, and pedestrian circulation, to achieve a true regional multimodal corridor.

	Plan	Description	IBR Program Consistency
	City of Vancouver Shoreline Master Program	Sets a program goal to protect natural values and functions of the shorelines while guiding and allowing appropriate development. New utility and transportation facilities must protect, enhance, and encourage development of physical and visual shoreline public access.	The IBR Program would comply with Shoreline Master Program requirements to protect shoreline ecological processes as well as preserve public access to the Columbia River shoreline.
Neighborhood or Area-Specific (Washington)	Downtown Vancouver Transportation System Plan	Addresses transportation conditions and plans from Fourth Plain Boulevard south to the Columbia River.	Includes specific directives to optimize MAX service into Vancouver, including such things as designating certain streets as transit streets.
	Central Park Plan	Calls for a unified sense of place by celebrating a shared historic landscape and emphasizing design of key features such as a “great street” network.	Includes CRC-specific language within the Plan’s vision statements that also applies to IBR: “the I-5 Columbia River Crossing improves access to Central Park from all parts of the city and region.”
	Port of Vancouver Waterfront Development Master Plan	Defines a vision for the Columbia River waterfront that is consistent with the Port’s mission to provide economic benefit to the community through leadership, stewardship, and partnership in maritime-related development.	Plan accounts for the Interstate Bridge replacement and its alignment relative to adjacent development.
	Highway 99 Sub-Area Plan	Covers the area from 63rd Street north to approximately 134th Street. serves as a guide for public investments and for Team 99, a group of business leaders in the corridor.	Notes that all planning efforts for the Highway 99 Subarea Plan will support the CRC project recommendations for high-capacity transit including light-rail or bus rapid transit. This also applies to the IBR Program.

Tolling

Tolling of cars and trucks that use the new Columbia River bridges is proposed as a method to fund the Modified LPA and encourage the use of transit and active transportation. Variable toll rates during peak periods would support regional and local policies for managing traffic congestion. Tolling is not expected to change land use patterns, because as discussed in Section 3.4.5, Indirect Effects, and the Land Use Technical Report, land use and development in the study area are governed by state land use and growth management laws, local land use plans and zoning regulations, and other controls. These require all development to be consistent with existing zoning and comprehensive planning in order to be permitted. Effective local plans and policies have been shown to control potential unplanned growth and land use changes resulting from transportation investments (CH2M Hill 2006; Tidd et al. 2013). See the Land Use Technical Report for a more detailed discussion.

Analysis using the Metro/RTC regional travel demand model showed an increase in transit mode share under the Modified LPA and design options relative to the No-Build Alternative as a result of both improved transit investment and the introduction of variable-rate tolling on the new Columbia River bridges. This shift to transit would reduce overall vehicle travel miles traveled across the Columbia River on an average weekday by approximately 1% compared to the No-Build Alternative. While tolling could divert some traffic from I-5 to I-205, the reduction in total vehicle trips because of toll and transit investments is expected to minimize any effect from diversion on traffic congestion. Therefore, tolling is not expected to induce changes in land use. See the Transportation Technical Report for a more detailed analysis of tolling effects.

Economics

Property acquisition for the Modified LPA would displace several businesses and their employees. The acquisition of taxable property for additional right of way would also decrease property tax revenues. The additional right of way acquired would include both full parcels, which would be removed from the tax rolls completely, and partial acquisitions. Business displacements and property tax revenue reductions are discussed in the subsections below.

The Modified LPA would also eliminate parking spaces, primarily at the Expo Center (386 of 2,160 existing stalls) and on Hayden Island (180 of 4,354 existing stalls). The Expo Center seldom requires the use of all 2,160 parking stalls, so no substantial reduction in parking revenue is expected. Any potential reduction in patronage during peak events due to loss of parking would likely be offset by the availability of the new light-rail transit service connecting the Expo Center with Vancouver. The parking loss on Hayden Island is a small fraction of available parking in the area; for businesses affected by parking loss, coordination with property owners would occur as the design progresses to minimize impacts to parking and site use. Overall, no significant economic impacts due to the elimination of parking are anticipated.

Business Displacements

Table 3.4-11 provides an estimate of the number of businesses, and their employees, that would be displaced due to land acquisition for the Modified LPA. See the Economics Technical Report for a description of the types of businesses affected.

Table 3.4-11. Business Displacements from the Modified LPA

Area	Businesses Displaced from Modified LPA Design Options with Centered I-5	Total Employees of Displaced Businesses from Modified LPA Design Options with Centered I-5	Businesses Displaced with I-5 Westward Shift Design Option	Total Employees of Displaced Businesses with I-5 Westward Shift Design Option
Oregon Mainland	7	41	7	41
Hayden Island	15	159	15	159
Ruby Junction	3	16	3	16
Downtown Vancouver	10	400	13	542
Upper Vancouver	0	0	0	0

Sources: IBR 2022b; Metro 2015

Compared to the Modified LPA with a centered mainline configuration, shifting the I-5 mainline west would displace an additional 3 businesses and 142 employees (in total, 13 businesses and 542 employees). Displaced employees may be impacted by longer commutes, depending on the availability of nearby space for the businesses to be relocated. None of the other design options, except park and ride sites, would have different number of business acquisitions.

If Site 3 were chosen for the Waterfront Station park and ride, an office building with approximately 53 employees would be displaced. None of the other park-and-ride sites would result in business displacements.

Property Tax Impacts

Table 3.4-12 presents the estimated reduction in property tax revenues associated with the Modified LPA. The tax effect of the partial acquisitions was calculated by multiplying the actual 2022 property tax collected for the parcel by an estimate of the percentage of the parcel taken. Estimated losses in property tax revenue are not substantial; in Multnomah County, losses attributable to the Modified LPA would account for less than 0.2% of annual revenues; estimated losses in Clark County would be between approximately 0.33% and 0.43% of annual revenues.

Table 3.4-12. Property Tax Reduction from the Modified LPA Design Options

Area	Estimated Assessed Value of Right of Way (millions) from Modified LPA	Property Tax Reductions (thousands) from Modified LPA	Percentage of 2022 County Budgeted Property Tax Revenues Lost as a Result of Modified LPA	Estimated Assessed Value of Right of Way (millions) from I-5 Westward Shift Design Option	Property Tax Reductions (thousands) from I-5 Westward Shift Design Option	Percentage of 2022 County Budgeted Property Tax Revenues Lost as a Result of I-5 Westward Shift Design Option
Oregon Mainland	$19.0	-$72.0	0.02%	$19.0	-$72.0	0.02%

Area	Estimated Assessed Value of Right of Way (millions) from Modified LPA	Property Tax Reductions (thousands) from Modified LPA	Percentage of 2022 County Budgeted Property Tax Revenues Lost as a Result of Modified LPA	Estimated Assessed Value of Right of Way (millions) from I-5 Westward Shift Design Option	Property Tax Reductions (thousands) from I-5 Westward Shift Design Option	Percentage of 2022 County Budgeted Property Tax Revenues Lost as a Result of I-5 Westward Shift Design Option
Hayden Island	$49.8	-$542.0	0.16%	$49.8	-$542.0	0.16%
Ruby Junction	$4.3	-$43.2	<0.01%	$4.3	-$43.2	<0.01%
Downtown Vancouver	$21.6	-$195.8	0.3%	$32.1	-$259.3	0.4%
Upper Vancouver	$2.6	-$21.3	0.03%	$2.6	-$21.3	0.03%

Sources: IBR 2022b; Multnomah County Tax Assessor 2022; Clark County Tax Assessor 2022

The I-5 mainline westward shift design option would only affect properties in downtown Vancouver, as shown in Table 3.4-12.

Table 3.4-13 presents the estimated property tax impacts associated with the park-and-ride sites that would result in impacts beyond those expected from the Modified LPA. Waterfront Site 3 is owned by the State of Washington, so there would be no loss of property tax associated with that potential impact. The reduction in property tax revenues from land acquired for Evergreen Station Site 1 would represent less than one-tenth of 1% of the total annual 2022 property tax revenues for Clark County.

Table 3.4-13. Clark County Property Tax Reductions

Park-and-Ride Station	Site	Estimated Assessed Value of Right of Way (millions)	Clark County Property Tax Reduction (thousands)	Clark County Budgeted 2022 Property Tax Revenues
Waterfront Station	3	$4.5	$0	0%
Evergreen Station	1	$6.0	-$58.2	0.08%

Washington Sales Tax Impacts

The displacement of businesses in Vancouver would result in a reduction of sales tax revenue. Detailed information on the amount of sales tax collected by these businesses was not available; however, it is not anticipated that the reduction would have a substantial economic impact given that most of the affected businesses would be commercial offices.

Impacts to Regional Economic Sectors

Economic Impacts of Delay

According to a study of the regional economic effects of transportation choke points (Cambridge Systematics 2003), five industries in the Portland-Vancouver region are particularly sensitive to road congestion: lumber/wood/paper, distribution/wholesale trade, transportation equipment/steel, farm and food products, and high-tech. These industries are particularly vulnerable to delay and decreased travel time reliability resulting from roadway congestion in the I-5 corridor. According to the study, congestion at the Interstate Bridge increases the cost of congestion delay to trucks. Reducing freight truck travel times by investing in transportation infrastructure improvements that increase access and decrease congestion would help maintain the efficiency of the area's freight movement on I-5. As well, travel time improvements would benefit all business and worker trips that travel through the I-5 corridor in the primary study area.

Commercial marine navigation includes similar products to those conveyed by road, which are transported under the Columbia River bridges both up and downriver. As with vehicle transportation, marine vessel transport products can be vulnerable to delays. Delays to some marine transport would occur with the single-level movable-span bridge configuration for vessels dependent upon bridge openings, as vessels may not be able to accurately time their arrival to outside the bridge opening time restrictions. No delays to marine transport would occur with either of the fixed-span configurations. However, vessels with vertical navigation clearance requirements of greater than 116 feet would permanently be unable to transit under the bridge for its 100+ year service life.

Effects of the Modified LPA on Freight Transport

Truck Transport

The Modified LPA would benefit the trucking industry by reducing travel times and increasing reliability, which in turn would reduce costs and improve efficiency for truck freight operators. As described in Section 3.1, Transportation, traffic operations on I-5 are expected to improve with the addition of one auxiliary lane and would improve even more with the addition of a second auxiliary lane. These improvements would enhance regional mobility and access, which would increase the competitiveness of the regional economy, reduce transportation costs for local businesses, and increase operational flexibility for businesses (e.g., deliveries, shipping, and business operations). However, if the C Street ramps at the SR 14 interchange were eliminated, additional traffic delay and longer travel times near the Mill Plain Boulevard interchange and in downtown Vancouver would have an adverse economic impact on local businesses in that area.

The single-level fixed-span configuration (all bridge type options) would have a lower maximum height and a reduced highway grade compared to the double-deck fixed-span configuration. The reduced grade would allow for improvements in freight vehicle speed. With the single-level movable-span configuration, the average number of bridge openings for vessels is anticipated to be less than 146 per year, which is the average number of openings for vessels over the past 12-year period (2012-2023). If future maritime use increases or decreases, the number of bridge openings may also deviate from recent historical patterns over the course of the 100+ year service life of the new Columbia River bridges. Future bridge openings would continue to cause delays and congestion for freight truck transport, with associated economic impacts that would offset the benefit provided by the reduced grade.

As described in Section 3.1, Transportation, under existing conditions, the average bridge opening and gate closure duration during the 5-year period (January 1, 2015, to December 31, 2019) was 11.6 minutes. While bridge openings are not allowed during peak highway traffic periods[3] except in emergency situations, they are

[3] Interstate Bridge lift openings are currently restricted to avoid weekday peak highway traffic operations between 6:30 a.m. and 9:00 a.m. and between 2:30 p.m. and 6:00 p.m., excluding emergency bridge lifts.

allowed before and after the peaks. Depending on the closure time and duration as well as traffic levels, it can take between 5 and 110 minutes for traffic to recover from a bridge opening and gate closure. An opening or closure just before the peak period can last even longer, affecting conditions throughout the peak traffic period. The single-level movable-span configuration would likely have increased restrictions on bridge openings to minimize impacts to vehicle traffic and transit compared to today's restrictions.

Marine Cargo Transport

Under the Modified LPA, each of the new Columbia River bridges would be built on six pairs of in-water piers, plus several pairs of piers on land. The new bridges under consideration in the Modified LPA include both fixed-span and movable-span configurations. As with the existing bridges, the new bridges would provide three shipping channels: a primary navigation channel and two alternate channels. Each of the three navigation channels would be 400 feet wide, which includes 50-foot maintenance buffers on each side of the navigation channels for all bridge configurations and bridge types currently under consideration. All bridge types of the fixed-span bridge configurations would provide approximately 116 feet of vertical navigation clearance over the primary navigation channel. The movable-span configuration would provide approximately 92 feet of vertical clearance in the closed position over the primary navigation channel (or 99 feet over the north barge channel) and 178 feet in the open position, compared to 72 feet in the closed position and 178 feet in the open position for the existing Interstate Bridge.

For a movable-span configuration, all current vessel traffic could pass beneath the new bridges; however, as noted above, the movable span could have more timing restrictions on bridge openings than the No-Build Alternative to minimize impacts to vehicle traffic and transit service. Construction of a fixed-span configuration with 116 feet of vertical navigation clearance would result in two vessels that currently transit under the Interstate Bridge and large cargo manufactured upstream by three industrial operations (fabricators) not being able to pass beneath the new bridges. The two vessels that would require a vertical navigation clearance greater than 116 feet include the Derrick Barge [DB] *Taylor*, which passes under the Interstate Bridge approximately 10 times per month, or 120 times per year; and, the DB *Freedom,* which makes approximately 10 trips under the bridge per year (based on 2012-2020 operations). On average during the 2012-2020 timeframe, about 2,600 commercial vessel trips occurred each year; therefore, the DB *Taylor* represents approximately 4.6% of total commercial vessel trips each year, while the DB *Freedom* represents approximately 0.3% of commercial vessel trips each year. Three additional vessels (DB *4100*, DB *General* and dredge *Yaquina*) would be restricted when the river level is at the ordinary high water level of 16 feet above Columbia River Datum, which is about 1% of days in a typical year. Each of these three vessels make approximately 12-28 trips per year. In summary, a total of five vessels and three fabricators would be adversely affected by any of the fixed-span configurations, whereas the movable-span configuration would allow passage for all current vessels and cargo. The IBR Program is committed to working with the owners and operators of these vessels to identify mutually acceptable measures to avoid or minimize economic impacts.

Vessels or cargo shipments unable to pass beneath a fixed-span configuration could result in economic impacts including increased production costs, reduced potential for future work, and reduced employment opportunities in the region. Affected fabricators could continue to seek contracts for products that exceed the bridges' vertical clearance but would require securing a downriver satellite site to complete final assembly and could incur higher costs.

Under the Modified LPA with any of the fixed-span configurations, other commercial vessels on the Columbia River such as cruise vessels and tugs/tows for the barges would continue operations. Under the Modified LPA with the movable-span configuration, all vessels currently using the Columbia River would be able to pass under the bridges, but the movable-span configuration would provide greater vertical clearance (92 feet over the primary navigation channel or 99 feet over the north barge channel) compared to the No-Build Alternative (72 feet over the alternate barge channel) when each is in the closed position, potentially allowing more

vessels to pass without requesting a bridge opening. If a bridge opening were required, these vessels would either need to revise their schedules to avoid restricted times for bridge openings or experience delay. See Section 3.2, Navigation, and the Navigation Impact Report for detailed discussion on the benefits and effects of the Modified LPA on vessel navigation.

Resulting economic benefits with the fixed-span configurations would be eliminating delays associated with the movable-span configuration and improving travel times for vehicles and transit service crossing over the river, which would no longer have interruptions from bridge openings.

The marine cargo transportation impacts listed above are a snapshot in time and represent current waterway usage. Over the 107 years of service life of the Interstate Bridge (northbound span opened in 1917 and southbound span opened in 1958), numerous bridge lifts have been conducted for mariners with large vertical navigation clearance requirements, including those requiring openings for clearances over 116 feet and up to 178 feet. It is difficult to predict maritime transportation system demands and associated needs for bridge openings for the 100+ year service life of the bridges, since vessel traffic and river-level conditions vary from year to year and economic trends for maritime commerce may change over time. Nevertheless, a fixed-span configuration with 116 feet of vertical clearance would permanently deny access under the bridges to mariners who require vertical clearances of greater than 116 feet for the 100+ year service life span of the bridges.

Rail Transport

The BNSF Railway mainline operates on an east-west alignment north of the Columbia River in Vancouver, between the river and downtown Vancouver. No long-term economic impacts to rail traffic operations would be anticipated as a result of the Modified LPA.

Other Considerations

New transit connections in downtown Vancouver would improve travel time accessibility and broaden the pool of labor available along the corridor and in the region.

Earthquakes could cause economic impacts by delaying or completely stopping the flow of freight, disrupting travel routes for employees traveling to and from work, and destroying billions of dollars in infrastructure. The Modified LPA would withstand a major seismic earthquake, minimizing these impacts to the greatest extent possible.

Tolling

The Modified LPA assumes a variable-price toll using two scenarios. These tolling scenarios are used to study the impacts of various toll rates related to Program funding and other traffic-related impacts. The IBR Program would not be setting toll rates; the Washington Transportation Commission and Oregon Transportation Commission have the authority to jointly set toll rates.

Scenario A (northbound and southbound tolls with a variable toll rate range of $2.15 to $3.55) estimates toll revenues, while Scenario B (a north and southbound toll with a variable toll rate range of $1.50 to $3.15) forecasts the impacts of tolling on traffic volumes for this NEPA analysis. The tolls are in Fiscal Year 2026 dollars and are assumed to escalate by 2.15% per year. Variable tolls are likely to be beneficial for freight-dependent businesses and businesses that rely on just-in-time deliveries because the predictability of travel would also increase. This benefit is somewhat offset by the higher toll charges truck movements would incur during peak periods; however, peak freight travel times tend to fall outside the peak periods for general-purpose traffic.

The application of a variable toll pricing scheme to the new Columbia River bridges would add an out-of-pocket cost to trips and is anticipated to result in an overall reduction in bridge crossings with the Modified LPA. With the proposed tolling scenarios, the highest annual cost of tolls for a typical driver making

an outbound and inbound trip 5 days a week, 50 weeks per year, would be approximately $1,625 (this assumes the driver pays $3.25 per trip under Scenario A in Fiscal Year 2022 dollars). The 2021 median household income was $78,476 for Portland and $67,462 for Vancouver (U.S. Census Bureau n.d.). The cost of tolls for traveling across the I-5 Columbia River bridges would constitute approximately 2% and 2.4% of the median household's income in Portland and Vancouver, respectively. According to the Consumer Expenditure Survey, administered by the Bureau of Labor Statistics, the average household spent approximately $10,961 on transportation expenditures in 2021, which is between approximately 14% and 16% of household income for Portland and Vancouver, respectively. The addition of toll fees would increase these percentages to approximately 16% of household income for Portland and 19% for Vancouver.

3.4.4 Temporary Effects

No-Build Alternative

Under the No-Build Alternative, the existing Interstate Bridge, I-5, local roads, and associated infrastructure would remain as they are today. With no new infrastructure, there would be no temporary impacts to land use.

The No-Build Alternative would not involve construction activities, which often result in temporary economic benefits from capital expenditures, opportunities for entering the labor market through construction jobs, the purchasing of local goods and services needed for construction, and construction employees spending money in the community. The No-Build Alternative would also not result in temporary adverse economic impacts such as limiting business visibility and access, traffic delays and detours, and noise.

Modified LPA

Most temporary effects on land use and economics would not differ among the Modified LPA design options. Where differences would occur, they are described in the subsections below.

Land Use

Construction of the Modified LPA, including construction of the new bridges and removal of the existing bridges, is expected to take between approximately 9 and 15 years overall. In most parts of the study area, impacts would not be continuous throughout this timeframe, but would be limited to the duration of active construction on a specific component of the Modified LPA. Because construction activities would be temporary, they are unlikely to have lasting impacts on land uses, land use patterns, or compliance with land use plans and policies. However, construction-related impacts from noise, dust, lighting (for nighttime construction), and traffic delays may have secondary impacts on land uses. For example, adjacent residential uses are particularly sensitive to the impacts of construction; commercial uses may also be affected if they rely upon easy access and a pleasant driving experience. For more information, please refer to the Noise, Air Quality, Visual Quality, and Transportation Technical Reports and Sections 3.1, 3.9, 3.10, and 3.11 of this SEIS.

Bridge construction would disturb existing land uses and associated activities on Hayden Island. The existing commercial use pattern on the island is predominantly auto-oriented big-box retail. Shoppers and visitors to the area would likely face delays, detours, and other inconveniences. Noise, dust, and vibration impacts may also reduce the shopping center's attractiveness to shoppers during construction, especially when compared to similar shopping centers nearby.

Although I-5 is only one of the ways to access the area, many land uses in downtown Vancouver, particularly businesses which rely heavily on pass-by traffic, could be negatively impacted by construction activities due to detours, unclear access, noise, vibration, and dust. However, construction activities would not change the zoning designation and land use; if a business were to close due to construction impacts, similar businesses

compatible with local zoning regulations, overlay districts, and land use plans would be expected to take its place.

A total of approximately 5.6 acres of temporary construction easements would be needed along the length of the Modified LPA. These areas would be used to access construction sites, store vehicles and equipment, and for other ancillary purposes. Areas required for temporary easements would be restored to their former condition and use at the end of the construction period.

Economics

Regional Temporary Effects

Construction has the potential to cause negative economic effects by blocking visibility and access to businesses and causing traffic delays and detours that increase travel times. Traffic congestion is already a common occurrence within the study area during peak hours. Construction activities and temporary detours could extend the peak duration, negatively impacting businesses whose employees commute via I-5. Likewise, the movement of freight, goods, and services could be negatively affected if construction activities make travel times longer or less predictable.

Construction of the new Columbia River bridges would also affect marine commerce on the river. Work on the new bridges is anticipated to take place over a period of approximately 4 to 7 years, with a general sequence of activities including initial preparation, installation of foundation piles, shaft caps, pier columns, superstructure, and deck. Construction barges would be anchored in the river, and support barges traveling to and from supply points could create conflicts with freight. Some likely effects on marine commerce include:

- There would be temporary closures or changes to the three navigation channels during construction of the proposed Columbia River bridges, but it is assumed that at least one navigable channel would remain open at all times for marine traffic.
- Commercial vessels may be provided with towing assistance during times where navigation is made difficult by construction activities.
- Vertical and horizontal clearance restrictions would be in place for portions of the construction period. Such restrictions would require U.S. Coast Guard concurrence. A temporary construction navigation envelope (height and width of unobstructed clearance for navigation) would be maintained during construction with a minimum clearance of 72 feet (vertical) by 150 to 200 feet (horizontal). During times when these minimum clearances are in effect, vessels requiring more than 72 feet of vertical navigation clearance would be unable to pass under the bridges; however, potential passage with reduced width or scheduled interim short-term openings could be coordinated with the bridge construction contractor.
- Temporary river travel restrictions are anticipated as barges are used to ferry materials to and from work sites.

Construction of the Modified LPA could also result in positive economic effects through increased employment and spending during construction. The extent of these effects depends on the source of funding and the makeup of construction work crews. Funds from local or regional sources are transfers of money that could be spent by residents and businesses on other economic activities in the region, and therefore do not add to the overall supply of funding in the regional economy. Conversely, federal or state funds that are new to a region can have a measurable economic effect, resulting in employment and income gains from construction. The federal government and the states of Oregon and Washington would provide the funds for the Modified LPA, thus resulting in some economic and employment benefits in the region that would otherwise not occur.

Local Temporary Effects

Roadway closures could affect local economic activity, depending on the location and duration. There is one temporary road closure associated with the Modified LPA; a portion of Jantzen Drive east and west of I-5 would be closed for approximately 8 months to allow for road and utility work. This section of roadway does not include any direct access points for businesses not permanently displaced by the Modified LPA. Access would remain open along N Hayden Island Drive and Center Avenue, but some out-of-direction travel could be required to continue to access businesses in the immediate vicinity of the closure.

In Washington, ramp closures associated with improvements to the SR 14 interchange would primarily affect traffic from downtown Vancouver to points east and the connection between Portland and downtown Vancouver on I-5. Alternate routes would be available to travel to these areas, but they would be more difficult and less direct. This could affect businesses in downtown Vancouver by increasing delivery times for goods and making it more difficult for employees and customers to reach downtown businesses. For more detail regarding local temporary economic effects due to construction, see the Economics Technical Report.

3.4.5 Indirect Effects

Most indirect effects on land use and economics would not differ among the Modified LPA design options. Where differences would occur, they are described in the subsections below.

Land Use

Indirect Effects on Local and Regional Land Use

Indirect effects on land use are associated with (1) the potential for the Modified LPA's transportation improvements to facilitate growth and development compared to the No-Build Alternative, and (2) the consistency of such potential growth and development with local and regional land use plans. This section evaluates both topics.

As described in Section 3.4.3, Long-Term Benefits and Effects, and Table 3.4-10, both Portland and Vancouver have accounted for future anticipated growth within their planning documents and provide strategies, visions, and goals to guide this growth. The plans provide for a development strategy to accommodate growth by increasing land use density, particularly in areas that would be served by high-capacity transit if the Modified LPA is implemented. Under the No-Build Alternative, light-rail would not be extended to Vancouver and express bus service across the Columbia River would be subject to delays caused by increasing congestion. Without high-capacity transit and associated light-rail stations on Hayden Island and in downtown Vancouver, the demand for higher-density development would be less likely to materialize, and the development strategy provided for in local land use plans may not be achievable. Vehicle, express bus, and active transportation would be the only mode option for crossing the Columbia River because high-capacity transit would not be available. Because the No-Build Alternative would have fewer transportation mode options to cross the river and would not include the LRT stations proposed under the Modified LPA, it would be less likely to support the increased development density provided for under the local planning documents. The Modified LPA would provide new light-rail service and improve the reliability of bus transit, which would facilitate the development strategy provided for in local planning documents, especially on Hayden Island and in Downtown Vancouver. This would support the plan to accommodate increased population growth through higher density development . The Modified LPA would not be expected to result in urban sprawl (scattered development on the periphery of urban areas) because the transit improvements would be provided in established urban areas, the local land use planning strategy to increase density is more likely to be achievable and the Columbia River bridges would be tolled. Because tolling increases the out-of-pocket cost of commuting, individuals have an incentive to shorten their commutes by living closer to alternative transportation connections, services and where they work (Brueckner 2001). As

described in Section 3.1, the transportation analysis also shows that tolling would cause some drivers to change to transit to avoid tolls.

The CRC EIS included an analysis of the project's potential for induced land use changes. The analysis used MetroScope, Metro's integrated land use and transportation model, to predict how the proposed changes in transportation infrastructure could influence the future distribution of employment and housing throughout the region. The modeling effort, which was completed in 2010, concluded that the CRC project would not significantly induce growth or sprawl. Compared to the No-Build Alternative, the model estimated that the CRC project, with tolling, would result in a 0.03% decrease in households in north Clark County and a 0.51% increase in households in the southern, more urban, half of the county (Conder 2010). Metro reviewed these findings in January 2024 and concluded they remain relevant to the Modified LPA.

The amount and timing of land use changes in transit station areas can be affected by transit ridership levels (e.g., higher ridership would be expected to increase land use development compared to lower ridership). Thus, the amount and timing of transit-oriented development in station areas would depend to some degree on transit ridership levels and other factors such as local economic conditions. Regardless of the pace of development, transit-oriented development would be consistent with existing planning and zoning that anticipates the future availability of high-capacity transit to support planned densities.

In conclusion, while the Modified LPA is expected to have the indirect effect of facilitating growth and development within the study area, the magnitude and location of this development would be consistent with all local and regional land use plans. Conversely, the No-Build Alternative would not encourage as much dense, transit-oriented development, and congestion resulting from over-capacity transportation facilities could inhibit the region from accommodating planned levels of growth.

Indirect Land Use Effects Related to Navigation

The Navigation Impact Report (IBR 2022) evaluated the potential for future land use changes upstream of the Interstate Bridge that could affect marine commerce based on city, port, state and federal land use and other management plans, which typically have planning horizons of 10 to 20 years. The report identified properties along the Columbia River that currently have marine facilities available or have the potential for future development of such facilities. It concluded there are few opportunities for new or expanded commercial and industrial development that would require the use of vessels too large to pass beneath the proposed new fixed-span Columbia River bridges. The number of suitable properties is limited by political and geographic constraints on land along the Columbia River waterfront, which include the Columbia River Gorge Natural Scenic Area designation, parallel transportation routes (SR 14, I-84, Union Pacific Railroad, and BNSF Railway), steep topography, and existing recreational and open space uses. The types of industrial uses that currently generate or could generate marine vessel traffic in the future are located within urban areas and typically within established industrial parks (e.g., Columbia Business Center, Port of Cascade Locks Industrial Park).

Per current planning documents, there are no known planned developments within the study area that would create additional navigation activities that would be adversely affected by the new Columbia River bridges with either the double-deck or single-level fixed-span configurations. If new marine-based businesses were to develop upstream of the new Columbia River bridges over their 100+ year service life, either fixed-span bridge configuration would limit their activities to a maximum vertical navigation clearance of 116 feet. The single-level movable-span configuration would continue to provide at least 178 feet of vertical clearance, and therefore would pose no additional limitations to future activities or marine development beyond those posed by the existing Interstate Bridge.

Economics

Indirect economic impacts may result from the displacement of local businesses if remaining businesses find it difficult to attract or retain customers because complementary businesses no longer exist. The long-term

magnitude of this impact would depend on the potential to relocate displaced businesses in the same neighborhood and the extent and types of infill and redevelopment that occurs. This in turn depends on a number of factors such as regional economic trends and market conditions, the willingness of businesses to relocate, available building space for lease during the relocation process, and community and city support for redevelopment.

Improved travel times for vehicles and improved transit options would have a positive impact on workers and business trips in the project area, reducing delay and the time cost of travel.

The types of economic activity dependent on marine navigation upriver of the bridge is not anticipated to change considerably in the near future. Most of the commercial river traffic in the shallow-draft upriver section of the Columbia/Snake system would continue to be dominated by barged shipments of grain, petroleum products, wood products, and other bulk products for domestic consumption and export. It would be highly unlikely the nature or composition of upriver navigation would change as a result of the Modified LPA. River depth and other existing, permanent height and width constraints limit the size and draft of vessels capable of upriver navigation, and the availability of suitable waterfront properties for industrial development is, and is expected to remain, extremely limited for the next 20 or more years. As a result, the Modified LPA would be expected to have limited, at most, impact on future upriver economic activity.

3.4.6 Potential Avoidance, Minimization, and Mitigation Measures

Long-Term Effects

Regulatory Requirements

As described in Section 3.3, Property Acquisitions and Displacements, property acquisition and residential or business displacements would be mitigated under the provisions of the Uniform Relocation and Real Property Acquisitions Policies Act of 1970, as amended. Those affected would receive compensation and relocation assistance from ODOT or WSDOT, depending on location. Property would be purchased at fair market value, and residential occupants displaced by the Modified LPA would be provided decent, safe, and sanitary replacement housing. The Acquisitions and Displacements Technical Report includes more information on the provisions of the Uniform Act and the processes used to value properties and provide relocation assistance.

The IBR Program would continue to work with the U.S. Coast Guard and the U.S. Army Corps of Engineers to help ensure that the potential for effects on river users is addressed through the agencies' permitting processes.

Program-Specific Mitigation

The Land Use Technical Report also identifies several measures which, although they are not specifically land use mitigation, would support the Modified LPA's compatibility with existing land uses:

- The use of interchange area management plans to guide development within the vicinity of interchanges.
- Mitigation for effects to historic resources, including demolition of the existing Interstate Bridge.
- Avoidance of potential land use conflicts by planning and designing efforts to support integration of park-and-ride facilities with current and planned land uses in downtown Vancouver.

Temporary Effects

Regulatory Requirements

Construction best management practices would be used to avoid or minimize indirect construction effects on land use and economics, such as dust, noise, and aesthetic impacts. These measures are discussed in the analyses of air quality (Section 3.10), noise and vibration (Section 3.11), and visual quality (Section 3.9).

Program-Specific Mitigation

Land Use

- Monitor noise levels on a regular basis during construction near noise-sensitive receptors located closest to construction activities to reduce disturbance to nearby land uses, and confirm compliance with noise thresholds set by local jurisdictions as well as the conditions of any noise variances obtained.
- Schedule and manage construction activities to minimize community disruption to the greatest extent feasible.
- Implement mitigation measures for temporary impacts on residents as discussed in Section 3.3, Property Acquisitions and Displacements.
- Carefully plan construction of the Modified LPA to phase work in such a way that reduces or avoids complete closure of affected roadways and access points to nearby businesses. Necessary detours would be routed to reduce travel times and signed to reduce confusion. Construction would be planned to keep business access points open as much as possible and would be well signed. A construction communication plan could be developed to inform travelers about detours and road closures and would direct them to businesses.

Economics

- Reduce impacts to local businesses by implementing a phased construction schedule that avoids complete closures of roads and access points to local businesses. A construction communication plan could be developed to inform travelers about detours and road closures and would direct them to businesses.
- Design construction schedules to minimize temporary impacts to BNSF Railway lines and service frequency.
- Provide outreach to businesses affected by construction and use assistance programs to help mitigate potential negative construction-related effects.
- Coordinate with the Ports of Portland and Vancouver and associated businesses to identify ways to minimize delays for commercial freight vehicles during construction.
- To keep freight moving during construction, the IBR Program would conduct outreach to businesses in areas with high volumes of freight traffic to determine access and site circulation needs and maintain access as needed.

3.5 Neighborhoods and Equity

This section summarizes the IBR Program's benefits and impacts to neighborhoods and the broadened view of equity priority communities.

Transportation infrastructure substantially influences neighborhoods and communities. Highways and transit connect people with their homes and daily destinations, while local streets and paths provide circulation for drivers, bicyclists, and pedestrians within their neighborhoods. New or modified transportation infrastructure can improve these connections, such as by improving commutes for nearby residents and increasing community investment. It can also negatively change a community's character, for example by displacing neighborhood resources and increasing noise levels for residents adjacent to the highway. Thoughtful planning and design of transportation infrastructure can increase benefits to surrounding communities and reduce negative impacts.

The IBR Program defines **equity priority communities** as those who experience and/or have experienced discrimination and exclusion based on identity or status. The IBR Program provides a two-part definition for equity:

1. **Process equity** means that the IBR Program centers and prioritizes access, influence, and decision-making power for equity priority communities in establishing objectives, design, implementation, and evaluation of success.
2. **Outcome equity** is the result of successful process equity and is demonstrated by tangible transportation, community, and economic benefits for equity priority communities.

Terms and Definitions

As defined by the IBR Program, **Equity priority communities** refer to populations who experience and/or have experienced discrimination and exclusion based on identity or status, including:

- Black, Indigenous, and People of Color
- Tribal Governments
- People with disabilities
- Communities with limited English proficiency
- Persons with lower incomes
- Houseless individuals and families
- Immigrants and refugees
- Young people (under 25 years of age)
- Older people (65 years or older)

Together, process equity and outcome equity contribute to addressing harmful impacts and removing longstanding injustices experienced by equity priority communities.

The information in this section is based on the IBR Neighborhoods and Populations Technical Report and Equity Technical Report.

3.5.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with neighborhoods and equity has been updated in this Draft SEIS to include:

Neighborhoods

- Updated demographic information, neighborhood characteristics, and community resources within the study area.
- Changes in land uses such as development at the Vancouver Waterfront, planned uses on Hayden Island, and recently constructed, altered, or removed buildings.
- Changes in the project footprint necessitated by changed conditions resulted in shifting the LRT alignment and modifying interchange designs.
- Updated analysis of the Modified LPA and design options, which were necessitated by changed conditions.
- Updated analysis of long-term, short-term, direct, indirect, and cumulative effects on Oregon and Washington neighborhoods resulting from the Modified LPA.

Equity

- Prepared a new Equity Technical Report based on the IBR Program Equity Framework.
- Applied the Climate and Economic Justice Screening Tool (CEQ 2023) to assist identifying equity priority populations.
- Incorporated directives from Presidential Executive Order (EO) 13985: Advancing Racial Equity and Support for Underserved Communities Through the Federal Government (2021) and Presidential EO 14096: Revitalizing Our Nation's Commitment to Environmental Justice for All (2023).
- Developed a public engagement plan that targets equity priority communities and evaluated benefits and burdens to these communities to support the U.S. Department of Transportation's Justice40 Initiative as part of Presidential EO 14008: Tackling the Climate Crisis at Home and Abroad (2021).
- Coordinated and engaged with the newly chartered Community Advisory Group and Equity Advisory Committee per the IBR Equity Framework and also updated public engagement efforts.
- Identified long-term, short-term, direct, indirect, and cumulative effects to equity communities resulting from the Modified LPA and design options.

IBR Equity Framework

The IBR Program is committed to centering equity by developing a shared understanding of what the Program seeks to achieve and how it will be achieved. IBR Equity Framework outlines the Program's approach and tools it will use to advance equity.

Table 3.5-1 compares the impacts and benefits to neighborhoods and equity between the CRC LPA and the IBR Modified LPA. While the CRC Final EIS evaluated neighborhoods, equity was not explicitly studied.

The impacts associated with the Modified LPA do not differ substantially from those of the CRC LPA. Both the CRC LPA and the Modified LPA would be consistent with neighborhood plans, both would have lower emissions for all Mobile Source Air Toxics and criteria pollutants than under existing conditions, I-5 travel times and reliability would improve, and access to transit, bike, and pedestrian facilities would increase. A detailed description of impacts and benefits to neighborhoods and equity from the IBR Modified LPA and associated design options follows.

Table 3.5-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects on Neighborhoods and Equity

Technical Considerations	Technical Subgroup	CRC Effects Identified in the 2011 Final EIS	Modified LPA	Explanation of Differences
Displacements	Residential	59	43 for most design options. One design option that shifts I-5 west in downtown Vancouver would displace 33 residential units in the Esther Short neighborhood, resulting in 76 total residential displacements.	Modified LPA design changes would reduce residential property acquisition, except the I-5 westward shift design option, which would increase displacements compared to the CRC LPA. Key design changes include replacing the full interchange on Hayden Island with a partial interchange and moving the LRT alignment closer to I-5 (removing the proposed couplet in downtown Vancouver).
	Business	69	36 for most design options. One design option that shifts I-5 west in downtown Vancouver would displace three commercial businesses at the Regal City Center Complex, resulting in 39 total business displacements.	Commercial property acquisitions would also decrease due to the Modified LPA's smaller footprint.
Neighborhoods	Access to resources	• Displacement of Hayden Island Safeway and bottle return.	• None identified.	The Safeway grocery store (including a pharmacy and bottle return) closed after the CRC project was suspended. A new Target store, replacing some of these services, was constructed outside the Modified LPA footprint.
	Community cohesion	• Improved cohesion with light-rail and transit-oriented development. • Would result in residential and commercial displacements.	• Similar to the CRC LPA, but with fewer commercial displacements; residential displacements would be less than under the CRC LPA for all design options except the I-5 westward shift design option.	Impacts of the CRC project and the Modified LPA for Hayden Island are similar and would affect community cohesion despite benefits from improved transit, bicycle, and pedestrian connections. Due to differences in design footprint, the

Technical Considerations	Technical Subgroup	CRC Effects Identified in the 2011 Final EIS	Modified LPA	Explanation of Differences
		• Reduced access to restaurants, wage-earning jobs on Hayden Island.		CRC project would have caused more commercial displacements and, except for the I-5 westward shift design option, more residential displacements.
	Noise and vibration	• 110 residential equivalent impacts after mitigation.	• 122 residential equivalent impacts after mitigation.	Noise impacts would increase with the Modified LPA. Differences between CRC and the Modified LPA result from changes in highway footprint at the I-5/SR 500/39th Street Interchange and in Oregon, as well as changes in transit alignment and proximity of alignment to the direct fixation trackway in downtown Vancouver.
	Tolling	• Tolling would increase overall household transportation costs and would require a higher share of income for low-income populations. Transponder mitigation for low-income populations would offset this impact. • Tolls would reduce travel times and improve travel time reliability.	• Similar to CRC LPA. • Toll rates and policies, including a possible low-income toll program, would be jointly set by the OTC and WSTC. Both commissions have supported the study of a low-income toll program, including how such a program could be implemented in each state. They will work together to determine how to approach this for the IBR Program.	Although changes in external economic conditions over time (e.g., inflation) may have influenced household costs related to tolling, the effects would be similar between CRC and the Modified LPA.

Technical Considerations	Technical Subgroup	CRC Effects Identified in the 2011 Final EIS	Modified LPA	Explanation of Differences
Equity	High-capacity transit	N/A [a]	• All equity priority communities would experience increased access to jobs and services via transit. • Three equity priority communities are estimated to see greater increases in access than their counterparts.	New analysis completed for the Modified LPA.
	Highway and driving improvements	N/A	• 18% to 20% more jobs accessed during AM peak and 3% during midday (on average) for all equity priority communities living in the Program area.	New analysis completed for the Modified LPA.
	Houseless populations	N/A	• Residential displacement for those living within existing or to-be-acquired right of way.	New analysis completed for the Modified LPA.
	Long-term displacement potential	N/A	• Potential for increased costs of housing and other necessities due to improved amenities and livability, which in turn could lead to displacement of lower-income residents.	New analysis completed for the Modified LPA.
	Tolling	N/A	• New toll requires higher proportion of income for low-income drivers. • Toll rates and policies, including a possible low-income toll program, would be jointly set by the OTC and WSTC.	New analysis completed for the Modified LPA.

Note: Residential Equivalent = used to equate the use of common outdoor areas to individual outdoor use areas for parks or other nonresidential household uses. The calculation includes the usage factor of the area, the number of uses, and the equation of users to residences.

a The CRC project EIS did not identify, define, or evaluate impacts/burdens and opportunities to equity populations.

CRC = Columbia River Crossing; LPA = locally preferred alternative; LRT = light-rail transit; N/A = not applicable; OTC = Oregon Transportation Commission; WSTC = Washington State Transportation Commission

3.5.2 Existing Conditions

The IBR corridor includes a 5-mile segment of I-5 approximately between the SR 500 interchange in Washington and the I-5/Columbia Boulevard interchange in Oregon, as well as the Ruby Junction Maintenance Facility in Gresham, Oregon.

Terms and Definitions

Community resources and cohesion. Community resources typically include educational, religious, health care, cultural, and recreational facilities. Community cohesion measures how well residents can connect with one another within their community. These connections can occur at gathering places such as schools, community centers, parks, or transit stations. High home ownership rates and active neighborhood associations also contribute to cohesion.

Neighborhoods

The study area includes 15 neighborhoods in the cities of Portland, Gresham, and Vancouver (Figure 3.5-1).

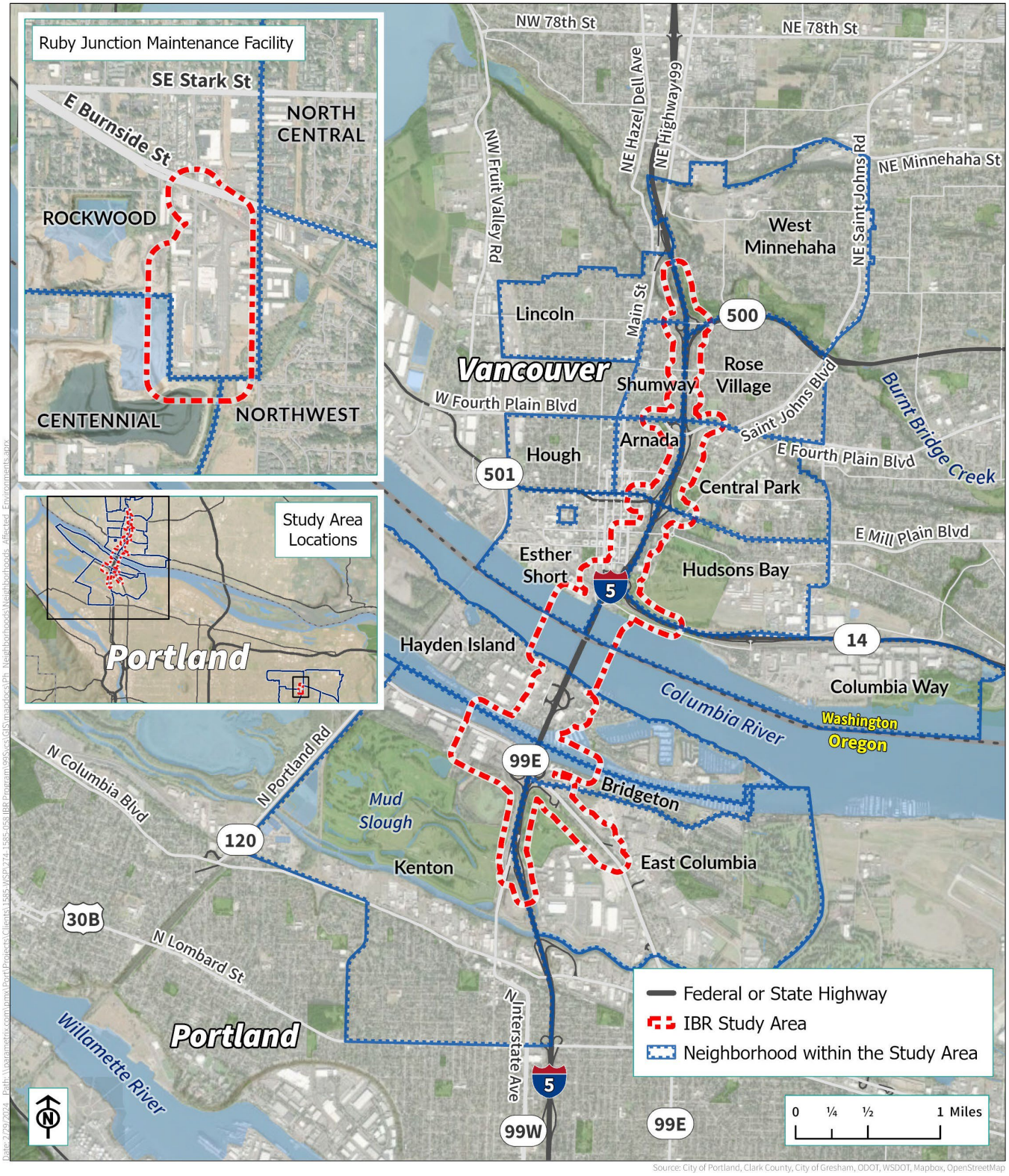
- Portland
  - Bridgeton
  - East Columbia
  - Hayden Island
  - Kenton
- Gresham
  - Rockwood
- Vancouver
  - Arnada
  - Central Park
  - Columbia Way
  - Esther Short
  - Hough
  - Hudson's Bay
  - Lincoln
  - Rose Village
  - Shumway
  - West Minnehaha

Data that help identify the overall neighborhood character and equity priority communities, which are detailed in the IBR Neighborhoods and Populations Technical Report, include:

- Total population.
- Household size.
- Demographics of equity priority communities compared to city and county.
- Median assessed home value.
- Crime rate statistics.
- Inventory of community resources.
- Neighborhood cohesion.

Analysists primarily used 2022 U.S. Census data for the analysis. Other data sources are provided in the footnotes to the tables in this section.

Figure 3.5-1. Neighborhoods in the Study Area



Neighborhood Demographics

Each neighborhood has a unique character formed by its residents, community resources, businesses, and landmarks. Table 3.5-2 through Table 3.5-7display the race/ethnicity, demographic, and age characteristics of study area neighborhoods in Oregon and Washington. For Oregon neighborhoods, data for Portland and Multnomah County are provided for comparison. For Washington neighborhoods, data for Vancouver and Clark County are provided for comparison. Several distinctions within the demographics of the study area are summarized as follows:

The IBR Program is consulting with 10 federally recognized Indian Tribes. While there are no reservations within the IBR study area, these tribes are sovereign nations that have identified an interest in the Program and the project area. Enrollment data is held and managed by the tribes and therefore is not incorporated into this report. However, tribal members living within the IBR study area are reflected in the U.S. Census data, but they are not specifically identified by tribal affiliation.

People with disabilities. The disabled population rate varies across study area neighborhoods. The Esther Short neighborhood reports a 25% disability rate, likely due to the senior housing in the area. All other neighborhood disability rates fall between about 11% and 19% (see Table 3.5-5).

Older adults and children. The Columbia Way neighborhood has the largest rate of people over 65, with 38.6%; all other study area neighborhoods have a rate between 6.5% and 26%. The Columbia Way neighborhood has the lowest percentage of children (age 18 or younger), at 3.2%, while the Rockwood neighborhood has the highest percentage of children, at 28.3% (see Table 3.5-6 and Table 3.5-7).

Car ownership. The neighborhoods vary in their reliance on automobile transportation. Thirty percent of households in the Esther Short neighborhood report not owning a car. The Hough neighborhood also shows relatively low rates of car ownership; 20% of the residents do not own a car. All other neighborhoods have a rate of households without a car between 2.1% and 16.5% (see Table 3.5-4 and Table 3.5-5).

Table 3.5-2. Race/Ethnicity for Oregon Study Area Neighborhoods, Portland, and Multnomah County

Study Area Neighborhood	Total Population	White Alone	Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Some Other Race Alone	Two or More Races	Hispanic or Latino Alone
Hayden Island	2,373	76.5%	0.8%	2.1%	0.9%	0.4%	<0.1%	4.2%	15.0%
Bridgeton	701	69.4%	21.1%	1.9%	0.1%	<0.1%	0.0%	4.3%	3.1%
East Columbia	1,141	52.7%	16.8%	0.1%	16.2%	1.0%	0.0%	5.6%	7.7%
Kenton	7,626	67.6%	8.7%	0.6%	2.2%	0.9%	<0.1%	8.6%	11.4%
Rockwood	13,712	40.0%	7.5%	1.6%	6.4%	2.1%	<0.1%	3.6%	38.7%
Portland	650,380	69.5%	5.7%	0.6%	8.6%	0.6%	0.4%	4.8%	9.8%
Multnomah County	809,869	68.9%	5.2%	0.7%	7.7%	0.6%	0.4%	4.7%	11.8%

Source: U.S. Census Bureau 2022, Table B03002

Table 3.5-3. Race/Ethnicity for Washington Study Area Neighborhoods, Vancouver, and Clark County

Study Area Neighborhood	Total Population	White Alone	Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Some Other Race Alone	Two or More Races	Hispanic or Latino Alone
W. Minnehaha	3,839	69.5%	2.9%	0.4%	1.3%	3.3%	0.0%	8.8%	13.8%
Lincoln	4,029	79.9%	2.9%	0.2%	2.8%	<0.1%	0.1%	6.6%	7.4%
Shumway	1,094	79.3%	2.3%	0.4%	3.0%	2.3%	0.2%	7.0%	5.4%
Rose Village	5,780	55.3%	1.3%	0.6%	0.9%	2.4%	<0.1%	11.1%	28.5%
Hough	2,795	86.1%	1.8%	0.3%	1.5%	<0.1%	<0.1%	2.4%	7.9%
Arnada	991	74.4%	1.5%	1.8%	1.7%	0.2%	1.4%	12.0%	7.0%
Central Park	2,174	81.7%	6.0%	0.1%	1.5%	<0.1%	0.3%	1.5%	9.0%
Esther Short	2,821	75.9%	6.1%	2.1%	2.5%	0.7%	0.9%	3.8%	8.0%
Hudson's Bay	2,034	76.5%	0.2%	<0.1%	2.5%	<0.1%	<0.1%	11.5%	9.2%
Columbia Way	1,195	76.5%	1.1%	<0.1%	12.7%	<0.1%	<0.1%	2.1%	7.6%
Vancouver	182,792	70.0%	2.1%	0.3%	5.5%	1.5%	0.2%	5.7%	14.6%
Clark County	481,950	77.5%	1.7%	0.5%	4.7%	0.7%	0.2%	4.7%	10.0%

Source: U.S. Census Bureau 2022, Table B03002

Table 3.5-4. Demographic Characteristics for Oregon Study Area Neighborhoods, Portland, and Multnomah County

Study Area Neighborhood	Families below Poverty Level	Low-Income Population (<2x poverty level)	Disabled [a]	Large Families [b]	Owner-Occupied Housing	Home Value Index [c]	Housing Units with No Vehicle
Hayden Island	3.0%	14.8%	17.3%	7.2%	76.2%	$315,632	4.0%
Bridgeton	0.1%	18.9%	11.0%	2.5%	44.8%	$385,931	2.1%
E. Columbia	6.3%	10.9%	11.0%	7.9%	76.6%	$425,977	3.0%
Kenton	5.7%	23.4%	10.8%	6.9%	71.1%	$457,029	10.2%
Rockwood	21.5%	49.6%	13.5%	23.3%	40.9%	$353,825 [d]	12.7%
Portland	7.7%	27.2%	11.9%	11.1%	53.1%	$508,250	14.0%

Study Area Neighborhood	Families below Poverty Level	Low-Income Population (<2x poverty level)	Disabled [a]	Large Families [b]	Owner-Occupied Housing	Home Value Index [c]	Housing Units with No Vehicle
Multnomah County	8.2%	28.3%	12.3%	12.3%	54.4%	$474,991	12.9%

Source: U.S. Census Bureau 2022, Tables B1702, C17002, S1810, B11016, B25044

a Disability is defined by the existence of a physical, mental, or emotional condition lasting 6 months or more in household members 5 years of age and older that makes it difficult to perform activities including working and leaving home.

b Large family means five or more people per family household.

c Zillow Home Value Index, January 2021. https://www.zillow.com/research/data/.

d Neighborhood-specific value unavailable for Rockwood. Reported home value is for ZIP code 97233, which includes Ruby Junction and much of Rockwood neighborhood.

Table 3.5-5. Demographic Characteristics for Washington Study Area Neighborhoods, Vancouver, and Clark County

Study Area Neighborhood	Families below Poverty Level	Low-Income Population (<2x poverty level)	Disabled [a]	Large Families [b]	Owner-Occupied Housing	Home Value Index [c]	Housing Units with No Vehicle
West Minnehaha	3.9%	30.9%	13.3%	26.6%	60.1%	$389,650	2.7%
Lincoln	8.6%	24.9%	14.3%	11.0%	58.7%	$419,358	10.7%
Shumway	1.0%	24.9%	15.8%	5.7%	50.2%	$394,907	13.4%
Rose Village	14.0%	37.7%	15.1%	19.0%	46.7%	$316,998	8.7%
Hough	11.4%	30.2%	18.9%	12.2%	45.2%	$408,568	20.1%
Arnada	10.1%	38.1%	14.8%	1.2%	28.6%	$429,085	16.5%
Central Park	7.2%	25.8%	12.7%	15.8%	39.4%	$331,351	10.2%
Esther Short	17.2%	50.6%	25.0%	6.3%	19.0%	$348,447	31.0%
Hudson's Bay	1.7%	29.4%	13.2%	8.1%	34.1%	$353,304	9.9%
Columbia Way	0.1%	22.9%	15.4%	<0.1%	49.0%	$353,935	8.2%
Vancouver	8.4%	30.3%	14.0%	14.1%	51.7%	$402,113	7.0%
Clark County	6.0%	22.9%	12.1%	15.8%	67.1%	$428,582	4.6%

Source: U.S. Census Bureau 2022, Tables B1702, C17002, S1810, B11016, B25044

a Disability is defined by the existence of a physical, mental, or emotional condition lasting 6 months or more in household members 5 years of age and older, that makes it difficult to perform activities including working and leaving home.

b Large family means five or more people per family household.

c Zillow Home Value Index, January 2021. https://www.zillow.com/research/data/.

Table 3.5-6. Population Age for Oregon Study Area Neighborhoods, Portland, and Multnomah County

Study Area Neighborhood	Total Population	0 to 4 Years	5 to 17 Years	18 to 64 Years	65 and Older
Hayden Island	2,371	<0.1%	8.6%	63.3%	26.0%
Bridgeton	701	4.9%	12.2%	71.7%	11.7%
East Columbia	1,141	3.6%	15.5%	69.5%	11.1%
Kenton	7,626	6.6%	10.1%	75.4%	9.3%
Rockwood	13,712	8.9%	19.4%	64.6%	8.9%
Portland	650,380	4.9%	12.5%	69.4%	13.2%
Multnomah County	809,869	5.5%	13.4%	67.9%	13.5%

Source: U.S. Census Bureau 2022, Table B0101

Table 3.5-7. Population Age for Washington Study Area Neighborhoods, Vancouver, and Clark County

Study Area Neighborhood	Total Population	0 to 4 Years	5 to 17 Years	18 to 64 Years	65 and Older
West Minnehaha	3,839	8.6%	16.8%	61.4%	14.3%
Lincoln	4,029	7.2%	14.0%	64.5%	14.5%
Shumway	1,094	3.9%	9.6%	69.1%	16.6%
Rose Village	5,780	8.5%	17.5%	68.3%	6.5%
Hough	2,795	5.2%	11.0%	61.7%	22.2%
Arnada	991	4.9%	12.2%	71.7%	11.7%
Central Park	2,174	6.7%	10.7%	70.4%	12.2%
Esther Short	2,821	1.5%	2.9%	73.4%	21.4%
Hudson's Bay	2,034	4.2%	11.8%	65.0%	19.5%
Columbia Way	1,195	<0.1%	3.2%	60.7%	38.6%
Vancouver	182,792	6.6%	15.8%	61.5%	16.2%
Clark County	481,950	6.1%	17.9%	60.6%	15.4%

Source: U.S. Census Bureau 2022, Table B0101

Neighborhood Plans

Neighborhoods often define themselves and strengthen their identities through neighborhood plans, which are formally adopted by city-supported neighborhood associations. The Cities of Portland and Vancouver formally adopt these neighborhood plans as part of their respective comprehensive plans. All neighborhoods

in the study area have an adopted plan except for the East Columbia, Rockwood in Gresham, and Columbia Way neighborhoods.

Neighborhood plans typically include goals, objectives, proposed comprehensive plan and zoning changes, and an implementation strategy. Within the study area, neighborhood plans with goals relevant to potential benefits and impacts of the IBR Program include:

- Minimize the adverse impacts of increased density; support density adjacent to transit.
- Preserve existing housing stock; preserve historic character.
- Reduce transportation-related noises and odor; mitigate I-5 noise.
- Reduce speeding within the neighborhood.
- Enhance and maintain on-street parking, including bike parking.
- Maintain adequate transit service; support development of light-rail.
- Improve bicycle and pedestrian facilities and connections.
- Protect the Columbia River from contaminants.

Equity

For each equity priority community, Table 3.5-8 lists the percentage that population comprises in the Program area and the broader Portland-Vancouver metropolitan area.[1] People with disabilities, persons with lower incomes, and older adults make up a large share of the Program area population compared to the metropolitan area. Percentages of young people and immigrants and refugees are lower in the Program area than in the metropolitan area, while percentages of Black, Indigenous, and People of Color (BIPOC) and limited English proficiency populations are similar. Section 3.20, Environmental Justice, discusses existing conditions and potential long-term effects on low-income and minority populations.

Table 3.5-8. Percentage of Equity Priority Communities within the IBR Program Area and Portland-Vancouver Metropolitan Area

Community	Description	Percent Program Area Population	Percent Portland-Vancouver Metropolitan Area Population
Black, Indigenous, and People of Color	People selecting any race/ethnicity combination besides White/non-Hispanic on the census.	30%	31%
People with Disabilities	People living with a serious difficulty within four basic areas of functioning: hearing, vision, cognition, and ambulation.	15%	12%
Communities with Limited English Proficiency	People who indicate that they speak English less than very well.	6%	6%

[1] Because tribes are sovereign nations with members living throughout local communities across Oregon, Washington, reservations, the United States, and beyond, elements of equity for tribal governments are discussed separately from other equity priority communities, which can be evaluated, in part, with demographic data. Data for houseless individuals and families is not shown because the geographic area for which this data is available is too large to determine a count for the IBR Program area.

Community	Description	Percent Program Area Population	Percent Portland-Vancouver Metropolitan Area Population
Persons with Lower Incomes	People or households with income at or below 200% of the federal poverty level.	32%	24%
Immigrants and Refugees	People born outside of the United States (Foreign Born Population).	9%	13%
Young People	People under 25 years of age.	25%	29%
Older Adults	People 65 years of age or older.	18%	15%

Source: U.S. Census Bureau 2022, Tables B03002, S1810, C16001, C17002, DP02, Table B01001

The IBR Program is consulting with 10 federally recognized Indian Tribes. Tribal governments (federally recognized tribes) are sovereign nations as recognized by the U.S. Government, and consultation with federally recognized tribes occurs through a government-to-government consultation process that is separate and distinct from public and community outreach and comment. Because tribes are sovereign nations with members living throughout local communities, Oregon, Washington, reservations, the United States, and beyond, elements of equity for tribal governments are discussed separately from other equity priority communities, which can be evaluated, in part, with demographic data.

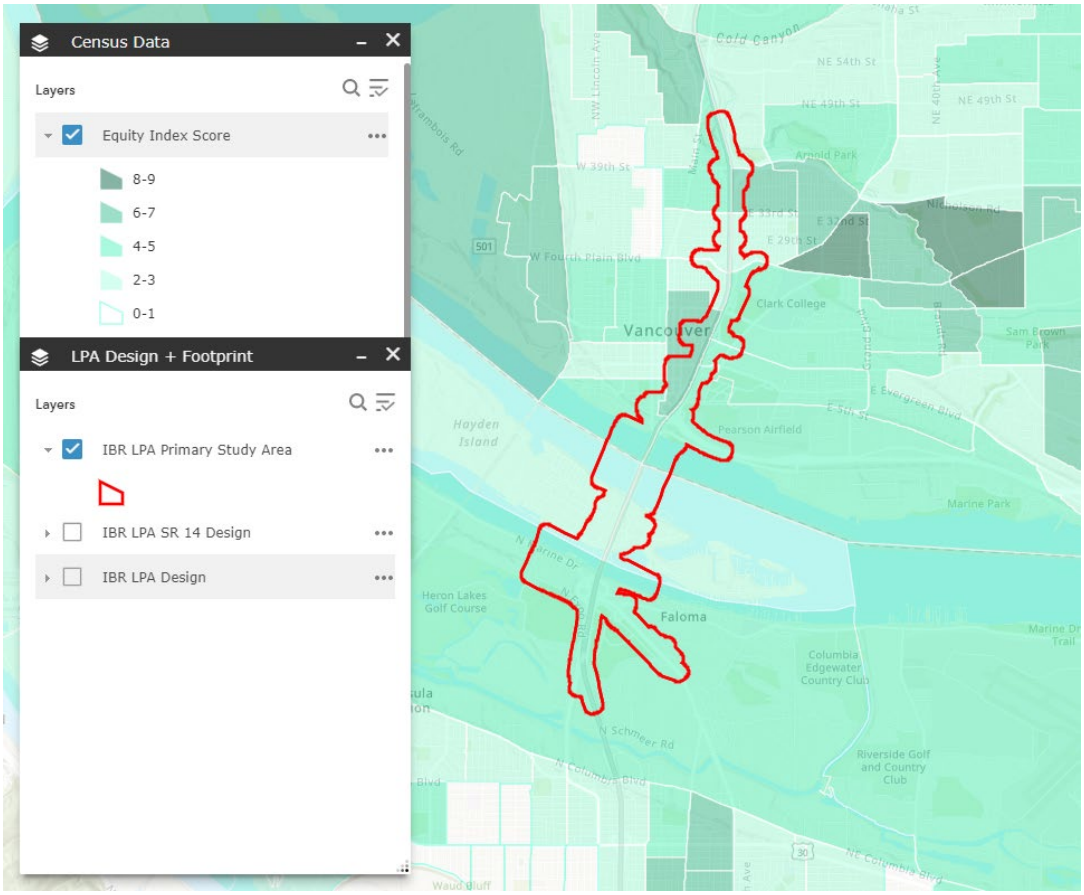
An equity index tool was developed to identify where equity priority communities live in the study area and the metropolitan region, with the exception of tribal governments (as noted above). The equity index assigns points to geographic areas (block groups or census tracts) in the study area that have an above-average percentage of equity priority populations compared to the metropolitan region. For example, 25% of the region's households are low-income according to census information (U.S. Census Bureau 2022), so a point was awarded to a study area block group if greater than 25% of households were low-income. Figure 3.5-2 shows a screenshot of this interactive web-based tool, showing that most equity priority communities are located in downtown Vancouver and east of the study area.

3.5.3 Engagement Activities and Consultation

Public Engagement Activities

Public involvement is important to data gathering, building trust, and developing viable solutions. Meaningful public involvement in the IBR Program included forming four advisory groups: the Community Advisory Group, Equity Advisory Group, Community Benefits Advisory Group, and Executive Steering Group. The advisory groups are composed of regional community members, who were identified and appointed to represent a diverse range of perspectives, as well as representatives from local agencies and community-at-large members. The IBR Program has been engaging with partner agencies, tribal governments, and community-based organizations since late 2020 and has been conducting more formal intentional community engagement since January 2021. This process is documented in the IBR Community Engagement Report (IBR 2021) and is described in Appendix B.

Figure 3.5-2. Screenshot of IBR Equity Index



Government-to-Government Consultation

WSDOT, ODOT, FHWA, and FTA are committed to government-to-government consultation with tribes on projects that may affect tribal rights and resources. The IBR tribal consultation process is designed to encourage early and continued feedback from, and involvement by, tribes potentially affected by the IBR Program and to ensure that their input is incorporated into the decision-making process. Although tribal coordination and government-to-government tribal consultation is being undertaken as a distinct outreach effort, tribal involvement is also occurring concurrently with agency coordination and public involvement. The government-to-government consultation goals and process are documented in Appendix A, Agency and Tribal Coordination.

3.5.4 Long-Term Benefits and Effects

Table 3.5-9 summarizes the effects of the No-Build Alternative, Modified LPA, and design options on neighborhoods. Table 3.5-10 summarizes the effects of the No-Build Alternative, Modified LPA, and design options on equity. Detailed analyses of the effects are provided in the following sections.

Table 3.5-9. Summary of No-Build Alternative and Modified LPA Effects on Neighborhoods

1	2	3	4	5
No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration, One or Two Auxiliary Lanes, with or without C Street Ramps, Centered I-5, all Park-and-Ride Site Options	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Westward Shift, all Park-and-Ride Site Options	Modified LPA with Single-Level Fixed-Span Configuration,[a] One Auxiliary Lane, C Street Ramps, Centered I-5, all Park-and-Ride Site Options	Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, all Park-and-Ride Site Options
• No change to existing neighborhoods, community facilities, or social resources. Future development might not be fully consistent with goals that assume improved mobility and expanded transit access. Neighborhoods would not benefit from reduced congestion, improved mobility, and access to employment.	• Would not adversely affect community cohesion in neighborhoods, except for Hayden Island. Could increase cohesion in neighborhoods near the Community Connector. • Would affect the Hayden Island neighborhood's community cohesion, including displacement of floating homes and changes to views. Fourteen businesses would be displaced. However, neighborhood cohesion would be improved by a more continuous street system, improved pedestrian and bicycle facilities, and transit that increases connections for residents. • Construction-related impacts such as traffic diversion noise, temporary reductions in air quality, and sidewalk disruptions.	• Similar to Column 2 but with additional residential displacements in the Esther Short neighborhood.	• Similar to Column 2.	• Similar to Column 3, except that bridge openings would cause backups. The backups would reduce reliability for all travel modes, similar to the No-Build Alternative, which would negatively affect neighborhood cohesion by impairing access to community facilities and encouraging cut-through traffic in neighborhoods.

a The effects associated with the single-level fixed-span configuration would be the same for all bridge type options.

Table 3.5-10. Summary of No-Build Alternative and Modified LPA Effects on Equity

1	2	3	4	5
No-Build Alternative	**Modified LPA with Double-Deck Fixed-Span Configuration One Auxiliary Lane, With or Without C Street Ramps, Centered I-5 or I-5 Westward Shift, all Park-and-Ride Site Options**	**Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, With or Without C Street Ramps, Centered I-5 or I-5 Westward Shift, all Park-and-Ride Site Options**	**Modified LPA with Single-Level Fixed-Span Configuration, [a] One Auxiliary Lane, With or Without C Street Ramps, Centered I-5 or I-5 Westward Shift, all Park-and-Ride Site Options**	**Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, With or Without C Street Ramps, Centered I-5 or I-5 Westward Shift, all Park-and-Ride Site Options**
• Equity priority communities would not benefit from increased mobility and accessibility. • Would avoid short- and long-term displacement of residents and businesses. • Would avoid construction-related impacts such as traffic diversion, noise, temporary reductions in air quality, and cost burdens of tolling.	• Increased access to high-capacity transit, increased availability of active transportation, and highway and driving travel time reductions. The degree of benefits would vary by equity priority community. • Increase in job access for all demographic groups due to faster travel times. • Potential displacement of encampments of houseless populations, residential displacements, and additional transportation cost from tolling. There would be more residential displacements with the I-5 westward shift design option. • Construction-related impacts such as traffic diversion, noise, temporary reductions in air quality, and cost burdens of tolling. • Tolling would place a burden on low-income travelers.	• Similar to Column 2, but it would reduce delay and congestion on the Columbia River bridges to a greater extent, which would improve travel times for motorists, express bus riders, and emergency vehicles; slightly greater increase in jobs access for all demographic groups.	Similar to Column 2, except: • Users would experience a shorter distance to walk across the bridge. • Users may feel safer due to the extra security of being visible to passing vehicles.	• Similar to Column 4, except that there may be travel delays for transit and active transportation users due to lifts of the movable span. This would reduce the level of benefit that the Modified LPA would provide to equity priority communities.

a The effects associated with the single-level fixed-span configuration would be the same for all bridge type options.

No-Build Alternative

Neighborhoods

Under the No-Build Alternative, there would be no Program-related change to existing neighborhoods, community facilities, or social resources. Neighborhoods in the study area would continue to develop according to local and regional plans, though their development might not be fully consistent with goals that assume improved mobility in the I-5 corridor and expanded transit access; for example, the goals of the Hayden Island Plan would likely not be realized without the construction of a high-capacity transit station on the island. Section 3.4, Land Use, contains more information on local land use plans. There would be no changes in noise or vibration levels or transportation patterns that would change community cohesion, but study area neighborhoods would not benefit from reduced congestion, improved mobility, or access to employment opportunities from increased transit connectivity and improved active transportation connections.

Equity

The No-Build Alternative would not move the IBR Program toward its equity objectives. Equity priority communities would not benefit from increased mobility and accessibility resulting from construction of light-rail, active transportation facilities, or highway improvements.

In terms of potential burdens, the No-Build Alternative would avoid short- and long-term displacement of residents and businesses, as well as other construction-related impacts such as traffic diversion, noise, temporary reductions in air quality, and cost burdens of tolling. Above-average concentrations of equity priority communities were identified in each subarea where these impacts would occur.

Modified LPA

Most long-term effects on neighborhoods and equity would not differ among the Modified LPA design options. Where differences would occur, they are described in the subsections below.

Neighborhoods

Oregon

Potential effects on neighborhoods from the Modified LPA were assessed using six questions defined by the IBR Program to evaluate impacts and benefits. Table 3.5-11 summarizes the questions and answers for each Oregon neighborhood in the study area.

The Modified LPA is not anticipated to adversely affect community cohesion in most neighborhoods, except for Hayden Island. In the Hayden Island neighborhood, the Modified LPA is anticipated to adversely affect the neighborhood's community cohesion, particularly among the floating home community, where there would be changes to views and displacements of some floating homes. Fifteen businesses, and the 159 jobs associated with them, would be displaced, many of which are restaurants that provide places for neighbors to meet. In addition, bridge openings associated with the single-level movable-span configuration would cause backups that would reduce reliability for all travel modes, similar to the No-Build Alternative, which would negatively affect neighborhood cohesion.

However, neighborhood cohesion on Hayden Island would be improved by a more continuous street system, improved pedestrian and bicycle facilities, and transit that increases connections for residents under the Modified LPA. This assessment is described in more detail in the Neighborhoods and Populations Technical Report.

Table 3.5-11. Overview of Potential Effects on Oregon Neighborhoods

Potential Effect Question	Hayden Island	Bridgeton	East Columbia	Kenton	Rockwood
Will the Program displace people or community resources, including businesses?	Residential and business displacement	Business displacement	Impacts to Delta Park (loss of 1 acre of off-leash area)	Residential and business displacement	Business displacement
Will the Program create direct or indirect impacts to social services by displacing them?	No	No	No	No	No
Will the Program separate neighborhood residents from community resources?	No	No	No	No	No
Will the Program change travel such that it will affect access to community resources?	No	No	No	No	No
Will the Program change community cohesion?	Yes, positively and negatively	No	No	No	No
Is the Program consistent with existing neighborhood plan goals?	Yes	Yes	N/A[a]	Yes	N/A [a]

a This neighborhood does not have an approved neighborhood plan.

Washington

Table 3.5-12 summarizes the answers to the same set of questions for the study area neighborhoods in Vancouver. The Modified LPA is not anticipated to adversely affect community cohesion in these neighborhoods.

Table 3.5-12. Overview of Anticipated Effects on Vancouver Neighborhoods

Potential Effect Question	Rose Village	Hough	Arnada	Central Park	Esther Short	Hudson's Bay	Columbia Way
Will the Program displace people or community resources, including businesses?	No	No	No	Impacts to Marshall Park through land acquisition	Business displace-ments Residential displace-ments (design options)	No	No
Will the Program create direct or indirect impacts to social services by displacing them?	No	No	No	No	No	No	No

Potential Effect Question	Rose Village	Hough	Arnada	Central Park	Esther Short	Hudson's Bay	Columbia Way
Will the Program separate neighborhood residents from community resources?	No	No	No	No	No	No	No
Will the Program change travel such that it will affect access to community resources?	No	No	No	No	No	No	No
Will the Program change community cohesion?	No	No	No	No	No	No	No
Is the Program consistent with existing neighborhood plan goals?	Yes	Yes	Yes	Yes	Yes	Yes	N/A [a]

a This neighborhood does not have an approved neighborhood plan.

The Modified LPA would require the acquisition of a portion of Marshall Park in the Central Park neighborhood for a retaining wall along I-5. The retaining wall would displace horseshoe pits, landscaping, and trees that serve as a buffer between the community center and I-5; the current community center and senior center would remain. Compared to the centered mainline, the I-5 Mainline Westward Shift design option would require two additional property acquisitions: the Normandy Apartments, where 33 residential units would be displaced, and the Regal City Center complex, where three businesses would be displaced. This is a notable effect, especially for those living in these units. However, these displacements are not anticipated to substantially alter neighborhood cohesion because the Normandy Apartments are located at the edge of the neighborhood in an otherwise nonresidential area. Moreover, the displaced businesses, which are not considered community resources, make up a small portion of overall commercial property in the neighborhood.

Three sites are being considered for the Waterfront Park and Ride. Depending on the site selected, there would be up to four parcels acquired, with up to one business displacement. The potential displacement of a single business at the Waterfront Park-and-Ride site would not affect neighborhood cohesion. Two sites are being considered for the Evergreen Park and Ride; depending on the site, up to five parcels would be acquired, with no businesses or residential units displaced. For a more detailed analysis, see the Neighborhoods and Populations Technical Report.

The Modified LPA design options would have differing effects on travel reliability, congestion, and neighborhood cohesion, depending on their specific design elements. The single-level fixed-span and single-level movable-span configurations would have a lower profile than the double-deck fixed-span configuration at the bridge landing in downtown Vancouver. The single-level configurations would provide more flexibility in potential locations for the Vancouver Waterfront Station compared to the double-deck fixed-span configuration.

In addition, the single-level bridges would provide more opportunities for connection to residences and development, helping to maintain or improve neighborhood cohesion. However, bridge openings associated with the single-level movable-span configuration could cause backups that would reduce reliability for all travel modes similar to the No-Build Alternative. These backups could spill into neighborhood streets, limiting circulation within the neighborhood, impeding access to community facilities, and, thereby, negatively affecting neighborhood cohesion.

The design option eliminating the C Street ramps would redirect traffic from downtown Vancouver to the Mill Plain Boulevard interchange. This would result in additional traffic delay at intersections near the Mill Plain Boulevard interchange, which could reduce neighborhood cohesion in the Esther Short neighborhood by substantially increasing travel delay for residents and people accessing the neighborhood. These impacts would occur in an equity priority community.

Equity

This equity assessment looks at the distribution of benefits and burdens. Benefits from the Modified LPA to equity priority communities include increased access to high-capacity transit, increased availability of active transportation, and highway and driving travel time reductions. Burdens to equity priority communities include potential displacement of encampments of houseless populations, residential displacements, and the additional transportation cost from tolling.

Terms and Definitions

Counterparts: Those who are not members of a particular equity priority community. For example, the counterpart to the BIPOC community is the White, non-Hispanic population.

The Modified LPA would benefit equity priority communities with increased mobility and accessibility choices—specifically, the high-capacity transit and active transportation program elements. These new transportation improvements would help address existing gaps for those who depend on modes other than automobile transportation. While all members of the local community would have access to 40% more jobs via improved mode choices compared to the No-Build Alternative, the high-capacity transit analysis did identify some disparities in terms of distribution of benefits (i.e., increased access to jobs) between equity priority communities living in the study area and their non-equity priority counterparts. Three demographic groups—people with disabilities, persons with lower incomes, and older adults—would likely see greater increases in access than their counterparts during either or both the morning peak and midday hours. BIPOC communities, those with limited English proficiency, immigrants and refugees, and young people would experience an increase in accessibility, but the increase would be less than for their demographic counterparts. To address these disparities, the Program is working closely with C-TRAN to optimize the transit network and create convenient bus connections from the Evergreen Station to surrounding racially diverse neighborhoods.

Distribution of Benefits

High-Capacity Transit

The equity analysis used demographic and jobs data to examine how the Modified LPA's light-rail alignment would affect transit riders' mobility. Specifically, the analysis estimated how many jobs (a proxy for access to both employment and services) would be within a 45-minute trip on the 2045 transit network. The 45-minute threshold is consistent with a similar analysis conducted by the Portland Bureau of Transportation (Portland Bureau of Transportation 2020).

The equity analysis found that the degree of transit access improvements would differ across equity priority communities and the general population. Based on where members of equity priority communities currently live, three equity priority groups (people with disabilities, persons with lower incomes, and older adults) are estimated to see greater increases in access to jobs and services during either or both the morning peak and midday hours compared to their counterparts. Based on where they currently live, four equity priority groups (BIPOC communities, limited English proficiency, immigrants and refugees, and young people) would experience an increase in accessibility, but the increase would be less than for the general population. Table 3.5-13 shows the transit access improvements expected for equity priority communities in the study area.

Table 3.5-13. Transit Access Improvements for Equity Priority Residents: Percentage Increase in Jobs Access in a 45-Minute Trip

Equity Priority Community	Morning Peak Increase for Average [a] Member of Community (e.g., BIPOC)	Morning Peak Increase for Average Counterpart (e.g., White Non-Hispanic/Latino)	Midday Increase for Average Member of Community (e.g., BIPOC)	Midday Increase for Average Counterpart (e.g., White Non-Hispanic/Latino)
Black, Indigenous, and People of Color (BIPOC)	85%	107%	55%	68%
People with Disabilities	111%	96%	66%	59%
Communities with Limited English Proficiency	67%	100%	43%	61%
Persons with Lower Incomes	100%	92%	60%	60%
Immigrants and Refugees	71%	101%	46%	61%
Young People (under 25)	74%	102%	47%	64%
Older Adults (65+)	131%	87%	83%	55%

Sources: Metro 2045 Regional Model; U.S. Census Bureau 2020, 2022

Notes:

"Counterpart" is defined as someone who is not considered a member of the corresponding equity priority community. For example, the counterpart to members of the BIPOC community are those whose race/ethnicity combination is White Non-Hispanic/Latino; the counterpart to people with disabilities is people who do not have a disability, and so on.

Due to overlap within equity priority communities (i.e., individuals who belong to more than one community), the total increase in jobs for all equity priority community members cannot be determined.

a Average access is calculated based on residential distribution of each demographic group and weighted accordingly.

Estimated access improvements are similar when comparing equity priority communities and the general public at the regional level (i.e., the average resident of the four-county region in each group would see similar increases in access to jobs reachable within a 45-minute transit ride).

Demographic characteristics of residents within a half-mile walk of a station are largely similar to the Program area as a whole, meaning the stations serve equity priority communities at a level expected given where they live in the Program area.

Active Transportation

Active transportation components of the Modified LPA would support the equity objective to "improve mobility, accessibility, and connectivity, especially for lower-income travelers, people with disabilities, and historically underserved communities that experience transportation barriers." The facilities would provide new and safe connections for all people of all abilities and would improve the quality of existing connections.

Several of the Modified LPA design options would have different long-term effects on active transportation. Experiences could differ for the various age and ability levels, depending on grade, height, and distance of each option. The bridge configurations would have the following different impacts on active transportation:

- People walking, bicycling, or rolling on the shared-use path would be more exposed to noise from highway vehicles on the single-level fixed-span and the single-level movable-span configurations compared to the double-deck configuration. Blind and low-vision individuals could experience the greatest noise interference in their active transportation as they use sound to aid navigation.
- The single-level movable-span configuration would have a lower bridge height over the Columbia River than the double-deck fixed-span and single-level fixed-span configurations, which would decrease the length and steepness of the uphill and downhill grades for all users on the shared-use path.
- Some equity priority communities are more affected by discrimination and violence, and they might prefer the single-level fixed-span and single-level movable-span configurations because they provide visibility to active transportation users from passing vehicles, thereby potentially providing an increased sense of security. In comparison, with the double-deck fixed-span configuration, active transportation users would travel on the lower bridge deck and would not be visible from passing vehicles on the upper decks.
- With the single-level movable-span configuration, active transportation users could experience additional travel delays when bridge openings occurred. These delays would be similar to the No-Build Alternative. However, fewer bridge openings are anticipated with the Modified LPA single-level movable-span configuration because it would have increased vertical navigation clearance in the closed position that would allow more vessels to travel under the bridge in the closed position compared to the existing Interstate Bridge.

These differences in the experiences of active transportation users could adversely affect equity priority communities more than the general population—in particular, BIPOC, low-income, and people with disabilities—due to their greater reliance on modes besides driving.

Highway and Driving Improvements

As shown in Table 3.5-14, the Program area analysis estimates that, due to reduced congestion, within a 45-minute commute each demographic group would be able to reach an average of 18% to 20% more jobs during the morning peak and an average of about 3% more jobs during the midday (within a 45-minute drive) under the Modified LPA compared to the No-Build Alternative. This equates to an increase in access to about 180,000 to 197,000 jobs during the morning peak and 35,800 to 44,000 jobs during the midday.

As shown in Table 3.5-15, within the Portland-Vancouver metropolitan area, average access improvements from the Modified LPA would be 3% to 4% (an additional 30,000 to 37,000 jobs) during the morning peak and about 1% (an additional 11,400 to 13,700 jobs) during the midday compared to the No-Build Alternative. Estimated increased access to jobs would be similar between equity priority communities and the general public.

The addition of a second auxiliary lane in each direction would have a slightly greater increase in jobs access for all demographic groups due to faster travel times within the corridor from less congestion.

Table 3.5-14. Driving Access Improvements for Equity Priority Community Residents in the Program Area: Percentage Increase in Jobs Access with the Modified LPA Compared to No-Build Alternative (45-minute Travel Time)

Equity Priority Community	Morning Peak: Increase for Average Member of Community (e.g., BIPOC) [a]	Morning Peak: Increase for Average Counterpart (e.g., White Non-Hispanic/ Latino)	Midday: Increase for Average Member of Community (e.g., BIPOC)	Midday: Increase for Average Counterpart (e.g., White Non-Hispanic/ Latino)
Black, Indigenous, and People of Color	19%	19%	3%	3%
People with Disabilities	19%	19%	3%	3%
Communities with Limited English Proficiency	20%	19%	3%	3%
Persons with Lower Incomes	20%	19%	3%	3%
Immigrants and Refugees	19%	19%	3%	3%
Young People (Under 25)	20%	19%	3%	3%
Older Adults (65+)	18%	19%	3%	3%

Sources: 2022 Metro, RTC, C-TRAN, TriMet, and IBR Analysis; 2020 Census (U.S. Census Bureau 2020); 2016-2020 American Community Survey (U.S. Census Bureau 2022).

a Average access is calculated based on residential distribution of each demographic group and weighted accordingly.

Table 3.5-15. Driving Access Improvements for Equity Priority Community Residents in the Portland-Vancouver Metropolitan Area: Percentage Increase in Jobs Access with the Modified LPA Compared to No-Build Alternative (45-minute Travel Time)

Equity Priority Community	Morning Peak: Increase for Average Member of Community (e.g., BIPOC) [a]	Morning Peak: Increase for Average Counterpart (e.g., White Non-Hispanic/ Latino)	Midday: Increase for Average Member of Community (e.g., BIPOC)	Midday: Increase for Average Counterpart (e.g., White Non-Hispanic/ Latino)
Black, Indigenous, and People of Color	3%	4%	1%	1%
People with Disabilities	4%	3%	1%	1%
Communities with Limited English Proficiency	3%	4%	1%	1%
Persons with Lower Incomes	3%	3%	1%	1%
Immigrants and Refugees	3%	4%	1%	1%

Equity Priority Community	Morning Peak: Increase for Average Member of Community (e.g., BIPOC) [a]	Morning Peak: Increase for Average Counterpart (e.g., White Non-Hispanic/ Latino)	Midday: Increase for Average Member of Community (e.g., BIPOC)	Midday: Increase for Average Counterpart (e.g., White Non-Hispanic/ Latino)
Young People (Under 25)	4%	3%	1%	1%
Older Adults (65+)	4%	3%	1%	1%

Sources: Metro 2045 Regional Model; 2020 Census (U.S. Census Bureau 2020); 2016-2019 American Community Survey (U.S. Census Bureau 2022)

a Average access is calculated based on residential distribution of each demographic group and weighted accordingly.

Tribal Government Consultation

In addition to the benefits associated with increased transit options and improved highway and active transportation, the government-to-government consultation process is encouraging improved and timely communication between the IBR Program and tribes. This process enables tribal governments to understand the Program, ask questions, and participate in issue identification and solution strategies, which could lead to protection of culturally sensitive resources, increased input into the design of the Program, and avoidance, minimization, and mitigation measures of potential impacts to resources valued by tribal governments.

Community Benefits

The IBR Program's Community Benefits Advisory Group is developing recommendations for community benefit efforts to achieve the greatest positive benefit to the communities in the Program area and broader region from the Program's work, in alignment with the Program's equity framework and community priorities. Recommendations from this advisory group will be shared with the larger community for input. This advisory group is collaborating with the Equity Advisory Group, Community Advisory Group, and the IBR Program to identify benefits that could be incorporated into the Final SEIS as mitigation strategies, construction contracts as design and construction specifications, or other documents as appropriate to ensure accountability for implementation of the community benefits.

Distribution of Burdens

Table 3.5-16 presents an analysis of the associated property impacts identified for each of the five geographic subareas and the specific equity priority communities affected by these property impacts. All subareas have high concentrations of multiple equity priority communities. The IBR Program has conducted outreach to potentially affected communities in each of these subareas and will continue to engage the community and consult with the Equity Advisory Group to identify and address potential impacts throughout the planning and design phases.

Table 3.5-16. Overview of Impacts to Equity Priority Communities in the Study Area

Study Area Subarea	Equity Priority Communities with Above-Average Representation [a]	Property Acquisitions and Displacements
Oregon Mainland	• BIPOC • Low-Income • People with Disabilities • Older Adults	• 4 single-family homes displaced (3 floating homes, 1 on land). • 5 retail/service businesses displaced. • 20 partial parcel acquisitions.
Hayden Island	• People with Disabilities • Older Adults	• 32 single-family homes displaced (all floating homes). • 15 retail/service businesses displaced. • 20 partial parcel acquisitions.
Downtown Vancouver	• Low-Income • People with Disabilities • Older Adults	• 10 office/professional/healthcare businesses displaced. • 31 partial parcel acquisitions.
Upper Vancouver	• BIPOC • Limited English proficiency • Low-Income • Older Adults • Young People	• 7 single-family homes displaced. • 33 multifamily units displaced (I-5 Mainline Westward Shift design option only). • 58 partial parcel acquisitions.
Ruby Junction	• BIPOC • Immigrants and Refugees • Low-Income • Young People	• 3 retail/service businesses displaced.

Sources: U.S. Census Bureau 2020, 2022

a Specific equity priority communities are listed where their percentage of the population is above average for the Portland-Vancouver metropolitan area in at least one census tract in that geographic area.

BIPOC = Black, Indigenous, and People of Color

Houseless Populations

The Modified LPA would likely displace houseless individuals and families staying in the study area during construction, including those living within existing or to-be-acquired right of way. While many experiencing houselessness either choose or are forced to relocate regularly, others remain in place for extended times when they have found a safe location with limited disturbances. Thus, the number of houseless people present in the study area who would be displaced at the time of construction is unknown. As design progresses and construction is scheduled, the IBR Program would continue to coordinate with local jurisdictions and aid organizations to determine potential impacts. Such impacts could include displacements of houseless individuals within the limits of construction; construction proximity impacts such as noise, vibration, and air pollution; and reduced access to food assistance and other resources as a result of construction-related closures or transit delays.

Tolling

The Modified LPA tolling program would place a burden on low-income travelers, who are disproportionately BIPOC. Toll rates and policies, including a possible low-income toll program, would be set jointly by the Oregon Transportation Commission and the Washington State Transportation Commission. Both commissions have supported the study of a low-income toll program, including how such a program could be implemented in each state. They would work together to determine how to approach this for the IBR Program.

3.5.5 Temporary Effects

No-Build Alternative

There would be no temporary effects to neighborhoods or equity priority communities under the No-Build Alternative.

Modified LPA

Most temporary effects on neighborhoods and equity would not differ among the Modified LPA design options. Where differences would occur, they are described in the subsections below.

Neighborhoods

On-site Construction

Construction of the Modified LPA includes construction of the new bridges and removal of the existing Interstate Bridge. Neighborhoods in the study area would experience temporary effects from construction of the Modified LPA. These effects would generally increase with proximity to construction areas and could include:

- Noise and vibration
- Dust and emissions
- Traffic delays, detours, and traffic spillover into neighborhoods
- Property easements for temporary construction staging areas
- Sidewalk disruptions and closures (which could impede access and mobility for disabled persons)

Neighborhoods near the construction activity, such as Hayden Island and Esther Short, would experience some of these effects over several years. Neighborhoods farther from the bridge construction could expect to experience effects over a shorter duration. Roadway and transit construction effects in other areas would cause traffic disruption and noise intermittently for several months.

Section 3.3, Property Acquisitions and Displacements, details the temporary easements that would be required to reconstruct sidewalks, build retaining walls, and other types of roadway features. None of these temporary easements would adversely affect neighborhood cohesion or livability.

Off-Site Staging Areas and Casting Yards

Most neighborhoods in the study area would not have temporary construction staging areas nearby. However, the Hayden Island neighborhood would experience temporary increases in noise levels, congestion on local roads, and reduced visual quality from the use of the Thunderbird Hotel site for staging because of its proximity to more densely populated areas. All neighborhoods in the study area could experience temporary noise and increases in truck traffic during construction, particularly in areas adjacent to I-5. Given that the potential construction duration could be up to 15 years, neighborhood quality and cohesion could be

adversely affected during construction for portions of neighborhoods adjacent to the corridor. However, construction effects in most neighborhoods are likely to be intermittent and temporary, since work would occur in different portions of the corridor at different times. See the Neighborhoods and Populations Technical Reports for a discussion of temporary effects for each neighborhood in the study area.

Equity

Table 3.5-17 summarizes temporary, construction-related impacts to equity priority communities.

Table 3.5-17. Overview of Temporary Effects to Equity Priority Communities in the Study Area

Study Area Subarea	Equity Priority Communities with Above-Average Representation [a]	Construction-Related Impacts
Oregon Mainland	• BIPOC • Low-Income • People with Disabilities • Older Adults	• Temporary increase in noise levels, reduced air quality (e.g., fugitive dust), and increase in truck traffic during construction, particularly in the areas immediately adjacent to I-5. • Temporary adverse effect on visual quality (e.g., construction equipment and activities blocking views, high-visibility signage, lighting during nighttime work). • Traffic detours and road closures. • Traffic spillovers in the Bridgeton, East Columbia, and Kenton neighborhoods.
Hayden Island	• People with Disabilities • Older Adults	• Temporary increase in noise levels, reduced air quality (e.g., fugitive dust), and increase in truck traffic during construction, particularly in the areas immediately adjacent to I-5. • Residents living in floating homes and the mobile home park may be particularly susceptible to air emissions due to their proximity to both the highway and transit alignments. • Temporary effects on visual quality. • Traffic detours and road closures.
Downtown Vancouver	• Low-Income • People with Disabilities • Older Adults	• Temporary increase in noise levels, reduced air quality (e.g., fugitive dust), and increase in truck traffic during construction, particularly in the areas immediately adjacent to I-5. • Temporary adverse effects on visual quality. • Traffic detours and road closures. • Temporary closures of east-west bicycle and pedestrian connections at SR 14, Evergreen Boulevard, and Mill Plain Boulevard.

Study Area Subarea	Equity Priority Communities with Above-Average Representation [a]	Construction-Related Impacts
Upper Vancouver	• BIPOC • Limited English proficiency • Low-Income • Older Adults • Young People	• Temporary increase in noise levels, reduced air quality (e.g., fugitive dust), and increase in truck traffic during construction, particularly in the areas immediately adjacent to I-5. • Temporary adverse effects on visual quality. • Traffic detours and road closures. • Temporary closures of east-west bicycle and pedestrian connections at McLoughlin Boulevard, Fourth Plain Boulevard, 29th Street, and 33rd Street. • Traffic spillovers in the Minnehaha, Rose Village, Central Park, Hudson's Bay, and Columbia Way neighborhoods.
Ruby Junction	• BIPOC • Immigrants and Refugees • Low-Income • Young People	• Temporary increase in noise levels, reduced air quality (e.g., fugitive dust), and increase in truck traffic during construction. • Temporary adverse effects on visual quality. • Traffic detours and road closures.

Sources: U.S. Census Bureau 2020, 2022

a Specific equity priority communities are listed where their percentage of the population is above average for the Portland-Vancouver metropolitan area in at least one census tract in that geographic area.

BIPOC = Black, Indigenous, and People of Color

3.5.6 Indirect Effects

Neighborhoods

As described in Section 3.4.1, the Modified LPA would have the indirect effect of facilitating growth within the study area compared to No-Build Alternative by providing new light-rail service and reducing traffic congestion for general-purpose and transit vehicles. The greatest potential effects on growth would be in proposed station areas, particularly in the Hayden Island and Esther Short neighborhoods, which have the greatest potential to support transit-oriented development. Such development is anticipated and encouraged in the adopted plans for these neighborhoods. Under the No-Build Alternative, light-rail would not be extended to Vancouver, and transit-oriented development would not occur. The Hayden Island neighborhood would have the greatest potential to experience indirect effects from the Modified LPA because transit-oriented development is planned to replace some of the dispersed, auto-oriented shopping centers that exist today. Creating a less auto-oriented environment for residents to travel between home and their services would provide more opportunities for residents to interact with one another and easily access potential new community resources. Similarly, if smaller-scale commercial services were to develop close to housing and transit, residents would be encouraged to use services provided in their neighborhood rather than leaving the island to access the same services.

In the Esther Short neighborhood, potential new transit-oriented development would add to cohesion in ways similar to those for Hayden Island. New housing and commercial services, particularly around light-rail transit stations, would give residents the opportunity to walk, bicycle, or take transit to services close to their homes, therefore providing more chances for residents to interact with one another and use community resources. Similar to the Hayden Island neighborhood, these changes would not occur under the No-Build Alternative, making it inconsistent with current planning for the area.

Although increased development density and intensity in these neighborhoods would be consistent with existing planning and zoning, these could still result in negative indirect effects, including increased noise, additional traffic on local streets, greater demand for public services, and changes in visual character.

Equity

Over time, there would be an increased risk of residential displacement in areas where the Modified LPA improves neighborhood amenities and livability, potentially increasing housing costs to unaffordable levels for lower-income residents. An analysis conducted in 2019 for the City of Vancouver as part of an anti-displacement plan identified downtown Vancouver, the Meadow Homes neighborhood, and the Maplewood neighborhood as particularly vulnerable to neighborhood change and residential displacement (City of Vancouver n.d.). Downtown Vancouver is home to high concentrations of BIPOC residents, low-income households, people with disabilities, and seniors. While Meadow Homes and Maplewood are not in the Program area, they are a short distance east and are also home to a large concentration of equity priority communities. These neighborhoods may be indirectly affected if development in nearby areas facilitated by the Modified LPA improvements leads to increased housing costs.

3.5.7 Potential Avoidance, Minimization, and Mitigation Measures

Long-Term Effects

Regulatory Mitigation

- Comply with the Uniform Relocation Act. When displacement cannot be avoided, federal and state regulations require property to be purchased at fair market value and all displaced residents to be provided with replacement housing and relocation assistance. Federal regulations, such as the Uniform Relocation Act, and state statutes determine the standards and procedures for providing such replacement housing, based on the characteristics of individual households. Relocation benefit packages usually include replacement housing for owners and renters, moving costs, and assistance in locating replacement housing. Relocation benefits for businesses can include moving costs, site search expenses, and business reestablishment expenses.

Program-Specific Mitigation

Specific mitigation for effects on neighborhoods includes:

- The Modified LPA is anticipated to have an overall neutral effect on visual quality in study area neighborhoods. The IBR Program would work with residents and community members to understand impacts and avoid, minimize, or mitigate those impacts.
- The IBR Program would avoid and minimize impacts to community resources and neighborhood cohesion wherever feasible. Strategies to minimize impacts to neighborhood cohesion could include providing additional community gathering spaces such as pedestrian and bicycle facilities.

Specific mitigation for effects on equity includes:

- Work with residents and community members to understand impacts and avoid, minimize, or mitigate those impacts.
- Develop a package of community benefits, which may be captured in a variety of documents, including contract specifications, environmental documents, a potential workforce agreement and either a community benefits plan or report. Community benefits are likely to include a variety of investments and strategies to ensure workforce and contracting equity, enhance the local community, and offset burdens associated with construction and operation.

Temporary Effects

Regulatory Mitigation

Required measures to minimize construction impacts, such as construction best management practices, would also reduce impacts to neighborhoods and equity priority communities. These measures are used to address construction effects such as temporary easements, noise, dust, emissions from construction vehicles, and visual clutter. Best management practices applicable to the potential impacts described above in Section 3.5.5 are discussed in Section 3.3, Acquisitions and Displacements; Section 3.9, Visual Quality; Section 3.10, Air Quality; and Section 3.11, Noise and Vibration.

Program-Specific Mitigation

- Where feasible, implement nighttime construction schedules and shield nighttime lighting.
- Hold community meetings before construction starts to inform residents of the construction timeline, relevant staging plans, ramp and road closures, and detour plans.
- Use temporary signage, including variable message signs, to inform drivers of traffic delays because of construction or heavy equipment entering or leaving the highway.
- Provide signs for local business assistance alerting customers of continued operation and a hotline for construction information.
- Conduct regional outreach activities to provide information on construction-related impacts and detours that include communications to businesses, agencies, and community-based organizations within the greater Portland and Vancouver area. Traffic advisories and updates would be made available to the public to help make travel choices.
- Place communication and signage for temporary routes for pedestrians and biking well in advance of the detour areas. Wayfinding signage would be accessible, consistent, thorough, and maintained.
- Coordinate with affected property owners to minimize potential impacts to structures and access points during construction.
- Coordinate with local jurisdictions and other organizations offering services to people experiencing unsheltered houselessness in areas directly affected by construction activities. Services would be provided in advance of construction and could include harm reduction, access to health services, and emergency shelter or alternate housing options.
- Restore removed landscaping on properties following construction or as otherwise agreed within the property rights process.
- Pay property owners in exchange for the use of their property during construction.

3.6 Public Services and Utilities

Public services such as schools, emergency response services, government offices, and hospitals are vital to the health of a community and can be affected by large construction projects and changes to the transportation network. Similarly, utilities such as electricity, water, sewer, natural gas, telephone, data, fiber optic, and other communications services can be temporarily disrupted by construction activities. This section identifies the public services and utilities in the study area and evaluates the potential long-term and temporary effects of the Modified LPA on these resources. The information presented in this section is based on the Public Services Technical Report and the Utilities Technical Report.

3.6.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with public services and utilities has been updated in this Draft SEIS to include:

- Changes in development, population and employment, transportation, demographics, and other aspects of the built environment and urban setting.
- Changes in land uses such as development at the Vancouver Waterfront, planned uses on Hayden Island, and recently constructed, altered, or removed buildings.
- Changes in the project footprint necessitated by changed conditions resulted in shifting the light-rail transit alignment and modifying interchange designs.
- Changes in transportation modeling and analysis.

Table 3.6-1 compares the impacts and benefits of the CRC LPA and the IBR Modified LPA. Based on the analysis described in this section, the effects of the Modified LPA would be similar to the effects of the CRC LPA. A detailed description of impacts and benefits to public services and utilities from the Modified LPA and associated design options follows.

Table 3.6-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects

Technical Considerations	CRC LPA Effects Identified in the 2011 Final EIS	Modified LPA Effects Identified in this Section	Explanation of Differences
Traffic effects on emergency services	The CRC LPA would improve traffic conditions on I-5; thus, response times for mobile public services relying on I-5 would be positively affected.	Similar to CRC LPA.	N/A
Displacement of public services	• ODOT Permit Station and Field Office, Clark Public Utilities building, and Clark College Annex would be displaced.	• Partial acquisitions would include property from FHWA Western Federal Lands office and Discovery Middle School.	The reduction in the displacement of public services is due to both changes in land uses and design modifications, including replacing the full

Technical Considerations	CRC LPA Effects Identified in the 2011 Final EIS	Modified LPA Effects Identified in this Section	Explanation of Differences
	• Partial acquisitions would include property from FHWA Western Federal Lands office, Discovery Middle School, Kiggins Bowl, and Clark College Athletic Annex. No uses would be displaced.	No uses would be displaced.	interchange on Hayden Island with a partial interchange and moving the LRT alignment along I-5 instead of a couplet in downtown Vancouver and past Clark College.
Utilities	Utilities would be protected in place or relocated.	Same as CRC LPA.	N/A

CRC = Columbia River Crossing; FHWA = Federal Highway Administration; LPA = locally preferred alternative; LRT = light-rail transit; N/A = not applicable; ODOT = Oregon Department of Transportation

3.6.2 Existing Conditions

Public Services

There are several medical centers, schools, solid waste management facilities, and other public service facilities in the study area, as shown on Figure 3.6-1 and Figure 3.6-2. Table 3.6-2 lists the types of services and the providers in the study area.

Both Portland and Vancouver operate fire and police stations in the study area. In addition, Portland, Clark County, and the U.S. Coast Guard have rescue and emergency services stations with watercraft and response teams serving the Columbia River. The Washington State Patrol and the Oregon State Police have jurisdiction over interstate and other state highways. There are mutual response agreements in place with emergency service providers outside of the study area to provide additional support when necessary, particularly for incidents on the Columbia River (Leek 2023; White 2021).

Emergency service providers designate critical emergency access routes for providing rapid response. I-5 is an important north-south access route through the area, and it is the only access route to and from Hayden Island. In Portland, other critical north-south access routes include N Interstate, N Vancouver, and N Williams Avenues and NE Martin Luther King Jr. Boulevard. In Vancouver, additional critical north-south access routes include NW Hazel Dell Avenue and SR 99. Table 3.6-3 describes the critical emergency access routes used by public service providers in the study area.

Four Portland schools serve students within the study area. Seven Vancouver School District schools and three other district facilities are located within or serve the study area. Two specialty schools that require special consideration in the design of transportation facilities, the Washington State School for the Blind and the Washington State School for the Deaf, are located outside of the study area but serve communities within the study area. While the main campus of Clark College, a private two-year junior college, is located outside of the study area, the Clark College Athletic Annex building is in the study area. Clark College athletic facilities at this location include tennis courts, a softball diamond, and a baseball diamond. The students, faculty, and staff that attend and support these schools rely on safe and efficient transportation facilities and services.

No other public services or facilities were identified outside the study area that would require special transportation considerations for service within the study area. See the Public Services Technical Report for further discussion.

Figure 3.6-1. Public Services in North Portland and Hayden Island

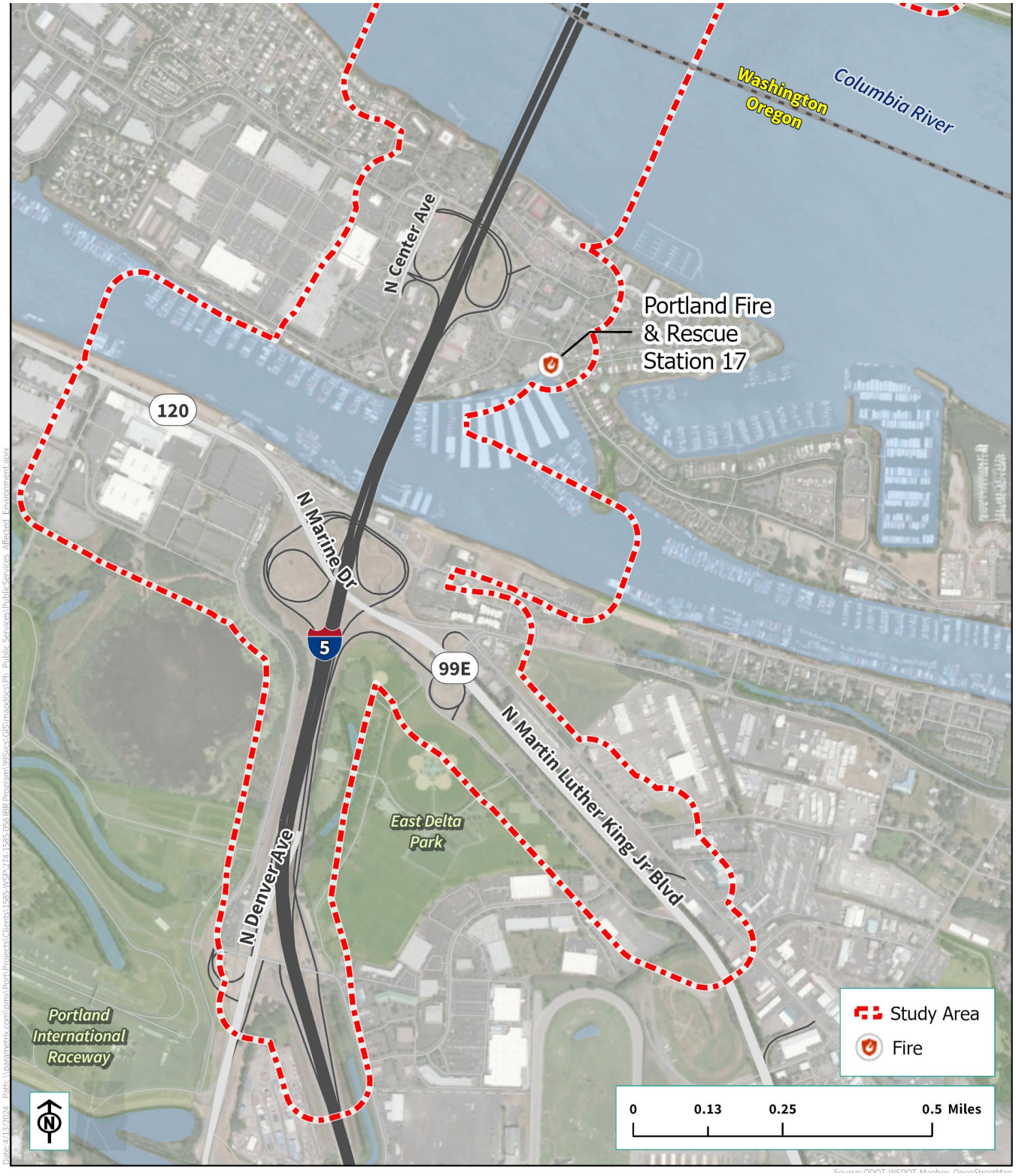


Figure 3.6-2. Public Services in Downtown and Upper Vancouver

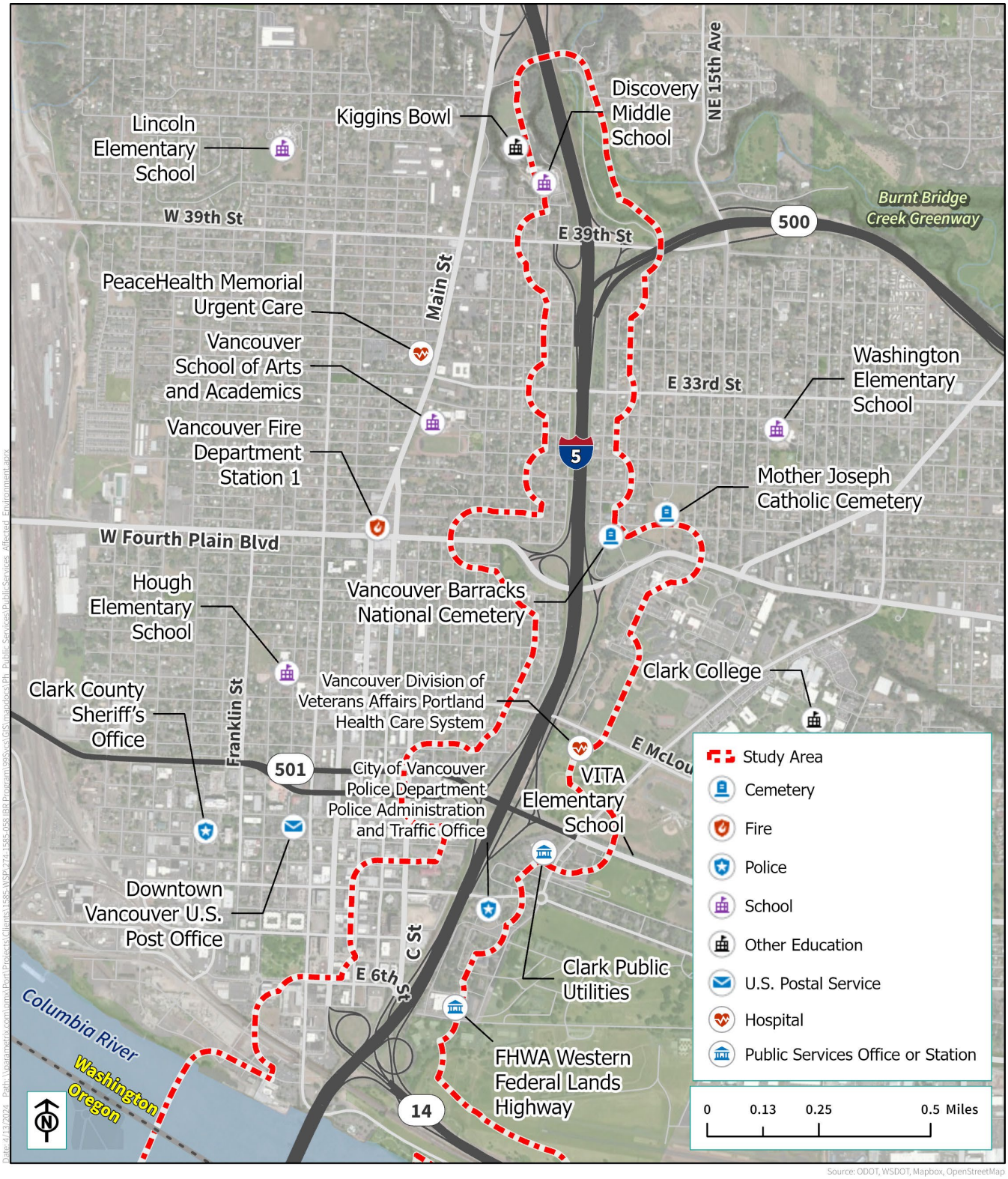


Table 3.6-2. Public Service Providers in the Study Area

Public Service	Providers
Fire and Life Safety	Portland Fire & Rescue Vancouver Fire Department Clark County Fire Marshal U.S. Coast Guard
Law Enforcement	Portland Police Multnomah County Sheriff TriMet (Transit Police Division) Oregon State Police Vancouver Police Department Clark County Sheriff Washington State Patrol
Medical Centers	Legacy Emanuel Hospital and Health Center Kaiser Permanente Vancouver Division of Veterans Affairs Portland Health Care System PeaceHealth Memorial Urgent Care Southwest Washington Medical Center Legacy Salmon Creek Southwest Washington Memorial Hospital and Urgent Care Center
Public Schools	Portland Public Schools Vancouver Public Schools and Colleges Washington State-funded Schools for the Blind and the Deaf Ridgefield School District
Cemeteries	Vancouver Barracks National Cemetery Mother Joseph Catholic Cemetery City of Vancouver Old City Cemetery City of Vancouver Park Hill Cemetery Clark County Poor Farm Cemetery Salmon Creek United Methodist Cemetery St. John Lutheran Cemetery Manor Wilson Bridge Cemetery Memory Memorial Cemetery

Table 3.6-3. Mobile Public Service Critical Emergency Access Routes

Mobile Public Service	Critical Emergency Access Routes
North Precinct Portland Police	N Interstate Avenue, N Denver Avenue, NE Martin Luther King Jr. Boulevard, and N Greeley Avenue. I-5 is the only critical access route to/from Hayden Island.
Portland Fire & Rescue Station 17	N Interstate Avenue, N Denver Avenue, NE Marine Drive, NE Martin Luther King Jr. Boulevard, N Tomahawk Island Drive, N Hayden Island Drive, N Jantzen Drive, and N Center Avenue.

Mobile Public Service	Critical Emergency Access Routes
Vancouver Fire Department Downtown Station (1)	Main Street/SR 99, W Fourth Plain Boulevard, Kauffman Avenue, 39th Street, 15th Street, St. Johns Boulevard, McLoughlin Boulevard, Mill Plain Boulevard, Evergreen Boulevard.
Vancouver Fire Department Westside Station (2)	E Fourth Plain Boulevard, E 18th Street, Grand Boulevard.
Clark County Fire Marshal (District 6)	I-205, SR 99, and NW Hazel Dell Avenue.
West Precinct City of Vancouver Police	Main Street/SR 99, Fort Vancouver Way, P Street, SR 500 to I-205.
Clark County Sheriff's Office	NW Fruit Valley Road, NE Hazel Dell Road, NE St. Johns Boulevard, and NE Andresen Road (SR 500).

Sources: Lawson 2021; Leek 2023.

Utilities

Utilities in the study area are identified in Table 3.6-4.

Table 3.6-4. Utilities within the Study Area

Utility Owner	Type of Utility	Comments
AT&T	Communications	Local network services; cellular telecommunications antennae.
Clark Public Utilities	Power	Serves the area north of the Columbia River.
Comcast	Communications	Cable and fiber optic network.
Integra Telecom	Communications	Fiber optic network formerly owned by Electric Lightwave.
NW Natural	Natural gas	Natural gas service provider for the area.
Pacific Power & Light	Power	Generally serves the area east of I-5 and south of North Portland Harbor.
Portland, City of	Water, sewer, stormwater, and communications	None.
Portland General Electric	Power	Generally serves Hayden Island and the area west of I-5 and south of North Portland Harbor.
Qwest	Communications	General telephone service provider for the area.
Time Warner Telecom	Communications	Fiber optic network.
Verizon Wireless	Communications	Cellular telecommunications antennae.

Utility Owner	Type of Utility	Comments
Vancouver, City of	Water, sewer, stormwater, and communications	None.

Note: The list of utility owners is based on CRC project information. Later phases of the IBR Program will include additional studies and confirmation of utility providers and locations. The list will be updated and confirmed with appropriate regulatory agencies as the project progresses.

Several important utility lines cross the Columbia River and North Portland Harbor to provide service to Hayden Island. The presence of bridges across these two water bodies, combined with the narrow 2,200-foot width of Hayden Island at this location, result in a concentration of utilities along the I-5 right of way. Utilities in this area include:

- A water transmission main across the North Portland Harbor bridge (Portland Water Bureau).
- A main natural gas feed line across the North Portland Harbor bridge (NW Natural).
- An underwater power cable (Portland General Electric) and telephone lines located under the bed of North Portland Harbor, immediately west of the Interstate Bridge.
- Underground communication cables across North Portland Harbor, Hayden Island, and the Columbia River. A trunk line crosses the Columbia River, 500 feet east of the Interstate Bridge, and includes telephone, television, data, and fiber optic from multiple utility providers.

Other utility lines or structures in the study area, all in Vancouver, include water mains that cross I-5 at SE Columbia Way, 5th Street, Mill Plain Boulevard, 16th Street, McLoughlin Boulevard, E 29th Street, E 32nd Street, 39th Street, and 40th Street. Another major water line is located parallel to the western right of way line of I-5 between McLoughlin Boulevard and E 16th Street. The City of Vancouver Waterfront Pump Station is also within the study area.

ODOT, WSDOT, and TriMet maintain infrastructure in the study area for their agencies' uses, but do not provide direct service to the public. These utilities include power, stormwater, water, and sanitary sewer. These agencies also maintain signal and communication systems for transportation management and transit operations.

See the Utilities Technical Report for further discussion.

3.6.3 Long-Term Benefits and Effects

Long-term effects on public services are defined as physical changes to public service facilities such as medical facilities, police and fire facilities, or schools, as well as changes in traffic operations that could affect critical access routes or disrupt emergency vehicle response. Long-term effects on utilities are defined as permanent changes in utility service or availability.

Table 3.6-5 summarizes the effects of the Modified LPA, design options, and the No-Build Alternative on public services and utilities. Additional information is provided in the sections that follow.

Table 3.6-5. Summary of Modified LPA and No-Build Alternative Effects on Public Services and Utilities

1	2	3	4	5
No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, with or Without C Street Ramps, Centered I-5 or I-5 Westward Shift	Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5	Modified LPA with Single-Level Fixed-Span Configuration,[a] One Auxiliary Lane, C Street Ramps, Centered I-5	Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5
• Increased congestion on I-5 would increase delays in emergency response. • No change to utilities.	• Emergency service response time would be reduced with improved traffic conditions. • Utilities would be relocated or protected in place during construction and restored to full service following construction.	• Similar to effects listed in Column 2, but further reduced congestion and multimodal operations would lead to improved response times. • Same effects on utilities as listed in Column 2.	• Similar to effects listed in Column 2, but response times to transit and shared-use path incidents could improve because emergency vehicles would have better access to transit and active transportation facilities. • Same effects on utilities as listed in Column 2.	• Delays and disruptions to emergency response due to bridge openings would continue, but with less frequency than the No-Build Alternative. • Same effects on utilities as listed in Column 2.

a The effects associated with the single-level fixed-span configuration would be the same for all bridge type options.

No-Build Alternative

With the No-Build Alternative, no physical impacts to public services (including medical centers and school sites) are anticipated. There would be no change in intersection operations on critical access routes in Portland during either the AM or PM peak periods. In Vancouver, three intersections would not meet level of service standards during the AM peak period, and seven intersections would not meet level of service standards during the PM peak period, which could slow response times for emergency vehicles (see Section 3.1, Transportation, for further discussion). In addition, bridge openings to allow ship passage would continue to disrupt traffic and cause potential delays for emergency vehicles.

The No-Build Alternative would not involve any changes to existing utilities in the study area. However, damage to the Interstate Bridge from a seismic event could have adverse impacts to utilities located on or near the bridge and could hinder the provision of emergency services.

Modified LPA

Most long-term effects on public services and utilities would not differ among the Modified LPA design options. Where differences would occur, they are described in the subsections below.

Public Services

Effects on Public Service Facilities

Most public services would not experience direct long-term impacts to facilities as a result of the Modified LPA, including:

- Fire and life safety
- Solid waste management
- Postal service
- Cemeteries

The Modified LPA with C Street ramps at the SR 14 interchange would partially acquire the parcel that contains the FHWA Western Federal Lands office, north of 5th Street and immediately east of I-5. This would affect six marked parking stalls, adjacent asphalt and curbing, landscaping, parking area illumination, and an electronic swing gate. The Modified LPA without C Street ramps would move building access to the south from E 5th Street.

None of Portland Public Schools' facilities are near areas that would be directly affected by the Modified LPA. In Vancouver, the Modified LPA would directly affect Discovery Middle School, located at the northern end of the study area in the Lincoln neighborhood, with a minor acquisition of part of the southeastern portion of the parcel for a retaining wall. The retaining wall would require a permanent subsurface easement with some long-term surface use restrictions. No structures would be displaced, and the long-term use of the site would not be changed.

The property housing the Vancouver Police Department administrative offices, located east of I-5 and south of E Evergreen Boulevard, is planned for partial acquisition to accommodate I-5 and sidewalk improvements to E Evergreen Boulevard. No impacts to the building on the property are anticipated.

Traffic Effects on Public Services

Traffic congestion along critical emergency routes can cause delays for emergency service providers. The transportation analysis for the Modified LPA evaluated 2045 levels of service at 63 local street intersections along critical emergency access routes (46 in Vancouver and 17 in Portland). In Portland, all but one intersection along the critical emergency access routes would meet level of service standards in the AM peak

period with the Modified LPA; in the PM peak period, three intersections would not meet the standards. In Vancouver, three intersections would not meet level of service standards in the AM peak period with the Modified LPA; in the PM peak period, four intersections would not meet the standards. The design option to remove the C Street ramps would result in additional congestion in downtown Vancouver; under this option, five intersections would not meet level of service standards in the AM peak period, and eight intersections would not meet the standards in the PM peak period.

In Vancouver, the local streets with the most changes to level of service compared to the No-Build Alternative would be Main Street and 39th Street. During the AM and PM peaks, response times for mobile public services relying on Mill Plain Boulevard or 39th Street as critical access routes could increase. All design options of the Modified LPA would provide full-width shoulders on the new Columbia River bridges, which could improve response times by allowing emergency providers using I-5 to bypass congestion while crossing the Columbia River or accessing Hayden Island. The addition of an auxiliary lane would also reduce congestion and facilitate emergency response by improving traffic flow on I-5 through the study area. A second auxiliary lane would further reduce congestion and improve multimodal operations on I-5. This would lead to a decrease in response times for emergency vehicles using I-5 as an emergency route.

The fixed-span double-deck configuration would provide emergency access to the transit guideway and shared-use path on the lower decks of the Columbia River bridges for rescue trains and first responders. The single-level fixed-span configuration would improve emergency response times to transit and shared-use path incidents compared to the fixed-span double-deck configurations because all the facilities being located on a single level would allow response teams to access the incidents directly from the highway lanes. The single-level movable-span configuration would cause delays and disruptions to emergency response due to bridge openings, but with less frequency than under the No-Build Alternative.

See the Public Services Technical Report for further discussion of traffic effects on public services and the Transportation Technical Report for a full description of the traffic analysis completed.

Utilities

The Modified LPA would cross or be in close proximity to a number of major utility lines in Portland, on and near the existing Interstate Bridge, and in Vancouver. These include water supply, natural gas, and sewer mains, communications cables and infrastructure, a high-voltage electrical transmission line, a cellular antenna array, and, potentially, a wastewater lift station. Utility infrastructure on the North Portland Harbor bridge is particularly sensitive because in several cases these facilities are the only link between Hayden Island and the mainland.

Utilities affected by construction of the Modified LPA would either be protected in place or relocated. Once relocated, the utilities would be more robust and reliable. The effects would generally be similar across the design options, except that additional utilities at the park-and-ride locations at W 4th Street and W 3rd Street in downtown Vancouver could require relocation or replacement. No long-term adverse impacts to utilities are expected. See the Utilities Technical Report for additional information.

As noted in Section 3.6.2, the current analysis is based on CRC project information; later phases of the IBR Program will include additional studies and confirmation of utility providers and locations. As the design progresses, coordination with utility providers will be conducted to confirm there are no changes in impacts since the CRC EIS was prepared.

3.6.4 Temporary Effects

Temporary effects are defined as those that would occur during construction of IBR Program facilities. Construction of the Modified LPA includes the construction of the new brides and removal of the existing bridges. This could include traffic and access disruptions to public services and short-term service

interruptions resulting from utility relocation or protection measures. The duration of these effects would be limited to the active construction period.

No-Build Alternative

Under the No-Build Alternative, no temporary impacts to public services or facilities (including medical centers and school sites) are anticipated. The No-Build Alternative would not result in temporary utility disruptions from construction.

Modified LPA

Most temporary effects on public services and utilities would not differ among the Modified LPA design options. Where differences would occur, they are described in the subsections below.

Public Services

Traffic Effects on Public Services

Detours, increased delays, and traffic on streets with construction may cause response time delays for mobile public services including police, fire, medical emergency, school transportation, and solid waste services. In Portland, temporary effects on public services include increased delays for the fire services stationed on Hayden Island which must use I-5 when serving North Portland. Other services, such as law enforcement, would also experience delays accessing Hayden Island from North Portland or Vancouver. More information about traffic impacts during construction can be found in Section 3.1, Transportation.

Construction on emergency transportation routes may cause delays in emergency services' response times and must be communicated with those service providers in advance. Construction on school routes could cause delays for school transportation providers and advance coordination with school transportation services would be necessary. Construction noise and vibration may affect Discovery Middle School; Vancouver Innovation, Technology and Arts Elementary School; and the Athletic Annex at Clark College. More information can be found in Section 3.11, Noise and Vibration.

Temporary Construction Easements

Temporary construction easements would be needed from several properties that contain public service facilities. The buildings on these properties would not be affected, and their ongoing functions would not change.

- A temporary construction easement is planned for the northwestern corner of the City of Portland Fire Department property (Portland Fire & Rescue Station 17) on Hayden Island. No modifications to the building, parking lot, or driveway are planned.
- A temporary construction easement and a construction staging area would be needed on the western portion of the Clark College Athletic Annex and recreation fields property. The easement would not interrupt the function or public use of the recreation fields or modify the building on the western portion of the property. Chapter 4, Draft Section 4(f) Evaluation, has more information on this temporary construction easement.
- A temporary construction easement would be needed for the northwestern corner of the Clark Public Utilities District property, located on the east side of the existing northbound Interstate Bridge abutment. The building functions as an information center with energy conservation staff. Some landscaping would be lost, but there would be no modification to the building, parking lot, or access roads.

- A temporary construction easement is planned along the northwestern boundary of the Vancouver Division of Veterans Affairs Portland Health Care System. The impact would be limited to the northwestern corner of the site adjacent to East Fourth Plain Boulevard and the far western portion of the site along the I-5 frontage road.

Utilities

Temporary impacts to utilities during construction would result from the need to relocate the utilities or protect them in place to prevent damage from, or conflict with, new IBR infrastructure. The largest temporary utility impacts would occur in the area between Marine Drive and the SR 14 interchange. Between these interchanges, utilities are concentrated in a relatively narrow corridor parallel to or under I-5; the utilities would require temporary relocation during construction. Short-term service outages could occur as a result of utilities being relocated or while protective measures are implemented. Throughout the study area, utility providers would be contacted during design regarding temporary utility relocations and/or staging and sequencing provisions, many of which could occur in the early phase of construction, prior to heavy civil construction phases.

The following major utilities in Oregon on the North Portland Harbor bridge may be temporarily affected:

- A water main that supplies water to Hayden Island, including for fire flows, would be affected by a new span to accommodate the Jantzen Drive realignment.
- A natural gas feed main serving Hayden Island would be affected by the new North Portland Harbor bridges.
- Communication cables across the North Portland Harbor bridge, Hayden Island, and on the southbound Columbia River bridge, including several trunk lines, would be affected by the new North Portland Harbor bridges and Marine Drive and Hayden Island interchanges.

Additionally, underwater communication and power cables west of the North Portland Harbor bridge would be affected by construction of the new North Portland Harbor bridges and ramps. Sanitary sewer force mains crossing Marine Drive and Jantzen Drive could also be affected.

Other potentially affected utilities include:

- Water, power, gas, and communications infrastructure would be affected by Marine Drive interchange reconstruction.
- Electrical feeds and switches and the main gas feed adjacent to I-5 on Hayden Island would be affected by reconstruction of the Hayden Island interchange, construction of light-rail, and roadway realignments.
- The existing cellular antenna array in the vicinity of Jantzen Drive would be affected by reconstruction of the Hayden Island interchange.

Major utilities that cross I-5 in Washington and would be temporarily affected include:

- A sanitary interceptor sewer crossing I-5 around 5th and 6th Streets in Vancouver would be affected by construction of new ramps at the SR 14 interchange.
- Communications infrastructure, a sewage lift station and force main, and a high-pressure gas line between the SR 14 interchange and the Columbia River may be affected by bridge construction, improvements to SR 14, and local street improvements.
- A water supply main crossing I-5 at Mill Plain Boulevard would be affected by street reconstruction.
- A communications duct bank crossing I-5 at Fourth Plain Boulevard could be affected by the construction of additional lanes.

- A high-voltage electrical transmission line crossing I-5 at 33rd Street could be affected by over-crossing reconstruction. One or both poles at either end of the existing Interstate Bridges could conflict with construction of the new, longer Columbia River bridges.
- A water supply main crossing I-5 at McLoughlin Boulevard may be affected when the street is modified to allow for the widened highway and transit guideway, and by construction of the guideway S-curve between 17th Street and McLoughlin.
- A communications cable and duct bank crossing I-5 at Fourth Plain Boulevard would be affected by the construction of additional lanes.
- A sewage lift station at Columbia Street could be affected by new bridge foundations.
- A water supply main crossing I-5 at NE 40th Street would be affected by construction of a new ramp at NE 39th Street.
- Communication trunk lines on Washington Street south of W 6th Street would be affected by road reconstruction.

3.6.5 Indirect Effects

Public service and utility providers generally plan based on forecast population and development patterns found in the long-range comprehensive plans of the jurisdictions they serve. They evaluate future population growth and calculate needed future service increases such as increased numbers of police officers, new equipment, or new station locations. As described in Section 3.4, Land Use and Economics, the Modified LPA would facilitate growth in the study area, particularly in new light-rail station areas, in a manner consistent with local and regional land use plans. This, in turn, could result in increased demand for public services and utilities in areas where growth occurred. The increased service needs would be in urbanized areas where public services and utilities are already present; it is not anticipated that any extension of service to new geographic areas would be required.

3.6.6 Potential Avoidance, Minimization, and Mitigation Measures

Long-Term Effects

Regulatory Requirements

- Oregon Administrative Rules Chapter 660, Division 11: Public Facilities Planning. Governing bodies are directed to avoid, minimize, and mitigate impacts to public services if possible.
- Growth Management Act (GMA) Revised Code of Washington 36.70A.030(33) defines public services. The GMA directs local governments to avoid, minimize, and mitigate impacts to public services.
- For utilities, ODOT and WSDOT would develop or modify agreements with affected utility owners to specify the locations of utilities within the right of way, access and maintenance requirements, etc.

Program-Specific Mitigation

Program-specific mitigation measures for effects on public services and utilities include:

- Implement feasible mitigation strategies for increased travel times along emergency service routes as described in Section 3.1, Transportation, of this Draft SEIS.

Temporary Effects

Regulatory Requirements

- Incorporate measures to maintain traffic flow and access during construction and to avoid and minimize temporary utility service disruptions into contract specifications.
- Comply with current federal Dig Once laws (23 CFR 645.307) and associated state regulations and guidelines, which require advanced coordination with the broadband/fiber industry to invite these providers to participate in highway improvement projects.

Program-Specific Mitigation

Program-specific mitigation for temporary effects on public services and utilities would include:

- Protect utilities in place where feasible and cost-effective.
- Work with utility providers to relocate utilities when protection in place is not feasible, with the goal of relocating facilities only once to reduce service disruptions.
- Work with service providers and the public to minimize temporary effects to the extent practicable. Advance communication with the impacted public services would be conducted to inform dispatchers and responders about planned road closures and detours. A preconstruction communication plan would be developed with affected emergency response groups and other public service agencies detailing how detour and road closure information would be provided to the services.
- Evaluate the need for backup on-call emergency services to transport patients during bridge construction to mitigate highway delays.
- Before construction, evaluate the need for backup on-call emergency services to transport patients during bridge construction to mitigate highway delays.
- Conduct public outreach campaigns before construction to ensure that detours and traffic routing plans during construction are available to public service providers and the communities they serve. Provide detour signs on routes typically used and signed to access public service locations.
- Coordinate closely with utility owners during project design to identify temporary facility needs and minimize temporary construction disruptions.

3.7 Parks and Recreation

Existing and planned parks and recreation facilities are important community resources that are highly valued by individuals, private organizations, and local governments. This section identifies, describes, and evaluates the long-term, temporary, and indirect effects of the No-Build Alternative and Modified LPA on park and recreation resources, including school facilities, interpretive or community centers, trails, open spaces, and sports fields. Additionally, this analysis examines potential impacts on recreational events and activities. An evaluation of the use of park and recreation resources in accordance with Section 4(f) of the U.S. Department of Transportation Act (49 United States Code [USC] 303) (referred to as "Section 4(f)") can be found in Chapter 4 of this Draft SEIS. An evaluation of impacts to park and recreation resources protected under Section 6(f) of the federal Land and Water Conservation Fund Act (referred to as "Section 6(f)") is included in Section 3.21 of the SEIS.

The information presented in this section is based on the Parks and Recreation Technical Report, which contains greater detail and additional analysis.

3.7.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with parks and recreation has been updated in this Draft SEIS to include:

- Updates to information on existing and planned park and recreation resources within the study area.
- Updates to information on federally and state-protected park and recreation resources.
- Changes in land uses such as development at the Vancouver Waterfront, planned uses on Hayden Island, and recently constructed, altered, or removed buildings.
- Updates to long-term and temporary effects of the Modified LPA.
- Updates to mitigation, in consultation with the agencies with jurisdiction, for the long-term and temporary effects of the Modified LPA.

Table 3.7-1 compares the impacts and benefits of the CRC LPA to those of the Modified LPA as a result of the changes listed above. Based on the analysis described in this section, the effects of the Modified LPA would be similar to those of the CRC LPA, but overall, the Modified LPA would have fewer impacts to parks and recreation resources than the CRC LPA.

Table 3.7-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects as Identified in this Section	Explanation of Differences
Total acres of park and recreation resources acquired	4 acres	0.8 acres	The reduction in total acres acquired is primarily the result of reduced impacts to Fort Vancouver National Historic Site, Waterfront Park, Discover Historic Loop Trail, and Clark College

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects as Identified in this Section	Explanation of Differences
			Recreation Fields. These reductions are the result of design modifications, including straightening the bridge alignment and moving the LRT terminus from Clark College to Evergreen Boulevard.
Acres of acquired parkland within the Fort Vancouver National Historic Site	1.7 acres	0.4 acres	The reduction in impact is due to a slight westward shift in the I-5 mainline alignment, which also shifts the reconstructed loop ramp from I-5 northbound to C Street to the west.

CRC = Columbia River Crossing; EIS = Environmental impact statement; I-5 = Interstate 5; LPA = Locally Preferred Alternative; LRT = light-rail transit

3.7.2 Existing Conditions

Parks and recreation facilities were identified within the study area, which extends from approximately the SR 500 interchange in Washington and the I-5/Columbia Boulevard interchange in Oregon. North of the Columbia River, the study area generally terminates on the west side of I-5, expanding west into downtown Vancouver to include potential park and ride locations. The study area also includes the potential construction staging sites, identified in Chapter 2, and the Ruby Junction Maintenance Facility in Gresham, Oregon. Figure 3.7-1 shows the study area boundaries and the locations of parks and recreation facilities within or near the study area. Table 3.7-2 provides a description of these facilities, including their amenities.

The following parks are located nearby, but outside of the study area, and would not be affected by the Modified LPA:

- Lotus Isle Park (N Tomahawk Drive, east of I-5, Portland).
- Esther Short Park (W Columbia and 8th Streets, Vancouver).
- Leach Park (E 28th Street and K Street, Vancouver).
- Ike Memorial Dog Park (NE Ross Street and NE 15th Avenue, Vancouver).

Figure 3.7-1. Parks and Recreation Facilities in the Study Area

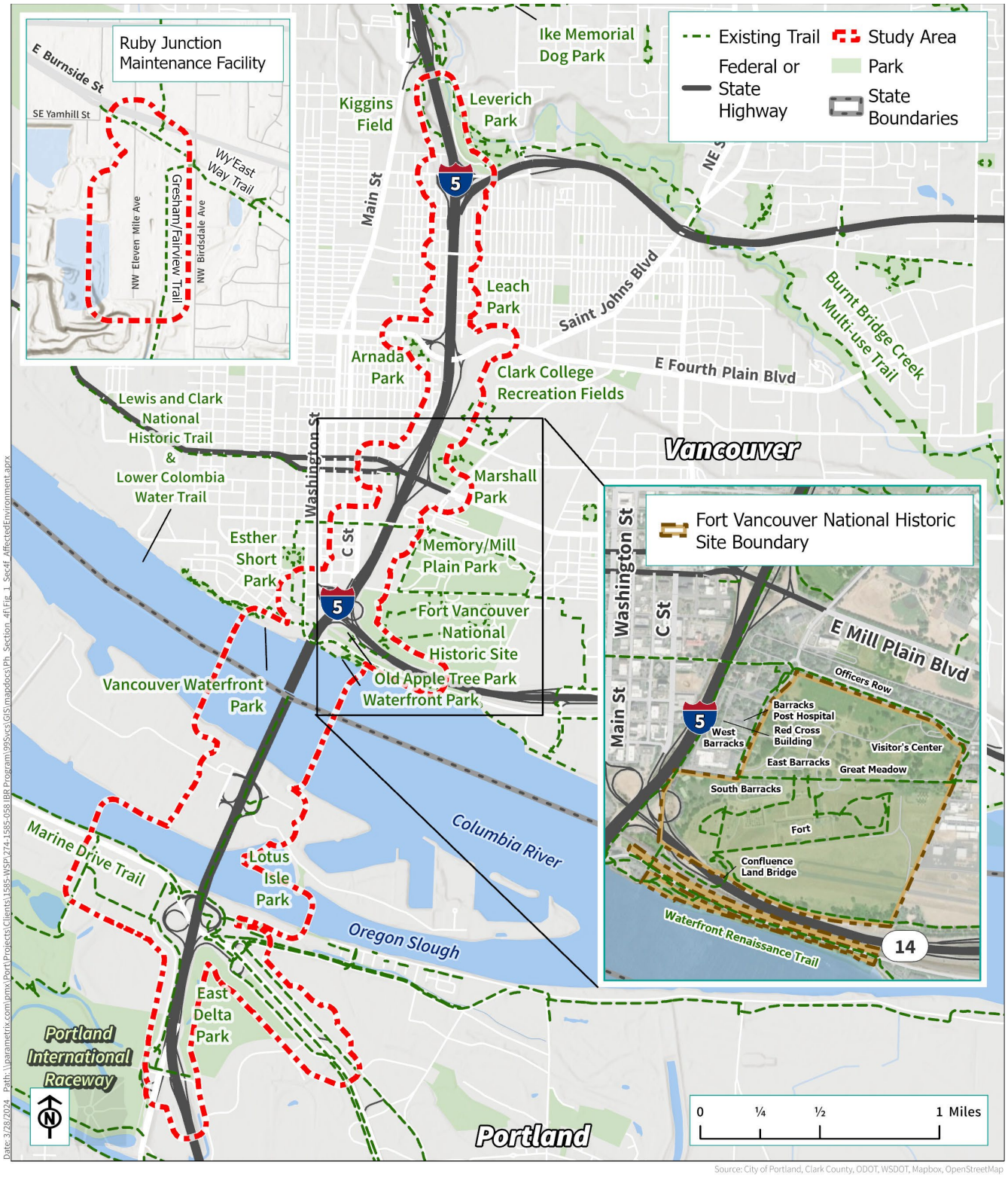


Table 3.7-2. Parks and Recreation Facilities – Location, Jurisdiction, and Amenities

Resource	Type	Location	Agency with Jurisdiction	Description and Amenities
East Delta Park	Regional park	N Denver and Martin Luther King Jr. Boulevard, Portland	PP&R	87.5 acres; softball and soccer fields, volleyball courts, nature trails, playground, control-line model aircraft flying field; off-leash area on ODOT property
Bridgeton Trail (Proposed)	Proposed multiuse trail	NE Bridgeton Road, Portland	PP&R and Prosper Portland	Proposed paved multiuse path paralleling NE Bridgeton Road and connecting to the Marine Drive Trail
Marine Drive Trail	Multiuse trail	I-5 to Kelley Point Park	PP&R	5.0-mile paved multiuse path connecting Marine Drive interchange and Kelley Point Park
Gresham/ Fairview Trail	Multiuse trail	NE Halsey Street to Springwater Corridor Trail	City of Gresham	3.29-mile-long trail starting at the intersection of Northeast Halsey Street at 201st Avenue and traveling south to the Springwater Trail at SW 10th Avenue
Wy'East Way Trail	Multiuse trail	Ruby Junction Station, Rockwood to Cleveland Station, Gresham	City of Gresham	2-mile-long, 12-foot-wide walking and bike path that runs along the MAX light-rail line from the Ruby Junction Station in Rockwood to the Cleveland Station in historic downtown Gresham
Lower Columbia River Water Trail	Recreational waterway	Columbia River	Not Applicable	Informally designated trail managed by Lower Columbia River Estuary Partnership. 146.0-mile recreational waterway from Bonneville Dam to Pacific Ocean
Lewis and Clark National Historic Trail	Recreational waterway	Columbia River	NPS	Recreational waterway
Columbia River Renaissance Trail (part of Discovery Historic Loop Trail)	Multiuse trail	115 Columbia Way, Vancouver	VPR&C	5.0-mile, 14-foot-wide multiuse paved trail starting at the intersection of Columbia Way and Columbia Street and traveling east to Marine Park and Wintler Park
Vancouver Landing at Terminal One	City amphitheater and public dock	River mile 106 on north shore of the Columbia River	VPR&C and Port of Vancouver	Public transient moorage facility/dock, amphitheater
Vancouver Waterfront Park	Public open space	115 SE Columbia Way, Vancouver	VPR&C	7.3 acres; completed in 2018, part of a 35-acre, high-density, mixed-use urban development – the Waterfront. Incorporates public open spaces with the Columbia River edge.

Resource	Type	Location	Agency with Jurisdiction	Description and Amenities
Old Apple Tree Park	City of Vancouver park	112 Columbia Way, Vancouver	VPR&C	1.3 acres; entrance to Confluence Land Bridge. The tree died in 2020, but interpretive signs, fencing, and the stump of the original tree remain.
Fort Vancouver National Historic Site	Includes a National Historic Site, Historic District	Between Columbia River and Mill Plain Boulevard east of I-5	NPS	209 acres (largely overlapping with the VNHR); historic interpretive sites and replica structures, multiuse trails, picnic tables, event and recreation fields, and reservable picnic shelter. Newly constructed main visitor parking lot and improvements to E 5th Street, including repaving, new sidewalks, reoriented parking spaces, and bicycle and pedestrian routes, completed in fall 2022. NPS is currently constructing a replica village dwelling in the western portion of the property. Waterfront Park, which NPS manages as a part of the Fort Vancouver NHS, includes passive recreation and viewing opportunities for the Columbia River and is crossed by the Columbia River Renaissance Trail.
Discovery Historic Loop Trail (includes portion of Waterfront Trail)	Multiuse trail and city sidewalks	Columbia River Waterfront, Fort Vancouver National Historic Site, downtown Vancouver	VPR&C/NPS	2.3-mile trail on paved multiuse paths and local streets
Marshall Community Center, Luepke Senior Center, and Marshall Park	Community center, senior center, and park	1009 E McLoughlin Boulevard, Vancouver	VPR&C	19.0 acres; community garden, play equipment, fields, gym, senior center
Clark College Recreation Fields	School recreation facility	1500 E Mill Plain Boulevard, Vancouver	Clark College	13.0 acres; operated by Clark College with soccer fields, softball fields, and tennis courts open to public
Arnada Park	Neighborhood park	610 E 25th Street, Vancouver	VPR&C	3 acres; gazebo, picnic shelter, play equipment, sports court, benches, and paved walkway
Leverich Community Park	Community park	39th and M Streets, Vancouver	VPR&C	16 acres; disc golf course, picnic areas

Resource	Type	Location	Agency with Jurisdiction	Description and Amenities
Burnt Bridge Creek Trail	Multiuse trail	North of SR 500 interchange, Vancouver	VPR&C	8.0-mile paved multiuse trail; portion extends through Leverich Park
Kiggins Bowl Sports Fields and Stadium	Sports venue	North of 39th Street, west of I-5, Vancouver	Vancouver Public Schools	3.0 acres; sports venue for Vancouver Public Schools and public

I-5 = Interstate 5; NHS = National Historic Site; NPS = National Park Service; ODOT = Oregon Department of Transportation; PP&R = Portland Parks and Recreation; SR = State Route; VNHR = Vancouver National Historic Reserve; VPR&C = Vancouver Parks, Recreation and Cultural Services

Planned Facilities

In Oregon, Portland Parks and Recreation (PP&R), in coordination with Prosper Portland, plans to construct a 0.5-mile trail section linking the Bridgeton neighborhood on North Portland Harbor with I-5. The proposed Bridgeton Trail would travel along the levee and underneath I-5, connecting to the Marine Drive Trail on the west side of I-5. In winter 2009, PP&R and Prosper Portland (known at the time as the Portland Development Commission) began acquiring trail easements from property owners. After these acquisitions are complete, work will begin to refine the trail design for construction.

Where are the regional multiuse trails?

Section 3.1, Transportation, contains a map showing the routes and connections of the region's nonmotorized multiuse trails.

The Portland Citywide Systems Plan maps a large portion of Hayden Island west of I-5 as a parks-deficient area and states that future park acquisitions are needed to serve residents in the area. The 2009 Hayden Island Plan recommends the development of future park spaces and increased recreational opportunities and conceptually identifies an area west of I-5.

In Washington, Vancouver Parks, Recreation and Cultural Services (VPR&C) has identified the area surrounding the Modified LPA as having a deficit in acquired and developed park acres. The City of Vancouver is therefore seeking to acquire new parks and expand current parks within the study area; currently, no specific sites have been identified.

Previously, Clark College had planned to develop athletic facilities on a parcel located immediately east of I-5 and north of McLoughlin Boulevard. This parcel, now owned by the State of Washington and maintained by Clark College, is currently used for college purposes such as parking for the athletic fields and is not open to the public.

The National Park Service (NPS) is coordinating with the City of Vancouver to increase connectivity between the Fort Vancouver National Historic Site (NHS) and downtown Vancouver. These plans include a pedestrian overpass between E Evergreen Boulevard and 7th Street. Within the study area, planned Fort Vancouver NHS park and recreation facilities include a replica Hudson Bay Company (HBC) historic village (HBC Village) and associated extensions to the existing trail system. The planned facilities would be tied to the historic village and the Confluence Land Bridge in the southwestern portion of the Fort Vancouver NHS near the I-5/SR 14 interchange, as well as a proposed new pedestrian crossing over I-5 connecting E 7th Street and Hathaway Road. This planned development would occur on land that was previously owned by the U.S. Army Reserve but transferred to NPS in 2012.

Recreational Events

Prior to the COVID-19 pandemic in 2020, recreational events taking place within the study area included several large ongoing events and festivals in the Fort Vancouver NHS. Although several previously ongoing events have not resumed, events that took place in 2022 included the Vancouver Summer Fest, a day-long festival that included live music, games, food and marketplace vendors, and a beer garden. The Fort Vancouver NHS also hosts ongoing interpretive events such as military history talks, cultural demonstrations, and a Junior Ranger program for children (Fort Vancouver NHS 2023). Esther Short Park, while located outside the study area, is a venue for numerous downtown festivals and events throughout the year, including the Vancouver Farmers Market, the Vancouver Brewfest, and the Vancouver Wine and Jazz Festival. In addition to the organized events taking place in parks within the study area, recreational fishing and boating occur in the Columbia River portion of the study area throughout the year.

3.7.3 Long-Term Benefits and Effects

No-Build Alternative

No long-term direct effects of recreational resources would occur under the No-Build Alternative. However, the No-Build Alternative would result in substantial traffic congestion along the I-5 corridor and would not improve transit, bicycle, and pedestrian access to parks and recreational facilities in the study area. The increased traffic congestion and limited transit, bicycle and pedestrian access would reduce the ability of community members to access and/or enjoy park and recreation resources. Large events in downtown Vancouver, such as festivals and events at the Fort Vancouver NHS, Vancouver Farmers Market, Vancouver Brewfest, and Vancouver Wine and Jazz Festival, would continue to have limited transit and active transportation access, particularly from Portland. Connections between the Marine Drive and Columbia River Renaissance Trails would not be improved, and the shared-use path on the Interstate Bridge would remain narrow and considerably less accessible.

Modified LPA

Each design option under the Modified LPA would have the same effects on the following park and recreation facilities, as described in Table 3.7-3. Table 3.7-4 compares the long-term effects on parks and recreation facilities from Modified LPA options where the effects differ. Table 3.7-5 summarizes the long-term effects from the No-Build Alternative and the Modified LPA and its design options.

Table 3.7-3. Long-Term Effects on Parks and Recreation Facilities from the Modified LPA (No Difference between the Design Options)

Resource	Description of Long-Term Effects from the Modified LPA
East Delta Park	• Total of approximately 0.2 acres permanently acquired. • Traffic noise levels could slightly increase. • Approximately 2.1 acres of ODOT right of way currently in park use reverting to highway use.
Bridgeton Trail (planned)	• No effects on this planned trail.
Marine Drive Trail	• Marine Drive interchange improvements would enable greater ease of future connection to the existing Marine Drive Trail. • Improved connections within and to Marine Drive interchange. • Portions of reconstructed trail would consist of replacement of existing sidewalks along north side of Marine Drive with 16-foot-wide multiuse trail.

Resource	Description of Long-Term Effects from the Modified LPA
Gresham/Fairview Trail	• No effects on this trail.
Wy'East Way Trail	• Approximately 140 linear feet of the trail, where it currently crosses the existing LRT tracks, would need to be reconstructed once construction of the new tracks and pavement for the Ruby Junction Maintenance Facility completes. The existing alignment of the trail would not change.
Columbia River Renaissance Trail (coextensive with Discovery Historic Loop Trail along affected portion)	• Realignment of up to 1,000 linear feet of trail underneath new Columbia River bridges landing (see Discovery Historic Loop Trail below). • Traffic noise levels are expected to slightly decrease with double-deck fixed-span configuration. Traffic noise levels may increase with the wider single-level configurations (all bridge type options). • Reduced number of connections between the Columbia River bridges and the water (from two to one). The connection would be wider and safer.
Vancouver Landing at Terminal One	• Changes in eastern and southern views due to new Columbia River bridges. • Improved active transportation connections to the park.
Vancouver Waterfront Park	• Changes in eastern and southern views due to new Columbia River bridges. • Traffic noise levels are expected to decrease.
Old Apple Tree Park	• Approximately 0.08 acres permanently acquired. • Less than 0.1 acres of airspace permanently acquired by easement.
Marshall Community Center and Park	• Approximately 0.6 acres permanently acquired. • Traffic noise levels from I-5 are predicted to increase slightly. • Long-term character, use, and enjoyment of the existing facilities would not be affected.
Clark College Recreation Fields	• Changes in westerly views. • Incremental increase in highway noise due to shift of I-5 closer to recreation fields.
Arnada Park	• Traffic noise levels could slightly decrease. • Long-term character, use, and enjoyment of the existing facilities would not be affected.
Leverich Community Park	• Changes in westerly views. • Traffic noise levels could slightly increase.
Burnt Bridge Creek Trail	• Traffic noise levels could slightly increase.
Kiggins Bowl Sports Fields/Stadium	• Less than 0.01 acres of property permanently acquired. • Approximately 0.3 acres of a permanent subsurface easement for retaining wall ties.

Table 3.7-4. Comparison of Long-Term Effects on Parks and Recreation Facilities from the Modified LPA Options

1	2	3	4	5	6
Facility	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	Modified LPA Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, and Centered I-5	Modified LPA with Single-Level Fixed-Span[a] or Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	Modified LPA Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Centered I-5, without C Street Ramps	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Westward Shift
Lower Columbia River Water Trail	• Reduced navigational hazard with reduced number of in-water piers. • Traffic noise levels expected to slightly decrease due to increased bridge height over the Columbia River. • The Modified LPA with the double-deck fixed-span configuration and one auxiliary lane would have 173 linear feet of shading and coverage effects; a net increase of approximately 37 linear feet after the removal of the existing Interstate Bridge.	Similar to effects listed in Column 2, but: • Two auxiliary lanes would result in an additional 16 linear feet of shading and coverage effects (total of approximately 189 linear feet).	Similar to effects listed in Column 2, but: • The single-level fixed-span configuration would result in an additional approximately 80 linear feet of shading and coverage effects (total of approximately 253 linear feet) and a net increase of approximately 117 linear feet once the existing Interstate Bridge is removed. • The single-level movable-span configuration would result in an additional approximately 80 to 100 linear feet of shading and coverage effects (depending on the location); a net increase of 117 to 137 linear feet once the existing Interstate Bridge is removed.	• Reduced navigational hazard with reduced number of in-water piers. • Traffic noise levels expected to slightly decrease due to increased bridge height over the Columbia River. • Would have 173 linear feet of shading and coverage effects; a net increase of approximately 37 linear feet after the removal of the existing Interstate Bridge.	• Reduced navigational hazard with reduced number of in-water piers. • Traffic noise levels expected to slightly decrease due to increased bridge height over the Columbia River. • Would have 173 linear feet of shading and coverage effects; a net increase of approximately 37 linear feet after the removal of the existing Interstate Bridge.

1	2	3	4	5	6
Lewis and Clark National Historic Trail	• Reduced navigational hazard with reduced number of in-water piers. • Traffic noise levels expected to slightly decrease due to increased bridge height over the Columbia River. • The Modified LPA with the double-deck fixed-span configuration and one auxiliary lane would have 173 linear feet of shading and coverage effects; a net increase of approximately 37 linear feet after the removal of the existing Interstate Bridge.	Similar to effects listed in Column 2, but: • Two auxiliary lanes would result in an additional 16 linear feet of shading and coverage effects.	Similar to effects listed in Column 2, but: • The single-level fixed-span configuration would result in an additional approximately 80 linear feet of shading and coverage effects (total of approximately 273 linear feet) and a net increase of approximately 117 linear feet once the existing Interstate Bridge is removed. • Depending on bridge type, the single-level movable-span configuration would result in an additional approximately 80 to 100 linear feet of shading a coverage effects; a net increase of 117 to 137 linear feet once the existing Interstate Bridge is removed.	• Same as effects listed in Column 2.	• Same as effects listed in Column 2.
Discovery Historic Loop Trail (includes portion of Columbia River Renaissance Trail)	• Realignment of up to 2,750 linear feet of trail (1,000-foot portion of overlaps with affected length of the Columbia River Renaissance Trail). • Improved visitor experience from new and improved intersections, sidewalks, and	• Same as effects listed in Column 2.	• Same as effects listed in Column 2.	• The SR 14 interchange without C Street ramps design option would require approximately 174 fewer linear feet of permanent trail realignment along the Discovery Historic Loop Trail than the SR	• Same as effects listed in Column 2.

1	2	3	4	5	6
	bicycle lanes in downtown Vancouver portion. • Traffic noise levels are expected to slightly decrease on the Columbia River Renaissance Trail with the double-deck fixed-span configuration because the bridges would be shifted slightly to the west further from the trail. Traffic noise levels may increase with the wider single-level configurations which would be closer to the trail (all bridge type options). • Community Connector, which would span over I-5 and block traffic noise, would slightly reduce traffic noise levels on a portion of trail near and on Evergreen Boulevard.			14 with C Street ramps design option would.	
Fort Vancouver NHS	• Approximately 0.4 acres permanently acquired. • Traffic noise levels could increase due to shift in SR 14 interchange. • At Waterfront Park, changes in western and southern views due to new Columbia River bridges.	Similar to effects listed in Column 2, but: • The Modified LPA with two auxiliary lanes would require permanent acquisition of an additional 0.03 acres.	Similar to effects listed in Column 2, but: • The single-level fixed-span configuration would require permanent acquisition of an additional 0.02 acres.	• Same as effects listed in Column 2.	• The Modified LPA with the westward shift of I-5 would require an approximately 0.4-acre permanent easement from the Fort Vancouver NHS, a reduction of approximately 200 square feet from the Modified LPA design option that

1	2	3	4	5	6
					does not shift the I-5 mainline.

Note: Table does not include park and ride options because the potential park and ride areas are not near any of the parks and recreational facilities/resources. No long-term adverse direct effects are anticipated.

a The long-term effects associated with the single-level fixed-span configuration would be the same for all bridge type options, unless otherwise specified.

I-5 = Interstate 5; LPA = Locally Preferred Alternative; NHS = National Historic Site; ODOT = Oregon Department of Transportation; SR = State Route

Table 3.7-5. Summary of Long-Term Effects from the No-Build Alternative, Modified LPA, and Design Options on Parks and Recreation Facilities and Trails

1	2	3	4	5	6	7
Feature	No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	Modified LPA Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5	Modified LPA with Single-Level Fixed-Span[a] or Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	Modified LPA Double-Deck Fixed-Span Configuration, One Auxiliary Lane, without C Street Ramps, Centered I-5	Modified LPA Double-Deck Fixed-Span Configuration One Auxiliary Lane, C Street Ramp, I-5 Westward Shift
Total acres [b] of park and recreation resources to be acquired (approximate) [c]	0 acres	1.3 acres	1.3 acres (+1,500 square feet compared to area of acquisitions stated in Column 3)	1.3 acres (+760 square feet compared to area of acquisitions stated in Column 3)	1.3 acres	1.3 acres (-200 square feet compared to area of acquisitions stated in Column 3)
Linear feet of trails to be reconstructed and/or permanently realigned (approximate)	0 acres	5,800 feet	6,000 feet	6,000 feet	5,700 feet	5,800 feet
Anticipated transit access to park and recreation resources in study area	No change.	Would improve access to some large regional parks.	Would improve access to some large regional parks.	Would improve access to some large regional parks.	Would improve access to some large regional parks.	Would improve access to some large regional parks.

a The long-term effects associated with the single-level fixed-span configuration would be the same for all bridge type options, unless otherwise specified.
b Does not include 2.1 acres of property permanently acquired from an off-leash area associated with East Delta Park but located in ODOT-owned right of way.
c Differences would be less than 0.1 acres between the design options.
I-5 = Interstate 5; LPA = Locally Preferred Alternative; N/A = not applicable; NHS = National Historic Site; ODOT = Oregon Department of Transportation; SR = State Route

East Delta Park

The Modified LPA would require permanent acquisition of approximately 0.2 acres of park land. Approximately 0.1 acres would be acquired from the western edge of East Delta Park to construct a wall supporting the I-5 northbound to Marine Drive interchange ramp.

A 2.1-acre area of ODOT-owned highway right of way north of N Union Court, which has previously been used as an off-leash dog area associated with East Delta Park, would be developed with a roadway connection between Oregon Route 99 E and N Union Court and a stormwater facility would be developed in place of the dog park. The off-leash dog area is currently closed. Because this area is highway right of way it is not included in calculations of parkland areas that would be acquired and converted.

Approximately 0.1 acres of PP&R-owned park land would be required to enable construction of the roadway connection between Oregon Route 99 E and N Union Court. This area is part of a small parcel located northeast of the main portion of East Delta Park that is not used by PP&R.

Portions of East Delta Park currently experience noise levels approaching FHWA noise abatement criteria, as discussed in Section 3.11, Noise and Vibration. Compared to the No-Build Alternative, the Modified LPA is predicted to slightly increase traffic noise levels in East Delta Park, due to the revisions to the I-5 northbound mainline and the N Marine Drive/NE Martin Luther King Jr. Boulevard interchange and roadways that would shift traffic noise slightly closer to East Delta Park. Portions of East Delta Park nearest to transportation noise sources are primarily ballfields, model aircraft flying areas, and other active recreation areas not dependent on a quiet environment.

The Modified LPA would result in improved access to East Delta Park via transit as a result of improvements at the Expo Center and the new light-rail connection to Hayden Island. Additionally, new active transportation facilities and improvements to the existing active transportation network throughout the Oregon portion of the study area would improve access to East Delta Park via active transportation modes. See Section 3.1, Transportation, and the Transportation Technical Report, for additional detail on these improvements.

Marine Drive Trail

The Modified LPA would realign and reconstruct Marine Drive, requiring approximately 3,000 linear feet of the 5-mile Marine Drive Trail to be demolished and rebuilt in a similar location. The rebuilt portion of the trail would be slightly widened to connect with a 16-foot-wide multiuse path along the north side of Marine Drive, which would replace the existing sidewalk. Following construction of the Modified LPA, the rebuilt portion of the Marine Drive Trail would extend through the Marine Drive interchange, connecting both sides of I-5 to the Expo Center light-rail station, East Delta Park, the existing portion of the Marine Drive Trail, and the crossing over North Portland Harbor to Hayden Island.

The existing network of paths within the Marine Drive interchange area is difficult for users to navigate; the greater connectivity and ease of travel provided by the trail improvements would be a benefit. The reconstructed portion of the Marine Drive Trail would be designed for forward compatibility with the proposed Bridgeton Trail, and a connection to the Bridgeton Trail is included in the Modified LPA design with an extension through the I-5 right of way.

Gresham/Fairview Trail

The expansion of the Ruby Junction Maintenance Facility in Gresham is not expected to affect the Gresham/Fairview Trail. The Gresham/Fairview Trail runs through the study area along the east side of the existing Ruby Junction Maintenance Facility, which would not be affected by the expansion to the west of the existing maintenance facility.

Traffic noise levels under the Modified LPA for the Gresham/Fairview Trail are expected to be the same or similar to the noise levels under the No-Build Alternative because the trail would still run along the east side of the existing facility.

Wy'East Way Trail

The expansion of the Ruby Junction Maintenance Facility in Gresham is expected to affect approximately 140 linear feet of the Wy'East Way Trail. The effects would be from new tracks and pavement that would be constructed for the Ruby Junction Maintenance Facility. Traffic noise levels under the Modified LPA for the Wy'East Way Trail are expected to be the same or similar to the noise levels under the No-Build Alternative because the trail would still run along the north side of the existing facility.

Lower Columbia River Water Trail

Users of the Lower Columbia River Water Trail (LCRWT) would benefit from the Modified LPA's replacement of the Interstate Bridge, as the number of pier sets in the Columbia River would be reduced from nine to six. The bridge piers can pose a navigational hazard to those using the trail for recreation and commercial purposes; therefore, fewer bridge piers would reduce navigation hazards. Compared to the No-Build Alternative, traffic noise levels along the LCRWT are expected to decrease with the Modified LPA because the bridge and highway traffic would be higher above the trail (over the Columbia River).

The Modified LPA with the double-deck fixed-span configuration and one auxiliary lane would result in approximately 173 linear feet of shading and coverage effects to the LCRWT. The demolition of the existing Interstate Bridge would remove approximately 136 linear feet of existing shading. Therefore, the Modified LPA with the double-deck fixed-span configuration and one auxiliary lane would result in a net increase of approximately 37 linear feet of shading to the LCRWT. Compared to the Modified LPA with the double-deck fixed-span configuration, the Modified LPA with the single-level fixed-span would result in an additional approximately 80 linear feet of shading and coverage effects on the LCRWT. The Modified LPA with the single-level movable-span would result in an additional approximately 100 linear feet of shading and coverage effects at the movable-span location and 80 linear feet elsewhere. Compared to the Modified LPA with one auxiliary lane, the Modified LPA with two auxiliary lanes would result in an additional approximately 16 linear feet of shading and coverage of the LCRWT.

The new Columbia River bridges would be visible from the LCRWT. See Section 3.9, Visual Quality, for more detail on visual effects.

Lewis and Clark National Historic Trail

As with the LCRWT, users of the Lewis and Clark National Historic Trail along the Columbia River would benefit from the reduced navigational hazard as a result of the Modified LPA. Compared to the No-Build Alternative, traffic noise levels along the LCRWT are expected to decrease with the Modified LPA because the bridge and highway traffic would be higher above the trail (over the Columbia River).

The Modified LPA with the double-deck fixed-span configuration and one auxiliary lane would result in approximately 173 linear feet of shading and coverage effects to the Lewis and Clark National Historic Trail. The demolition of the existing Interstate Bridge would remove approximately 136 linear feet of existing shading. Therefore, the Modified LPA with the double-deck fixed-span configuration and one auxiliary lane would result in a net increase of 37 linear feet of shading to the Lewis and Clark National Historic Trail. Compared to the Modified LPA with the double-deck fixed-span configuration, the Modified LPA with the single-level fixed-span would result in an additional approximately 80 linear feet of shading and coverage effects on the Lewis and Clark National Historic Trail. The Modified LPA with the single-level movable-span would result in an additional approximately 100 linear feet of shading and coverage effects at the movable-

span location and 80 linear feet elsewhere. Compared to the Modified LPA with one auxiliary lane, the Modified LPA with two auxiliary lanes would result in an additional approximately 16 linear feet of shading and coverage of the Lewis and Clark National Historic Trail.

The new bridges would be visible from the Lewis and Clark National Historic Trail. See Section 3.9, Visual Quality, for more detail on visual effects.

Columbia River Renaissance Trail

The Modified LPA would permanently realign approximately 1,000 linear feet of the Columbia River Renaissance Trail. Currently, the only access to the Columbia River Renaissance Trail from I-5 is via steep or circuitous paths extending from the north end of the Interstate Bridge to Columbia Way and then across Columbia Way. The Modified LPA would include a new multiuse path that would extend underneath the northbound Columbia River bridge and connect directly to the trail along the realigned Columbia Way.

The Modified LPA would reduce the number of connections between the Columbia River bridges and the waterfront from two to one, and the connection would be wider and safer than what currently exists, benefiting the Columbia River Renaissance Trail users. The Modified LPA with the double-deck fixed-span configuration is anticipated to result in lower traffic noise levels along the Columbia River Renaissance Trail than the No-Build Alternative because of the increased bridge height. The Modified LPA with the single-level fixed-span and the single-level movable-span configurations may slightly increase traffic noise levels due to the wider bridge span.

Discovery Historic Loop Trail

The Modified LPA, with the C Street ramps, would permanently realign approximately 2,750 linear feet of the Discovery Historic Loop Trail with construction of the new Columbia River bridges and demolition of the existing bridges. The elimination of the C Street ramps at the SR 14 interchange would reduce the permanent realignment of the Discovery Historic Loop Trail to approximately 2,579 linear feet—a reduction of approximately 174 linear feet. The affected portions of the Discovery Historic Loop Trail include approximately 1,000 linear feet where it shares an alignment with the Columbia River Renaissance Trail, with the impacts discussed above.

Users of the section of the Discovery Historic Loop Trail traversing downtown Vancouver streets would benefit from new and improved intersections, sidewalks, and bicycle lanes under the Modified LPA, which would result in an overall improvement in safety and enjoyment for users. Trail users would benefit from the Community Connector that would be constructed south of Evergreen Boulevard. This Community Connector would include off-street pathways for active transportation modes including pedestrians, bicyclists, and other micro-mobility modes, and public space and amenities to support the active transportation facilities – improving connections between downtown Vancouver and the VNHR and adding to the network of public spaces in the area. The Community Connector, which would span over I-5, would provide some reduction in highway noise when compared to existing sidewalks and bike lanes, which would further enhance the user experience when traveling this section of the Discovery Historic Loop Trail.

Project modifications would be visible from the Discovery Historic Loop Trail. See Section 3.9, Visual Quality, for more detail on visual effects.

Fort Vancouver National Historic Site

The Modified LPA, with the double-deck fixed-span configuration and one auxiliary lane, would require an approximately 0.4-acre permanent acquisition from the Fort Vancouver NHS. These permanent impacts would result from the modifications to the I-5/SR 14 interchange and the widening of I-5. The Modified LPA with the single-level fixed-span (all bridge type options) and single-level movable-span configuration would result in the permanent acquisition of an additional approximate 0.02 acres (approximately 762 square feet)

of park land at the Fort Vancouver NHS. The Modified LPA with two auxiliary lanes would result in the permanent acquisition of an additional approximately 0.03 acres of undeveloped park land at the Fort Vancouver NHS. Figure 3.7-2 shows the permanent and temporary impacts for each of the Modified LPA design options.

Traffic noise levels in the recreational portion of the Fort Vancouver NHS near the I-5/SR 14 interchange could increase slightly under the Modified LPA compared to the No-Build Alternative because highway infrastructure associated with the SR-14 interchange would shift slightly closer to the Fort Vancouver NHS.

The Modified LPA would not result in long-term direct effects on Waterfront Park, beyond changes in western and southern views from the new Columbia River bridges. These changes in views would not adversely affect the function or enjoyment of Waterfront Park.

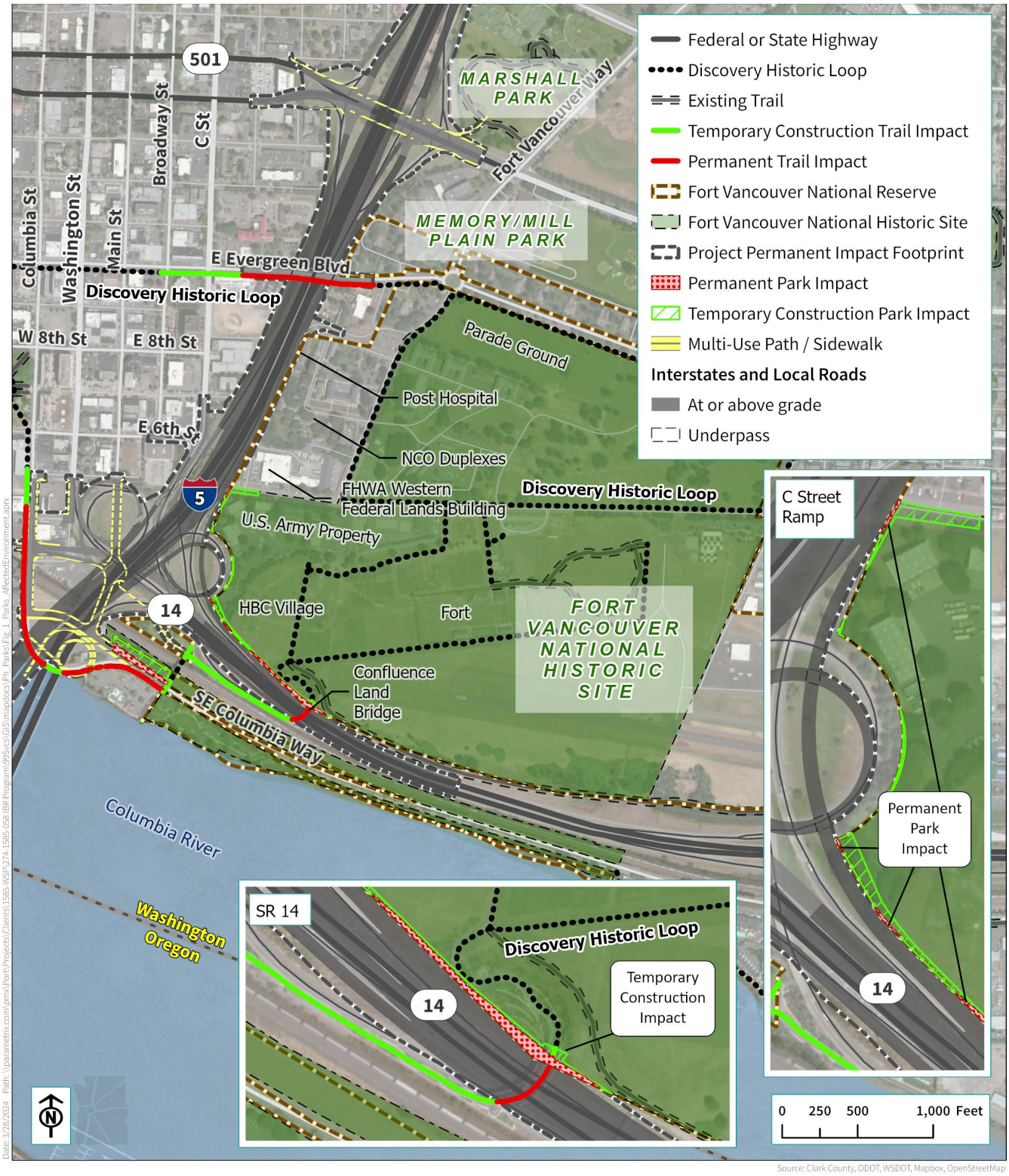
Old Apple Tree Park

The Modified LPA would permanently acquire approximately 0.08 acres from Old Apple Tree Park for a new shared-use path that would link Main Street and downtown Vancouver. Users of the Confluence Land Bridge, which extends over SR 14 and connects the Vancouver waterfront with the Fort Vancouver NHS, would benefit from this new path as they travel through the park.

The Modified LPA, with or without the C Street Ramps and with either the I-5 centered mainline or westward shift, would also require a permanent airspace easement (less than 0.1 acres) over the northwest corner of Old Apple Tree Park for maintenance of the I-5 northbound to SR 14 elevated ramp. This easement would provide WSDOT with the right to enter Old Apple Tree Park with equipment to perform routine inspections of the ramp structure. This easement is not expected to affect landscaping on the park property. The new I-5 northbound to SR 14 interchange ramp would be located within 5 to 10 feet of the park's northern boundary, closer to the park than the existing ramp. The ramp is not expected to adversely affect the forested buffer along the northern edge of the park, which would remain.

Traffic noise levels in Old Apple Tree Park are predicted to be slightly lower under the Modified LPA than under the No-Build Alternative because the new SR 14 ramp would be higher in elevation than the existing SR 14 ramp, reducing noise levels at grade within the park. In the case of the SR 14 without C Street Ramps option, traffic noise levels would be eliminated.

Figure 3.7-2. Fort Vancouver National Historic Site – Comparison of Modified LPA and Design Options



Marshall Community Center, Luepke Senior Center, and Marshall Park

The Modified LPA would require the permanent acquisition of approximately 0.6 acres of land from the parcel that includes the Marshall Community Center, the Luepke Senior Center, and Marshall Park. The area needed would be for a retaining wall associated with the elevated exit ramp from I-5 northbound to Fourth Plain Boulevard.

The permanent acquisition would displace up to four horseshoe pits and trees (both in state right of way and within the park boundary), including several large sequoia trees that serve as a buffer between the community center campus and I-5. The retaining wall would be located along the border of the parking lot, with a height of up to 20 feet. The existing parcel also contains a few medium-sized trees and provides a partial vegetative buffer between the park and I-5. Specific tree replanting requirements would be determined by the City of Vancouver Urban Forester during the tree removal permitting process.

Traffic noise levels from I-5 are predicted to increase slightly at Marshall Community Center, the Luepke Senior Center, and Marshall Park under the Modified LPA compared to the No-Build Alternative. The addition of the light-rail transit (LRT) line along the west side of I-5 is not expected to result in an increase in noise levels.

With the re-establishment of a vegetated buffer and replacement of trees and landscaping that would be removed between I-5 and the community center.

Kiggins Bowl Sports Fields and Stadium

The Modified LPA would require the acquisition of less than 0.01 acres of the Kiggins Bowl Sports Fields and Stadium property for a retaining wall near the southern access, along the east side of Discovery Middle School. This permanent acquisition would not displace park use. A permanent subsurface easement, totaling approximately 0.3 acres, would extend from the retaining wall to under the access road for the installation of long ties that would anchor the wall into the soil. This subsurface easement would not permanently affect the aboveground use of this area, but would limit excavation below a depth that would be determined based on the final design of the retaining wall.

3.7.4 Temporary Effects

No-Build Alternative

Under the No-Build Alternative, construction and associated construction-phase impacts such as use of park lands; traffic detours; temporary closures; and noise, dust, and vibration would not occur. Overall, there would be no foreseeable temporary direct effects or benefits to park and recreation resources from the No-Build Alternative.

Modified LPA

Construction of the Modified LPA includes construction of the new bridges and removal of the existing Interstate Bridge. Temporary effects of the Modified LPA on park and recreation resources include temporary easements on park land to stage construction and/or store materials; increased noise, glare, dust, and vibration; and temporary closures, detours, and congestion that could delay users traveling to parks or recreational activities. Temporary impacts on park and recreation resources are summarized in Table 3.7-6. The narrative following the table provides additional description for parks where more potentially substantial temporary effects would occur.

Table 3.7-6. Modified LPA Temporary Effects on Park and Recreation Resources

Resource	Description of Temporary Effects from Modified LPA
East Delta Park	• Approximately 0.2 acres temporary impacts for construction of retaining wall. • Detours required for active transportation and vehicles. • Increased noise and dust.
Marine Drive Trail	• Trail users diverted during construction to opposite side of Marine Drive and at times along south side of Portland Expo Center, resulting in approximately 360 feet of temporary impacts.
Gresham/Fairview Trail	• No temporary effects from construction.
Wy'East Way Trail	• Temporary trail detours and disruptions at NW Burnside Court and NW Eleven Mile Avenue / Wy'East Way.
Lower Columbia River Water Trail and Lewis and Clark National Historic Trail	• Recreational marine travel along the Columbia River would be limited. Safe passage route or detours, if necessary, to be provided through construction. • Possible temporary closure of near-shore areas to recreational use due to safety considerations.
Columbia River Renaissance Trail and Discovery Historic Loop Trail	• Increased levels of noise, dust, glare, and construction equipment emissions. • Long-duration closures of connections between downtown Vancouver and SR 14. Trail users diverted to Columbia Way to reach downtown Vancouver.
Vancouver Landing at Terminal One	• Less than 0.1 acres temporary impacts. • Temporary construction impacts from increased noise, changes in views of the Columbia River at I-5, and glare from construction lighting.
Fort Vancouver NHS	• Temporary construction easement on approximately 1 acre of the Fort Vancouver NHS, which would be adjacent to I-5 near the C Street ramp and E Fifth Street and near the Confluence Land Bridge, for construction of retaining wall. • Increased noise, vibration, and dust. • Temporary construction impacts from increased noise, changes in views of the Columbia River at I-5, and glare from construction lighting at Waterfront Park.
Vancouver Waterfront Park	• No temporary effects.
Old Apple Tree Park	• Temporary construction easement on approximately 0.2 acres. • Increased noise, glare from construction lighting, additional dust, and possibly debris entering the park. • Temporary increases in traffic levels along Columbia Way may affect trail users leaving or entering the park.

Resource	Description of Temporary Effects from Modified LPA
Marshall Community Center and Park	• Temporary construction easement on approximately 0.4 acres during construction. • Realignment and/or closure of accesses and potential temporary closure of access and portion of parking. • Increased noise/vibration, as well as glare from construction lighting.
Clark College Recreation Fields	• Increased noise, vibration, dust, and glare.
Arnada Park	• Less than 0.1 acres of temporary impacts for construction, affecting landscaped areas including grass and small trees. • Increased noise, dust, and glare.
Leverich Community Park	• Revised access and traffic movements on 39th Street during construction of the SR 500/I-5 interchange. • Increased noise, dust, and glare.
Burnt Bridge Creek Trail	• No temporary impacts.
Kiggins Bowl Sports Fields/Stadium	• Temporary construction easement on approximately 0.01 acres. • Increased noise, vibration, and dust.

East Delta Park

Under the Modified LPA, highway construction would require a temporary construction easement from approximately 0.2 acres from the western, eastern, and northern edges of East Delta Park. The affected area is covered by grass that is mowed periodically. The temporary construction easement would be required to gain access to the I-5 right of way to build a retaining wall that would support the I5 northbound bridge to the Marine Drive interchange ramp.

The duration of the temporary construction easement in East Delta Park is expected to be less than six months.

Construction activities would generate noise and dust and damage the grass where construction equipment would operate. All landscaping would be restored after construction. Detours for active transportation would reflect the Portland Bureau of Transportation guidance for detours around construction sites and would be maintained regularly. While detours may be required during some construction phases, vehicle access to East Delta Park would be maintained.

Wy'East Way Trail

The Wy'East Way Trail could experience trail detours and disruptions at NW Burnside Court and NW Eleven Mile Avenue / Wy'East Way.

Lower Columbia River Water Trail

During construction of the Columbia River bridges and the demolition of the existing Interstate Bridge, both recreational and commercial marine travel along the Columbia River would be limited. Users of the LCRWT would be provided with a safe passage route or detours, if necessary, through the construction zone. However, for safety purposes, it is possible that recreational travel through the study area would be limited at times and trail users may not be able to access some areas. For example, during construction or demolition of the shallow-water piers, near-shore areas may be closed to recreational use. Trail users in kayaks or canoes may not be able to venture into the mid-river detour routes that involve faster-flowing

water and possible interactions with motorized boats. This impact would be the same for the Modified LPA with or without the C Street Ramp options.

Temporary effects of the Modified LPA with two auxiliary lanes and the single-level fixed-span (all bridge type options) and single-level movable-span configurations would be similar to those described above.

Lewis and Clark National Historic Trail

Temporary impacts to the Lewis and Clark National Historic Trail would be the same as those described above for LCRWT.

Columbia River Renaissance Trail and Discovery Historic Loop Trail

Access under I-5 between downtown Vancouver and the Columbia River would be maintained throughout the duration of construction, though temporary detours and trail realignments would occur. The Columbia River Renaissance Trail would extend directly beneath the construction of the new Columbia River bridges and demolition of the existing Interstate Bridge. Trail users would experience increased levels of noise, changes in views of the Columbia River, glare from construction lighting, emissions from construction equipment, and possibly dust from construction activities.

Additionally, during construction at the I-5/SR 14 interchange, connections between downtown Vancouver and SR 14 would be closed for periods of time. Drivers and bicyclists attempting to make this movement would be detoured to enter and exit SR 14 at Exit 1 (Columbia House Boulevard) and would be required to travel along Columbia Way to reach downtown Vancouver. This would temporarily increase traffic levels on this street, which is adjacent to the Columbia River Renaissance Trail. This increase in traffic levels could pose a risk to trail users crossing into Old Apple Tree Park or crossing Columbia Way for another reason.

Fort Vancouver National Historic Site

The Modified LPA would temporarily affect approximately 1 acre of the Fort Vancouver NHS for construction of a retaining wall along I-5 in the western portion of the park, representing less than 1% of the 204-acre park.

The Modified LPA with two auxiliary lanes would require temporary disturbance of 0.96 acres of park land at the Fort Vancouver NHS. This is an approximately 0.03-acre decrease in temporary impacts from the Modified LPA with one auxiliary lane, because portions of the area of temporary impacts become permanent impacts with the addition of the second auxiliary lane. Compared to the double-deck fixed-span configuration, the wider structure associated with the single-level fixed-span (all bridge type options) and single-level movable-span configurations would shift some of the temporary impacts to permanent, resulting in a decrease of less than 0.1 acres (approximately 762 square feet) of temporary impacts at Fort Vancouver NHS.

The Modified LPA with the removal of the existing C Street ramps at the SR 14 interchange would temporarily affect approximately 0.98 acres) of the Fort Vancouver NHS, which would be adjacent to the West Barracks and at the west end of Officer's Row, for construction of a retaining wall along I-5. This would represent a minimal decrease (less than 0.02 acres) in temporary impacts compared to the Modified LPA. The westward shift of the I-5 mainline would also reduce the temporary impacts by approximately 0.02 acres.

Figure 3.7-2 shows the permanent and temporary impacts for each of the Modified LPA design options.

Waterfront Park west and east of the Columbia River bridges may experience temporary construction impacts such as increased noise, changes in views of the Columbia River at I-5, and glare from construction lighting. Waterfront Park users would be far enough to the west and east that they would not likely be affected by vehicle emissions and dust associated with construction.

Construction at the I-5/SR 14 interchange and along I-5 would temporarily increase noise, vibration, and dust that would distract from recreational activities, particularly for those seeking quiet.

Old Apple Tree Park

The Modified LPA would temporarily affect approximately 0.2 acres of Old Apple Tree Park during construction of the new I-5 northbound to SR 14 westbound off-ramp. Demolition of the existing ramp and construction of the new SR 14 westbound off-ramp would result in increased levels of noise, glare from construction lighting, additional dust, and possibly debris entering the park. Temporary increases in traffic levels along Columbia Way, as described above, may make it more challenging for trail users to leave or enter Old Apple Tree Park.

Marshall Community Center, Luepke Senior Center, and Marshall Park

The Modified LPA would require realigning the accesses to Marshall Community Center, Luepke Senior Center, and Marshall Park along McLoughlin Boulevard. This would result in temporary construction-related effects to approximately 0.4 acres along the western boundaries of the parcel. Access to and from the Marshall Community Center would be maintained during the duration of construction. One of the two access points may need to be closed for short periods to complete construction. During potential access closures, the one-way access between the two main parking lots would likely be signed for two-way traffic to allow for full use of the parking facility, which would likely require flaggers because this access is only one lane. Access closures would be coordinated with VPR&C.

Users of Marshall Community Center, Luepke Senior Center, and Marshall Park would likely experience increased levels of noise and glare from lighting for construction of the I-5 northbound exit ramp to Fourth Plain Boulevard.

Clark College Recreation Fields

Approximately 4.5 acres adjacent to the Clark College recreational fields would be temporarily affected by construction of the Modified LPA, which would affect landscaping (including grass and small trees) in this area. This temporary easement would occur west of the fields and is not expected to affect the recreational experience of users.

Similar to Marshall Community Center and Park, users of this facility would likely experience increased levels of noise and glare from construction lighting. Additionally, users attempting to access this facility from McLoughlin Boulevard may experience delays as they navigate through the construction on this street.

Arnada Park

Less than 0.1 acres of Arnada Park would be used for a temporary construction easement during construction of the Modified LPA, which would temporarily disturb landscaping (including grass and small trees). This landscaping would be restored per Program-specific mitigation measures. Users of this facility would likely experience increased levels of noise and glare from construction lighting.

Kiggins Bowl Sports Fields and Stadium

Construction of the retaining wall along the access to Kiggins Bowl Sports Fields and Stadium would temporarily affect less than 0.01 acres of the property. Construction is not expected to limit access by passenger vehicles, bicyclists, or pedestrians. The movement of heavier trucks and buses along this road could be restricted during installation of the underground tiebacks for the retaining wall. Every effort would be made to minimize closures of this access to large vehicles during times that have been identified by Vancouver Public Schools as high use times (e.g., September 1 through November 15). If closures are unavoidable and access to the stadium or fields is needed, an appropriate detour route would be established. This detour would be signed and would direct users to the northern access point from Main Street. The contractor would be directed to coordinate with the Vancouver Public Schools on planned access closures.

Construction along I-5 would temporarily increase noise, vibration, and dust that would distract from recreational activities, particularly for those seeking quiet.

3.7.5 Indirect Effects

The Modified LPA would include improved bicycle, pedestrian, highway, and transit access in North Portland and Vancouver, which could make access to parks and recreation resources easier and result in additional park users. New light-rail stations located within walking distance to the Fort Vancouver NHS would also improve access to nearby parks and recreation facilities.

As described in Section 3.4, transit-oriented development may occur along the new LRT line, consistent with local land use plans. Such development is frequently relatively high-density, with limited space devoted to yards or communal greenspace; residents of these developments may therefore have a greater per-capita demand for off-site recreational facilities. Greater demand, if it occurred, could result in increased use of existing parks and recreational facilities, which could potentially result in overcrowding at facilities that are already highly used.

3.7.6 Potential Avoidance, Minimization, and Mitigation Measures

The following regulatory and Program-specific measures are proposed to address long-term and temporary effects on parks and recreation facilities.

Long-Term Effects

Regulatory Requirements

- If tree removal is unavoidable, replace trees on site and in kind at appropriate replacement ratios in compliance with applicable requirements of Portland and Vancouver city code.
- Evaluate the feasibility and reasonableness of noise mitigation in accordance with WSDOT or ODOT criteria to shield park visitors and trail users from increased noise levels.

Program-Specific Mitigation

- If the acquired park land includes play equipment or other amenities, replace those features either in the same park or at one nearby.
- Coordinate specific tree removal permitting process and tree replanting requirements (location and type) for each park with the appropriate jurisdiction.
- Screen portions of the transportation improvements from view with trees, vegetation, or built screens.
- Explore retaining wall façade treatments to improve the visual quality, where feasible.

Temporary Effects

Regulatory Requirements

- In compliance with the City of Vancouver's tree conservation requirements (VMC 20.770.090, Tree, Vegetation, and Soil Protection During Construction) or City of Portland preservation standards for trees in development situations (PCC 11.50.040, Tree Preservation Standards) and Tree Plan requirements (PCC 11.50.020) protect trees on park property that would be close to construction activities from adverse impacts as directed by the agency managing the park land (the cities of Vancouver, Portland and Gresham, NPS, and the Vancouver Public School District).

- Employ best management practices, including those outlined in WSDOT and ODOT construction manuals, to minimize increased levels of noise, vibration, glare from construction lights, emissions from construction vehicles, or dust from demolition of existing structures.
- Comply with local ordinance requirements to provide additional protection for park users.

Program-Specific Mitigation

- Restore landscaping to its original condition and select plants that are resilient or adaptive to future climate conditions for new landscaping once construction is complete.
- Protect trees on park property that would be close to construction activities but not removed, as agreed to with the appropriate jurisdiction.
- Restore landscaping to as close as possible to its original condition once construction is complete.
- Establish detour routes based on work zone Transportation Management Plan.
- Schedule construction-related closures at public parks and recreation facilities to minimize effects on large events, as feasible.
- Provide notice to users of the recreational trails of the temporary limits on recreation in the Columbia River.
- Notify recreational anglers of temporary access restrictions to fishing areas and consider other coordination efforts, including working with the Washington Department of Fish and Wildlife and the Oregon Department of Fish and Wildlife to share closure information and distribute this information at locations that serve the fishing community.

3.8 Cultural Resources

This section analyzes the potential impacts of the Modified LPA to cultural resources in the Area of Potential Effects (APE; see Section 3.8.2) compared to the No-Build Alternative. In addition, this section describes design changes or new information obtained since 2013, existing conditions, project planning to avoid and minimize effects, and the ongoing process to develop a Programmatic Agreement (PA) to resolve adverse effects to historic properties (see Section 3.8.6). This section summarizes information in the Archaeology Technical Report and Historic Built Environment Technical Report, which were prepared to comply with NEPA, and summarizes compliance with Section 106 of the National Historic Preservation Act (NHPA; 54 USC 306101) and its implementing regulations at 36 CFR Part 800 (Protection of Historic Properties) (NHPA Section 106).

Evaluation of Cultural Resources

The evaluation of impacts to cultural resources in this section of the Draft SEIS uses terminology associated with Section 106 of the National Historic Preservation Act. Several new terms are introduced:

- **Area of Potential Effects (APE)** is used to represent the study area for cultural resources (see Section 3.8.2).
- **Direct Effects** to cultural resources are those caused by the undertaking at the same time and place with no intervening cause and regardless of type (e.g., visual, physical, auditory), and may be permanent or temporary.
- **Indirect Effects** to cultural resources are those caused by the undertaking that are later in time or father removed in distance but still reasonably foreseeable.

The term *cultural resources* refers to sites, buildings, structures, objects, and districts, which may also include traditional cultural properties (TCPs), historic properties of religious and cultural significance to Indian tribes (HPRCSIT), and cultural landscapes.[1] Cultural resources may be considered *historic properties* as defined in 36 CFR 800.16 if they are included in, or eligible for inclusion in, the National Register of Historic Places (NRHP). To be NRHP-eligible, historic properties must meet one or more NRHP significance criteria; possess integrity of location, design, setting, materials, workmanship, feeling, and association; and typically be 50 years of age or older. Resources meet the NRHP significance criteria if they:

- (Criterion A) are associated with events that have made a significant contribution to the broad patterns of our history.
- (Criterion B) are associated with the lives of persons significant in our past.

[1] TCPs are defined by the National Park Service (NPS) as properties that are eligible for the NRHP for their "association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" (Parker and King 1992:1).

HPRCSIT is a term used in federal law and regulation to describe an historic property to which specifically a Native American tribe or Native Hawaiian organization attaches traditional religious and cultural importance and may be determined eligible in accordance with Section 101(d)(6)(A) of the NHPA (54 USC 302706a). Though conceptually similar, HPRCSIT are differentiated from TCPs because they must be associated with a Native American tribe or Native Hawaiian organization rather than a general "living community."

A cultural landscape is defined by NPS as "a geographic area (including both cultural and natural resources and the wildlife or domestic animals therein), associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values" (Birnbaum 1992). Cultural landscapes are generally categorized as at least one of four types: historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes.

- (Criterion C) embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value, or that represent a significant and distinguishable entity whose components may lack individual distinction.
- (Criterion D) have yielded, or may be likely to yield, information important in prehistory or history.

Certain categories of resources are typically not considered eligible for listing in the NRHP: cemeteries, birthplaces, or graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 50 years (NPS 1995). However, these properties may qualify as NRHP-eligible if they are:

- (Criteria Consideration A). A religious property deriving primary significance from architectural or artistic distinction or historical importance.
- (Criteria Consideration B). A building or structure removed from its original location, but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event.
- (Criteria Consideration C). A birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building directly associated with the figure's productive life.
- (Criteria Consideration D). A cemetery which derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events.
- (Criteria Consideration E). A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived.
- (Criteria Consideration F). A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own exceptional significance.
- (Criteria Consideration G). A property achieving significance within the past 50 years if it is of exceptional importance.

Archaeological sites are physical remnants of past human activity, including items left behind by past peoples (i.e., artifacts) and physical modifications to the landscape (i.e., features). Historic built environment resources are buildings, objects, structures, sites, or districts (NPS 1995). TCPs are places, landscape features, or locations associated with cultural practices, traditions, beliefs, lifeways, arts, crafts, or social institutions of a living community that meet one or more of the four NRHP significance criteria (Parker and King 1992). Historic districts may be composed of a collection of all or some of these resources—archaeological sites, historic built environment resources, and TCPs (NPS 1995).

Cultural resources may be listed in national, state, or local historic registers and may also be identified as important to a particular group during public outreach or formal consultation under Section 106. Project elements that occur on federal lands are also required to comply with the Archaeological Resources Protection Act of 1979 (ARPA; 16 USC 470) and the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA; 25 USC 3001-3013). In Oregon, statutes that consider cultural resources include Archaeological Objects and Sites (Oregon Revised Statutes [ORS] 358.905 to 358.961), Permit and Conditions for Excavation or Removal of Archaeological or Historical Material on Public Lands (ORS 390.235), and Indian Graves and Protected Objects (ORS 97.740-97.760). In Washington, these laws include Archaeological Sites and Resources (Revised Code of Washington [RCW] 27.53), Indian Graves and Records (RCW 27.44), and Abandoned and Historic Cemeteries and Historic Graves (RCW 68.60). In addition, the City of Portland, the City of Vancouver,

and Clark County have ordinances and environmental policies that consider the preservation of cultural resources.

Section 106 of the NHPA requires federal agencies to consider the effects on historic properties of undertakings they carry out, assist, fund, permit, license, or approve and consult on anticipated effects on historic properties.

FHWA and FTA, co-lead federal agencies under Section 106, initiated consultation for the Modified LPA. In September 2020, FHWA and FTA extended formal letters inviting consultation on the IBR Program with 21 tribes and Native Hawaiian Organizations that consulted during the Columbia River Crossing (CRC) project. Through this initial effort, 10 federally recognized tribes expressed an interest in consultation. In February 2022, as a result of consultation with the National Park Service (NPS), letters were sent to an additional 17 tribes. None of those tribes accepted the invitation to consult. A complete list of consulting tribes and a summary of the IBR Program's outreach efforts is included in the Tribal Consultation section of Appendix A. In March 2022, FHWA and FTA contacted 48 points of contact from governments and organizations, sending information about the IBR Program and an invitation to be a NHPA Section 106 consulting party.

In correspondence dated February 7, 2023, FHWA and FTA notified consulting parties and consulting tribes that the IBR Program would be treated as a new undertaking under Section 106, provided maps depicting their determination of the APE, and initiated consultation on the PA. On February 8, 2023, the IBR Program solicited feedback from consulting parties on the APE during a consulting party meeting. The Oregon State Historic Preservation Office (SHPO) agreed with the definition of the APE in correspondence dated March 7, 2023, and the Washington Department of Archaeology and Historic Preservation (DAHP) agreed with the definition of the APE in correspondence dated March 10, 2023. In response to comments from consulting parties and in response to design modifications the APE was revised and FHWA and FTA provided documentation of the revised APE in correspondence to consulting parties dated September 8, 2023. FHWA and FTA provided documentation of additional revisions to the APE in correspondence to consulting parties dated December 27, 2023, and July 1, 2024. Section 106 consultation for the current undertaking is ongoing, including development of a PA. Stipulations in the PA will outline processes for continued consultation, phasing of additional historic property identification, evaluation, effect determination, and mitigation in accordance with 36 CFR Part 800. More detail is provided in Section 3.8.6, Mitigation and Programmatic Agreement.

From April 17 through May 18, 2023, a cultural resources online open house was held to provide an opportunity for public input on efforts to research and identify cultural resources in and near the APE. Information regarding the methods and process for public involvement is provided in Appendix B. Efforts to engage the public specifically related to the cultural resources online open house included advertisement on IBR social media and the home page of the IBR Program website, email notifications to Program partners and community organizations, postcard mailing to addresses in the Program vicinity, press release distribution, and promotion in the April 2023 IBR Program newsletter. In addition, IBR Program cultural resources staff participated in in-person neighborhood forums in May and June 2023 and have staffed virtual and in-person office hours to field questions from the public. Reports on historic properties and the Draft PA will be made available for review to the general public at the IBR project office and through online open houses. Documentation that includes sensitive information exempt from the Freedom of Information Act will not be readily available for public review pursuant to Section 304 of NHPA.

In addition to Section 106 compliance, historic properties that are NRHP-listed or determined to be NRHP-eligible are also subject to applicable state laws and Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 USC 303). The Section 4(f) Evaluation is Chapter 4 of this Draft SEIS.

3.8.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC Locally Preferred Alternative (CRC was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with cultural resources has been updated in this Draft SEIS to include:

- Initiation of a new undertaking under Section 106.
- Updated APE based on changes to the construction footprint.
- Updated information on known historic properties within the APE in response to reduced construction footprint and expansion of historic built environment analysis to consider resources that would be 50 years of age at the time of the Modified LPA's anticipated completion date in 2032.
- Updates to direct and indirect effects of the Modified LPA and design options.

Table 3.8-1 compares the effects identified for the CRC LPA and the IBR Program's Modified LPA resulting from the changes listed above. As shown, changes to the design of the CRC LPA may result in fewer adverse effects on archaeological sites. Meanwhile, although the construction footprint of the Modified LPA is less than the CRC LPA in some areas, the number of historic built environment resources affected increased because the quantity of historic built environment resources assessed increased. Compared to 25 resources assessed by CRC, 39 resources were accessed for the Modified LPA. This increase is due to the following additions:

- Resources built between 1967 (the most recent resources evaluated in the CRC Final EIS) and 1982 were evaluated because they would be at least 50 years of age at the time of the Modified LPA's anticipated completion date in 2032.
- Both the northbound and southbound portions of the Interstate Bridge are assessed for effects in this Draft SEIS, while the CRC Final EIS evaluated only the northbound portion of the bridge.
- The CRC Final EIS considered the Vancouver National Historic Reserve (VNHR) as one property. This analysis refines that approach by separately considering the four historic districts and one historic site that are located within the boundaries of the VNHR, but previously documented separately as NRHP-eligible or NRHP-listed historic properties. These include Vancouver National Historic Reserve Historic District, Pearson Field Historic District, Vancouver Barracks Historic District, Officers Row Historic District, and Fort Vancouver National Historic Site. Portions of the VNHR are owned and managed separately by NPS and City of Vancouver.

A detailed description of effects on archaeological sites and historic built environment resources from the IBR Modified LPA and design options is provided in Section 3.8.3, Direct Effects.

Table 3.8-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects as Identified in this Section [a]	Explanation of Differences
Number of NRHP-listed or NRHP-eligible historic built environment resources adversely affected	3	12	• Pier 99 (OR 1, also referred to as Totem Pole Marina No. 2) would have been adversely affected under CRC but was demolished in 2023 by activities unrelated to the IBR Program. • Northbound portion of the Interstate Bridge would be adversely affected under both CRC and IBR. • Additional adverse effects of the I-5 southbound portion of the Interstate Bridge and the Normandy Apartments with the Modified LPA. • VNHR was previously assessed as one property. Under the IBR Program, four districts and one site, which are located within the boundary of VNHR but previously documented as separate historic properties, are assessed separately and found to be adversely affected separately. • Four previously unevaluated properties would be adversely affected, of which two were built between 1967 and 1982.[b]
Number of archaeological sites adversely affected	32	12	• Changes in project construction footprint reduced the number of adverse effects.

a Given the complexities of the IBR Program and the anticipated mix of construction contract delivery methods, additional cultural resource investigations completed consistent with a Section 106 phased identification process that will be stipulated in the PA are required and may result in changes to these totals. When executed, the PA will include stipulations that specify the process for continued consultation, evaluation, effect determination, and mitigation in accordance with 36 CFR Part 800. Current totals are based on Section 106 investigations completed at the time of document publication.

b These include Jantzen Beach Moorage (OR 111), Jantzen Beach Water Tank (OR 109), Harbor Shops (OR 107), and Bridge Substation (WA 1192).

CFR = Code of Federal Regulations; CRC = Columbia River Crossing; EIS = Environmental Impact Statement; IBR = Interstate Bridge Replacement; LPA = Locally Preferred Alternative; NRHP = National Register of Historic Places; PA = Programmatic Agreement; VNHR = Vancouver National Historic Reserve

3.8.2 Existing Conditions

This section describes the APE and summarizes baseline conditions in the APE, as described in the Archaeology and Historic Built Environment Technical Reports. These reports include context and background for the precontact and post-contact periods that inform the significance analysis of documented historic properties. In addition, this section presents the findings of archaeological and historic built environment investigations conducted to date to identify historic properties within the APE.

Area of Potential Effects

The APE is shown in Figure 3.8-1. The APE is defined as “the geographic area or areas within which an undertaking may directly or indirectly cause alteration in the character or use of historic properties, if any

such properties exist" (36 CFR 800.16(d)). The APE was established through FHWA's and FTA's consultation with SHPO, DAHP, 10 consulting tribes, and other Section 106 consulting parties.

The APE was delineated to account for direct and indirect effects. The APE includes the project footprint (limits of ground disturbance) of the Modified LPA plus a 100-foot buffer. In addition, it includes all areas within the NPS VNHR, as well as a non-contiguous area consisting of the property boundary for the Ruby Junction Maintenance Facility in Gresham, Oregon, and the C-TRAN Operations and Maintenance Facility in Vancouver, Washington. The 100-foot buffer from the project footprint account for potential visual or air quality effects, such as dust created during construction or noise or vibration effects, which could affect historic properties. Potential effects are assessed for historic properties on parcels crossed by the APE boundary, including parcels where only part of the historic property boundary is within the APE boundary. In total, the APE encompasses 1,094.07 acres, including 49.05 acres for the Ruby Junction Maintenance Facility and 1.79 acres for the C-TRAN Operations and Maintenance Facility.

Context

Precontact Period Background

While there is archaeological evidence that Native Americans inhabited the Pacific Northwest more than 10,000 years ago, the archaeological record for Native American land use in the lower Columbia River begins around 3,500 years ago. The scarcity of archaeological sites from earlier periods in the region is thought to be related to the submergence and burial of earlier archaeological sites as sea levels rose quickly during the early to middle Holocene epoch. The Holocene epoch is the period extending from around 12,000 years ago to the present. Numerous precontact archaeological sites dated to after around 3,500 years ago are located along the shores of the lower Columbia River, indicating widespread and persistent Native American occupation of the region at this time. At the time of European American contact, the shores of the Lower Columbia River in the vicinity of the APE were inhabited by Native peoples, with numerous villages located along the river between the outer coast and what is now referred to as The Dalles, as well as several ethnographically named places in the vicinity of the APE.

The Native American groups inhabiting the APE were part of an extensive network of villages, trade, and harvesting, fishing, and resource sites. The Native peoples practiced a seasonal mobility pattern in which they occupied winter villages inland before moving to spring fishing locations on the Columbia River and its tributaries. The river and its tributaries, in addition to providing important resources, also served as an important transportation route for these groups. While salmon was the primary staple, other fish were also harvested, including sturgeon, eulachon, smelt, and lamprey. Important fishing spots included the mouth of the Columbia River, the Columbia at The Dalles and at Hayden Island (in the APE), and on the Willamette River at Willamette Falls. Summer villages were centers of gathering and trade. Common trade goods included beaver, elk, and otter skins; whale blubber; plants, such as wapato, camas, and berries; obsidian, shell beads, and dentalium shell; and manufactured goods such as baskets. Later, Europeans introduced items such as wool blankets and copper kettles. Villages consisted of multifamily houses and other structures such as fish-drying sheds or scaffolds, sweat and menstrual lodges, and temporary dwelling houses. In the late summer and fall, small bands would begin to move inland to hunt game such as deer, elk, and fowl and gather roots, nuts, fruits, and berries while enroute to their winter villages.

The 10 federally recognized tribes, and one non-federally recognized tribe, consulting on the Program have been invited to prepare geographic and ethnographic context statements in lieu of standard context statements so the tribes can share information about the background of this region from their perspective and in their own words. Two federally recognized tribes have accepted this invitation. Preparation of these context statements is in progress. Completed context statements will be provided in an appendix of the Archaeology Technical Report. The IBR Program recognizes that the context statements prepared may not reflect the histories of those tribes that have chosen not to participate.

Figure 3.8-1. Area of Potential Effects

Post-Contact Period Background

Starting in the late 18th century, maritime expeditions by Europeans and European Americans began to interact with Native Americans along the Oregon coast and the mouth of the Columbia River. In 1792, a party

from the Vancouver expedition—a British expedition that circumnavigated the globe in the late 18th century—briefly traveled up the Columbia River from its mouth to Reed Island, passing through the APE. European and European American settlement of the region accelerated shortly after Meriweather Lewis and William Clark completed their overland expedition to the Pacific Coast in 1806. This expedition also passed through the APE.

The introduction of foreign diseases such as smallpox and malaria caused severe epidemics among Pacific Northwest Native populations in the late 1700s and periodic outbreaks throughout the 1800s. At the time of contact between Native peoples of the lower Columbia and Lewis and Clark's Corps of Discovery, populations had already declined considerably. Settlers then began arriving along the Oregon Trail in the 1840s. British agency in the region ended with the Treaty of Oregon in 1846, which settled competing colonial claims in favor of the United States.

A series of Pacific Coast, southwest Washington, and Willamette Valley treaties were negotiated between the United States and local Native American tribes between 1848 and 1855. The first treaties signed with the surviving tribes of western Oregon would have established several Indian reserves in the Willamette Valley. Congress never ratified these treaties due to opposition to the reservations by European American settlers. A second round of treaties, one of which included the Native peoples of the Clackamas and lower Willamette River drainages, was ratified, and two reservations (Siletz and Grand Ronde) were established by executive order shortly thereafter. With the creation of the reservations, federal troops began the process of relocating the Willamette Valley groups to the reservations.

Oregon

During the 19th century, Hayden Island was used by Native peoples and the Hudson's Bay Company (HBC). European American settlement along the Columbia River's southern bank remained sparse in the mid-1800s, as settlers migrating into the region along the Oregon Trail commonly continued south into the Willamette Valley to settle in the vicinity of Oregon City or in the Tualatin Valley. Homesteading in North Portland was hindered by the area's topography, which consisted of a series of swales, lakes, and wetland marshes. The Donation Land Claims of George W. Force and J. R. Switzler (encompassing the present-day site of the Interstate Bridge approach on the south bank of the Columbia River) during this period were noted by surveyors as frequently inundated. The area remained sparsely developed throughout the 19th century, with the only notable development being a single streetcar line extending northward from East Portland to the docks of the Vancouver-Portland ferry on the south shore of the Oregon Slough (now North Portland Harbor) near the east end of Hayden Island. Further development of this area began in the early 20th century, though it remained limited. Union Meat constructed a large-scale meatpacking facility on the south shore of the Oregon Slough near the west end of Hayden Island from 1907 to 1909, the neighborhood of Bridgeton was platted in 1912, and a ferry landing was constructed at nearby Columbia Beach in 1916. In addition to upland developments, small groupings of floating homes began to be developed along the Columbia Slough during this period, with concentrations in the vicinity of the Union Meat facility and Bridgeton. Navigation of the Columbia River was instrumental to 19th-century development of Portland. Vessels regularly sailed between the settlements of Astoria, Vancouver, and Portland, bringing in supplies and people and shipping out goods and raw materials. The U.S. Army Corps of Engineers (USACE) began to make modifications of Columbia River and Willamette River channels in the vicinity of the APE in 1867 and continued through at late 1800s and early 1900s, including survey, dredging, shoaling, and the construction of levees, dams, dikes, and revetments.

Over the first half of the 20th century, the area between the Columbia River and Columbia Slough to the south was gradually developed as an industrial district. Supported by federal reclamation projects beginning in 1913 and continuing through World War I, four drainage districts—from east to west, Sandy Drainage Improvement Company, Multnomah Drainage District No. 1, Peninsula Drainage District 1, and Peninsula Drainage District 2—were created, and newly available land turned over for agricultural uses. The four drainage districts (now collectively known as the Columbia Slough Drainage District), served an important role in the redevelopment of North Portland, Northeast Portland, Gresham, Fairview, and Troutdale.

Reclamation associated with these drainage districts and their associated levee infrastructure resulted in new productive land uses and improved public health through sewage flow controls. Industrial developments along the Oregon Slough gradually expanded southward. Parcels transitioned to uses such as heavy industry, boat building and repair workshops, recreational developments such as golf courses, and, farther to the east, the Portland-Columbia Airport (now Portland International Airport).

As vessels used on the Lower Columbia River grew in size, the U.S. Congress authorized USACE under the Rivers and Harbor Act of 1930 to increase the depth and width of the Lower Columbia River Federal Navigation Channel, expanding the navigation channel from Portland to the Columbia River's mouth and from Portland to the Bonneville Dam and Locks. Between 1915 and 1939, the Port of Vancouver and USACE constructed associated channel maintenance and navigations structures, including the Hayden Island Pile Dike System, built 1915-circa 1920s by Port of Vancouver; Vancouver Bar-Washington Side Pile Dike System, built 1915–1931 by Port of Vancouver and USACE; Upper Vancouver Bar – Oregon Bank Pile Dike system, built 1936–1939 by USACE; and the Lower Vancouver Turning Basin and Upper Vancouver Turning Basin, with the construction of both authorized by the Rivers and Harbors Act of 1933 and modifications authorized by amendments to the Rivers and Harbors Act in 1935 and 1937. The navigation channel from the Columbia River's mouth to the Willamette River was further expanded and additional modifications and repairs were made to its channel control and navigation structures in the 1960s under the Rivers and Harbors Act of 1962 (33 USC Public Law 87-874) to accommodate additional increases in shipping volume.

The onset of World War II and the rapid development of Portland's wartime industries created an acute need for wartime housing in the city. The area between the Columbia Slough and Columbia River and to the west of present-day I-5 was developed by Henry Kaiser, owner of the Oregon Shipbuilding Corporation, to provide housing for company workers; it became known as Vanport. When the housing development was completed in 1943, it included 703 apartment buildings and 17 multiunit dwellings, as well as a post office, schools, fire stations, a movie theater, social buildings, a library, an infirmary, a police station, and various other service and administration facilities. The population of Vanport increased exponentially, growing from 6,000 in January 1943 to a peak of 39,000 in August 1943.

A sizable percentage of Vanport's population were Black employees of Kaiser's shipyards, with 6,000 of Oregon's estimated 15,000 Black citizens residing in the Vanport development. Though it was never articulated as official policy, Vanport was a predominantly segregated community; Black residents were placed into a specific section of the city, and there are documented examples of overtly racist internal communications among the development's administering agencies. On May 30, 1948, when the levee protecting Vanport from Smith Lake broke, the community was flooded, many of its buildings and structures were destroyed, and 15 people were killed. Rather than attempt to rebuild, the City of Portland and state officials chose to demolish what remained of the settlement.

In the latter decades of the 20th century, the North Portland area gradually changed to include a variety of land uses. While industrial development remained along the Columbia River, large areas to the west of I-5 along the Columbia Slough are now occupied by the protected Smith and Bybee Wetlands Natural Area, Heron Lakes Golf Club, and Portland International Raceway. Land to the east of I-5 was redeveloped as small residential, commercial, and light-industrial developments, as well as recreational areas such as Delta Park and the Columbia Edgewater Country Club.

The earliest European American settlement of Hayden Island was the 1866 claim of Gay and Mary Jane Hayden. The Haydens reportedly constructed a property on the island, though 19th century surveyors never documented this property. By the turn of the 20th century, much of Hayden Island had been acquired by the Portland Electric and Railway Company (later the Portland Electric Power Company and then Portland General Electric) to prevent competitive developments to its ferry business between Portland and Vancouver. The Hayden Island Amusement Company (later Hayden Company and then Hayden Island Inc.) acquired portions of Portland General Electric's Hayden Island landholdings in the late 1920s and 1930s, developing a

portion of the island as the Jantzen Beach Amusement Park. During World War II, Hayden Island Inc. began a decades-long effort to develop Hayden Island as a residential and commercial center, culminating in the company's 12-year development plan, which spanned from 1968 to 1980 and included large-scale commercial developments such as the Jantzen Beach Center as well as numerous hotels, multifamily residential developments, and floating home moorages.

Washington

In the early 19th century, to better capitalize on regional commercial interests, the HBC established Fort Vancouver upriver of the mouth of the Columbia River. During this period, the HBC and the Northwest Company, another British trading company, utilized the Columbia River as a primary transportation route between their trading posts along the Columbia River and its tributaries. The fort was originally established in 1825 on high ground on the north side of the Columbia River, east of its current location. It was relocated in 1829 to its current location to be closer to the river. An extensive multicultural settlement known historically as Fort Vancouver Village or Kanaka Village, where most HBC employees lived, developed around the fort beginning in 1827. Following the Oregon Treaty of 1846, Fort Vancouver came under the jurisdiction of the United States. Shortly thereafter, a portion of Fort Vancouver became a military reservation. Over time, the reservation expanded to encompass much of the original Fort Vancouver footprint. This facility, originally referred to as Fort Vancouver and later referred to as the Vancouver Barracks, remained exclusively in use by the military until the 1940s, when it was designated as a national monument by NPS. Military use of the facility continued until 2012, though in a much-reduced capacity.

Beginning in the 1850s, the Vancouver townsite began to form to the west of Fort Vancouver on the former Donation Land Claim of Amos and Esther Short. In the later decades of the 19th century, Vancouver grew into the primary shipping point in Clark County for agricultural products and timber. Numerous rudimentary trails and roads from outlying settlements were developed, as well as several rail lines including the Spokane, Portland and Seattle Railway, a joint venture of the Northern Pacific Railroad and Great Northern Railway. Vancouver continued to expand into the 20th century, with small suburban residential and commercial areas established to the north of the original townsite and around the northern and eastern boundaries of Fort Vancouver.

In anticipation of a Great Northern Railway line connecting Vancouver to other Northwest cities such as Seattle, Portland, and Spokane, many of the residential areas closer to the original townsite were platted in the early 20th century. These included Columbia Orchard Lot in 1900, Swans Addition in 1905, Arnada Park in 1906, and Thompson's Addition in 1907. Following the completion of the Great Northern Railway line in 1908, Vancouver annexed other bordering areas, including the North Bank and Northern Pacific railyards to the west and Vancouver Heights, Lay's Addition, and portions of Irvington and Harney Hill to the east. New residents and commercial businesses poured into Vancouver, beginning a period of substantial growth that continued through World War I, which bolstered the city's shipyards and lumber mills.

Vancouver experienced a downturn during the late 1920s and into the 1930s, as agricultural declines and the Great Depression hampered local industries. The period's economic disruption was alleviated in part by federal programs such as the Civilian Conservation Corps, the western branch of which was headquartered in the Vancouver Barracks, which provided temporary employment for many of the city's unemployed workers. The construction of the nearby Bonneville Dam in 1938 provided additional employment opportunities for Vancouver residents, and the cheap energy it provided brought new industrial developments, such as aluminum product manufacturing, which helped to revitalize the local economy in the years leading up to World War II. The reindustrialization of Vancouver's economy during the war resulted in a second housing boom in the city, supported by the establishment of the Vancouver Housing Authority, a local governmental organization tasked with developing permanent housing for wartime (and later low-income) workers.

The completion of I-5 in 1955 bisected the city, separating the military reserve of Fort Vancouver and its adjacent suburban areas from the main portion of the city and its residential neighborhoods to the north. In the late 1950s, urban renewal programs were proposed to redevelop sections of the city. These programs removed older residential developments and replaced them with new uses. Within the APE, urban renewal projects included the conversion of lands within the Esther Short neighborhood along the Columbia River to light-industrial uses and the demolition and reconstruction of historic residential areas. These programs of urban renewal led to a backlash in the late 1960s, causing the city to change its policy from demolition to improvement. Fort Vancouver was also redeveloped by NPS during this period. In 1961, the U.S. Congress changed the name of the Fort Vancouver National Monument to the Fort Vancouver National Historic Site and increased its authorized boundaries. The Fort Vancouver National Reserve was established by the U.S. Congress in 1996 and encompassed much of the original military reserve on the east side of I-5 and added the City of Vancouver and U.S. Army properties as part of the Fort Vancouver National Historic Site.

While the local political movement that grew out of the urban renewal programs of the 1950s and 1960s led to increased community-led commercial growth and housing in Vancouver's suburban areas, its downtown core suffered from commercial decline in the later decades of the twentieth century. In the 1990s and early 2000s, the City pursued public-private partnerships aimed at downtown revitalization, including improvements at and around Esther Short Park and conversion of the mid-twentieth century industrial waterfront to mixed commercial and residential uses.

Previous Cultural Resources Studies

Archaeological investigations in the vicinity of the APE began in 1947, within the boundary of HBC Fort Vancouver. Several additional archaeological studies were performed in Fort Vancouver in the late twentieth century and early twenty-first century, including extensive excavations in advance of the reconstruction of I-5 and SR 14 from 1974 to 1982 and an ongoing public archaeology field school administered by NPS.

Numerous cultural resources studies in support of private, local, and state projects have been performed within and adjacent to the Washington portion of the APE during the late twentieth and early twenty-first centuries. These studies have covered much of the Washington portion of the APE. Comparatively few cultural resources studies have been performed on the Oregon portion of the APE.

On the Washington portion of the APE, between 2006 and 2012 archaeological background research and survey conducted for the CRC project and APE documented 32 archaeological sites. The CRC project surveys included an underwater survey under the existing Interstate Bridge within the Washington portion of the CRC APE. No underwater archaeological sites were documented during this survey. No archaeological survey was performed within the Oregon portion of the CRC APE.

Geoarchaeological investigations, consisting of both rotosonic borings and ground-penetrating radar, were performed in support of the CRC project within both the Washington and Oregon portions of the CRC APE. These investigations revealed widespread and thick deposits of fill in Oregon and thick deposits of fill in portions of the Washington CRC APE. In both the Oregon and Washington portions of the CRC APE, several locations were identified as having the potential for encountering deeply buried archaeological deposits.

Precontact and Historical Archaeology

In the Pacific Northwest, **prehistoric or precontact archaeology** is associated with Native American peoples, culture, and settlements (Little et al. 2000). **Historical archaeology or post-contact archaeology** is defined by NPS guidance as dating from after the beginning of European American settlement of the area and addresses both European American and Native American peoples, culture, and settlement, within the historic period (Little et al. 2000). However, historical or post-contact archaeology is understood to be inclusive of all people, cultures, and settlement, within the historic period.

Historic built environment background research and survey was conducted for the CRC project between 2005 and 2013. The CRC project surveyed 877 resources constructed prior to 1967. Of these, 201 were identified as NRHP-listed or considered eligible for listing in the NRHP. In Oregon, four properties were identified as previously listed or eligible for listing in the NRHP, and one property was determined eligible as part of the CRC study. In Washington, 24 properties were identified as previously listed in the NRHP and 172 properties were determined eligible for listing in the NRHP as part of the CRC study.

Cultural Resources Identified

Archaeological Sites

For the purposes of this analysis, an archaeological site was considered if it is listed in the NRHP, is eligible for the NRHP, or has not been formally evaluated for listing in the NRHP. Archaeological sites determined not eligible for the NRHP were not considered for this analysis.

A review of archaeological resource data available on the Washington Information System for Archaeological and Architectural Resources Database and the Oregon Archaeological Records Remote Access identified 34 archaeological sites within or directly adjacent to the APE. These resources include 14 eligible for listing in the NRHP and one as-yet unevaluated resources.[2] Nineteen additional archaeological sites within or adjacent to the APE were previously determined not eligible for listing in the NRHP and are therefore not included in the count of archaeological sites. Additional information about the 14 eligible and one unevaluated archaeological sites is summarized in Table 3.8-2, below. Since location information relating to archaeological sites is protected under federal and state law, figures depicting specific resource locations are not provided.

While archaeological studies were previously performed for the CRC project, additional studies are in progress to verify known archaeological resource presence and dimensions, and to identify unrecorded terrestrial and marine archaeological sites. Further studies will be performed through phased identification as allowed under Section 106 of NHPA (36 CFR 800.4 (b)(2)) and would be stipulated in the Section 106 PA. The IBR Program would disclose anticipated effects, if any, to terrestrial or marine archaeological sites identified through phased identification and offer the public opportunities to comment through methods such as online open houses, listening sessions, community briefings, community working groups, and public comments submitted by email or telephone.

Oregon

No archaeological sites have yet been documented within or directly adjacent to the Oregon portion of the APE.

Washington

Fifteen archaeological sites have been documented within the Washington portion of the APE. Table 3.8-2 summarizes key information about these resources. Of these archaeological sites, 14 are eligible for listing in the NRHP and one remains unevaluated.

[2] Of the 14 eligible and one unevaluated archaeological sites, 12 are located within the Modified LPA and have the potential to be impacted by construction-related physical ground disturbance (45CL152, 45CL160, 45CL162, 45CL163, 45CL300, 45CL514, 45CL653, 45CL910, 45CL918, 45CL920, 45CL921, and 45CL922). Three resources (45CL217, 45CL400, and 45CL582) are located within the APE but outside the Modified LPA. See Section 3.8.3, which addresses direct effects.

Table 3.8-2. Archaeological Sites within the Washington Portion of the Area of Potential Effect

Trinomial	Management	Resource Name	IBR NRHP Eligibility Status	Resource Type
45CL152	Historic Trust	Providence Academy	Eligible	Multicomponent: historic structural features, privies, trash pits, refuse scatter, lithic materials.
45CL160	City of Vancouver	Officers Row	Eligible	Historic structural features, debris, refuse.
45CL162	City of Vancouver, NPS, and FHWA Western Federal Lands	Vancouver Barracks	Eligible	Historic structural features, debris, refuse.
45CL163	NPS	Fort Vancouver National Historic Site	Eligible	Multicomponent: historic fort, debris, precontact lithic material, bones, charcoal, fire-altered rocks, and features.
45CL217	Veterans Affairs	Post Cemetery	Eligible	Cemetery.
45CL300	VNHR	Fort Vancouver Village	Eligible	Multicomponent: historic fort village, debris, structural remains, lithic material.
45CL400	Underwater, WA DNR	Quartermaster East/Benoit Site	Eligible	Submerged multicomponent: historic refuse, precontact net weight, trade bead.
45CL514	Private	Killian Pacific	Eligible but portions no longer extant	Historic structural features, refuse scatter related to City Blocks 24 and 25.
45CL582	City of Vancouver	Vancouver Convention Center	Eligible	33 features and seven yard middens associated with City Block 62 and north half of City Block 66.
45CL653	City of Vancouver	N/A	Unevaluated	Historic refuse scatter.
45CL910	WSDOT	N/A	Eligible	Historic structural features, refuse scatter.
45CL918	WSDOT	N/A	Eligible	Multicomponent: historic trash pits, refuse, lithic debitage.
45CL920	WSDOT	N/A	Eligible	Historic structural features, refuse scatter.
45CL921	WSDOT	N/A	Eligible	Historic structural features; foundations, refuse, trash pits.
45CL922	WSDOT	N/A	Eligible	Historic trash pits, refuse scatter, human dental remains.

DNR = Department of Natural Resources; N/A=Not Available; NRHP = National Register of Historic Places; NPS = National Park Service; VNHR = Vancouver National Historic Reserve; WSDOT = Washington Department of Transportation

Historic Built Environment Resources

For the purposes of this analysis, a historic built environment resource was considered if it is listed in the NRHP or is eligible for the NRHP. Historic built environment resources determined not eligible for the NRHP were not considered.

For the purposes of this undertaking, and in consultation with Oregon SHPO and Washington DAHP, historic built environment resources with construction dates in or prior to 1982 were identified as historic-age resources requiring evaluation because they would be 50 years of age at the time of the Modified LPA's anticipated completion date in 2032. Therefore, resources within the APE constructed between 1967 (the year that the CRC survey analysis concluded evaluation) and 1982 have been added to the evaluation. Survey fieldwork to support preparation of Section 106 Documentation Forms for Individual Properties and preparation of the Historic Built Environment Technical Report was conducted in January 2023 and August 2023. Survey methodology included review of resources on any parcel crossed by the APE boundary.

The IBR Program review of historic built environment resources identified 36 historic properties in the APE constructed prior to 1982 that are listed in the NRHP or considered eligible for listing in the NRHP. These properties are summarized in Table 3.8-3 (Oregon), Table 3.8-4 (Interstate Bridge), and Table 3.8-5 (Washington). Appendix C to the Historic Built Environment Technical Report, Section 106 Documentation Forms for Individual Properties, provides the detailed evaluation for the NRHP eligibility status.

Oregon

The IBR Program review of historic built environment resources in Oregon identified seven historic properties eligible for listing in the NRHP. Of these seven properties, two were previously identified as NRHP-eligible historic properties, and five were not previously identified. These properties are summarized in Table 3.8-3 and depicted in Figure 3.8-2.

Interstate

Three identified historic built environment resources—the northbound and southbound portions of the Interstate Bridge and the Lower Columbia River Federal Navigation Historic District—span the Columbia River between Oregon and Washington. The northbound Interstate Bridge was previously listed in the NRHP. The southbound Interstate Bridge is considered eligible for listing in the NRHP. The Lower Columbia River Federal Navigation Historic District was recommended eligible for listing in the NRHP through consultation with the USACE. Additional detail about these resources is provided in Table 3.8-4 and are shown in Figure 3.8-3.

Washington

The IBR Program review of historic built environment resources in Washington identified 26 historic properties listed in or eligible for listing in the NRHP. This includes eight historic built environment resources previously listed in the NRHP and 22 eligible for listing in the NRHP. These properties are summarized in Table 3.8-5 and are shown in Figure 3.8-4 and Figure 3.8-5.

Traditional Cultural Properties

Formal consultation, as defined in 36 CFR 800.3, with consulting tribes and other consulting parties is ongoing. As of this writing, no traditional cultural properties have been identified in or adjacent to the APE, either during the previous CRC project Section 106 process or the current Section 106 review.

Table 3.8-3. Oregon Historic Built Environment Resources

Map ID	Resource ID	Property Name	Previously Identified (Yes/No)	NRHP Eligibility Status	Year Built	Address	Description
OR 2	663154	Columbia Slough Drainage Districts Historic District	Yes	Eligible (2023 IBR recommendation); Eligible (2011 determination); Criteria A and C	1916–1960	Various	System of levees, dikes, and ditches along the Columbia Slough.
OR 155[a]	N/A	East Vanport Commercial Center	No	Eligible (2023 IBR recommendation); Criterion A	1938	10850 N Denver Avenue	Northwest regional-style department store (sport facility).
OR 56	50293	Portland Assembly Center	Yes	Eligible (2023 IBR recommendation); Not eligible (2009); Criterion A	1924	2060 N Marine Drive	Complex of architecturally indistinct exposition halls associated with regional agricultural and social events and gatherings, and site of Oregon's only Temporary Assembly Center for Japanese American interred during WWII.
OR 111	N/A	Jantzen Beach Moorage	No	Eligible (2023 IBR recommendation); Criterion A	ca. 1960s	1501 N Jantzen Avenue	Large-scale moorage consisting of 175 floating homes and associated docks and infrastructure.
OR 109	N/A	Jantzen Beach Water Tank	No	Eligible (2023 IBR recommendation); Criteria A and C	1970	N Center Avenue	Cylindrical two-story steel water tower.
OR 107	N/A	Harbor Shops	No	Eligible (2023 IBR recommendation); Criteria A and C	1980	11915 N Center Avenue	Second phase strip mall type development associated with Hayden Island, Inc.'s large-scale planned commercial development.
OR 120[a]	N/A	Hayden Island Yacht Club Clubhouse	No	Eligible (2023 IBR recommendation); Criteria A and C	1972	12050 N Jantzen Drive	Modern-style (Northwest Regional and Shed-style elements) clubhouse.

a While the resource boundary shown in Figure 3.8-2 is outside the APE, the parcel boundary for this property crosses the APE and the resource is considered in this study.
APE = Area of Potential Effects; ca. = circa; Dr = Drive; N = North; N/A = Not Available; No. = Number; NRHP = National Register of Historic Places; VNHR = Vancouver National Historic Reserve

Figure 3.8-2. Oregon Historic Built Environment Resources

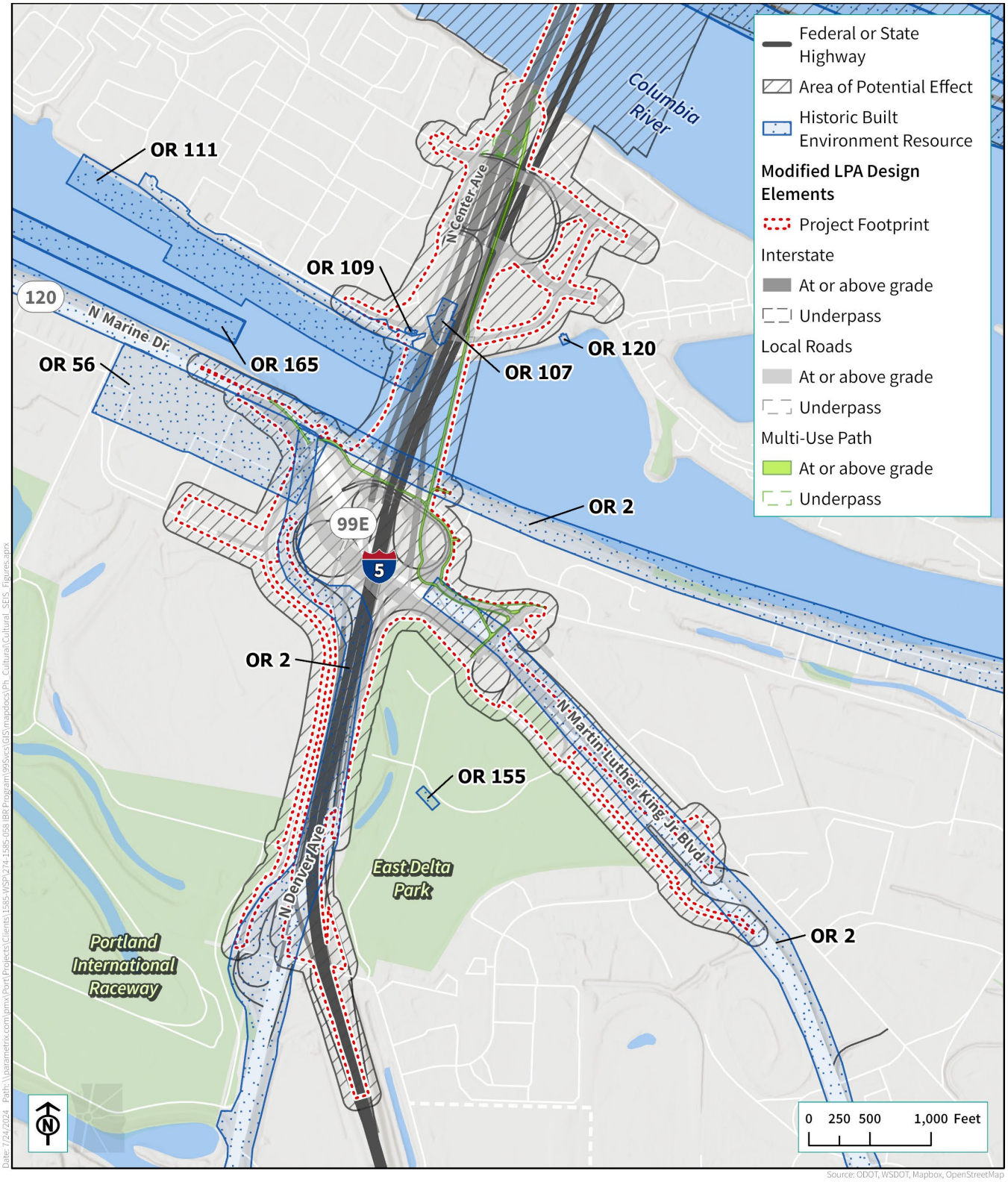


Table 3.8-4. Interstate Historic Built Environment Resources

Map ID	Resource ID	Property Name	Previously Identified (Yes/No)	NRHP Eligibility Status	Year Built	Address	Description
OR 50; WA 381a	OR 49361; WA N/A	Interstate Bridge (northbound)	Yes	NRHP-listed (1982); Criteria A and C	1917	Columbia River	Through-truss bridge.
OR 51; WA 381b	OR N/A; WA 18781	Interstate Bridge (southbound)	No	Eligible (2023 IBR recommendation); Criteria A and C	1956–1958	Columbia River	Through-truss bridge.
OR 165 and WA 1356	N/A	Lower Columbia River Federal Navigation Historic District	No	Eligible (2023 USACE recommendation); Criterion C	1873–1969	Columbia River	A pair of USACE-dredged federal navigation channels in the Lower Columbia River and associated turning basins, pile dike systems, and artificial landforms.

N/A = Not Available; NRHP = National Register of Historic Places; USACE = U.S. Army Corps of Engineers

Figure 3.8-3. Interstate Historic Built Environment Resources

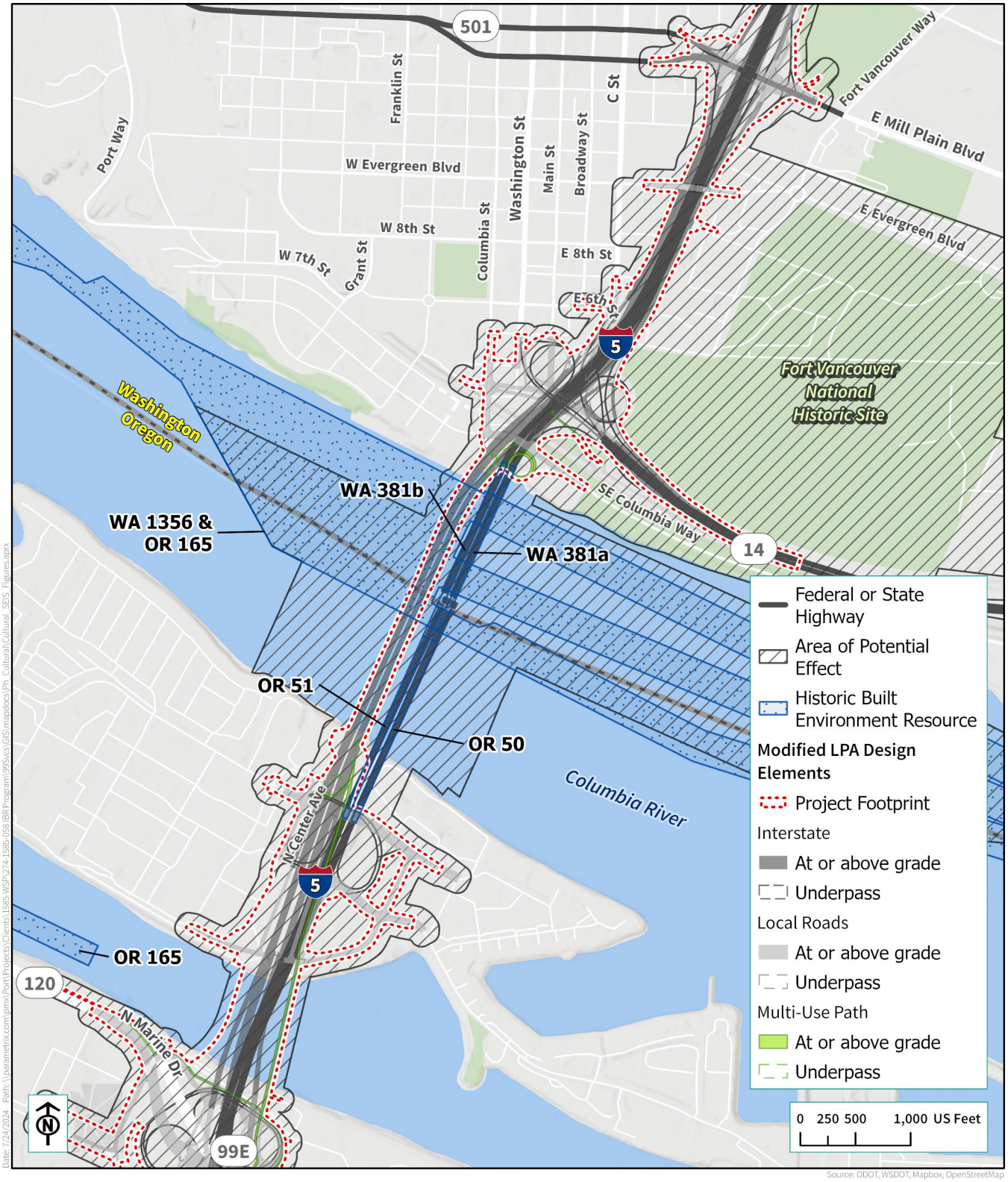


Table 3.8-5. Washington Historic Built Environment Resources

Map ID	Property ID	Property Name	Previously Identified (Yes/No)	NRHP Eligibility Status	Year Built	Address	Description
WA 1138	731246	Who Song and Larry's	No	Eligible (2023 IBR recommendation); Criterion C	1980	111 SE Columbia Way	Roadside-style restaurant.
WA 1192	89097	Bridge Substation	Yes	Eligible (2023 IBR recommendation); Criterion C	ca. 1918	100 SE Columbia Boulevard	Classical Revival-style energy facility.
WA 7	33716	Fendrich's Furniture	Yes	Eligible (2023 IBR recommendation); Criterion C	1947	209 West 6th Street	Modern-style commercial building.
WA 10	2124	Smith Tower	Yes	Eligible (2023 IBR recommendation); Criteria A and C	1966	515 Washington Street	Modern-style cylindrical multifamily apartment tower.
WA 21	20430	The Evergreen Hotel	Yes	NRHP-listed (1979); Criterion A	1928	500 Main Street	Italian Renaissance Revival-style hotel.
WA 29	20436	U.S. National Bank Building	Yes	NRHP-listed (1984); Criterion C	1912	601–603 Main Street	Classical Revival-style financial building (now mixed-use restaurant/ multifamily residential).
WA 149	89160	Normandy Apartments	Yes	Eligible (2023 IBR recommendation); Criteria A and C	1925/1930	318 E 7th Street	Tudor-style, U-court courtyard multifamily apartment building.

Map ID	Property ID	Property Name	Previously Identified (Yes/No)	NRHP Eligibility Status	Year Built	Address	Description
WA 1357	674732	VNHR Historic District	Yes	NRHP-Listed (2007); Criteria A and C, with Criterion Consideration G	1824–1966	Vancouver, Washington	Historic District consisting of four subdistricts and a site.[a]
WA 918	N/A	Officers Row Historic District	Yes	NRHP-listed (1974, 2006); Criteria A and C	1849–1903	601–1607 E Evergreen Boulevard	Historic district consisting of 21 built environment resources.
WA 369	674448	Pearson Field Historic District	Yes	NRHP-listed (1990, 2006); Criterion A	ca. 1904–1929	1105 E 5th Street	Historic district consisting of three built environment resources.
WA 1358	674435	Vancouver Barracks Historic District	Yes	Eligible (1979); Criterion A	1888-1981	Vancouver, Washington	Historic district consisting of 23 built environment resources.
WA 1359	674436	Fort Vancouver National Historic Site	Yes	NRHP-Listed (1966); Criterion A	1844	Vancouver, Washington	Site consisting of 74 built environment resources and contributing archaeological sites.
WA 1148	731279	Washington State Patrol District Five Headquarters	No	Eligible (2023 IBR recommendation); Criterion A	1975	605 E Evergreen Boulevard	Modern-style correctional facility.

Map ID	Property ID	Property Name	Previously Identified (Yes/No)	NRHP Eligibility Status	Year Built	Address	Description
WA 150	18827	House of Providence	Yes	NRHP-listed (1978); Criteria A, B, and C	1873–ca. 1930	400 E Evergreen Boulevard	Georgian/Federal and French Colonial-style institutional building and campus (now mixed-use commercial).
WA 1233	89149	Earls House	Yes	Eligible (2023 IBR recommendation); Criterion C	1938	815 East 22nd Street	Minimal Traditional-style residence.
WA 1144	731267	Office Building	Yes	Eligible (2023 IBR recommendation); Criterion C	1977	1514 E Street	Postmodern commercial building.
WA 1182b b	731284	Rudy Luepke Senior Center	No	Eligible (2023 IBR recommendation); Criterion A	1979	1009 E McLoughlin Boulevard	Northwest Regional-style meeting hall.
WA 382	44853	Radio Transmission Building	Yes	Eligible (2023 IBR recommendation); Criteria A and C	1940	1601 E Fourth Plain Boulevard	Modern-style hospital (now museum).
WA 1319	20317	Vancouver Barracks National Cemetery	Yes	Eligible (2023 IBR recommendation); Eligible (2016 determination); Criterion A	1882	1200 E Fourth Plain Boulevard	Cemetery.
WA 1320	731277	St. James Acres Catholic Cemetery	No	Eligible (2023 IBR recommendation); Criteria A and D	1871	1401 E 29th Street	Cemetery.

Map ID	Property ID	Property Name	Previously Identified (Yes/No)	NRHP Eligibility Status	Year Built	Address	Description
WA 1258	89483	Mickler House	Yes	Eligible (2023 IBR recommendation); Criterion A	ca. 1908	901 E 29th Street	Workingman's Foursquare residence.
WA 1168	731275 / 731276	Duplex Residences	No	Eligible (2023 IBR recommendation); Criteria A and C	1968	2901 K Street	Contemporary-style multifamily residences.
WA 61	89120	Porter House	Yes	Eligible (2023 IBR recommendation); Eligible (2011 determination); Criteria A and C	1915	3000 K Street	Craftsman-style residence.
WA 62	25537	Hall House	Yes	Eligible (2023 IBR recommendation); Criterion C	1910	903 E 31st Street	Craftsman-style residence.
WA 191	89189	Hood, William H. and Myrtle, Residence	Yes	Eligible (2023 IBR recommendation); Criterion C	ca. 1919	3405 K Street	Craftsman-style residence.
WA 900	20458	Covington House	Yes	NRHP-listed (1972); Criterion C	ca. 1848	4201 Main Street	Hall-and-Parlor-Pioneer Log-style residence.

a VNHR Historic District (WA1357) includes archaeological resources as contributing components. Archaeological resources that contribute to the historic district are identified in Table 3.8-2, including 45CL160, 45CL162, 45CL163, and 45CL300.
b While the resource boundary shown in Figure 3.8-4 is outside the APE, the parcel boundary for this property crosses the APE and the resource is considered in this study.
APE = Area of Potential Effects; IBR = Interstate Bridge Replacement (Program); N/A = Not Available; NRHP = National Register of Historic Places; VNHR = Vancouver National Historic Reserve.

Figure 3.8-4. Washington Historic Built Environment Resources – South

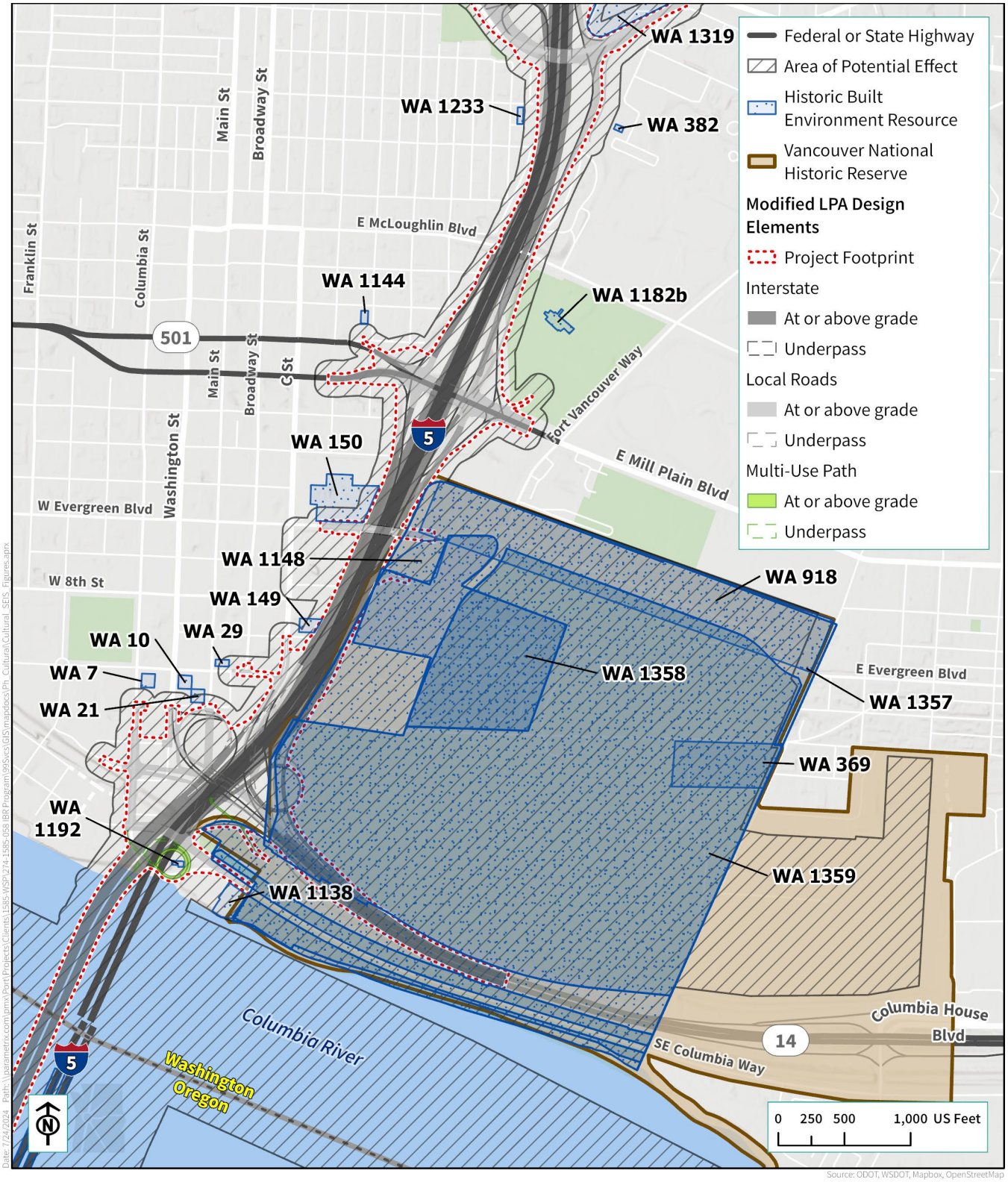
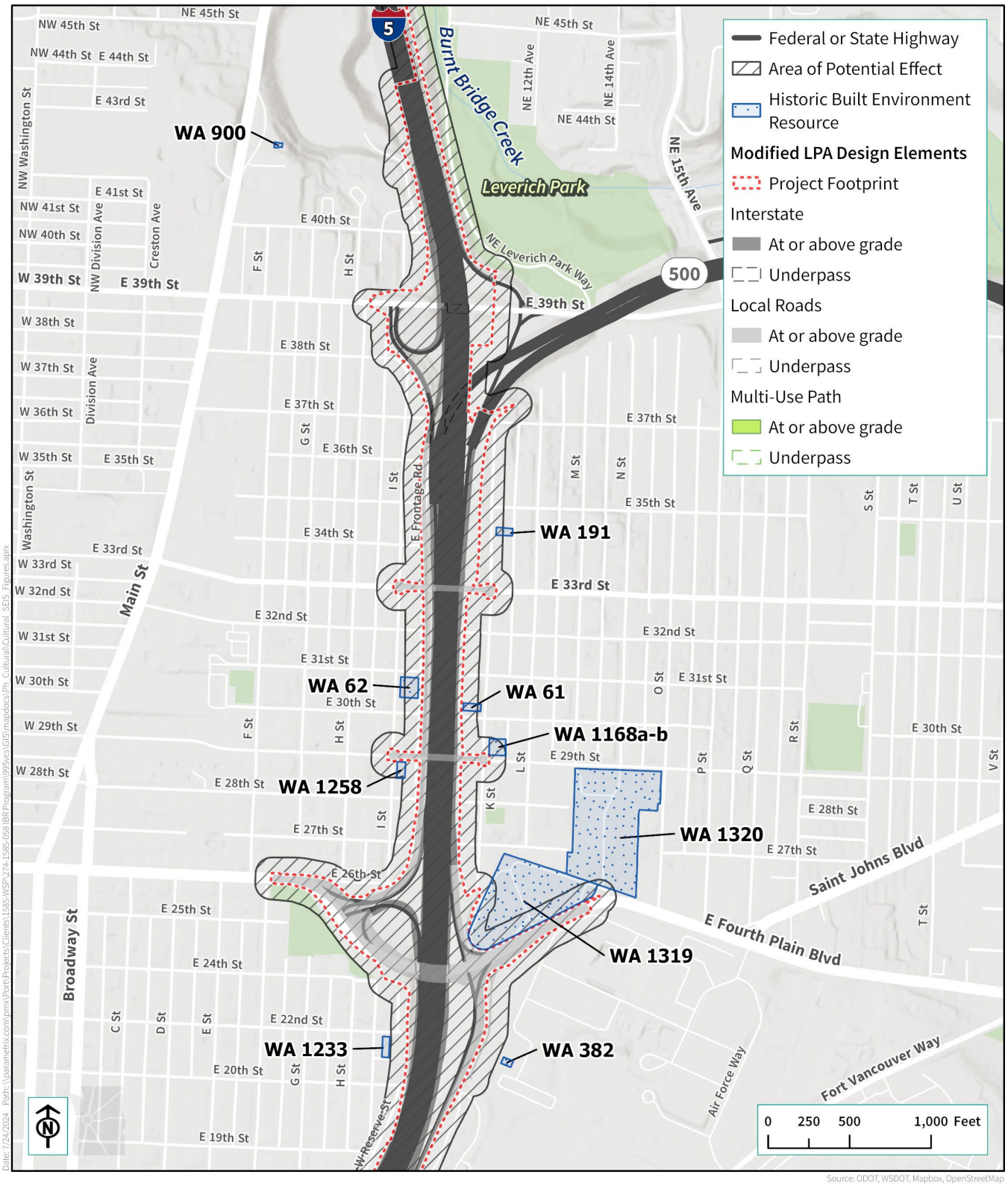


Figure 3.8-5. Washington Historic Built Environment Resources – North



3.8.3 Direct Effects

Direct effects on historic properties are described below for the No-Build Alternative and the Modified LPA. Direct effects under Section 106 are based on "…causality, and not the physicality, of the effect. This means that if the effect comes from the undertaking at the same time and place with no intervening cause, it is considered 'direct' regardless of its specific type (e.g., whether it is visual, physical, auditory, etc.). 'Indirect' effects are those caused by the undertaking that are later in time or farther removed in distance but are still reasonably foreseeable" (ACHP 2019). Indirect effects are discussed in Section 3.8.4.

Direct effects assessed include, but are not limited to, physical or atmospheric effects that permanently alter, damage, or destroy historic properties; visual effects from permanent introduction of new visual elements that diminish or remove the characteristics that make a cultural resource eligible for listing in the NRHP; effects to historic properties from air quality, noise, or vibrations that are the result of Modified LPA operations that diminish or remove characteristics that make a cultural resource eligible for listing in the NRHP; and construction easements that permanently occupy part or all of a historic property for the purposes of project construction and operation.

Under 36 CFR 800.5(a)(1), an adverse effect on a historic property would occur if an undertaking altered, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

Table 3.8-6 summarizes the effects of the No-Build Alternative, Modified LPA, and design options[3] on cultural resources. Detailed analysis of the effects is provided in the following sections.

Table 3.8-6. Summary of No-Build Alternative and Modified LPA Effects on Cultural Resources

Resource	Modified LPA (All Design Options)	No-Build Alternative
Number of NRHP-listed or NRHP-eligible historic built environment resources affected	12	0
Number of archaeological sites affected	12	0

LPA = Locally Preferred Alternative; NRHP = National Register of Historic Places

The No-Build Alternative would retain the existing infrastructure, and the existing Interstate Bridge, which consists of two distinct historic properties (OR 50; WA 381a and OR51; WA 381b), would continue to operate as they do today. Projected increases in traffic volumes would potentially result in increased congestion and delays for all travelers, as well as additional costs and uncertainty for all businesses that rely on this corridor for freight movement. Additionally, needs for repair and maintenance would potentially increase as the bridge ages, and the bridge would remain vulnerable to mechanical failure or damage from a seismic event. Under the No-Build Alternative, construction and associated construction-phase activities such as traffic detours; temporary closures; and noise, glare, dust, and vibration would not occur. The No-Build Alternative would

[3] In cases where the effects analysis is the same for all Modified LPA design options, the various design options are not separately addressed in the Modified LPA Direct Effects Analysis column of Tables 3.8-7, 3.8-8, and 3.8-9.

have no permanent or temporary effects to historic properties, including archaeological sites and historic built environment resources, but it would fail to address present and future travel demand, mobility needs, and safety considerations in the APE.

Modified LPA

Archaeological Sites

Construction-related physical ground disturbance is anticipated to be the primary source of potential permanent and temporary direct effects to archaeological sites. An example of an adverse effect would include physical destruction of or damage to all or part of the archaeological site.

As described in Section 3.8.2, Existing Conditions, the APE contains 15 archaeological sites; 14 eligible for listing in the NRHP and one unevaluated. These resources are located within the Washington portion of the APE. Of these, 12 are located within the Modified LPA and have the potential to be impacted by construction-related physical ground disturbance (45CL152, 45CL160, 45CL162, 45CL163, 45CL300, 45CL514, 45CL653, 45CL910, 45CL918, 45CL920, 45CL921, and 45CL922). Additionally, archaeological and geoarchaeological studies performed in support of the CRC project also highlight the potential for encountering as-yet-undocumented archaeological sites in previously unsurveyed areas and in deeply buried contexts at specific locations across the APE. Archaeological field studies to determine the dimensions, depths, and contents of known and as-yet-undocumented archaeological sites relative to the anticipated areas of ground disturbance associated with the Modified LPA have not yet been performed. These studies would be performed in accordance with stipulations under the IBR Program's Section 106 PA (see Section 3.8.6, Mitigation and Programmatic Agreement for more information) once it has been executed. Based on the anticipated nature and extent of ground disturbance associated with the Modified LPA, it is anticipated that construction would damage or destroy portions of 12 archaeological sites located within the Modified LPA's limits of construction within the APE. Potential effects to archaeological sites would be essentially the same across all design options.

Historic Built Environment Resources

Direct effects to the historic built environment analyzed herein, include those that would result in physical destruction or damage to the property or any part of the property that contributes to its historic significance; permanent changes within the property's setting that would alter characteristics that contribute to its historic significance; and the introduction of permanent visual, atmospheric, or audible elements that would diminish the integrity of the property's significant historic features. Work within temporary construction easements and staging areas, as well as temporary effects associated with construction such as noise, dust, and traffic congestion, were also analyzed given they are anticipated to be the primary sources of temporary effects to historic built environment resources.

The potential direct effects to the historic built environment are summarized in Table 3.8-7 for resources located in Oregon, in Table 3.8-8 for interstate resources located along the Interstate Bridge where it crosses the Columbia River, and in Table 3.8-9. for resources located in Washington. The Modified LPA would result in permanent direct effect to 12 historic built environment resources – three in Oregon, two interstate properties, and seven in Washington. This would include:

- Jantzen Beach Moorage (OR 111)
- Jantzen Beach Water Tank (OR 109)
- Harbor Shops (OR 107)
- Interstate Bridge northbound (OR 50; WA 381a)
- Interstate Bridge southbound (OR 51; WA381b)

- Bridge Substation (WA 1192)
- Normandy Apartments (WA 149)
- Vancouver National Heritage Reserve Historic District (WA 1357)
- Officers Row Historic District (WA 918)
- Pearson Field Historic District (WA 369)
- Vancouver Barracks Historic District (WA 1358)
- Fort Vancouver National Historic Site (WA 1359)

Potential direct effects to historic built environment resources would differ among design options for two historic properties:

- Normandy Apartments (WA 149).
  - The Modified LPA with centered I-5 mainline would not result in physical destruction of Normandy Apartments, but would result in permanent changes to the property's setting from construction of the elevated light-rail transit alignment that would contribute to an adverse effect to this historic property. See Figure 3.8-6.
  - The Modified LPA with the westward shift of the I-5 mainline would result in physical destruction of the Normandy Apartments, and would result in permanent changes within the property's setting as a result of construction of the elevated light-rail transit alignment that would contribute to an adverse effect to this historic property. See Figure 3.8-6.
- Vancouver National Historic Reserve Historic District (WA 1357).
  - The Modified LPA with the centered I-5 mainline would result in physical destruction or damage to part of the property by demolishing a portion of the contributing Army Road System on E 5th Street where it terminates against I-5. In addition, noise and vibration effects would affect contributing components of the historic district, and construction of the new bridges and ramp structures would affect the historic district's setting, resulting in an adverse effect to this historic property. See Figure 3.8-7 and Figure 3.8-8.
  - The Modified LPA with the westward shift of the I-5 mainline would not require demolition of a portion of the contributing Army Road System on E 5th Street where it terminates against I-5. However, noise and vibration effects would affect contributing components of the historic district, and construction of the new bridge and ramp structures would affect the historic district's setting, resulting in an adverse effect to this historic property. See Figure 3.8-7 and Figure 3.8-8.

The property-specific Section 106 effects assessments found in Appendix D of the Historic Built Environment Technical Report, Finding of Effect Forms, provide the detailed analysis for the Modified LPA direct effects analysis.

Figure 3.8-6. Design Options Comparison – Normandy Apartments (WA 149)

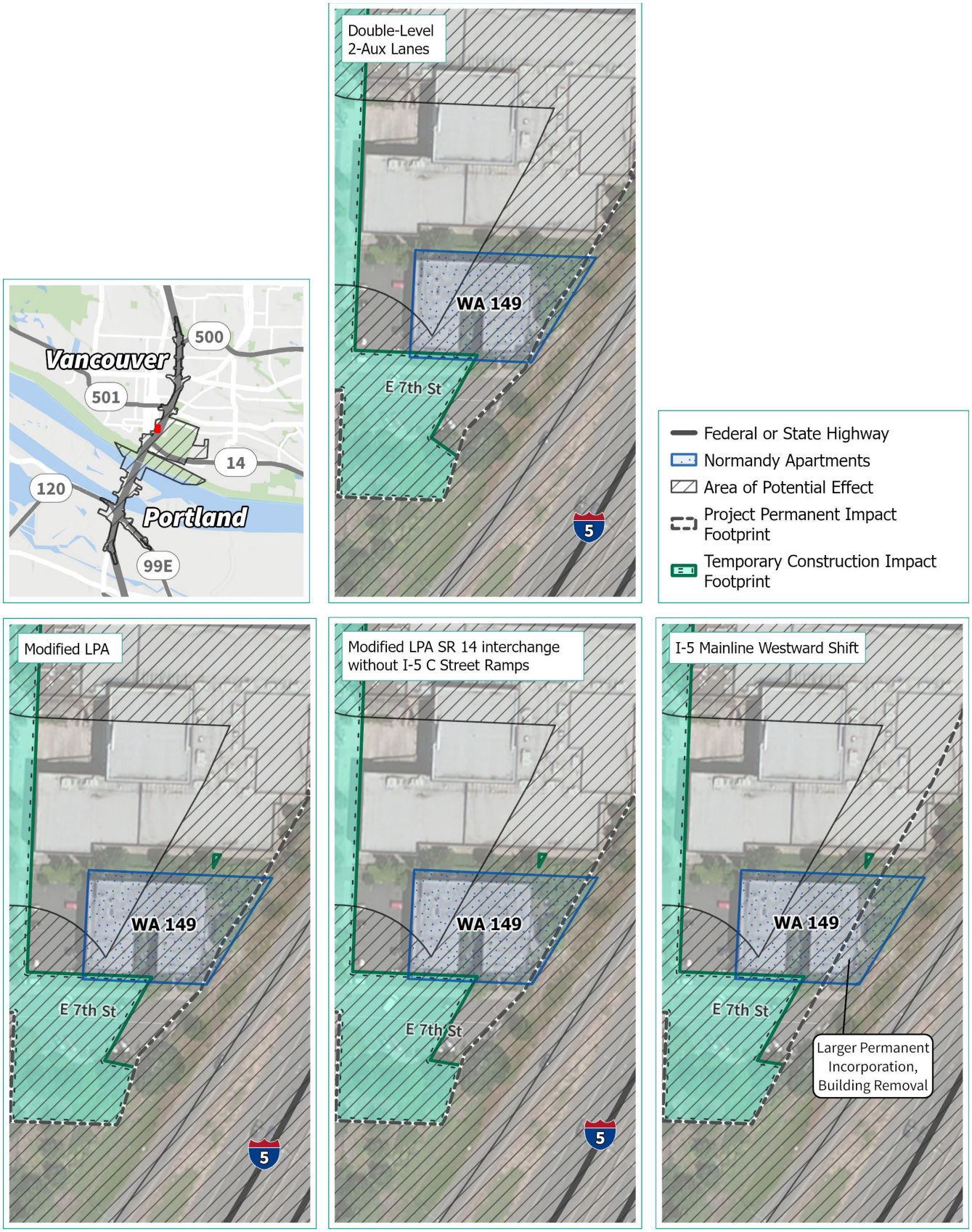


Figure 3.8-7. Design Options Comparison – Vancouver National Historic Reserve Historic District (WA 1357), South

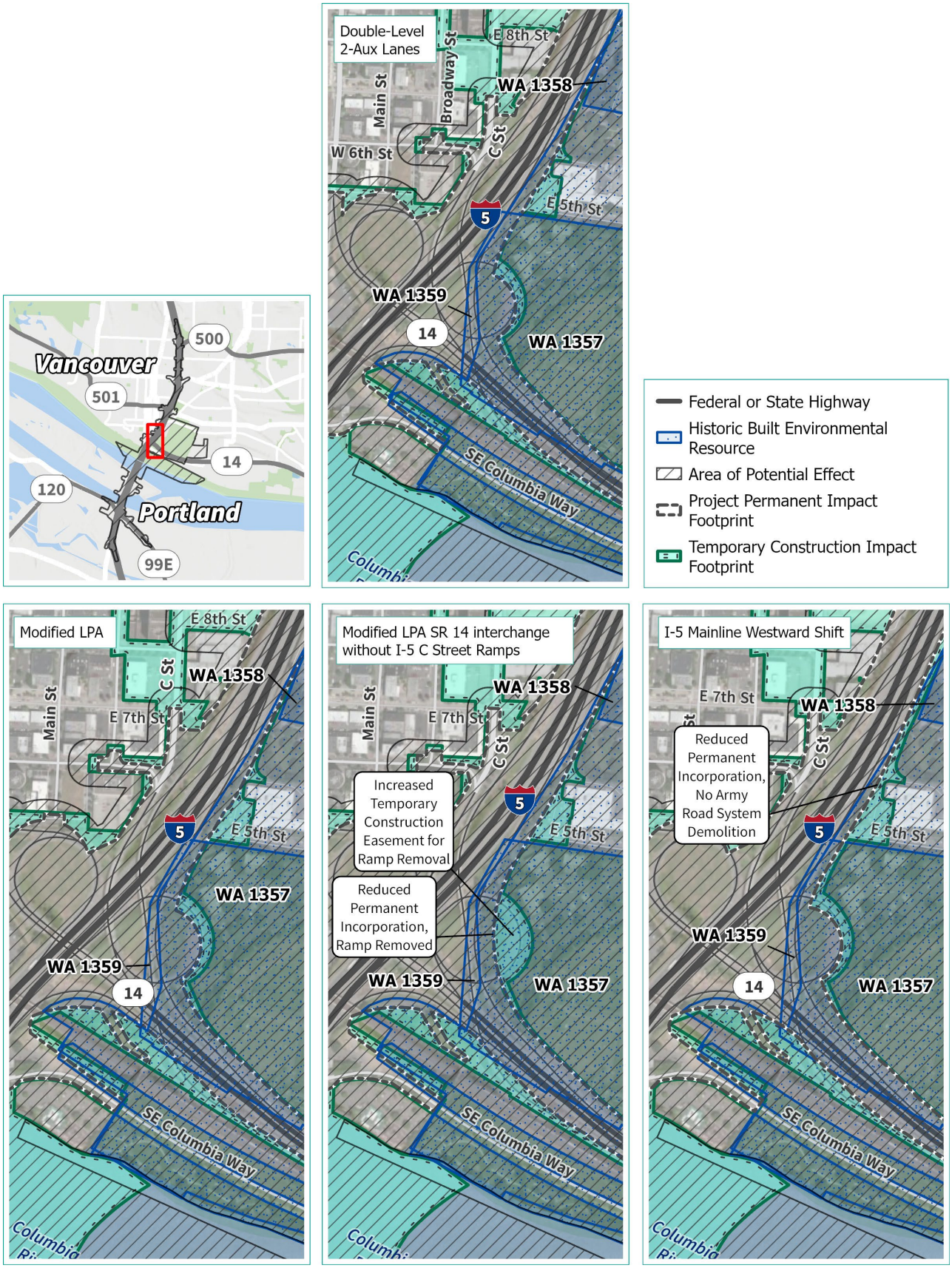


Figure 3.8-8. Design Options Comparison – Vancouver National Historic Reserve Historic District (WA 1357), North

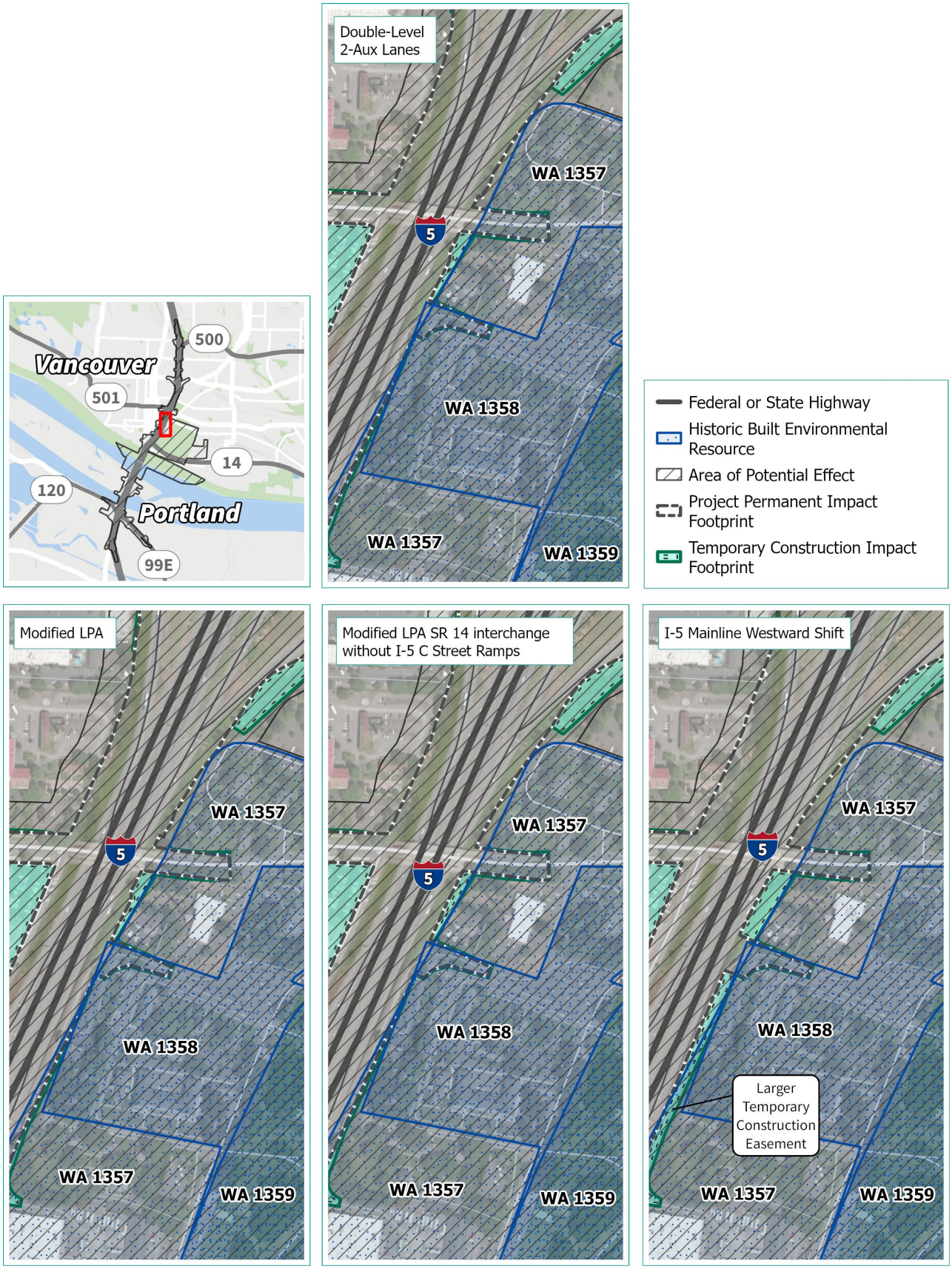


Table 3.8-7. Direct Effects of the Modified LPA on Oregon Historic Built Environment Resources

Map ID	Resource ID	Property Name	Section 106 Effects Finding	Modified LPA Direct Effects Analysis[a]
OR 2	663154	Columbia Slough Drainage Districts Historic District	No Adverse Effect	• Permanent physical change would be relatively small compared to the overall extent of the historic district. Alterations to Mud Slough Drainage would be limited to a small portion of the structure at the east side of I-5; most of the structure would not be affected and would retain its existing features. • Temporary disturbances to vegetation and soil or temporary placement of fill would occur on approximately 2.56 acres. These areas represent only a small fraction of the overall historic district, which covers approximately 12,550 acres and includes a total of 27 linear miles of levees, fills, and cross levees. These temporary physical changes would not alter any of the characteristics that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. As such, the Modified LPA is considered to have No Adverse Effect on the Columbia Slough Drainage Districts Historic District.
OR 155	N/A	East Vanport Commercial Center	No Effect	• No alteration to the characteristics of the historic property that qualify it for inclusion in or eligibility for the NRHP. As such, the Modified LPA is considered to have No Effect on the East Vanport Commercial Center.
OR 56	50293	Portland Assembly Center	No Adverse Effect	• Construction activities, including construction of an expanded or new light-rail vehicle overnight facility, are more than 200 feet away from the existing complex of buildings and not expected to alter any of the Portland Assembly Center’s contributing components. • Permanent changes within the property’s setting would not alter characteristics that contribute to its historic significance. These changes would not alter any of the characteristics that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. As such, the Modified LPA is considered to have No Adverse Effect on the Portland Assembly Center.

Map ID	Resource ID	Property Name	Section 106 Effects Finding	Modified LPA Direct Effects Analysis[a]
OR 111	N/A	Jantzen Beach Moorage	Adverse Effect	• Physical destruction of part of the property that contributes to its historic significance. Construction of a new bridge and new light-rail transit bridge would require the removal of components that contribute to the NRHP eligibility of the Jantzen Beach Moorage, including a section of dock, at least two finger piers, and approximately 20 floating shelters. As such, the Modified LPA is considered to have an Adverse Effect on the Jantzen Beach Moorage.
OR 109	N/A	Jantzen Beach Water Tank	Adverse Effect	• Physical destruction of the property. Permanent right-of-way acquisition and construction of the new road that would join the existing North Jantzen Avenue alignment west of the subject property would require the demolition of all extant features of the property, including the water tank, pump house, and the associated backup diesel generator. As such, the Modified LPA is considered to have an Adverse Effect on the Jantzen Beach Water Tank.
OR 107	N/A	Harbor Shops	Adverse Effect	• Physical destruction of the property. Permanent right-of-way acquisition of the property to construct the proposed northbound and southbound Columbia River bridges would require demolition of extant features in the NRHP-eligible property, including the primary commercial building, surface parking lots and circulation, and planted medians. As such, the Modified LPA is considered to have an Adverse Effect on the Harbor Shops.
OR 120	N/A	Hayden Island Yacht Club Clubhouse	No Effect	• No alteration to the characteristics of the historic property that qualify it for inclusion in or eligibility for the NRHP. As such, the Modified LPA is considered to have No Effect on the Hayden Island Yacht Club Clubhouse.

a All design options under the Modified LPA would have the same direct effects, unless specifically stated.

LPA = Locally Preferred Alternative; N/A = Not applicable; NEPA = National Environmental Policy Act; NRHP = National Register of Historical Places

Table 3.8-8. Direct Effects of the Modified LPA on Interstate Historic Built Environment Resources

Map ID	Resource ID	Property Name	Section 106 Effects Finding	Modified LPA Direct Effects Analysis[a]
OR 50; WA 381a	OR 49361; WA N/A	Interstate Bridge (northbound)	Adverse Effect	• Physical destruction of the property. The Modified LPA would replace the existing northbound Interstate Bridge with a new northbound bridge. This would require removal of the existing northbound bridge. As such, the Modified LPA is considered to have an Adverse Effect on the Interstate Bridge (northbound).
OR 51; WA 381b	OR NA; WA 18781	Interstate Bridge (southbound)	Adverse Effect	• Physical destruction of the property. The Modified LPA would replace the existing southbound Interstate Bridge with a new bridge. This would require the removal of the existing southbound Interstate Bridge. As such, the Modified LPA is considered to have an Adverse Effect on the Interstate Bridge (southbound).
OR 165 and WA 1356	N/A	Lower Columbia River Federal Navigation Historic District	No Adverse Effect	• Physical change is relatively small in comparison to the overall extent of the historic district. The LCR FNC from Vancouver to Bonneville Lock and Dam is a nearly 40-mile-long structure, and construction of the two proposed bridges and their associated staging/work areas would be limited to its westernmost extent. The alignment of all three channels would be slightly revised, with the centerline of the northernmost channel route shifting slightly south and the centerline of the middle and southernmost channel routes shifting north to correspond with the pier locations of the proposed bridges. Additionally, the locations of the primary navigation channel route and the barge channel route would be switched. Although these changes would alter traffic along the LCR FNC, they would not alter its depth or design, the channel's character-defining features. Similarly, construction activities would be limited to the easternmost extent of the Upper Vancouver Turning Basin which would be shifted slightly west while maintaining its existing size. The easternmost pile dike within the Hayden Island Pile Dike System, the system's only pile dike located in the APE, would be avoided by construction and in-water staging activities. Each contributing structure would continue to be maintained by USACE and support ongoing safe navigation along the river. The Modified LPA would affect the NRHP-eligible LCR Federal Navigation Historic District, but that effect would not be adverse. • Temporary in-water staging or work areas approximately 1,000 feet east of the existing bridges and 1,000 feet west of the proposed bridges would not alter any of the characteristics that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. As such, the Modified LPA is considered to have No Adverse Effect on the Lower Columbia River Federal Navigation Historic District.

a All design options under the Modified LPA would have the same direct effects, unless specifically stated.

LCR FNC = Lower Columbia River Federal Navigation Channel; LPA = Locally Preferred Alternative; NEPA = National Environmental Policy Act; USACE = U.S. Army Corps of Engineers

Table 3.8-9. Direct Effects of the Modified LPA on Washington Historic Built Environment Resources

Map ID	Property ID	Property Name	Section 106 Effects Finding	Modified LPA Direct Effects Analysis[a]
WA 1138	731246	Who Song and Larry's	No Adverse Effect	• Construction impact area is within the Columbia River waterway to the east of Who Song and Larry's. The area would be used for staging and temporary construction activities, but these activities would not alter any of the characteristics that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. As such, the Modified LPA is considered to have No Adverse Effect on Who Song and Larry's.
WA 1192	89097	Bridge Substation	Adverse Effect	• Physical destruction of the property. Permanent right-of-way acquisition and demolition of the bridge substation would be required to construct a proposed shared-use path and bridge. As such, the Modified LPA is considered to have an Adverse Effect on the Bridge Substation.
WA 7	33716	Fendrich's Furniture	No Effect	• No alteration to the characteristics of the historic property that qualify it for inclusion in or eligibility for the NRHP. As such, the Modified LPA is considered to have No Effect on Fendrich's Furniture.
WA 10	2124	Smith Tower	No Effect	• No alteration to the characteristics of the historic property that qualify it for inclusion in or eligibility for the NRHP. As such, the Modified LPA is considered to have No Effect on Smith Tower.
WA 21	20430	The Evergreen Hotel	No Adverse Effect	• The entrance in the south elevation may be rendered inaccessible during construction. However, the building's other entrance, in the east elevation, would continue to function as normal. The east elevation is larger and more highly ornamented than the south elevation, and it faces a more intact street grid; consequently, the entrance on this elevation may be considered more important to the Evergreen Hotel's ability to convey its significant development history. It is anticipated that the entrance on the south elevation would be returned to regular use following the conclusion of construction activities. As such, the Modified LPA temporary construction easement along the Evergreen Hotel's southern property boundary would not alter any of the characteristics that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. As such, the Modified LPA is considered to have No Adverse Effect on the Evergreen Hotel.
WA 29	20436	U.S. National Bank Building	No Effect	• No alteration to the characteristics of the historic property that qualify it for inclusion in or eligibility for the NRHP. As such, the Modified LPA is considered to have No Effect on the U.S. National Bank Building.

Map ID	Property ID	Property Name	Section 106 Effects Finding	Modified LPA Direct Effects Analysis[a]
WA 149	89160	Normandy Apartments	Adverse Effect	• The Modified LPA with the centered I-5 mainline would not result in physical destruction or damage to the property or any part of the property that contributes to its historic significance. The Modified LPA would reconstruct and widen the I-5 corridor to the east of the property. Related activities would include the construction of a new elevated light-rail transit alignment and a ramp connecting I-5 to SR 14. A long, narrow permanent acquisition paralleling the eastern property boundary would be required. In addition, a subsurface easement extending under the southeast portion of the apartment building's east wing would be required to accommodate tie-back anchors for a retaining wall to be constructed immediately east of the building. • Under all Modified LPA design options, permanent changes within the property's setting would alter characteristics that contribute to its historic significance. New construction, including the elevated light-rail transit alignment, would be located within approximately 5 feet of the southeast corner of the apartment complex. This would reduce the current, approximately 33-foot-wide buffer between the building and the western edge of the pavement for the I-5 off-ramp connecting to SR 14. The large trees currently screening the east side of the building from I-5 would likely be removed for construction, eliminating the current visual barrier between the Normandy Apartments and the highway. The elevated light-rail transit alignment, which would rise to the approximate height of the apartment building, would introduce new and highly visible infrastructure that would undermine the property's setting. Additionally, the noise analysis indicates that the property would experience increased noise effects relative to the No-Build Alternative that exceed thresholds set for residential properties. As such, the Modified LPA is considered to have an Adverse Effect on the Normandy Apartments. • The Modified LPA with the westward shift of the I-5 mainline would result in physical destruction of the property. The Modified LPA with the westward shift of the I-5 mainline includes ramps up to 40 feet to the west between SR 14 and Mill Plain Boulevard. This design option would require permanent right-of-way acquisition of the Normandy Apartments property and the demolition of the apartment building and its associated landscaping. The Modified LPA with the westward shift of the I-5 mainline would result in a greater degree of permanent effects to this NRHP-eligible property.
WA 1357	674732	VNHR Historic District	Adverse Effect	• The Modified LPA with the centered I-5 mainline would result in physical destruction or damage to part of the property by demolishing a portion of the contributing Army Road System on East 5th Street where it terminates against I-5. In addition, vibration effects from construction are anticipated to affect contributing components of the historic district. As such, the Modified LPA is considered to have an Adverse Effect on the VNHR Historic District.

Map ID	Property ID	Property Name	Section 106 Effects Finding	Modified LPA Direct Effects Analysis[a]
				• The Modified LPA with the westward shift of the I-5 mainline would not require demolition of a portion of the contributing Army Road System. However, vibration effects from construction are also anticipated to affect contributing components of the historic district under this design option and would also be considered to result in an Adverse Effect to the VNHR Historic District. • The Modified LPA would require the permanent acquisition of approximately 1.06 acres of new right of way including a narrow strip of land on the western edge of the VNHR along the main body of I-5, small segments of land on the southern edge of the VNHR along the main body of SR 14, and a 290-foot-long linear acquisition for a new pathway adjacent to the contributing Old Apple Tree and the SR 14 interchange. These permanent acquisitions would be required to widen I-5, upgrade the SR 14 interchange, and construct the new shared-use path near the Old Apple Tree. • The Modified LPA with the centered I-5 mainline would require a subsurface easement extending approximately 50 feet beneath the reserve's northwest corner to accommodate tieback anchors for a new retaining wall. These features are not anticipated to diminish the integrity of the property's significant historic features. The Modified LPA with the westward shift of the I-5 mainline would not require subsurface easements. • Under all Modified LPA design options, changes within the property's setting would alter characteristics that contribute to its historic significance. Construction of new bridge and ramp structures adjacent to the southwest corner of the historic district would introduce new visual elements into the viewshed of the Columbia River, which is an important element of the reconstructed Kanaka Village, Pearson Field, and an important interpretive view from the Mission 66 Visitor Center. Permanent introduction of visual elements would diminish the integrity of the property's significant historic features. Permanent introduction of audible elements would diminish the integrity of the property's significant historic features. The noise analysis indicates that the western and southwestern perimeter portions of the VNHR along I-5 and SR 14 would experience a noise impact, particularly to the westernmost buildings of the Officers Row area. These changes contribute to the Adverse Effect finding on the VNHR Historic District.

Map ID	Property ID	Property Name	Section 106 Effects Finding	Modified LPA Direct Effects Analysis[a]
WA 918	N/A	Officers Row Historic District	Adverse Effect	• Introduction of audible elements would diminish the integrity of the property's significant historic features. While the NRHP documentation prepared in 1974 for this property does not explicitly identify a quiet setting as character defining for the property, the district was designed to minimize the passage of sound between buildings. Therefore, quiet is considered an important component of this property's setting. The noise analysis indicates that multiple contributing buildings along the west edge of the Officers Row Historic District would experience increased noise levels relative to the No-Build Alternative that are above the 67 dBA criterion for Section 4(f) sites.[b] This would diminish their integrity of setting and association sufficient to constitute an Adverse Effect on Officers Row Historic District.
WA 369	674448	Pearson Field Historic District	Adverse Effect	• Changes within the property's setting would alter characteristics that contribute to its historic significance. Under all design options, the Modified LPA would change the current setting of the Pearson Field Historic District by constructing infrastructure improvements approximately 2,880 feet west of the district's western NRHP boundary including the new Columbia River bridges, ramps associated with the SR 14 interchange, and improvements to the SR 14 alignment. Although the district's integrity of setting has been diminished since the end of its period of significance in 1941, principally by the construction of I-5 and SR 14, the property's view of the historic Interstate Bridge remains a vital component of its historic integrity and ability to convey its significance. Permanent introduction of visual elements would diminish the integrity of the property's significant historic features with the removal of the current bridge, and the property's view of the historic Interstate Bridge remains a vital component of its historic integrity and ability to convey its significance. As such, the Modified LPA is considered to have an Adverse Effect on Pearson Field Historic District.
WA 1358	674435	Vancouver Barracks Historic District	Adverse Effect	• The Modified LPA could result in physical destruction or damage to the property. Vibratory effects from the replacement of the highway retaining wall and upgrades to the roadbed are expected to impact the Post Hospital, which is a contributing component of this district. Physical damage from vibration is anticipated due to the building's unreinforced masonry construction and proximity to construction activities (as close as 6 feet). Although the severity of potential damage from construction-related vibration cannot be readily evaluated in advance, a worst-case scenario assumes the potential for structural damage to the Post Hospital. Such damage would render the building unusable or result in its partial or complete collapse. A new permanent acquisition of 0.34 acres along its northwest corner is not anticipated to alter the contributing elements of the property. While some roadways along the west edge and northwest corner of the district would be demolished, these do not contribute to the district's significance. Changes within the property's setting would alter characteristics that

Map ID	Property ID	Property Name	Section 106 Effects Finding	Modified LPA Direct Effects Analysis[a]
				contribute to its historic significance. The district's historic view of the Columbia River waterfront and the historic Interstate Bridge would be altered by replacement of the bridge, as well as upgrades to the SR 14 interchange and approach. Permanent introduction of visual elements would diminish the integrity of the property's significant historic features. As such, the Modified LPA is considered to have an Adverse Effect on the Vancouver Barracks Historic District.
WA 1359	674436	Fort Vancouver National Historic Site	Adverse Effect	• No physical destruction or damage to the property or any part of the property that contributes to its historic significance. Permanent acquisition of approximately 0.2 acres of new right of way, including small segments of land on the southern edge of the Fort Vancouver National Historic Site along the main body of SR 14. In the same area, a new temporary construction easement of 0.46 acres would be required. The acquisitions would reduce the size of the overall site, and both the permanent acquisitions and temporary construction easements could result in removal of some vegetation buffer along its southwest edge, which helps shield the site's viewshed from some of the visual and auditory effects of the highways. • Permanent changes within the property's setting would alter characteristics that contribute to its historic significance. The Modified LPA would introduce new visual elements into the historic site's setting. These elements include replacement of the existing Interstate Bridge with a new structure which would be both on average taller and more substantial than the existing bridge, and associated upgrades to the SR 14 interchange to connect the new mid-level bridge span with ramps to the existing at grade alignment of I-5 and SR 14. Although the district's integrity of setting has been diminished since the end of its period of significance (1844–1846) in the mid-nineteenth century, these changes would further degrade the site's historic viewsheds of the Columbia River through the introduction of modern infrastructure on a greater size and scale than before. In addition, the temporary construction easement of 0.46 acres may result in the removal of some of the vegetation buffer along the southwest edge of the historic site. While this vegetation buffer would be replaced following implementation of the Program, the temporary physical changes would contribute to undermining the historic setting. Both these permanent and temporary changes within the property's setting would alter characteristics that contribute to historic significance. As such, the Modified LPA is considered to have an Adverse Effect on the Fort Vancouver National Historic Site.

Map ID	Property ID	Property Name	Section 106 Effects Finding	Modified LPA Direct Effects Analysis[a]
WA 1148	731279	Washington State Patrol District Five Headquarters	No Adverse Effect	• The Modified LPA would require temporary construction easements (adjacent to permanent acquisitions of small areas from the southwest corner of the property, adjacent to Anderson Street, and from the northern boundary of the property, adjacent to E Evergreen Boulevard). However, these easements would not alter any of the characteristics that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. As such, the Modified LPA is considered to have No Adverse Effect on the Washington State Patrol District Five Headquarters. • Infrastructure improvements proposed by the Modified LPA would alter the current setting of the Washington State Patrol District Five Headquarters property through the introduction of new visual, atmospheric, and audible elements. However, the degree of change from these new elements would be negligible. As such, the Modified LPA would have an effect on the NRHP-eligible Washington State Patrol District Five Headquarters, but that effect would not be adverse.
WA 150	18827	House of Providence	No Adverse Effect	• The Modified LPA would require a temporary construction easement along the southern property boundary at E Evergreen Boulevard. The easement would extend approximately 10 feet into the House of Providence's historic property boundary, overlapping character-defining landscape features such as gate posts, a low hedge, and concrete curb along the public sidewalk. However, the Modified LPA includes plans to restore to preconstruction conditions the character-defining features of the House of Providence located within the temporary construction easement along the southern property boundary at E Evergreen Boulevard. This includes preserving the gate posts and replacing in-kind the hedge and curb, consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties. • A subsurface easement would extend approximately 100 feet into the property boundary but would remain more than 100 feet from the House of Providence contributing resources and would not alter any of the characteristics that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. As such, the Modified LPA is considered to have No Adverse Effect on the House of Providence. • Compared to the Modified LPA with the centered I-5 mainline, the Modified LPA with the westward shift of the I-5 mainline would expand the I-5 corridor into the eastern portion of the House of Providence's historic property boundary. The westernmost lanes of I-5, retaining wall, and noise wall would cross through the parcel containing the House of Providence, which would reduce the size of the area that historically contained the institution's grounds. The only

Map ID	Property ID	Property Name	Section 106 Effects Finding	Modified LPA Direct Effects Analysis[a]
				character-defining features that would be altered by the Modified LPA with the westward shift of the I-5 mainline are the hedge and curb along the property's southern boundary, where a portion of these features would be removed. However, the loss of less than 50 feet of the hedge and curb represents a relatively small portion of these features, which currently run more than 350 feet along the southern property boundary; enough of the hedge and curb would remain unaltered at the center of the southern boundary to continue to convey the property's historic landscape qualities. Additionally, under this design option, the subsurface easement would extend farther west into the parcel than with the centered I-5 mainline, but the easement would remain more than 50 feet from the primary building and its associated landscape features. Therefore, the Modified LPA with the westward shift of the I-5 mainline would result in the same No Adverse Effect finding for the House of Providence as the Modified LPA with the centered I-5 mainline.
WA 1233	89149	Earls House	No Effect	• No alteration to the characteristics of the historic property that qualify it for inclusion in or eligibility for the NRHP. As such, the Modified LPA is considered to have No Effect on the Earls House.
WA 1144	731267	Office Building, 1514 E Street	No Effect	• No alteration to the characteristics of the historic property that qualify it for inclusion in or eligibility for the NRHP. As such, the Modified LPA is considered to have No Effect on the office building at 1514 E Street.
WA 1182b	731284	Rudy Luepke Senior Center	No Effect	• No alteration to the characteristics of the historic property that qualify it for inclusion in or eligibility for the NRHP. As such, the Modified LPA is considered to have No Effect on the Rudy Luepke Senior Center.
WA 382	44853	Radio Transmission Building	No Effect	• No alteration to the characteristics of the historic property that qualify it for inclusion in or eligibility for the NRHP. As such, the Modified LPA is considered to have No Effect on the Radio Transmission Building.
WA 1319	20317	Vancouver Barracks National Cemetery	No Effect	• No alteration to the characteristics of the historic property that qualify it for inclusion in or eligibility for the NRHP. As such, the Modified LPA is considered to have No Effect on the Vancouver Barracks National Cemetery.
WA 1320	731277	St. James Acres Catholic Cemetery	No Effect	• No alteration to the characteristics of the historic property that qualify it for inclusion in or eligibility for the NRHP. As such, the Modified LPA is considered to have No Effect on the St. James Acres Catholic Cemetery.

Map ID	Property ID	Property Name	Section 106 Effects Finding	Modified LPA Direct Effects Analysis[a]
WA 1258	89483	Mickler House	No Adverse Effect	• Modified LPA improvements to E 29th Street would require a temporary construction easement from the extreme northern edge of the tax lot. Activities in this easement have the potential to disturb the northern edge of the concrete-paved walkway connecting the north (principal) elevation of the Mickler House to the sidewalk along E 29th Street; while this feature is considered contributing to the property's significance, disturbance or damage would be limited to its extreme northern edge and would not diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. As such, the Modified LPA is considered to have No Adverse Effect on the Mickler House.
WA 1168	731275 / 731276	Duplex Residences, 2901-03 and 2905-07 K Street	No Adverse Effect	• Temporary physical changes would damage or destroy characteristics that contribute to historic significance. The Modified LPA would include a temporary construction easement that extends into the property's southwest corner, which currently contains a portion of the property's grass lawn and one mature ornamental shrub. Construction activities may damage the lawn. However, the Modified LPA includes plans to restore the grass lawn. This includes replacing in-kind the lawn and preserving one mature ornamental shrub that would not be removed during construction, consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties. As such, the Modified LPA is considered to have No Adverse Effect on the duplex residences at 2901-03 and 2905-07 K Street.
WA 61	89120	Porter House	No Adverse Effect	• The Modified LPA would construct additional interstate lanes to the west of the property and new intervening retaining and sound walls along the western edge of the alley separating the property from I-5. Construction of the retaining wall would require a permanent subsurface easement on the western portion of the Porter House property for the installation of subterranean tie-back anchors. The subsurface easement would extend into the yard to the rear of the dwelling's footprint. Surface-level construction activities are not anticipated to enter the tax lot, which is the NRHP eligibility boundary for the property. The Modified LPA would not alter any of the characteristics that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. As such, the Modified LPA is considered to have No Adverse Effect on the Porter House.

Map ID	Property ID	Property Name	Section 106 Effects Finding	Modified LPA Direct Effects Analysis[a]
WA 62	25537	Hall House	No Adverse Effect	• The Modified LPA would construct additional interstate lanes to the east of the residence, on the opposite side of J Street, and new intervening retaining and sound walls along the eastern edge of J Street. Construction of the walls would require a permanent subsurface easement on the eastern portion of the property for the installation of subterranean tie-back anchors. The subsurface easement would extend into the side yard but not beneath the dwelling's footprint. Surface-level construction activities are not anticipated to enter the tax lot, which is the NRHP -eligibility boundary for the property. The Modified LPA would not alter any of the characteristics that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. As such, the Modified LPA is considered to have No Adverse Effect on the Hall House.
WA 191	89189	Residence, 3405 K Street	No Effect	• No alteration to the characteristics of the historic property that qualify it for inclusion in or eligibility for the NRHP. As such, the Modified LPA is considered to have No Effect on the residence at 3405 K Street.
WA 191	89189	Hood, William H. and Myrtle, Residence	No Effect	• No alteration to the characteristics of the historic property that qualify it for inclusion in or eligibility for the NRHP. As such, the Modified LPA is considered to have No Effect on the William H. and Myrtle Hood Residence.
WA 900	20458	Covington House	No Effect	• No alteration to the characteristics of the historic property that qualify it for inclusion in or eligibility for the NRHP. As such, the Modified LPA is considered to have No Effect on Covington House.

a All design options under the Modified LPA would have the same direct effects, unless specifically stated.
b Decibel thresholds applied for assessment of direct effects from noise as a result of construction and highway traffic are codified in 23 CFR 772 Table 1, Noise Abatement Criteria.
CFR = Code of Federal Regulations; IBR = Interstate Replacement Bridge; LPA = Locally Preferred Alternative; NEPA = National Environmental Policy Act; NRHP = National Register of Historic Places; VNHR = Vancouver National Historic Reserve

3.8.4 Indirect Effects

Indirect effects are those caused at a later time or farther away, but that are still reasonably foreseeable. The Modified LPA, including all design options, would include improved bicycle, pedestrian, highway, and transit access in Portland and Vancouver. This increased accessibility could make these areas more attractive for redevelopment or development of previously undeveloped areas. As described in Section 3.4, local and regional land use plans encourage growth and density in proposed areas near the stations proposed under the Modified LPA on Hayden Island and in downtown Vancouver, making these areas especially likely to redevelop.

Urban redevelopment frequently results in increased pressure to demolish or modify historic built environment resources in ways that are not compatible with their historic integrity, and new development in previously undeveloped areas can result in effects to significant settings of historic built environment resources. In addition, urban redevelopment or development of previously undeveloped areas can increase the potential for ground disturbance that could damage or destroy archaeological sites. While it is possible that implementation of the Modified LPA could result in access to new areas for future development or result in improved access to existing developed areas for redevelopment, there are currently no specific development or redevelopment projects that are contingent upon the Modified LPA planned. In addition, as discussed in Section 3.4, the Modified LPA is not expected to encourage urban sprawl-type growth in previously undeveloped areas. Therefore, no property-specific indirect effects have been identified for historic properties within the APE.

3.8.5 Program Planning to Avoid or Minimize Effects to Cultural Resources

Program planning has included identification of Modified LPA activities to avoid or minimize effects to historic properties. The "no adverse effect" findings for four historic built environment resources in the APE assumes implementation of the following activities:

- **House of Providence (WA 150).** Minimize effects by restoring to preconstruction conditions the character-defining features of the House of Providence located within the temporary construction easement along the southern property boundary at E Evergreen Boulevard. This includes preserving the gate posts, consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties.
- **Duplex Residence at 2901 K Street (WA 1168a and WA 1168b).** Minimize effects by restoring the grass lawn within the temporary construction easement that extends into the property's southwest corner to its preconstruction state. This includes replacing in-kind the lawn and preserving one mature ornamental shrub that would not be removed during construction, consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties.
- **Vancouver Barracks National Cemetery (WA 1319).** Avoid effects by preserving character-defining features along E Fourth Plain Boulevard within the temporary construction easement. This includes preservation of the perimeter fence, cobblestone wall with gates, perimeter road, and planting inside the boundary fence, consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties.
- **Mickler House (WA 1258).** Reconstruct the fence, if necessary, following project completion. Minimize to the maximum extent possible the effects to the existing walkway and curb when implementing Americans with Disabilities Act design efforts.

Program planning also includes efforts to minimize effects to the Fort Vancouver National Historic Site. However, even with implementation of the following activity, the Modified LPA would result in an "adverse effect" finding for the Fort Vancouver National Historic Site:

- **Fort Vancouver National Historic Site (WA 1359).** Protect two historic trees in the allée, which are contributing components associated with the property, consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties. Replace the vegetation buffer removed within the temporary construction easement along the southwest edge of the property following Program implementation.

In addition, Program planning to avoid or minimize effects on cultural resources will include, for historic built properties within 500 feet of the construction activity, monitoring of construction activities where construction-related vibration would exceed 0.2 inches per second for transient vibrations and 0.1 inches per second for continuous vibrations.

3.8.6 Mitigation and Programmatic Agreement

Identification of the mitigation for adverse effects to historic properties assessed under NEPA will be completed through the NHPA Section 106 process. FHWA and FTA, in coordination with WSDOT and ODOT, and in consultation with Oregon SHPO, Washington DAHP, consulting tribes, and other consulting parties, have chosen to complete the Section 106 process and resolve adverse effects on historic properties through the development of a PA pursuant to 36 CFR 800.14(b). A Draft PA, with redactions for sensitive information as deemed appropriate by FHWA and FTA in consultation with consulting tribes and other consulting parties, is currently undergoing consultation and will be made available to the public prior to publication of the Final SEIS, as required by 36 CFR 800.14(b)(2)(ii). The Final PA will be executed prior to the issuance of the ROD and will be included as an appendix to the ROD.

A PA is used when effects on historic properties cannot be fully determined prior to approval for the undertaking, as allowed under 36 CFR 800.14(b)(1)(ii), and where other circumstances warrant a departure from the normal Section 106 process as allowed under 36 CFR 800.14(b)(1)(v). Given the complexities of the IBR Program and the anticipated mix of construction contract delivery methods, FHWA and FTA intend for the PA to include stipulations to govern the implementation of the Program post-PA execution. The PA will include stipulations that outline processes for continued consultation; APE amendment; post-PA execution phased identification of historic properties, assessment of effects, and resolution of adverse effects; training; inadvertent discovery; archaeological monitoring; treatment of historic built environment resources, archaeological resources, historic cemeteries, human remains; and other administrative stipulations.

FHWA and FTA, in coordination with WSDOT and ODOT, have initiated consultation on the development of the PA with Oregon SHPO, Washington DAHP, the federally recognized tribes, and other consulting parties. This initial consultation involved review of an outline of the PA and outlines of the attachments to the PA. Based on comments on the PA and attachment outlines, FHWA and FTA, in coordination with WSDOT and ODOT, will continue consultation with Oregon SHPO, Washington DAHP, the federally recognized tribes, and other consulting parties to prepare a draft of the PA and attachments. The draft will include the stipulations and legal language required by FHWA, FTA, and the Advisory Council on Historic Preservation for project and program-level PAs. The draft PA attachments will detail measures to resolve adverse effects on known historic properties and procedures for post-PA execution, cultural resource investigations, and consultation. Preparation of the draft is ongoing. The draft, once completed, will be made available to the public prior to publication of the Final SEIS.

3.9 Visual Quality

Highways and major transit facilities are highly visible elements of landscapes. They are noticeable to local residents, travelers using the facilities, and nearby motorists, bicyclists, pedestrians, and transit users. This section describes and evaluates changes to visual character from the alternatives and how that change in visual character would affect visual quality as perceived by viewers.

The information presented in this section is based on the Visual Quality Technical Report, which contains greater detail and analysis.

3.9.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with visual quality has been updated in this Draft SEIS to include:

- Updated FHWA methodology for evaluating visual quality in their Guidelines for the Visual Impact Assessment of Highway Projects (2015).
- Updated locations of some key viewpoints and landscape units (LUs) to reflect the Modified LPA.
- Changes in viewsheds, based on the location and extent of the Modified LPA.
- Modifications in the highway and structure form, scale, and materials.
- Changes to the project footprint necessitated by these changed conditions including adding bridge configuration options with varying heights with respect to proximity to viewsheds.

Differences in methodology make direct comparison difficult but Table 3.9-1 compares the general impacts and benefits of the CRC LPA to those of the Modified LPA as a result of the changes listed above. Based on the analysis described in this section, the effects of the Modified LPA would be similar to those of the CRC LPA.

Table 3.9-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects

Visual Quality LU	CRC LPA Effects as Identified in 2011 Final EIS	Modified LPA Effects as Identified in this Section	Explanation of Differences
Columbia Slough LU	Visual effects in the LU and Scenic Corridor would be minor.	Some viewers would likely have negative visual quality impacts, but most would have neutral to beneficial. The overall impact to visual quality would be beneficial.	Differences between the CRC LPA and the Modified LPA would be minor in this LU. Visual quality would be similar.
Columbia River and Vancouver Downtown LUs	Views of bridge towers replaced with new bridges. Visual changes from higher bridges and the removal of bridge towers.	Some viewers would likely have negative visual quality impacts, but most would have neutral to beneficial. The overall impact to visual quality would be beneficial.	Similar change in the visual environment. The form, scale, and materials of the CRC LPA and the Modified LPA would be similar. Visual quality in the Vancouver Downtown LU would likely

Visual Quality LU	CRC LPA Effects as Identified in 2011 Final EIS	Modified LPA Effects as Identified in this Section	Explanation of Differences
			be more adverse because of the parking structures being moved from the Greater Central Park LU. The light-rail station would also move to the Vancouver Downtown LU but the extension of the light-rail guideway would be shorter and not located on downtown streets.
Greater Central Park LU	Visual impacts associated with the SR 14 structures and Clark Park and Ride. Other views improve with the Evergreen Community Connector.	Most viewers would likely have negative visual quality impacts, and the overall impact to visual quality would be adverse.	Compared to the CRC LPA, the Modified LPA moves the LRT station and park and ride structure to the Vancouver Downtown LU, which would reduce visual changes in the Greater Central Park LU. However, the Modified LPA's visual change from the prominence of the higher Columbia River bridges, C Street ramp, and SR 14 would have an overall adverse visual quality impact for sensitive recreational viewers compared to the CRC LPA.
Burnt Bridge Creek LU	Visual effects in the LU would be minor. (No Change in Visual Impact).	The visual environment would be similar to the existing conditions. The overall impact to visual quality would be neutral.	Visual differences between the CRC LPA and the Modified LPA would be minor in this LU. Visual quality would be similar.
Ruby Junction LU	Visual impacts are expected to be low because the added structures and uses are consistent with existing character and uses.	The visual environment would be similar to the existing conditions. The overall impact to visual quality would be neutral.	Differences between the CRC LPA and the Modified LPA would be minor in this LU. Visual quality would be similar.

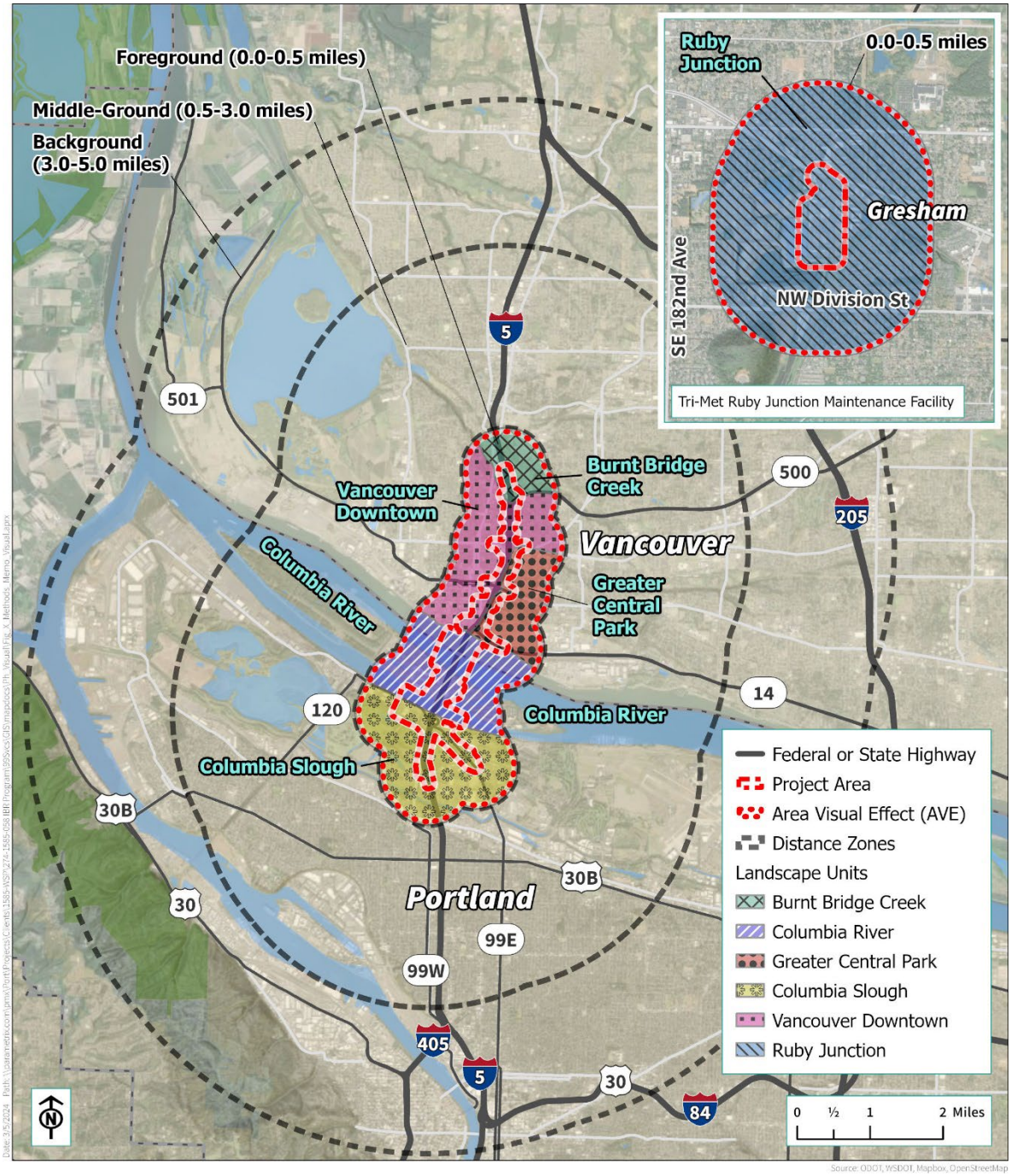
CRC = Columbia River Crossing; EIS = Environmental Impact Statement; LPA = Locally Preferred Alternative; LRT = light-rail transit; LU = Landscape unit;
SEIS = Supplemental Environmental Impact Statement; SR = State Route

3.9.2 Existing Conditions

FHWA's guidelines define the study area for visual quality analysis as the Area of Visual Effect (AVE) (FHWA 2015). The AVE is the area where views of the Modified LPA would be visible, determined by the physical constraints of the environment and the limits of human sight. Landforms (such as hills and mountains) and land cover (such as vegetation and buildings) limit views from large portions of the middle

and background distance zones (Figure 3.9-1). Therefore, the AVE for the Modified LPA, including the Ruby Junction Maintenance Facility, consists of areas within the foreground distance zone, which is 0 to 0.5 miles from the limits of ground disturbance. Along the I-5 corridor, background and middle ground distance zones were considered where they include scenic elements of views that could be altered or obstructed by the Modified LPA (i.e., bridges, ramps, etc.).

Figure 3.9-1. Area of Visual Effect and Landscape Units



Within the AVE, six defined LUs identify the existing visual character, viewer groups present, and current visual quality. Each LU is the geographic area used to assess changes to visual environments and character, sensitivity of viewers, and impact to visual quality. The six LUs are identified in Figure 3.9-1 and their existing resources and characteristics are described in Table 3.9-2.

It is not possible to assess every view within an LU, so key viewpoints (KVPs) were identified and used to define the existing visual character and visual quality and evaluate impacts to visual quality. The KVPs used in this analysis are shown in Figure 3.9-2. KVPs were selected because they represent a common or typical view from within an LU or because they are a view of a defining feature of the LU, such as a notable natural feature or important structure.

Table 3.9-2 Visual Character of Landscape Units

Landscape Unit	Visual Character
Columbia Slough	Views of North Portland Harbor and several sloughs, riparian areas, and large wetlands; level sports fields and recreational areas; large tracts of open space interrupted by large parking lots and industrial, retail, commercial, and transit and transportation development.
Columbia River	Riverine, industrial; flat landform; defined by near-continuous development along, and use of, the Columbia River. Open views upriver toward Mt. Hood.
Vancouver Downtown	Primarily developed residential, commercial, and retail areas. Smaller-scale urban core with higher density and taller structures, including mixed-use high-rise development along the waterfront.
Greater Central Park	Park-like campus and open fields crossed by several major roadways and elevated railroad tracks. Recreation- and education-oriented development.
Burnt Bridge Creek	Riparian valley between steep-sided slopes; residential development and open space.
Ruby Junction	Mix of industrial, commercial office, and retail development, including large-scale industrial uses such as sand and gravel mining and municipal transit maintenance and fleet services uses.

For each LU the visual analysis considers the sensitivity of the different viewer groups (people who would have views of or from the AVE) to changes in views and the visual character. The activities a viewer is engaged in, the visual context, and the values, expectations, and interests all affect viewer sensitivity. Although each viewer has individual preferences and sensitivities, there are three basic perceptions of the visual environments:

1. **Natural Harmony:** When viewing the natural environment, viewers evaluate the natural harmony of the existing scene, determining whether the composition is harmonious or inharmonious.
2. **Cultural Order:** When viewing the cultural environment, viewers evaluate cultural order, determining whether the composition is orderly or disorderly.
3. **Project Coherence:** When viewing a project environment, viewers evaluate how the visual character of all the elements of a project logically fit together and how the visual character of the project integrates with the visual character of the existing environment to form a complete whole. Viewers determine whether the project's composition is coherent (forms a logical whole) or incoherent (does not form a logical whole).

Table 3.9-3 summarizes the viewer groups present in each LU, their visual sensitivity and a qualitative rating of their perception of the existing elements of visual quality.

Figure 3.9-2. Key Viewpoints Used in the Visual Quality Analysis

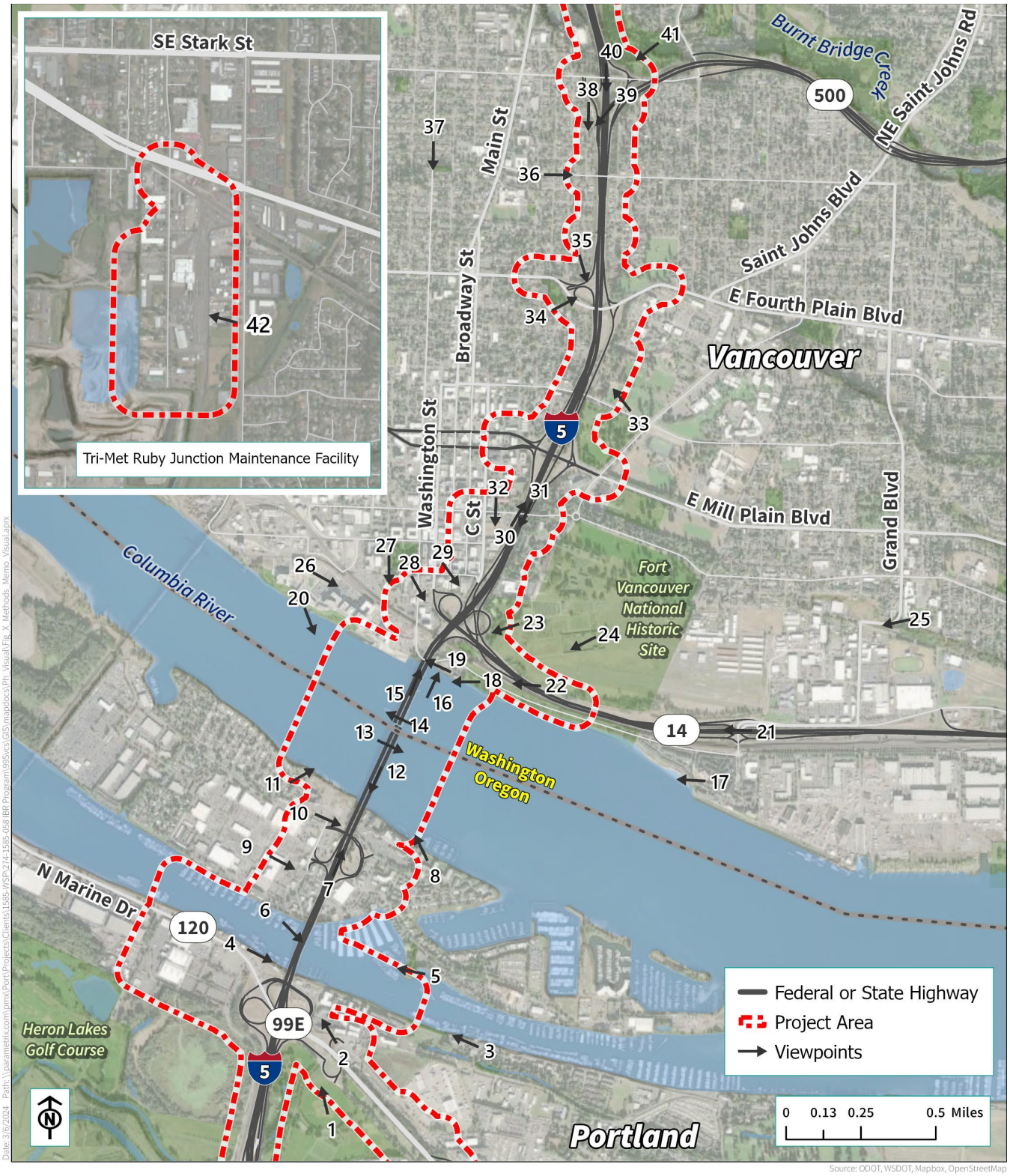


Table 3.9-3. Viewer Groups, Viewer Sensitivity, and Existing Visual Quality Ratings for Landscape Units

Landscape Unit	Viewer Groups	Viewer Sensitivity	Natural Harmony	Cultural Order	Project Coherence
Columbia Slough	Recreational, Residential, Motorist	Low (motorists) to High (recreational users)	Moderate	Low	Low
Columbia River	Recreational, Residential, Retail/Commercial, Motorist, Bicycle/Pedestrian	Low (motorists) to High (residential)	Moderate to High	Low	Low
Vancouver Downtown	Recreational, Residential, Retail/Commercial, Motorist, Bicycle/Pedestrian	Low (motorists) to High (residential)	Moderate	High	Low
Greater Central Park	Recreational, Motorist, Bicycle/Pedestrian	Low (motorists) to High (recreational users)	High	High	Low
Burnt Bridge Creek	Recreational, Residential, Motorist, Bicycle/Pedestrian	Low (all viewers)	High	Low	Moderate
Ruby Junction	Industrial, Commercial, Retail, Residential, Civic	Low (all viewers)	Low	Moderate to Low	Moderate to Low

3.9.3 Long-Term Benefits and Effects

"Long-term effects to visual quality" refers to how changes to visual resources affect the character of the physical, cultural, and project environments as perceived by viewers. The degree of impact to visual quality is determined by the compatibility of the visual change with the existing conditions and the sensitivity of viewers. The value of the effect to visual quality is identified as beneficial, adverse, or neutral.

Table 3.9-4 summarizes the effects of the No-Build Alternative, Modified LPA, and design options on visual quality. Detailed analysis of the effects is provided in the following sections.

No-Build Alternative

Under the No-Build Alternative, the constructed elements of the project environment within the AVE would not change. Existing bridges, ramps, interchanges, roadways, and other structures would remain. With regular maintenance, such as painting, views containing the bridge structures are not expected to decline in visual quality, except in the event of a major earthquake, which could visibly damage the structures.

The No-Build Alternative assumes that all highway, roadway, and transit projects within the AVE planned to be built by 2045 would be constructed. Even with completion of those projects, traffic congestion and delays are forecasted to increase within the AVE. Additionally, periodic bridge lifts to allow Columbia River traffic to pass under the existing Interstate Bridge would continue to cause stopped traffic and congestion on I-5. Additional congestion reduces the coherence of the project environment, particularly as viewed by motorists, which could reduce visual quality. Visual changes from traffic congestion may adversely affect visual quality for some viewers in all LUs except for the Ruby Junction LU. However, these conditions would likely develop over time, allowing viewers to become accustomed to the changing visual environment. The overall long-term impact on visual quality would be neutral.

Table 3.9-4. Summary of No-Build Alternative and Modified LPA Effects on Visual Quality

No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Westward Shift	Modified LPA with Single-Level Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, without C Street Ramps, Centered I-5	Modified LPA Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, all Park-and-Ride Site Options
• Constructed elements within the Area of Visual Effect (AVE) would not change. Project environment coherence would be negatively affected by increased traffic and congestion, however, natural and cultural elements are expected to be compatible with the existing visual environment.	• Impacts would include new visual elements that could alter the visual character and quality in the AVE (e.g., new bridges across the Columbia River). LUs where the effect to visual quality are beneficial or neutral would have a natural, cultural, and project environment that is compatible with existing visual conditions. Adverse effects to visual quality would result from blocking views of the natural environment and changes in visual experience from elevated bridge structures, such as to viewers in the floating homes at the North Portland Harbor bridges.	• Additional width would contribute to a slightly increased visual mass for viewers in close proximity or beneath the structures in the Columbia River LU.	• Would include an improvement in perception of visual quality by shifting project elements slightly farther from sensitive viewers at Kanaka Village and other views from Fort Vancouver National Historic Site in the Greater Central Park LU.	• May become a beneficial feature from nearby views in the Columbia River LU depending on the chosen architectural design.	• In the closed position, the lower height of the bridge decks would be similar, or less visible, than the existing Interstate Bridge. Some components of a movable span could protrude higher into the skyline and be visible from Vancouver, Fort Vancouver, and Hayden Island areas. In an open position, which would be intermittent and limited, the increased visibility of the bridge deck may obstruct additional views and skylines, and likely intensify visual impacts, especially for sensitive recreational viewers. The overall bridge deck would be higher and more visible than the existing bridge deck.	• Would eliminate project environment elements associated with the C Street Ramps that would be visible for sensitive recreational viewers in the Greater Central Park LU.	• Potential changes in the cultural visual environment in the Vancouver Downtown LU.

AVE = area of visual effect; I-5 = Interstate 5; LPA = Locally Preferred Alternative; LU = landscape unit

Modified LPA

The primary elements of the Modified LPA that could alter visual character and quality are the new bridges across the Columbia River and North Portland Harbor; reconfiguration of roadways and interchanges; and construction of new light-rail transit facilities and park-and-ride sites. Within the AVE, the Modified LPA, with any of the design options, would have perceptible changes in scale, form, and materials from:

- The greater heights and widths of the new Columbia River bridges.
- Reconfiguration or modification of interchanges at N Marine Drive, Hayden Island, SR 14, Mill Plain Boulevard, Fourth Plain Boulevard, and SR 500.
- The introduction of light-rail transit guideway and stations.
- Removal of the existing Interstate Bridge.

For each LU, the following provides an assessment of the visual compatibility of, and viewer sensitivity to, the Modified LPA, including an assessment of the design options in the applicable LU, and its overall degree of impact on visual quality.

Columbia Slough Landscape Unit

Within the Columbia Slough LU, the Modified LPA includes changes to the Marine Drive and Victory Boulevard interchanges, the extension of light-rail transit from the existing terminus at the Expo Center, and a facility on the Expo Center property that would provide a small number of storage tracks, one small maintenance building for light maintenance, an operator break facility, and a parking lot for operators. This facility would necessitate reconstruction of the Expo Road entrance to the Expo Center and the parking lot gates and booths, but it would not alter the existing Expo Center buildings. As an example of changes to the visual environment within the Columbia Slough LU, Figure 3.9-3 shows the existing conditions from KVP 2 (along Marine Drive looking northwest toward pedestrian trails) and a photographic simulation of the Marine Drive Interchange with the Modified LPA.

While the Modified LPA would remove some existing trees and vegetation, the natural environment would continue to include views of distant shorelines, rolling hills, and mountain profiles from both northbound and southbound I-5. The cultural environment would generally remain unchanged, and the project environment of roadways and bridges would be compatible with the existing visual conditions.

The compatibility of the Modified LPA with the project environment would be the same with either the one or two auxiliary lane design option; there is not a change in the assessment of visual quality. In the Columbia Slough LU, there would be no change in the assessment of visual quality with the Modified LPA between the different bridge configurations (double-deck fixed-span, single-level fixed-span, or single-level movable-span). The Modified LPA with the single-level fixed-span configuration would provide more options for bridge architecture, such as the potential to use a finback or extradosed design. These bridge architecture designs would have additional associated visual mass and height above the bridge deck that may be visible from the Columbia Slough LU. They would also provide greater opportunity for a bridge design that meets the communities' design goals and could become a beneficial feature from nearby views.

Figure 3.9-3. Existing Conditions Photograph and Conceptual Photographic Simulation (N Marine Drive Looking Northwest at Pedestrian Trails)

Existing Conditions

Photographic simulation of Modified LPA

Note: The simulation illustrates the general layout and massing. Visual elements of the Modified LPA may change as the design progresses. Roadways, intersections, signage, markings, and other simulated elements reflect early conceptual design and are shown for illustration purposes only.

Four KVPs were identified to assess the visual quality in the Columbia Slough LU. For each KVP within the Columbia Slough LU, Table 3.9-5 provides a quantitative assessment of the existing visual quality, the visual quality with the Modified LPA, and the overall visual quality score for the LU. Natural harmony, cultural order, and project coherence were rated on a scale of 1 to 7, with 1 being very low, 4 being moderate, and 7 being very high. As shown in Table 3.9-5, the Modified LPA was found to have a neutral degree of impact on one KVP (KVP 3), an adverse degree of impact on one KVP (KVP 1), and a beneficial degree of impact on two KVPs (KVP 2 and 4). For the Columbia Slough LU overall, the change in visual quality from the Modified LPA would be expected to be beneficial.

Table 3.9-5. Columbia Slough Landscape Unit Degree of Impact on Visual Quality

KVP	Visual Quality – Existing [a]				Visual Quality – with Modified LPA [b]				Change	Degree of Impact on Visual Quality
	Natural Harmony	Cultural Order	Project Coherence	Overall	Natural Harmony	Cultural Order	Project Coherence	Overall		
1	5	3	3	3.7	3	3	3	3	-0.7	Adverse
2	3	2	2	2.3	3	2	3	2.7	0.4	Beneficial
3	5	3	3	3.7	5	3	3	3.7	0	Neutral
4	2	1	2	1.7	2	2	3	2.3	0.6	Beneficial
Overall Landscape Unit Change									0.3	Beneficial

Note: Visual quality score definitions: 1 = very low, 2 = low, 3 = moderately low, 4 = moderate, 5 = moderately high, 6 = high, 7 = very high

a The visual quality ratings for the No-Build Alternative are the same as the existing conditions.

b The visual quality ratings for the Modified LPA are the same for each design option.

KVP = key viewpoint; LPA = Locally Preferred Alternative; LRT = light-rail transit

Columbia River Landscape Unit

Within the Columbia River LU, the Modified LPA, with any of the design options, would include two new parallel Columbia River bridges North Portland Harbor bridges, the extension of LRT, including transit facilities on the Columbia River bridges, a new interchange on Hayden Island, , a modified SR 14 interchange, shared-use paths along the new bridge structures providing an active transportation connection across the Columbia River, and the removal of the existing Interstate Bridge.

Within the Columbia River LU trees, vegetation, shorelines (both on the Columbia River and North Portland Harbor), and other natural elements would be relatively unchanged. The bridge decks for all the Modified LPA's Columbia River bridge configurations would be higher than the existing bridge decks, which may increase a visual sense of openness along the Columbia River shoreline and increase natural harmony. The cultural environment would be altered with elevated lanes, ramps, and retaining walls, but land cover would block most direct views and the cultural environment overall would be orderly. The project environment would experience

Visual mass refers to the perceived weight or prominence of an object or element. Visual mass is not directly related to the actual physical weight of an object, but rather its visual appearance. It is determined by various factors such as size, shape, color, texture, contrast, and placement. Objects or elements that are larger, darker, more detailed, or placed in a prominent position tend to have more visual mass and attract greater attention from the viewer.

updated highway and active transportation facilities that meet current design standards and would improve movements and speeds, which would be beneficial to project coherence.

With the Modified LPA, the location and layout of the North Portland Harbor bridges and transit structure would involve relocating some of the floating homes on the Columbia Slough, resulting in the Columbia River bridges and transit structures being closer to the floating homes that remain. The scale of the North Portland Harbor bridge structures, ramps, and roadways would increase the existing footprint, modifying the visual environment from the floating home community. While the existing bridge over the North Portland Harbor provides a visual precedent, the expanded footprint of the North Portland Harbor bridge and new transit bridge under the Modified LPA would be new visual elements for adjacent residential viewers. These residential viewers would experience a high degree of visual change, and the new North Portland Harbor bridges would not be compatible with the existing visual conditions.

The new Columbia River bridge decks and ramps would be higher in elevation than the existing Interstate Bridge but would not be as high as the existing lift towers. These higher structures would be much more visible and would be likely to block views of neighbors in surrounding areas. As currently conceptualized, the Modified LPA with the double-deck fixed-span configuration would not have substantial structural elements extending above the bridge deck, which would maximize views of the surrounding landscape from the top bridge deck and improve views of the surrounding landscape from the Columbia River bridges for travelers.

For viewers at the water level of the Columbia River or from the shorelines, transit, pedestrian, and utility facilities on the lower decks would contribute to the visual height and mass of the Modified LPA's Columbia River bridges, but fewer piers and the higher deck height would allow greater view of the corridors between piers and under the bridge. Therefore, the scale and magnitude for on-water viewers and viewers at lower elevations would be similar to those of the existing Interstate Bridge.

Compared to the existing shared-use path on the existing Interstate Bridge, the shared-use path associated with the Modified LPA would be moved to the lower-level bridge deck. Views for pedestrians and bicyclists would be nearly enclosed and exposed to the underside of the bridge deck above. However, generously sized bicycle and pedestrian facilities with overlooks and rest points would replace the existing narrow pedestrian path adjacent to vehicular traffic, and views would be improved as viewers would be higher than the existing bridge. Features such as safety railing and bicycle lane striping would improve the project coherence for bicyclists and pedestrians. Safe facilities would allow more focus and attention on beneficial elements in the cultural and natural visual environment. The overall experience would be beneficial for bicyclists and pedestrians.

The design option to shift the I-5 mainline westward would have the same visual compatibility as the design option where the I-5 mainline remains centered. In addition, the design option at the SR 14 interchange to have or not have C Street Ramps would not change the visual environment for viewers within the Columbia River LU and the optional park-and-ride sites would either be not visible or barely visible from views.

The Modified LPA with the design option of two auxiliary lanes would expand the roadway width of I-5 by an additional 16 feet, which would be slightly closer to viewers and would contribute to a slightly increased visual mass. Motorists inside enclosed vehicles (including light-rail cars on the lower deck) would likely not discern the slight expansion associated with the second auxiliary lane. Similarly, the additional 16-foot width would likely have minimal visual change to viewers somewhat farther from the bridge.

In comparison to the Modified LPA with the double-deck fixed-span configuration, the Modified LPA with the single-level fixed-span configuration would be slightly wider and somewhat closer to nearby viewers. However, the single-level fixed-span configurations would have a slimmer vertical profile and would grant viewers in proximity or beneath the Columbia River bridges along the Vancouver waterfront with more expansive and unobstructed views below bridge decks and between piers. In addition, the Modified LPA with the single-level fixed-span configuration would provide more options for bridge architecture, such as the

potential to use a finback or extradosed design. While those architectural designs would have additional associated visual mass and height above the bridge deck, they would also provide greater opportunity for a bridge design that meets the communities' design goals and could become a beneficial feature from nearby views.

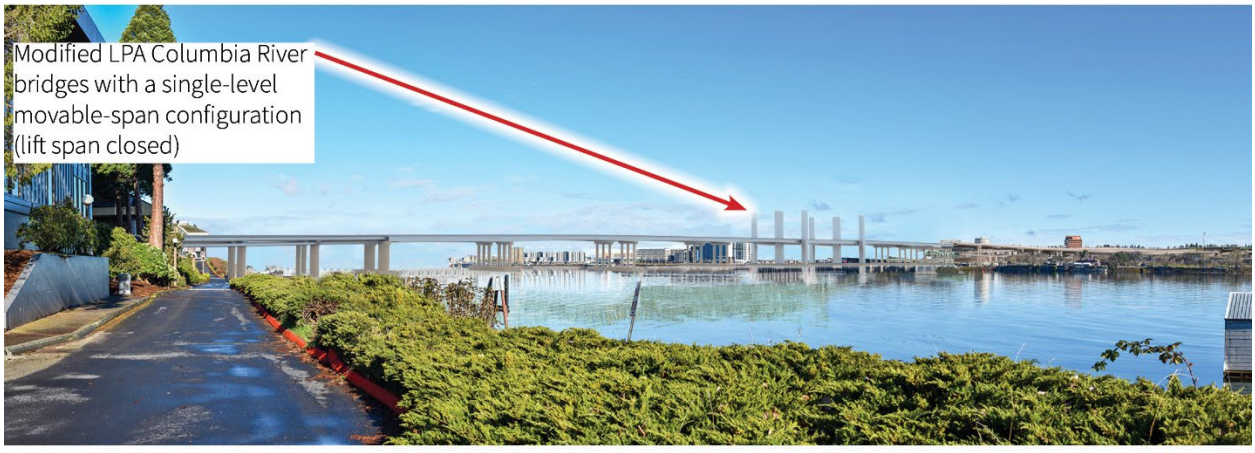
The Modified LPA with the single-level movable-span configuration would have bridge decks somewhat higher than the existing Interstate Bridge, which would slightly open up views from underneath. With the single-level movable-span configuration, the overall visual character and massing would be similar to the existing conditions or No-Build Alternative as there would be lift towers that would protrude higher into the skyline for areas in Vancouver, Fort Vancouver, and toward and from Hayden Island.

Overall, at the current level of design used in this analysis, the options for the bridge configurations would have a similar effect on visual quality. Figure 3.9-4 provides an existing condition photograph of the Interstate Bridge, a photographic simulation of the Modified LPA with the double-deck fixed-span configuration, and the Modified LPA with the single-level movable-span configuration. Figure 3.9-5 shows KVP 15 with an existing condition photograph of the Interstate Bridge, a photographic simulation of the Modified LPA with the double-deck fixed-span configuration, and a photographic simulation of the Modified LPA with the single-level movable-span configuration, both from the top deck looking north toward downtown Vancouver.

Figure 3.9-4. Existing Conditions Photograph and Conceptual Photographic Simulations (Columbia River Bridges)

Existing Condition

Photographic simulation of Modified LPA Columbia River bridges with a double-deck fixed-span configuration



Photographic simulation of Modified LPA with single-level movable-span configuration

Note: The simulations illustrate the general layout and massing of the Modified LPA double-deck fixed-span and single-level movable-span configurations. The movable-span configuration is shown in the closed position only because the open position would be intermittent and limited. Visual elements of the Modified LPA may change as the design progresses. Roadways, intersections, signage, markings, and other simulated elements reflect early conceptual design and are shown for illustration purposes only.

Figure 3.9-5. KVP 15: Existing Conditions Photograph and Conceptual Photographic Simulation (Columbia River Bridge northbound lane looking north to Vancouver)

Existing Conditions

Photographic Simulation of the Modified LPA with double-deck fixed-span bridge configuration

Photographic simulation of Modified LPA Columbia River bridge with single-level movable-span configuration

Note: The simulation illustrates the general layout and massing of the Modified LPA double-deck fixed-span and single-level movable-span configurations. Visual elements of the configurations may change as the design progresses. Conceptual photographic simulations are intended to illustrate general layout and massing of the Modified LPA. Roadways, intersections, signage, markings, and other simulated elements are conceptual and shown for illustration only. The early conceptual design may change as the design progresses.

Sixteen KVPs were identified to assess the visual quality in the Columbia River LU. For each KVP within the Columbia River LU, Table 3.9-6 provides a quantitative assessment of the existing visual quality and the visual quality with the Modified LPA. As shown in Table 3.9-6, five KVPs could have an adverse degree of impact to visual quality, six would have a neutral impact, and the remaining five would have a beneficial degree of impact. The overall LU change is a numeric average of the change of all KVPs combined. Based on this assessment, the Modified LPA would be expected to have a combined positive numeric change in the visual quality of KVPs and, therefore, an overall beneficial degree of impact to the visual quality of the Columbia River LU.

Table 3.9-6. Columbia River Landscape Unit Degree of Impact on Visual Quality

KVP	Visual Quality – Existing [a]				Visual Quality – with Modified LPA [b]				Change	Degree of Impact on Visual Quality
	Natural Harmony	Cultural Order	Project Coherence	Overall	Natural Harmony	Cultural Order	Project Coherence	Overall		
5	6	4	4	4.7	6	4	4	4.7	0.0	Neutral
6	6	3	2	3.7	4	2	1	2.3	-1.4	Adverse
7	2	2	2	2.0	2	4	4	3.3	+1.3	Beneficial
8	6	4	4	4.7	6	4	4	4.7	0.0	Neutral
9	2	2	3	2.3	2	2	3	2.3	0.0	Neutral
10	2	2	3	2.3	2	2	2	2.0	-0.3	Adverse
11	5	4	3	4.0	5	4	2	3.7	-0.3	Adverse
12	2	1	2	1.7	3	2	4	3.0	+1.3	Beneficial
13	4	2	1	2.3	4	3	3	3.3	+1.0	Beneficial
14	4	2	1	2.3	1	3	3	3.3	+1.0	Beneficial
15	2	1	2	1.7	3	2	4	3.0	+1.3	Beneficial
16	2	1	2	1.7	3	2	4	3.0	+1.3	Beneficial
17	6	4	4	4.7	6	4	3	4.3	-0.4	Adverse
18	4	4	2	3.3	4	4	2	3.3	0.0	Neutral
19	4	4	2	3.3	4	4	2	3.3	0.0	Neutral
20	6	5	3	4.7	6	5	2	4.3	-0.4	Adverse
Overall Landscape Unit Change									+4.4	Beneficial

Note: Visual quality score definitions: 1 = very low, 2 = low, 3 = moderately low, 4 = moderate, 5 = moderately high, 6 = high, 7 = very high
a The visual quality ratings for the No-Build Alternative are the same as the existing conditions.
b The visual quality ratings for the Modified LPA are the same for each design option.
KVP = key viewpoint; LPA = Locally Preferred Alternative

Vancouver Downtown Landscape Unit

In the Vancouver Downtown LU, views in the south include those toward the new Columbia River bridges. The Modified LPA also includes changes to the I-5 mainline, such as the design option for one or two auxiliary lanes, updates to interchanges, and the Evergreen Community Connector. In the Vancouver Downtown LU, the Modified LPA with either one or two auxiliary lanes would have similar visual changes as described in the Columbia River LU. In addition, the visual changes with the different options of bridge configurations would be the same as described in the Columbia River LU. Figure 3.9-6 provides an existing conditions photograph, a photographic simulation of the Modified LPA with the double-deck fixed-span configuration, and a photographic simulation of the Modified LPA with the single-level movable-span configuration, as seen from KVP 28 in downtown Vancouver.

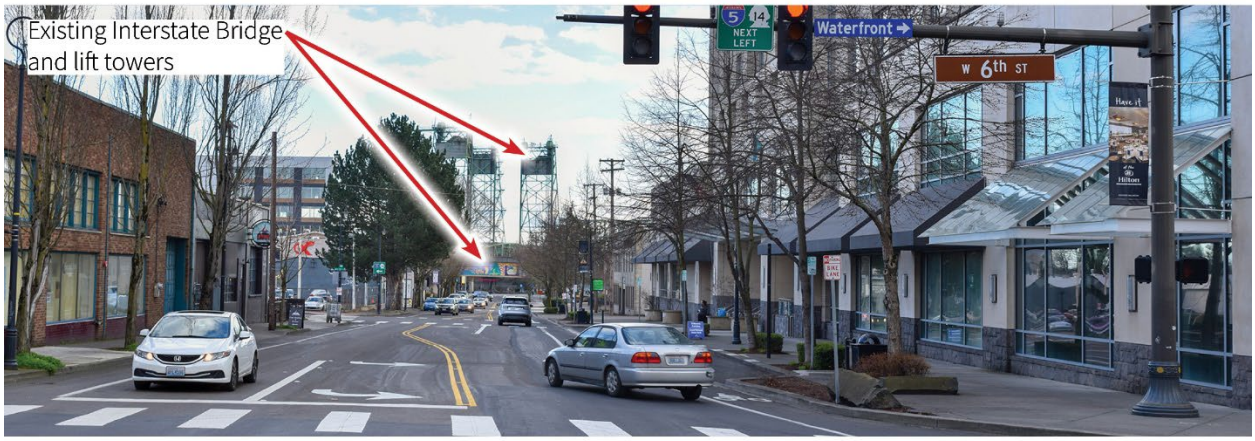
While the changes to the I-5 roadway and interchanges may remove some vegetation that would change the natural environment, the Community Connector would provide opportunities to add natural elements and enhance natural harmony.

The Modified LPA, with any of the design options, would change the cultural environment. While the Modified LPA's visual changes would be similar with the design option of with or without the I-5 C Street ramps, the design option of the westward shift of the I-5 mainline would result in changes to existing buildings between C Street and the I-5 mainline. Building renovation or reconstruction as a result of the design option of the westward shift of I-5 would be expected to be compatible with the existing visual character.

The transit stations and park-and-ride site options also have the potential to change the cultural visual environment. While the architectural design of the transit stations and park-and-ride facilities would be determined as the design progresses; both stations and the park-and-ride facilities would be developed through public workshops and interested party group meetings and would use compatible massing, materials, and landscaping. Further, at any of the site options, the park-and-ride facilities would be developed in compliance with Vancouver regulations and guidelines, including building design and materials, lighting and signage, art elements, landscaping, and street trees, which would ensure the compatibility with the existing visual character. Other urban design elements such as plazas and light-rail stations may be considered enhancements to the visual environment.

Twelve KVPs were identified to assess visual quality in the Vancouver Downtown LU. For each KVP within the Vancouver Downtown LU, Table 3.9-7 provides a quantitative assessment of the existing visual quality and the visual quality with the Modified LPA. As shown in Table 3.9-7, six of the KVPs would have a neutral degree of impact to visual quality, two would have a beneficial degree of impact, and four would have an adverse degree of impact. Based on this assessment, the Modified LPA would be expected to have a combined positive numeric change in the visual quality of KVPs and, therefore, an overall slightly beneficial degree of impact on the visual quality of the Vancouver Downtown LU.

Figure 3.9-6. Existing Conditions Photograph and Conceptual Photographic Simulation (6th Street)



Existing Conditions

Photographic simulation of Modified LPA Columbia River bridges with a double-deck fixed-span configuration

Photographic simulation of Modified LPA Columbia River bridges with single-level movable-span configuration

Note: The simulation illustrates the general layout and massing of the Modified LPA double-deck fixed-span and single-level movable-span configurations. Visual elements of the configurations may change as the design progresses. Roadways, intersections, signage, markings, and other simulated elements reflect early conceptual design and are shown for illustration purposes only.

Table 3.9-7. Vancouver Downtown Landscape Unit Degree of Impact on Visual Quality

KVP	Visual Quality – Existing [a]				Visual Quality – with Modified LPA [b]				Change	Degree of Impact on Visual Quality
	Natural Harmony	Cultural Order	Project Coherence	Overall	Natural Harmony	Cultural Order	Project Coherence	Overall		
26	3	3	3	3.0	3	3	2	2.7	-0.3	Adverse
27	3	3	3	3.0	3	3	3	3.0	0.0	Neutral
28	4	4	4	4.0	4	4	3	3.7	-0.3	Adverse
29	4	2	2	2.7	2	2	2	2.0	-0.7	Adverse
30	3	2	2	2.3	2	2	2	2.0	-0.3	Adverse
31	3	2	2	2.3	4	4	4	4.0	1.7	Beneficial
32	2	3	2	2.3	2	3	2	2.3	0.0	Neutral
34	5	4	4	4.3	5	4	4	4.3	0.0	Neutral
35	4	3	3	3.3	4	4	3	3.6	0.3	Beneficial
36	4	4	4	4.0	4	4	4	4.0	0.0	Neutral
37	4	4	4	4.0	4	4	4	4.0	0.0	Neutral
38	4	4	4	4.0	4	4	4	4.0	0.0	Neutral
Overall Landscape Unit Change									0.4	Beneficial

Note: Visual quality score definitions: 1 = very low, 2 = low, 3 = moderately low, 4 = moderate, 5 = moderately high, 6 = high, 7 = very high.

a The visual quality ratings for the No-Build Alternative are the same as the existing conditions.

b The visual quality ratings for the Modified LPA are the same for each design option.

KVP = key viewpoint; LPA = Locally Preferred Alternative

Greater Central Park Landscape Unit

In the Greater Central Park LU, most views toward the Modified LPA would be blocked by existing vegetation and land cover. However, views in the southern part of the Greater Central Park LU would include the new Columbia River bridges and the modified SR 14 interchange. Other elements of the Modified LPA include changes to I-5 mainline, such as design options for one or two auxiliary lanes and the westward shift or centered mainline, updates to interchanges, and the Evergreen Community Connector. In the Greater Central Park LU, the Modified LPA with the design options for one auxiliary lane or two auxiliary lanes would have similar visual changes as described in the Columbia River LU.

In the natural environment, compared to the existing Interstate Bridge, the Modified LPA and all of the design options could block views of distant hills to the southwest from adjacent ground-level viewpoints to a slightly greater degree, but would not interfere with views from a greater distance or elevation, such as Grand Boulevard to the east (KVP 25). Compared to the existing Interstate Bridge, the Modified LPA and all of the design options would open views under the bridge as a result of the increased bridge height and the wider spacing between piers. The majority of natural visual elements would remain. For the cultural environment, while the bridge type and architecture are yet to be determined, a new bridge structure and the revised SR 14 interchange would noticeably change the visual experience as elevated structures such as piers, bridge decks, railings, and barriers would shift slightly closer to viewers.

The Modified LPA's design of the SR 14 interchange would result in a significantly different view from the Kanaka Village area (KVP 23). Figure 3.9-7 provides an existing condition photograph of KVP 23, a photographic simulation of the Modified LPA with double-deck fixed-span configuration without C Street Ramp, a photographic simulation of the Modified LPA with single-level movable-span configuration without C Street ramp, and a photographic simulation of the Modified LPA with single-level movable-span configuration in the open position with C Street Ramp. The Modified LPA with the design option that would eliminate the C Street ramps would eliminate project environment elements that would be visible for sensitive recreational viewers at Kanaka Village (KVP 23) and other views from the Fort Vancouver National Historic Site (see Figure 3.9-7). The Modified LPA with the design option that would shift the I-5 mainline west would shift project environment elements slightly farther from sensitive viewers. This shift would improve viewers' perception of the visual quality (see Figure 3.9-7 and Figure 3.9-8). For most viewers within the Greater Central Park LU, the park-and-ride options would be behind or under the I-5 mainline or Columbia River bridges and would not be visible.

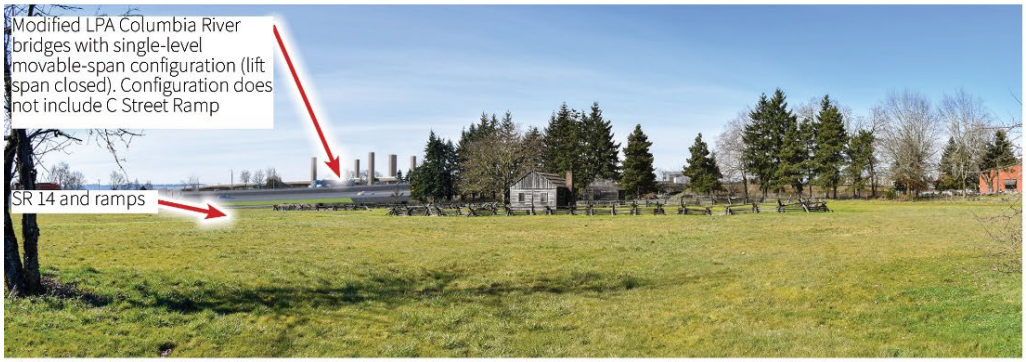
The Modified LPA with the single-level movable-span configuration would have bridge decks somewhat higher than the existing Interstate Bridge. However, compared to the double-deck fixed-span and single-level fixed-span configurations, the deck height would be lower, resulting in less visibility from the Greater Central Park LU. The single-level movable-span bridge configuration would have a slimmer profile than the double-deck fixed-span bridge configuration, but the increased height of the lift towers would add to its visual weight, meaning the size, color, and shape would draw more attention to this configuration. In the normal (closed) condition, the lower bridge deck and higher towers would likely balance the visual effects compared to the double-deck fixed-span configuration; however, impacts would change when the bridge is open. The bridge deck between the lift towers would be higher and more visible when in an open configuration. This increased visibility of the bridge deck may obstruct additional views and skylines, and likely intensify visual impacts, especially for sensitive recreational viewers. The overall bridge deck would be higher and more visible than the existing bridge deck. Because bridge lifts would not be lengthy or frequent, the exposure of these visual effects to sensitive and non-sensitive viewers would be limited.

Visual changes associated with the different bridge configuration options would be the same as described in the Columbia River LU. For KVP 23, Figure 3.9-8 shows the existing conditions photograph, a photographic simulation of the Modified LPA with the double-deck fixed-span configuration with C Street ramp, the Modified LPA with the single-level movable-span configuration with C Street ramp, and a photographic simulation of Modified LPA with single-level movable-span configuration in the open position with C Street ramp. With both of these configurations, I-5 and the Columbia River bridges would likely still be at least partially visible beyond existing vegetation.

Figure 3.9-7. KVP 23: Existing Conditions Photograph and Conceptual Photographic Simulation – SR 14 without I-5 C Street Ramps (Fort Vancouver National Historic Site)

Existing Conditions

Photographic simulation of Modified LPA with double-deck fixed-span configuration without C Street Ramp



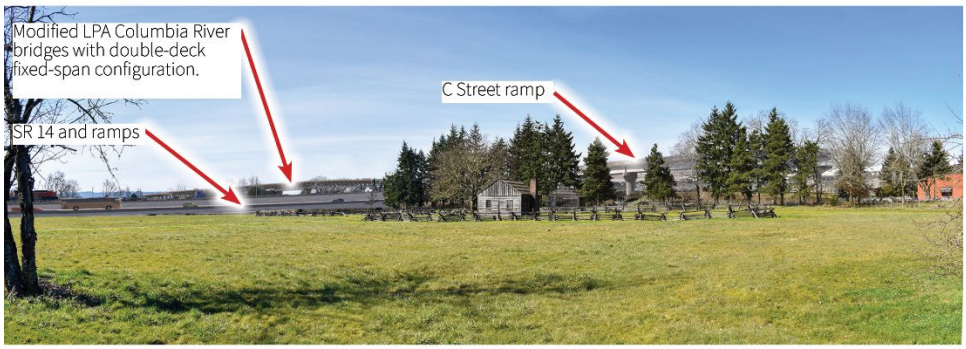
Photographic simulation of Modified LPA with single-level movable-span configuration without C Street ramp

Photographic simulation of Modified LPA with single-level movable-span open configuration with C Street ramp

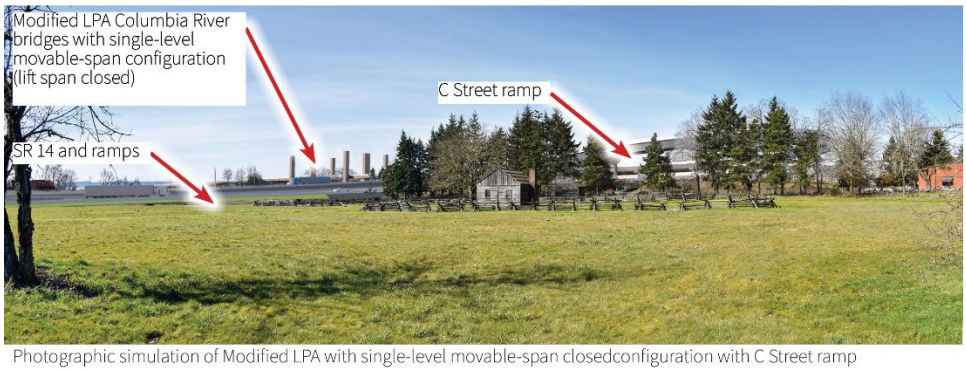
Note: The simulation illustrates the general layout and massing of the Modified LPA double-deck fixed-span and single-level movable-span configurations. Visual elements of the configurations may change as the design progresses. Roadways, intersections, signage, markings, and other simulated elements are conceptual and shown for illustration purposes only. The early conceptual design may change as the design progresses.

Figure 3.9-8. Existing Conditions Photograph and Conceptual Photographic Simulations (Fort Vancouver) National Historic Site, Southwest Corner)

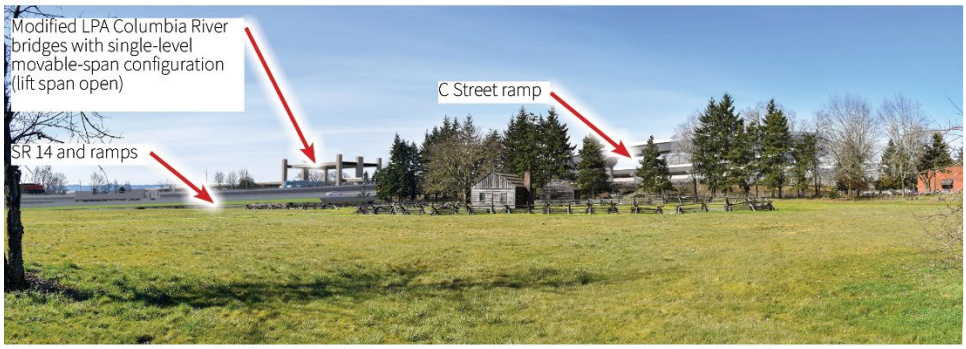
Existing Conditions



Photographic simulation of Modified LPA with double-deck fixed-span configuration with C Street Ramp



Photographic simulation of Modified LPA with single-level movable-span closedconfiguration with C Street ramp



Photographic simulation of Modified LPA with single-level movable-span open configuration with C Street ramp

Note: The simulation illustrates the general layout and massing of the Modified LPA double-deck fixed-span and single-level movable-span configurations. Visual elements of the configurations may change as the design progresses. Roadways, intersections, signage, markings, and other simulated elements reflect early conceptual design and are shown for illustration purposes only.

Six KVPs were identified to assess visual quality in the Greater Central Park LU. For each KVP within the Greater Central Park LU, Table 3.9-8 provides a quantitative assessment of the existing visual quality and the visual quality with the Modified LPA. As shown in Table 3.9-8, four of the KVPs would have a neutral degree of impact to visual quality and two would have an adverse degree of impact. Based on this assessment, the overall degree of impact of the Modified LPA on the visual quality of the Greater Central Park LU would be expected to be adverse.

Table 3.9-8. Greater Central Park Landscape Unit Degree of Impact on Visual Quality

KVP	Visual Quality – Existing [a]				Visual Quality – with Modified LPA [b]				Change	Degree of Impact to Visual Quality
	Natural Harmony	Cultural Order	Project Coherence	Overall	Natural Harmony	Cultural Order	Project Coherence	Overall		
21	4	3	4	3.7	4	3	4	3.7	0.0	Neutral
22	5	5	3	4.3	5	5	3	4.3	0.0	Neutral
23	6	6	2	4.7	3	6	2	3.7	-1.0	Adverse
24	6	6	2	4.7	6	6	2	4.7	0.0	Neutral
25	4	3	3	3.3	4	3	3	3.3	0.0	Neutral
33	6	4	4	4.7	5	4	4	4.3	-0.4	Adverse
Overall Landscape Unit Change									-1.4	Adverse

Note: Visual quality score definitions: 1 = very low, 2 = low, 3 = moderately low, 4 = moderate, 5 = moderately high, 6 = high; 7 = very high.
[1] The visual quality ratings for the No-Build Alternative are the same as the existing conditions.
[2] The visual quality ratings for the Modified LPA are the same for each design option.
KVP = key viewpoint; LPA = Locally Preferred Alternative Burnt Bridge Creek Landscape Unit

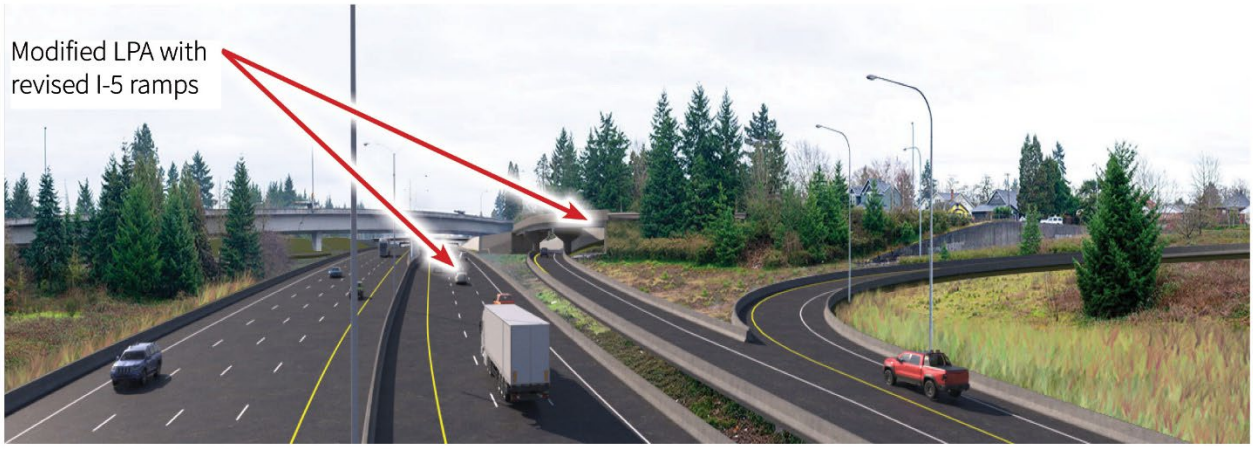
Burnt Bridge Creek Landscape Unit

In the Burnt Bridge Creek LU, the elements of the Modified LPA would be similar to and compatible with the existing visual character. Figure 3.9-9 shows a photograph of the existing conditions from KVP 40 and a photographic simulation of the Modified LPA. There would be no change in visual character from the Modified LPA with one auxiliary lane or two auxiliary lanes. In addition, the Columbia River bridges would not be visible from most locations in the Burnt Bridge Creek LU; therefore, the different bridge configuration options do not result in changes in visual character or quality.

While the Modified LPA may result in the removal of some trees and vegetation, it is not expected to change the character of the natural environment, which is that of a suburban greenway. The overall cultural environment would be orderly and compatible with the existing environment and would be a neutral visual impact. Minor changes, cohesive with the existing environment, would be made to the project environment.

Figure 3.9-9. Existing Conditions and Conceptual Photographic Simulation (39th Street Overpass Looking South)

Existing Conditions



Photographic simulation of Modified LPA

Note: The simulation illustrates the general layout and massing of the Modified LPA. Visual elements of the Modified LPA may change as the design progresses. Roadways, intersections, signage, markings, and other simulated elements reflect early conceptual design and are shown for illustration purposes only.

Three KVPs were identified to assess the degree of impact on viewers and the overall visual quality in the Burnt Bridge Creek LU. For each KVP within the Burnt Bridge Creek LU, Table 3.9-9 provides a quantitative assessment of the existing visual quality of the Burnt Bridge Creek LU and the visual quality with the Modified LPA. The overall visual quality score would remain the same under the Modified LPA; therefore, the degree of visual quality impact for the Burnt Bridge Creek LU would be neutral.

Table 3.9-9. Burnt Bridge Creek Landscape Unit Degree of Impact on Visual Quality

KVP	Visual Quality – Existing [a]				Visual Quality – with Modified LPA [b]				Change	Degree of Impact on Visual Quality
	Natural Harmony	Cultural Order	Project Coherence	Overall	Natural Harmony	Cultural Order	Project Coherence	Overall		
39	5	4	4	4.3	5	4	4	4.3	0.0	Neutral
40	4	3	4	3.7	3	3	5	3.7	0.0	Neutral
41	6	5	3	4.7	6	5	3	4.7	0.0	Neutral
Overall Landscape Unit Change									0.0	Neutral

Note: Visual quality score definitions: 1 = very low, 2 = low, 3 = moderately low, 4 = moderate, 5 = moderately high, 6 = high, 7 = very high. Scores are based on the visual simulations prepared for the project.
a The visual quality ratings for the No-Build Alternative are the same as the existing conditions.
b The visual quality ratings for the Modified LPA are the same for each design option.
LPA = Locally Preferred Alternative; KVP = key viewpoint

Ruby Junction Landscape Unit

The Ruby Junction Maintenance Facility would be expanded to accommodate the additional light-rail vehicles associated with the extension of light-rail with the Modified LPA. The expansion would include several parcels and existing buildings, structures, vegetation, and other elements on the purchased properties would be removed. However, the expansion of the Ruby Junction Maintenance Facility would be visually compatible with the existing facility and would not change the natural, cultural and project visual character in the Ruby Junction LU.

Table 3.9-10 provides a quantitative assessment of the existing visual quality and the visual quality with the Modified LPA from KVP 42 in the Ruby Junction LU. As shown in Table 3.9-10, the Modified LPA was determined to have a neutral degree of impact to the visual quality at KVP 42. Based on this assessment, the overall impact of the Modified LPA on the visual quality of the Ruby Junction LU would be expected to be neutral.

Table 3.9-10. Ruby Junction Landscape Unit Degree of Impact on Visual Quality

KVP	Visual Quality – Existing [a]				Visual Quality - with Modified LPA [b]				Change	Degree of Impact on Visual Quality
	Natural Harmony	Cultural Order	Project Coherence	Overall	Natural Harmony	Cultural Order	Project Coherence	Overall		
42	3	2	3	2.7	3	2	3	2.7	0.0	Neutral
Overall Landscape Unit Change									0.0	Neutral

Note: Visual quality score definitions: 1 = very low, 2 = low, 3 = moderately low, 4 = moderate, 5 = moderately high, 6 = high, 7 = very high.
a The visual quality ratings for the No-Build Alternative are the same as the existing conditions.
b The visual quality ratings for the Modified LPA are the same for each design option.
KVP = key viewpoint; LPA = Locally Preferred Alternative

3.9.4 Temporary Effects

Temporary visual effects would be related to the construction of the Modified LPA, which includes the construction of the new bridges and the removal of the existing bridge. Visible construction elements would be removed upon completion of construction work.

No-Build Alternative

The No-Build Alternative includes planned transportation projects in the AVE through 2045. Construction of these projects, as well as ongoing repair and maintenance activities for I-5 in the AVE (e.g., painting, repaving, and repairing pavement), would take place under the No-Build Alternative. Ongoing maintenance, repair, and construction would result in repeated temporary visual impacts introducing visual clutter that would have a slight adverse degree of impact to visual quality.

Although difficult to predict, if a future seismic event were to occur under the No-Build Alternative, it could result in cracks, damaged surfaces and finishes, structural deformations, or collapses of structures and the Interstate Bridge, depending on severity. Bridge closures could affect regional vehicular and river traffic for extended periods of time. Viewers may be exposed to heavy traffic on detour routes for long durations and visual clutter from construction activities to repair or replace bridge and roadway elements. The degree of impact to visual quality would be major and adverse.

Modified LPA

During construction of the Modified LPA, the quality of views to and from the construction area would be temporarily altered. Construction-related signage and heavy equipment would be visible in the vicinity of construction sites. Vegetation may be removed from some areas to accommodate the construction of the bridges, new ramps, and the light-rail transit guideway. This would degrade or partially obstruct views or vistas. Nighttime construction would be necessary to minimize disruption to daytime traffic. Temporary lighting may be necessary for nighttime construction of certain project elements. This temporary lighting would affect residential areas by exposing residents to glare from unshielded light sources and by increasing ambient nighttime light levels.

Staging of equipment and materials would occur in areas of the AVE throughout the construction period, generally within existing or newly purchased right of way or on nearby vacant parcels. At least one large site would be required for construction offices, to stage the larger equipment such as cranes, and to store materials such as rebar and aggregate. Work in staging areas would entail vegetation removal, construction vehicle movement, fencing, material storage, bright colors, flashing lights, nighttime lighting, dust, and other visual elements.

Construction activities would be visible to both neighbors and travelers in the AVE, primarily within the visual context of the existing roadway. Lighting, human-made structures and materials, bright colors, and vehicle movement would be visible within the AVE. While these visual changes are typical of construction activities, they would contribute to a perception of a disorderly cultural environment and incoherent project environment. Therefore, during construction, both neighbors and travelers would perceive a temporary degradation and adverse degree of impact to visual quality. In particular, residential neighbors (who prefer maintaining natural harmony and cultural order) adjacent to construction activities would perceive construction activities as degrading the existing visual quality.

Temporary visual effects from the Modified LPA with the single-level movable-span configuration would be similar in character to those described above; however, taller cranes would be needed to construct the lift towers. In addition, construction of the Modified LPA and the temporary visual effects could last up to two additional years. For all other bridge configurations, tall cranes would be required for a shorter duration during the demolition of the existing lift towers.

Visual impacts due to construction activities are, by nature, temporary, and visible detractions related to construction would be removed upon completion. Therefore, the Modified LPA would have a high degree of adverse impact on the visual quality of the AVE but would be limited by the duration of the construction of each item, and impacts would be temporary.

3.9.5 Indirect Effects

The Modified LPA would have indirect effects on visual character and visual quality. These effects could result from potential changes in land use within the AVE that may occur over time as a result of the Modified LPA and are anticipated to occur primarily in the Columbia River LU and the Vancouver Downtown LU.

Columbia Slough Landscape Unit

This LU is already a highly developed urban area, but improved vehicular access and reduced congestion may support denser development in areas currently planned for such development (see Section 3.4.4). Development would occur in compliance with the City of Portland land use plans and regulations. This would likely have a positive effect on the visual character, depending on the quality of design and materials used, compared with what is being replaced (primarily existing buildings and parking lots). Indirect impacts to visual quality as a result of the Modified LPA for this LU are not anticipated.

Columbia River Landscape Unit

Under the Modified LPA, potential indirect land use changes in this LU would primarily involve redevelopment around the proposed transit station on Hayden Island. These areas are already highly developed and new development would occur in compliance with the City of Portland's land use plans and regulations. Views for boaters, air passengers, and pedestrians are unlikely to change significantly because views of new development are likely to be blocked by existing structures or would be in character with existing development. In some instances, existing views of the Columbia River, distant hills, and Mount Hood may be obstructed by new development. However, as most transit-oriented development is anticipated to occur west of I-5, the impacts on views of Mount Hood from I-5 should be relatively minor. Therefore, the indirect effect to visual quality from the Modified LPA for this LU is anticipated to be neutral.

Vancouver Downtown Landscape Unit

The Modified LPA may have an indirect effect of encouraging redevelopment in the more urban areas of this LU, particularly in areas near new LRT stations consistent with Vancouver's plans to accommodate growth by increasing land use density in areas served by high-capacity transit. Such development would be in compliance with the City of Vancouver's land use plans and regulations. New development could obstruct views of the project environment, as well as the Columbia River, distant hills in Portland, and Mount Hood. Indirect land use changes may occur primarily around the proposed transit stations in downtown Vancouver and near Evergreen Boulevard (including the Community Connector), as new areas are opened or removed due to the SR 14 interchange and adjustments to the Mill Plain intersection. Because these areas are already highly developed, potential new transit-oriented development is anticipated to have either no effect or a positive effect on the visual character, depending on the quality of design and materials used compared to the structures being replaced. The visual quality experienced by neighbors on local streets is unlikely to be noticeably changed, as new buildings would become part of the existing urban view. Travelers on I-5 are also unlikely to experience changes in views as views are largely limited to highway infrastructure. Therefore, the indirect effect on visual quality from the Modified LPA is anticipated to be neutral.

Greater Central Park Landscape Unit

The Greater Central Park LU includes the Fort Vancouver National Historic Site, Clark College, Officers Row, Pearson Field, Marshall Park, and Hudson's Bay High School. Most areas within the LU are either protected or developed. Therefore, indirect impacts to visual quality as a result of changed land use or substantially increased development density are not anticipated for this LU. Potential changes in the visual setting of historic properties are discussed in Section 3.8, Historic and Archaeological Resources.

Burnt Bridge Creek Landscape Unit

Riparian areas and steep slopes that define the visual character in this LU would not change, and improving local and regional traffic congestion is not likely to change land uses. Therefore, indirect impacts to visual quality from the Modified LPA are not anticipated for this LU.

Ruby Junction Landscape Unit

Indirect impacts to visual quality as a result of changed land use or substantially increased development density are not anticipated for this LU.

3.9.6 Potential Avoidance, Minimization, and Mitigation Measures

Long-Term Effects

The following section identifies potential mitigation measures to address the long-term effects of the Modified LPA to visual quality.

Regulatory Requirements

- Meet the design standards of the Cities of Vancouver and Portland and the Tri-County Metropolitan Transportation District and the Clark County Public Transit Benefit Area Authority for visual quality, including street furniture and transit stations.
- Restore impacted roadsides in interchange and corridor areas in accordance with applicable vegetation and tree mitigation requirements.

Program-Specific Mitigation

The following Program-specific mitigation is recommended for the Modified LPA, as feasible.

Mitigation Common to All Landscape Units

- For local streets and transit stations, restore damaged landscapes, replant street trees, and provide enhanced landscapes to integrate the facilities into the community.
- Shield station and facility lighting.
- Minimize structural bulk, such as for ramps and columns.
- Design architectural features to blend with the surrounding community.
- Design gateways in coordination with applicable local plans including designs for landscaping, wall treatments, and other Program improvements.

Mitigation for Transit Stops and Stations

- Design transit structural and architectural elements to be context-sensitive, and system-related signage and transit patron cues to be consistent with other transit system elements within respective systems.

- Design the signal pole color, location, and style in accordance with the lighting district standards of the jurisdiction where the poles will be located (Portland or Vancouver).
- Integrate transit facilities into the design of the Community Connector.

Place-Specific Mitigation

Transit Stations and Park and Rides

- Conduct public design charrettes during the final design phases to refine the plans for each station area and park and ride.

Columbia River Landscape Unit

North Portland Harbor Crossings

- Preserve views of Mount Hood, to the extent practicable, for all users.

Hayden Island

- Integrate transit stations with the ground level, such as with landscaping.
- Evaluate surrounding views from the transit platform.
- Consult with the federally recognized tribes in the design process and provide opportunities to include cultural features such as public art, historic education, plazas, or indigenous canoe watercraft landing and taking off locations.

Hayden Island Bridgehead

- Separate structures to admit daylight, if feasible. Maintain the separation between bridge structures across the island to ensure daylight and viable landscape at ground level, if feasible.
- Explore the incorporation of preserved bridgehead character into final design.
- Consult with the federally recognized tribes in the design process and provide opportunities to include public art, historic education, plazas, water access, or other cultural features.
- Explore public art opportunities on Hayden Island to announce arrival in Oregon, including pylons, piers, and other structures.

Columbia River Spans

- Design the active transportation on the Columbia River bridges for as low-stress an environment as possible.
- Use art and landscaping to build anticipation of the river crossing in those approaching the main span, as feasible.
- Include lighting that would give expression to the architecture after dark, as feasible.

North Bank

- Incorporate a destination public open space under the bridge area, as feasible.
- Consult with the federally recognized tribes in the design process and provide opportunities to include cultural features such as public art, historic education, plazas, or water access.
- Encourage creating or enhancing spaces, events, or initiatives that activate open spaces and urban environments along the Main Street extension to the river. Enhancements may include public art, street furniture, bike and pedestrian facilities, popup markets and public events, or other measures.
- Activate open spaces and screen structures with landscaping.

- Use architecture or public art to mark entry and departure from each bridge.

Vancouver Downtown Landscape Unit

Transit Structure "Landing" in Vancouver

- Provide landscaping, public art, or other façade treatments for the walls of the light-rail landing structure, as feasible.
- Coordinate and design transit structures and facilities in conjunction with the Community Connector.

Park-and-Ride Facilities

- Incorporate design guidelines and consider input from Central Park and downtown interested parties and the general public.
- Buffer the park and ride from adjacent uses, mainly with landscaping but potentially with public art, fencing, or other elements, as feasible.
- Comply with City of Vancouver Design Standards and have plans reviewed by the Vancouver Design Review Committee.
- To the extent feasible, eliminate potential glare from the park-and-ride structure components.
- Incorporate public art reflective of the unique context at each park-and-ride facility.

McLoughlin Boulevard Crossing

- Coordinate lighting under structures with city and I-5 lighting.
- Keep the spaces beneath freeway structures clear of unauthorized uses to the extent possible.

Greater Central Park Landscape Unit

SR 14 Interchange

- Maintain existing vegetation wherever possible, particularly between the Kanaka Village and SR 14 ramps. Landscape plans should include plantings as visual screens. Replacement trees should be as large caliper trees as practical to replace screening value as quickly as possible.
- Provide visual and physical connections between under-bridge structures. Connect the Vancouver Land Bridge and Old Apple Tree Park with downtown Vancouver by combining improved sight lines, improved access, and integrated landscape design.
- Use Vancouver Land Bridge landscaping in new landscaped areas as feasible.
- Activate open spaces and screen structures with landscaping. Use landscape to organize the diversity and extent of open spaces associated with the interchanges and to screen the railroad berm.

Burnt Bridge Creek Landscape Unit

- Ensure compatibility of overpass approaches with neighborhoods with input from the neighborhood facing each end of the bridges, as feasible.
- Identify a local design theme for overpasses.

Ruby Junction Landscape Unit

No mitigation for construction impacts would be warranted in the Ruby Junction LU.

Mitigation for Temporary Effects

Regulatory Requirements

There are no regulatory requirements for temporary effects to visual quality, specifically. The Program would meet federal, state, and local design standards for light and glare.

Program-Specific Mitigation

- Follow standard construction specifications regarding the reduction of light and glare.
- Shield construction site lighting to reduce spillover light onto nearby residences and businesses, as feasible.
- Minimize visual obtrusiveness by locating construction equipment and stockpiling materials in less visually sensitive areas, when feasible, and in areas not visible from the road or to residents and businesses.
- Provide, as feasible, public areas to observe the construction and demolition processes, using them as an opportunity for public education.

3.10 Air Quality

Many natural and human activities generate air pollutants that can affect human and environmental health. Air quality is closely tied to transportation (including motor vehicles, trucks, and buses), which is a major contributor of air pollutants in the Portland-Vancouver area. This section evaluates the long-term and temporary effects of the No-Build Alternative and the network improvements of the Modified LPA for two types of air pollutants:

- Mobile source air toxics (MSAT). The Clean Air Act identifies 188 air toxics, of which MSAT are a subset of nine pollutants emitted by vehicles. These nine pollutants are also included in the Oregon Department of Environmental Quality's (DEQ) Toxic Air Contaminant Priority List.
- Criteria pollutants. These pollutants have federally established limits based on human health and environmental criteria.

Information presented in this section is based on the Air Quality Technical Report, including details of the emissions analyses for MSAT and criteria pollutants. Greenhouse gas emissions are discussed in Section 3.12, Energy, and Section 3.19, Climate Change.

3.10.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CPA LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with air quality has been updated in this Draft SEIS to include:

- Updated analysis to address National Ambient Air Quality Standards (NAAQS) and other recent federal guidance, such as FHWA's Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents (FHWA 2023a) and FHWA's Frequently Asked Questions for Conducting Quantitative MSAT Analysis for FHWA NEPA Documents (FHWA 2023b).
- Revised methodology based on the updated ODOT Air Quality Manual and WSDOT Guidance on Addressing Air Quality, Greenhouse Gas Emissions, and Energy for WSDOT projects.
- Removed an assessment for localized carbon monoxide at congested intersections, as the region's 20-year carbon monoxide maintenance period ended in 2017. Therefore, transportation projects in the region are no longer required to demonstrate conformity.
- Updated the analysis based on updated transportation modeling data.
- Calculated criteria pollutants using the U.S. Environmental Protection Agency's (EPA's) Motor Vehicle Emissions Simulator Model (MOVES) (version 3.1.0)[1], which is the version used in current regional modeling analyses in Oregon and Washington. CRC emissions estimates were developed using EPA's MOBILE6.2 model, which MOVES replaced.
- Deleted reference to the Portland Air Toxics Solution study, as it only projected emissions to 2017.
- Added a summary of Oregon State Toxic Air Contaminant Program, which was most recently amended in November 2021.

[1] As of August 2023, MOVES 4 is now the EPA's regulatory emissions modeling system. The EPA has provided a two-year grace period, meaning that MOVES 3 is still an acceptable and appropriate model for regional emissions analyses.

- Changes to the project footprint, as necessitated by changed conditions, and changes in existing land uses resulting in changes to proximity to sensitive receptors.

Table 3.10-1 compares the impacts and benefits of the CRC LPA to those of the Modified LPA as a result of the changes listed above, which include many updates in the analysis methodology and traffic modeling data. Based on the analysis described in this section, the effects of the Modified LPA would be similar to those of the CRC LPA. Overall, the Modified LPA would reduce the emissions of air quality pollutants compared to existing conditions.

Table 3.10-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects as Identified in this Section	Explanation of Differences
Change in VMT used to calculate air pollutant emissions – Difference from Existing (2005 in CRC LPA and 2015 in Modified LPA).	• 40% (2030)	• 62% (2045)	• Variations in methodology such as the base year of analysis and MSAT study area.
MSAT Emissions (2030 in CRC LPA and 2045 in Modified LPA) – Difference from Existing (2005 in CRC LPA and 2015 in Modified LPA). [a]	• 1,3-Butadiene: -53% • Acetaldehyde: N/A • Acrolein: -52% • Benzene: -57% • Diesel Particulate Matter: -93% • Ethylbenzene: N/A • Formaldehyde: -48% • Naphthalene: -37% • Polycyclic Organic Matter: N/A	• 1,3-Butadiene: -100% • Acetaldehyde: -85% • Acrolein: -90% • Benzene: -70% • Diesel Particulate Matter: -88% • Ethylbenzene: -29% • Formaldehyde: -88% • Naphthalene: -94% • Polycyclic Organic Matter: -96%	• CRC LPA MSAT emissions are in units of pounds per summer day and Modified LPA MSAT emissions are in tons per year. • Additional differences include analysis years, updates to future volume projections, updates to federal air emissions standards, and updates to EPA's emission factor model.
Regional Criteria Pollutant Emissions (2030 in CRC LPA and 2045 in Modified LPA) – Difference from Existing (2005 in CRC LPA and 2015 in Modified LPA). [b]	• Carbon Monoxide (winter): -26% • Nitrogen Dioxide: -74% • Sulfur Dioxide: N/A • Volatile Organic Compounds: -56% • Total PM_{10}: -92% • Total $PM_{2.5}$: -91%	• Carbon Monoxide: -63% • Nitrogen Dioxide: -79% • Sulfur Dioxide: 9% • Volatile Organic Compounds: 25% • Total PM_{10}: 21% • Total $PM_{2.5}$: -48%	• CRC LPA Regional Criteria Pollutant Emissions are in tons per day and Modified LPA Regional Criteria Pollutant Emissions are in tons per year.

Source: CRC 2011

Note: 2019 is the baseline year for most existing conditions data. The exception is for outputs that rely on the Metro/RTC regional travel demand model, which has not yet updated its base year model from 2015. As a result, all Metro/RTC regional travel demand model outputs summarize 2015 data based on 2015 land use, population, and employment data.

a MSAT Emissions for CRC are in pounds per day and for Modified LPA are in tons per year.

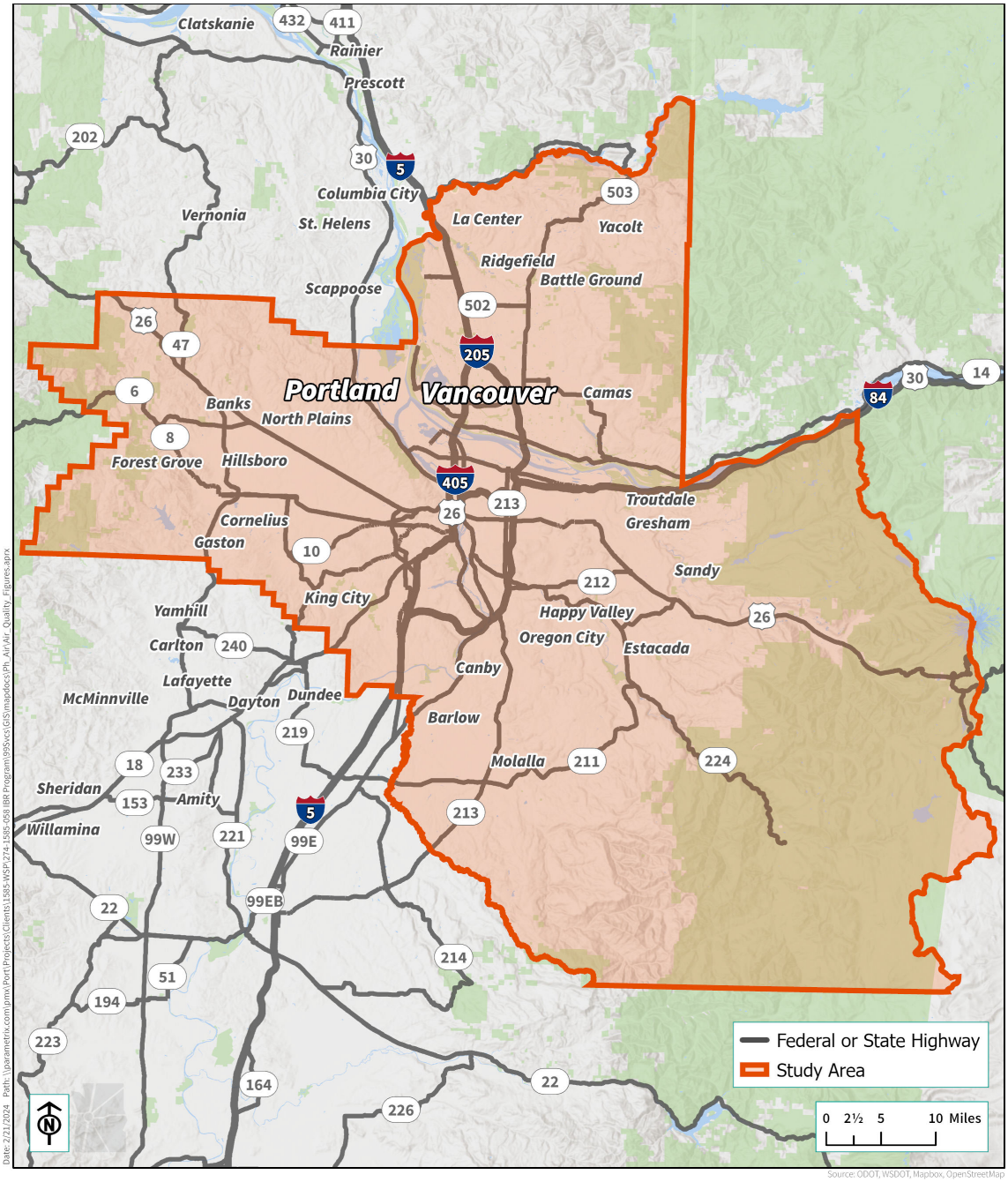
b Regional Criteria Pollutant Emissions for CRC are in tons per day and for Modified LPA are in tons per year.

CRC = Columbia River Crossing; EIS = Environmental Impact Statement; EPA = Environmental Protection Agency; LPA = Locally Preferred Alternative; MSAT = Mobile Source Air Toxics; N/A = not applicable; VMT = vehicle miles traveled

3.10.2 Existing Conditions

The study area is shown in Figure 3.10-1. The Oregon DEQ measures air pollutant levels with a network of air monitoring and sampling equipment at more than 40 sites throughout the state, including the study area. The Washington State Department of Ecology (Ecology) does not operate many monitors in the Vancouver area because the monitors operated by DEQ fulfill the federal monitoring requirements for the metropolitan area. Over the last 10 years, pollutant concentrations have been trending mostly downward for most locations, with most exceptions corresponding to wildfire smoke events. DEQ implements several programs that regulate emissions of air toxics and monitors ambient levels present at various locations across Oregon. DEQ uses this concentration data to develop strategies to reduce ambient levels of air toxics in the state. The Air Quality Technical Report includes tables of recent monitoring data for criteria pollutants and air toxics.

Figure 3.10-1. Air Quality Study Area



Air Quality Pollutants and Standards

Mobile Source Air Toxics

MSAT emissions are the subset of air toxics emitted by mobile sources. The priority MSAT pollutants include benzene, 1,3-butadiene, naphthalene, polycyclic organic matter, formaldehyde, acrolein, ethylbenzene, acetaldehyde, and diesel particulates. Exposure to these pollutants over time can affect human health. Unlike criteria pollutants, MSAT pollutants do not have regulatory standards.

The EPA's MOVES 3.1.0 model was used to estimate the MSAT emissions (in tons per year) for existing conditions, the No-Build Alternative and the Modified LPA. The analysis was performed according to FHWA guidance that recommends estimating emissions for roadway segments that are expected to have a change in volume of more than 5% compared to the No-Build Alternative. The roadway network used for the emissions analysis is shown by the roadway segments highlighted in Figure 3.10-2.

The MOVES model estimates emissions from this MSAT network based on details from regional travel demand modeling (traffic volumes, speeds, and vehicle mix) and region-specific MOVES inputs that describe the climate, fuel supply, and vehicle registration. DEQ and Ecology provided data files to run two MOVES models to determine the emissions on Oregon and Washington roadway segments, using regional conditions for each state. The Air Quality Technical Report presents details of the travel demand modeling assumptions, including the consideration of potential trip diversion.

Criteria Pollutants

The EPA has developed NAAQS for six major air pollutants. Areas previously designated nonattainment areas that are now in compliance with air quality standards are classified as "attainment" areas or "maintenance areas." A table of the current NAAQS is found in the Air Quality Technical Report.

The study area spans four counties in the Portland and Vancouver metropolitan areas; the EPA has designated both metropolitan areas as in attainment for all criteria pollutants. The area was previously designated as nonattainment for carbon monoxide and 1-hour ozone. As of October 2, 2017, the 20-year transportation conformity planning period associated with the Carbon Monoxide Maintenance Plan was completed. All measures and requirements contained in the Carbon Monoxide Maintenance Plan must be complied with until the EPA approves a revision to the state plan; however, transportation projects are no longer required to demonstrate NAAQS compliance with the transportation conformity requirements of 40 Code of Federal Regulations Part 93 subpart A.

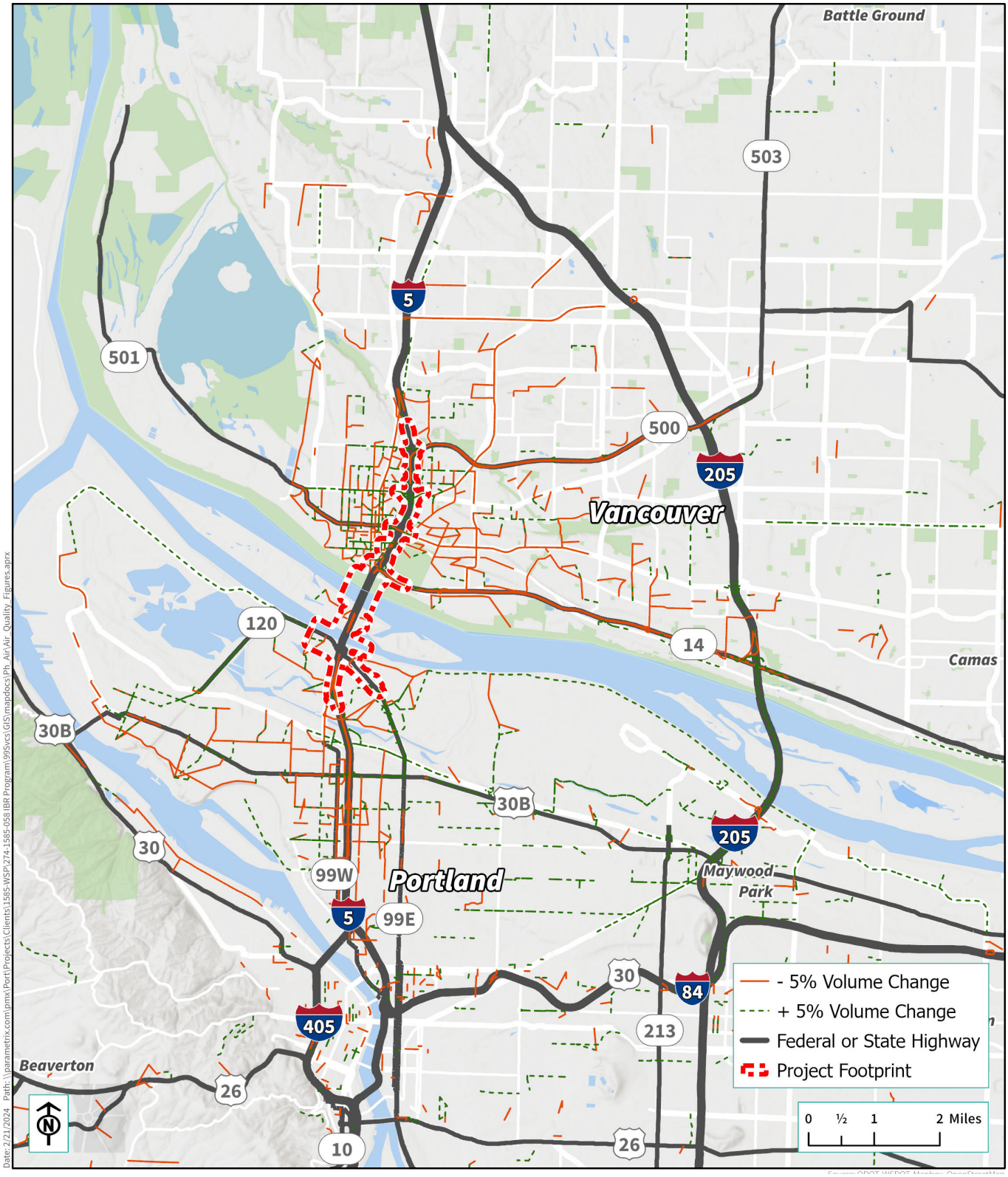
In 2005, EPA revoked the 1-hour ozone standard. At the time, the Portland-Vancouver region was subject to an ozone maintenance plan. The maintenance plan, including regional commitments for transportation strategies to address ozone, is still in effect.

The criteria pollutant emissions analysis followed the same methodology described for the MSAT analysis to provide a comparison of emissions between existing and future conditions.

As part of Oregon's State Implementation Plan for carbon monoxide, Transportation Control Measures (TCMs) were identified to reduce emissions by reducing vehicle use (DEQ 2004). Although transportation conformity is no longer required after the 20-year maintenance period, the following TCMs were applicable between the years of 2006 and 2017 and are examples of strategies that have been used to reduce emissions:

- Transit Service Increase: Regional transit service revenue hours (weighted by capacity) are increased 1% per year. The increase is assessed on the basis of a five-year rolling average of actual hours for assessments conducted between 2006 and 2017.

Figure 3.10-2. Roadway Emissions Analysis Network



- Bicycle Paths : Jurisdictions and government agencies must program a minimum total of 28 miles of bicycle paths or trails within the Portland metropolitan area between the years 2006 and 2017. Bicycle paths must be consistent with state and regional bikeway standards. A cumulative average of 5 miles of bikeways or trails per biennium must be funded from all sources in each Metropolitan Transportation Improvement Program. Facilities subject to this TCM must be in addition to those required for expansion or reconstruction projects under Oregon Revised Statutes 366.514.
- Pedestrian Paths : Jurisdictions and government agencies must program at least 9 miles of pedestrian paths in mixed-use centers between the years 2006 and 2017, including the funding of a cumulative average of 1.5 miles in each biennium from all sources in each Metropolitan Transportation Improvement Program. Facilities subject to this TCM must be in addition to those required for expansion or reconstruction projects under Oregon Revised Statutes 366.514, except where such expansion or reconstruction is located within a mixed-use center.

Sensitive Receptors

While air quality effects on all members of the population are evaluated, potential effects on sensitive receptors are of particular concern. Sensitive receptors are facilities that house or attract children, the elderly, people with illnesses, or others who are especially sensitive to the effects of air pollutants. Hospitals, schools, and assisted living facilities are examples of sensitive receptors. Table 3.10-2 lists the hospitals, schools, and assisted living facilities located near the Program footprint. Many of these facilities are located in downtown Vancouver, west of the Program footprint.

Table 3.10-2. Sensitive Receptors Near the Program Footprint

Facility	Address
Hospitals and other Healthcare Facilities	
Portland VA Health Care System- Vancouver	1601 E 4th Plain Blvd, Vancouver, WA 98661
Providence Esther Short - Vancouver	700 Washington St Suite 105, Vancouver, WA 98660
ZoomCare	781 W Columbia Way, Vancouver, WA 98660
Sea Mar Community Health Center- CSNW Rose Village	2502 E 4th Plain Blvd, Vancouver, WA 98661
Schools	
Discovery Middle School	800 E 40th St, Vancouver, WA 98663
Vancouver School of Arts and Academics	3101 Main St, Vancouver, WA 98663
Washington State School for the Blind	2214 E 13th St, Vancouver, WA 98661
Hudson's Bay High School	3528, 1601 E McLoughlin Blvd, Vancouver, WA 98663
VITA Elementary School	1111 Fort Vancouver Way, Vancouver, WA 98663
Clark College	1933 Fort Vancouver Way, Vancouver, WA 98663

Facility	Address
Assisted Living	
Rose Village Adult Care Home	3810 S St, Vancouver, WA 98663
Knights of Pythias Retirement Center	3409 Main St, Vancouver, WA 98663
The Oaks at Timberline	400 E 33rd St, Vancouver, WA 98663
The Evergreen Inn	500 Main St, Vancouver, WA 98660
The Springs at The Waterfront	655 W Columbia Way Suite 602, Vancouver, WA 98660
Van Vista	410 W 13th St, Vancouver, WA 98660

3.10.3 Long-Term Effects

Table 3.10-3 summarizes the effects on air quality of the No-Build Alternative and the Modified LPA with the double-deck fixed-span, single-level fixed-span, and single-level movable-span configurations. Detailed analysis of the effects is provided in the following sections.

No-Build Alternative

Air pollutant emissions from the regional transportation system would continue, including from idling vehicles during bridge openings under the No-Build Alternative (Table 3.10-4 and Table 3.10-5). Although vehicle miles traveled (VMT) would increase substantially between now and 2045, emissions of most MSAT and criteria pollutants would go down because of more stringent regulation of fuels and emissions.

Modified LPA

The Modified LPA would not cause long-term adverse air quality impacts. Emissions reductions vary by pollutant. Decreases range from 29% to 100%, with minor differences between the Modified LPA and the No-Build Alternative (Table 3.10-4 and Table 3.10-5). Changes in criteria pollutant emissions compared to existing conditions range from reductions of up to 79% to increases of up to 25%, depending on the pollutant.

Air pollutant emissions are expected to be substantially lower in the future than under existing conditions for all pollutants evaluated, except SO_2, VOC, and total PM_{10}. The predicted emissions reduction would be almost entirely due to EPA regulations, fuel and engine standard improvements. Emissions reduction associated SO_2, VOC, and total PM_{10} would not outpace emissions increases caused by VMT growth.

Future 2045 emissions for the Modified LPA are less than 2045 No-Build Alternative for all pollutants. The emissions shown for the roadway segments are meant to present the difference between the No-Build Alternative and the Modified LPA—the MOVES model results do not represent the total emissions for the entire regional study area.

Compared to the No-Build Alternative, travel demand modeling that includes projected transit ridership and potential trip diversion to avoid tolls, showed the Modified LPA would lower emissions of MSAT and criteria pollutants by improving traffic flow and reducing VMT within the study area. Compared to the Modified LPA with the double-deck fixed-span configuration, the Modified LPA with the single-level fixed-span (any bridge type option) or the single-level movable-span configuration may slightly reduce operational vehicle emissions because of the lower profile grade, which would reduce acceleration and braking of vehicles crossing the bridges.

Table 3.10-3. Summary of Air Quality Effects of the No-Build Alternative and the Modified LPA as Compared to Existing Conditions

1	2	3	4	5
Effect	No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration, One or Two Auxiliary Lanes, with or without C Street Ramps, Centered I-5 or I-5 Westward Shift, all Park-and-Ride Site Options	Modified LPA with Single-Level Fixed-Span Configuration, a One or Two Auxiliary Lanes, with or without C Street Ramps, Centered I-5 or I-5 Westward Shift, all Park-and-Ride Site Options	Modified LPA with Single-Level Movable-Span Configuration, One or Two Auxiliary Lanes, with or without C Street Ramps, Centered I-5 or I-5 Westward Shift, all Park-and-Ride Site Options
VMT in MSAT study area	• 3,537,900 VMT in 2045 (66% increase compared to existing conditions).	• 3,455,400 VMT in 2045 (62% increase compared to existing conditions).	• Same as effects listed in Column 3.	• Same as effects listed in Column 3.
Changes in air pollutant emissions	• Future regional emissions would be substantially lower than existing emissions for all MSAT, CO, NO_X, and $PM_{2.5}$. Future regional emissions of SO_2, VOC would be up to 25% higher than existing conditions due to increased VMT.	• Similar to No-Build Alternative (slightly lower emissions than No-Build Alternative due to reduced VMT).	• Similar to effects listed in Column 3, but may slightly reduce operational emissions due to the lower profile grade, which would reduce acceleration and braking of vehicles crossing the bridges.	• Similar to effects in Column 4, except for a minor increase in air quality pollutants due to vehicles idling during bridge openings. There would be fewer bridge openings than with the No-Build Alternative.
Changes in MSATs emissions (2045)	• 1,3-Butadiene: 100% reduction • Acetaldehyde: 82% reduction • Acrolein: 89% reduction • Benzene: 69% reduction • Diesel Particulate Matter: 86% reduction • Ethylbenzene: 29% reduction • Formaldehyde: 86% reduction • Naphthalene: 93% reduction • Polycyclic Organic Matter: 93% reduction	• 1,3-Butadiene: 100% reduction • Acetaldehyde: 85% reduction • Acrolein: 90% reduction • Benzene: 70% reduction • Diesel Particulate Matter: 88% reduction • Ethylbenzene: 29% reduction • Formaldehyde: 88% reduction • Naphthalene: 94% reduction • Polycyclic Organic Matter: 96% reduction	• Similar to effects listed in Column 3, but may slightly reduce operational emissions due to the lower profile grade, which would reduce acceleration and braking of vehicles crossing the bridges.	• Similar to effects in Column 4, except for a minor increase in air pollutants due to vehicles idling during bridge openings. There would be fewer bridge openings than with the No-Build Alternative.

1	2	3	4	5
Changes in regional criteria pollutant emissions	• Carbon Monoxide: 61% reduction • Nitrogen Dioxide: 75% reduction • Sulfur Dioxide: 16% increase • Volatile Organic Compounds: 26% increase • Total PM_{10}[a]: 46% increase • Total $PM_{2.5}$[b]: 39% reduction	• Carbon Monoxide: 63% reduction • Nitrogen Dioxide: 79% reduction • Sulfur Dioxide: 9% increase • Volatile Organic Compounds: 25% increase • Total PM_{10}[a]: 21% increase • Total $PM_{2.5}$[b]: 48% reduction	• Similar to effects in Column 3, but may slightly reduce operational emissions due to the lower profile grade, which would reduce acceleration and braking of vehicles crossing the bridges.	• Similar to effects in Column 4, except for a minor increase in air quality pollutants due to vehicles idling during bridge openings. There would be fewer bridge openings than with the No-Build Alternative.

a The long-term effects associated with the single-level fixed-span configuration would be the same for all bridge type options, unless otherwise specified.
LPA = Locally Preferred Alternative; MSAT = Mobile Source Air Toxics; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; PM_{10} = particulate matter less than or equal to 10 microns in diameter; VMT = vehicle miles traveled

Table 3.10-4. Mobile Source Air Toxics Emissions (Tons per Year)

Pollutant	Existing (2015)	No-Build Alternative (2045)	Modified LPA (2045)[a]	Modified LPA Difference from Existing	Modified LPA Difference from No-Build Alternative
MSAT Study Area Daily VMT	2,128,200	3,537,900	3,455,400	62%	-2%
1,3-Butadiene	0.7	0.0	0.0	-100%	0%
Acetaldehyde	2.4	0.4	0.4	-85%	-14%
Acrolein	0.23	0.03	0.02	-90%	-12%
Benzene	14.2	4.3	4.3	-70%	-1%
Diesel Particulate Matter	10.8	1.6	1.3	-88%	-14%
Ethylbenzene	19.0	13.5	13.4	-29%	-1%
Formaldehyde	3.61	0.51	0.45	-88%	-12%
Naphthalene	0.47	0.03	0.03	-94%	-7%
Polycyclic Organic Matter	0.19	0.01	0.01	-96%	-42%

Note: Percentage differences calculated prior to rounding.
a The data for the Modified LPA applies to all design options except the two auxiliary lane option.
LPA = Locally Preferred Alternative; MSAT = Mobile Source Air Toxics; VMT = vehicle miles traveled

Table 3.10-5. Criteria Pollutant Emissions (Tons per Year)

Pollutant	Existing (2015)	No-Build Alternative (2045)	Modified LPA (2045)[a]	Modified LPA Difference from Existing	Modified LPA Difference from No-Build Alternative
MSAT Study Area Daily VMT	2,128,200	3,537,900	3,455,400	62%	-2.3%
Carbon Monoxide	4,355	1,687	1,597	-63%	-5.3%
Nitrogen Dioxide	897	226	184	-79%	-18.5%
Sulfur Dioxide	2.4	2.8	2.6	9%	-5.7%
Volatile Organic Compounds	662	830	826	25%	-0.6%
Total PM_{10}[b]	46.0	67.1	55.9	21%	-16.6%
Total $PM_{2.5}$[c]	18.5	11.3	9.6	-48%	-14.5%

Note: Percentage differences calculated prior to rounding.
a The data for the Modified LPA applies to all design options except the two auxiliary lane option.
b Total PM_{10} emissions are the sum of PM_{10} exhaust, PM_{10} brake wear, and PM_{10} tire wear.
c Total $PM_{2.5}$ emissions are the sum of $PM_{2.5}$ exhaust, $PM_{2.5}$ brake wear, and $PM_{2.5}$ tire wear.
LPA = Locally Preferred Alternative; MSAT = Mobile Source Air Toxics; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; PM_{10} = particulate matter less than or equal to 10 microns in diameter; VMT = vehicle miles traveled

The Modified LPA with the double-deck fixed-span configuration and the single-level fixed-span configuration (any bridge type option) would eliminate emissions from idling during a bridge opening. The Modified LPA with the single-level movable-span configuration would still result in idling and emissions due to bridge openings; however, because it would have a higher vertical navigation clearance than the existing bridge, it could result in fewer bridge openings and reduced idling compared to the No-Build Alternative. Because the different bridge configurations would not result in meaningfully different regional VMT and speed, there was no change to the regional travel demand model output, and no additional air quality modeling was warranted. The emissions are considered to be the same as discussed above for the Modified LPA.

As discussed in the Navigation Technical Report, the configuration ultimately selected would affect navigation patterns. However, emissions from marine vessels were not evaluated because it is anticipated there would be no change in vessel idling emissions. Currently, bridge openings are scheduled as needed so vessels can pass with limited need for idling. The Modified LPA incorporating any of the configuration or bridge type options would result in either the same or less emissions from idling vessels. It is possible that marine traffic could increase if the need for bridge openings is eliminated; while the potential increase in marine traffic is beyond the scope of this project to predict it would be anticipated that the increased marine traffic would not require a bridge opening and therefore not result in marine idling.

Compared to the Modified LPA with one auxiliary lane, the analysis of the long-term effects of the Modified LPA with two auxiliary lanes using the regional travel demand model shows no statistical difference in pollutant emissions (Table 3.10-6 and Table 3.10-7); pollutant emissions are within a 1.5% difference.

As in the case of the configuration and bridge type options described above, the long-term effect on air quality of the Modified LPA would be the same for any of the design options except the two auxiliary lane options (i.e., with or without the I-5 C Street ramps at the SR 14 interchange, with the centered I-5 mainline or the westward shift, and with each of the park-and-ride site options). Because design options other than the two auxiliary lane option would not result in meaningfully different regional VMT and speed, no additional air quality modeling was conducted.

Table 3.10-6. Mobile Source Air Toxics Emissions for the Modified LPA with One or Two Auxiliary Lanes (Tons per Year)[a]

Pollutant	Modified LPA with One Auxiliary Lane (2045)	Modified LPA with Two Auxiliary Lanes (2045)	Difference Between Modified LPA with One and Two Auxiliary Lanes
MSAT Study Area Daily VMT	3,455,400	3,462,400	0.2%
1,3-Butadiene	0.00	0.00	0.0%
Acetaldehyde	0.4	0.4	-0.9%
Acrolein	0.02	0.02	-0.6%
Benzene	4.3	4.3	0.0%
Diesel Particulate Matter	1.3	1.3	-0.9%
Ethylbenzene	13.4	13.4	0.0%
Formaldehyde	0.45	0.45	-0.7%
Naphthalene	0.03	0.03	-0.2%

Pollutant	Modified LPA with One Auxiliary Lane (2045)	Modified LPA with Two Auxiliary Lanes (2045)	Difference Between Modified LPA with One and Two Auxiliary Lanes
Polycyclic Organic Matter	0.01	0.01	0.0%

a Data in this table apply to all design options, unless otherwise indicated.
LPA = Locally Preferred Alternative; MSAT = Mobile Source Air Toxics; VMT = vehicle miles traveled

Table 3.10-7. Criteria Pollutant Emissions for the Modified LPA with One or Two Auxiliary Lanes (Tons per Year)[a]

Pollutant	Modified LPA with One Auxiliary Lane (2045)	Modified LPA with Two Auxiliary Lanes (2045)	Difference Between Modified LPA with One and Two Auxiliary Lanes
MSAT Study Area Daily VMT	3,455,400	3,462,400	0.2%
Carbon Monoxide	1,597	1,596.1	0.0%
Nitrogen Dioxide	184	181.6	-1.4%
Sulfur Dioxide	2.6	2.6	0.0%
Volatile Organic Compounds	826	825.5	0.0%
Total PM_{10}[b]	55.9	55.3	-1.2%
Total $PM_{2.5}$[c]	9.6	9.5	-1.0%

a Data in this table apply to all design options, unless otherwise indicated.
b Total PM_{10} emissions are the sum of PM_{10} exhaust, PM_{10} brake wear, and PM_{10} tire wear.
c Total $PM_{2.5}$ emissions are the sum of $PM_{2.5}$ exhaust, $PM_{2.5}$ brake wear, and $PM_{2.5}$ tire wear.

MSAT Health Effects

Within the study area, there may be localized areas where ambient concentrations of MSAT with the Modified LPA could be different from the No-Build Alternative. The magnitude and duration of potential localized concentration increases cannot be reliably quantified because of uncertainty in future emissions, weather patterns, exposure pathways, and causation of effects.

In FHWA's view, the information needed to credibly predict Program-specific health impacts due to changes in MSAT emissions is incomplete or unavailable. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation than by any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

Sensitive Receptors

Some occupants of hospitals, schools, assisted living facilities and other sensitive receptors are more susceptible to the adverse effects of air pollutants than the general public. All of the design options would have the same air quality effect on sensitive receptors in the area (as listed in Table 3.10-2), except the Modified LPA with I-5 mainline westward shift would shift traffic closer to the sensitive receptors, which are located west of the Program footprint and could change localized pollutant emissions. Because the Portland

and Vancouver metropolitan areas are in attainment for NAAQS, no further analysis is necessary to confirm that the Modified LPA would not result in pollutant concentrations in excess of the NAAQS.

3.10.4 Temporary Effects

No-Build Alternative

The No-Build Alternative would not involve construction and therefore would not result in construction-related air quality effects.

Modified LPA

Construction of the Modified LPA under any of the design options includes construction of the new bridges and removal of the existing Interstate Bridge. Construction-related activities would result in temporary air emissions, which could include increases in particulate matter in the form of fugitive dust (from demolition, ground clearing and preparation, grading, stockpiling of materials, on-site movement of equipment, and transportation of construction materials) and exhaust emissions from material delivery trucks, construction equipment, and workers' private vehicles. Dust emissions increase during dry weather, construction activities, or high wind conditions. Temporary impacts to air quality from construction activities would occur during the 9- to 15-year Program-wide construction period, which is expected to last from 2 to 10 years in specific locations. Although this construction duration is longer than the 5 years usually considered as temporary under transportation conformity rules (40 CFR 93.123), these rules do not apply to areas like Portland, which are in attainment for all NAAQS. Locations of elevated emissions would likely occur directly next to the construction activities, staging areas, and material hauling routes. All design options of the Modified LPA are expected to have similar temporary construction effects.

At this design stage, the Program has not developed detailed construction sequencing plans, which depend on funding, permitting, and other future considerations. Once these plans are developed, some areas located near concentrations of construction activity may be exposed to elevated levels of emissions. To better understand the potential for increased air emissions near construction sites, particularly for construction activities near sensitive receptors, the IBR Program team reviewed the example of the Dan Ryan Expressway, which had similar scope to the IBR Program. During construction of the Dan Ryan Expressway, air monitoring was conducted at 27 sites—at schools, parks, public housing, and public facilities—where the population was expected to be more sensitive to air contaminants. The monitored pollutants included total dust, respirable silica, lead, asbestos, polycyclic aromatic hydrocarbons (as diesel components), PM_{10}, and $PM_{2.5}$. Air monitoring was conducted during the construction period (from January 2005 until October 2007) and federal air quality standards were not exceeded. The results from the Dan Ryan Expressway project indicate that the construction activities for the Modified LPA should not result in violations of air quality standards and should not pose an undue health risk to the neighboring communities, including sensitive populations. More information on the Dan Ryan Expressway project can be found in the Air Quality Technical Report.

3.10.5 Indirect Effects

Indirect effects are those caused at a later time or farther away, but that are still reasonably foreseeable. The Modified LPA, under any of the design options, may indirectly encourage development, particularly in light-rail station areas, due to improved bicycle, pedestrian, highway, and transit access in Portland and Vancouver. Such development could generate additional traffic, which would increase air emissions; however, because the Modified LPA would provide additional transportation options such as transit and nonmotorized facilities, any increase in emissions is expected to be minor. As described Section 3.4, Land Use and Economic Activity, the magnitude and location of development facilitated by the Modified LPA would be consistent with all local and regional land use plans, and the IBR Program is not expected to result in urban sprawl, which

tends to increase air emissions. No additional indirect effects would occur under the Modified LPA. All design options of the Modified LPA are expected to have similar indirect effects.

3.10.6 Potential Avoidance, Minimization, and Mitigation Measures

Long-Term Effects

Regulatory Requirements

The requirements of the Oregon and Washington State Implementation Plans would continue to be implemented by the states; there are no regulatory requirements that would be directly implemented by the IBR Program.

Program-Specific Mitigation

Long-term air quality impacts are not expected to occur because of the Modified LPA, and Program-specific mitigation for long-term impacts is not proposed.

Temporary Effects

There are no thresholds associated with the temporary effects to air quality. Although there is no mitigation required to meet applicable emissions thresholds, measures would be required to protect and minimize temporary effects on air quality during construction. ODOT, WSDOT, and all project contractors would comply with standard and regulatory mitigation measures. As construction phasing plans and mitigation measures are further developed, potential air quality impacts to sensitive receptors will be considered, particularly those due to prolonged construction emissions and/or simultaneous or sequential construction activities. Best management practices, including strategies to reduce fugitive dust and reduce vehicle idling, would be implemented to reduce and mitigate air quality emissions during construction.

Regulatory Requirements

To protect and minimize temporary effects on air quality during construction, standard and regulatory mitigation measures such as best management practices would be implemented.

Construction contractors would be required to comply with the following standard and regulatory air quality measures in Oregon:

- Division 208 of OAR 340.
- ODOT Standard Specifications Section 290.
- The Clean Diesel Construction Standard (OAR-731-005-0800).
- Oregon House Bill 2007, known as the “Clean Diesel Bill.”
- The City of Portland Clean Air Construction Program to reduce diesel emissions by implementing a standard set of idle reduction and diesel equipment requirements on job sites.

Standard and regulatory mitigation measures for air quality in Washington include:

- WSDOT Standard Specifications for Road, Bridge, and Municipal Construction, Section 1.07.5(4).
- Fugitive dust control best management practices set forth in the Associated General Contractors of Washington Education Foundation and Fugitive Dust Task Force pamphlet, “Guide to Handling Fugitive Dust From Construction Projects.”

Program-Specific Mitigation

- Through contract specifications, encourage all contractors to minimize impacts to surrounding communities such as using newer low-emitting construction equipment and electric equipment, and avoiding haul routes through residential areas.

3.11 Noise and Vibration

This section summarizes the guidelines and standards for evaluating noise and vibration impacts, existing noise levels, the long-term and temporary noise and vibration levels from the No-Build Alternative and the Modified Locally Preferred Alternative (LPA), and mitigation measures for noise and vibration impacts. The information presented in this section is based on the Noise and Vibration Technical Report. Section 3.16, Ecosystems, provides information about noise-related effects on fish and wildlife within the study area's environment.

How do decibels relate to sound levels?

The human ear generally cannot detect very slight changes in noise levels. The smallest change in noise level that a human ear can perceive is about 3 decibels, while increases of 5 decibels or more are clearly noticeable. For most people, a 10-decibel increase in noise levels is perceived as a doubling of sound level.

3.11.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC LPA. Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with noise and vibration has been updated in this Draft SEIS to include:

- Updated existing noise measurements for traffic noise modeling and transit noise assessment.
- Updated all peak-hour and peak-truck-hour traffic data for traffic noise assessment.
- Updated all transit operation assumptions for transit noise and vibration assessment.
- Updated the locations of sensitive noise receptors based on changes in land use.
- New FHWA, WSDOT, and ODOT traffic noise assessment guidance and FTA noise and vibration guidance.
- Developed new traffic noise model and transit noise and vibration assessment models.
- Changes to the project footprint, as necessitated by changed conditions, and in existing land uses resulting in changes to proximity to sensitive receptors.

Table 3.11-1 compares the impacts and benefits between the CRC LPA and the Modified LPA as a result of the changes listed above. Based on the analysis described in this section, the Modified LPA would have fewer residences, and other noise-sensitive land uses, that would have an increase in highway or transit noise levels or ground-borne vibrations that would meet FHWA's or FTA's threshold to be considered an impact. Key modifications that led to this decrease in highway noise, transit noise, and vibration impacts include reductions to the highway footprint at the I-5/SR 500/39th Street interchange and the realignment of light-rail from downtown Vancouver to along the I-5 corridor.

Table 3.11-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS (without Mitigation)	Modified LPA Effects as Identified in this Section (without Mitigation)	CRC LPA Effects as Identified in the 2011 Final EIS (with Mitigation)	Modified LPA Effects as Identified in this Section (with Mitigation)	Explanation of Differences
Number of receptors that exceed highway noise thresholds	325	198	110	121	Reduced highway footprint at the I-5/SR 500/39th St Interchange.
Number of receptors with moderate transit noise impact levels	31	12	0	0	Moved transit alignment from downtown Vancouver to along I-5.
Number of receptors with severe transit noise impact levels	0	0	0	0	No change.
Number of receptors with transit vibration impacts	15	13	0	13	Impacts associated with the Modified LPA are in proximity to the direct fixation trackway in downtown Vancouver.

3.11.2 Existing Conditions

Understanding Sound

How Sound Levels Are Measured

Two aspects of sound that partially determine its impacts are loudness and frequency. The loudness of sound is a result of its energy, which is measured in decibels (dB); an A-weighted decibel (dBA) measures noise as perceived by the human ear.

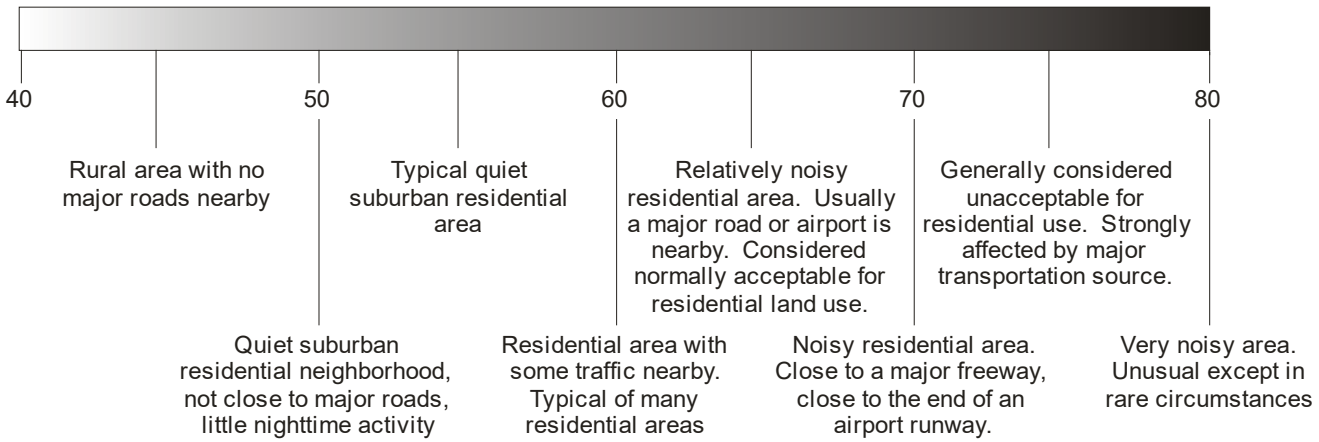
Most noise levels at a given location vary over time. To account for this variation, a commonly used noise measurement is the equivalent sound pressure level (L_{eq}). This noise analysis uses L_{eq} to describe traffic and transit noise at schools, libraries, and other noise-sensitive institutional uses. Consistent with FTA noise regulations, this analysis also gives more weight to noise that occurs at night (from 10:00 p.m. to 7 a.m.). This method produces the *day-night equivalent sound level*, which is abbreviated as L_{dn}.

The Noise and Vibration Technical Report (Chapter 2.4) provides detailed methods for sound level monitoring and noise model development.

Typical Noise Levels

Figure 3.11-1 shows typical community noise levels. Figure 3.11-2 shows how some common noise sources are perceived by the human ear.

Figure 3.11-1. Typical Community Noise Levels (in L_{dn})



Source: FTA 1995

L_{dn} = day-night equivalent sound level Noise Criteria and Analysis Methods

Highway Traffic Noise Criteria

Federal, state, and local governments regulate and provide guidance for acceptable noise and vibration levels to ensure the public's health and wellbeing. For highways and transit systems, FHWA, FTA, ODOT, and WSDOT have developed guidance for assessing noise and vibration impacts. This assessment also considers applicable regulations from the City of Portland and City of Vancouver.

Table 3.11-2 summarizes FHWA's traffic noise abatement criteria. ODOT is responsible for implementing the FHWA regulations in Oregon, and WSDOT administers the FHWA regulations in Washington. Under ODOT policy, a traffic noise impact occurs if predicted noise levels approach within 2 dBA or exceed the FHWA criteria; the criteria apply to the peak noise impact hour. Under WSDOT policy, a traffic noise impact occurs if predicted noise levels approach within 1 dBA of or exceed the FHWA criteria. Both agencies consider an increase of 10 dBA or more to be a substantial impact.

Figure 3.11-2. Typical Noise Source and Human Perception of Sound Levels

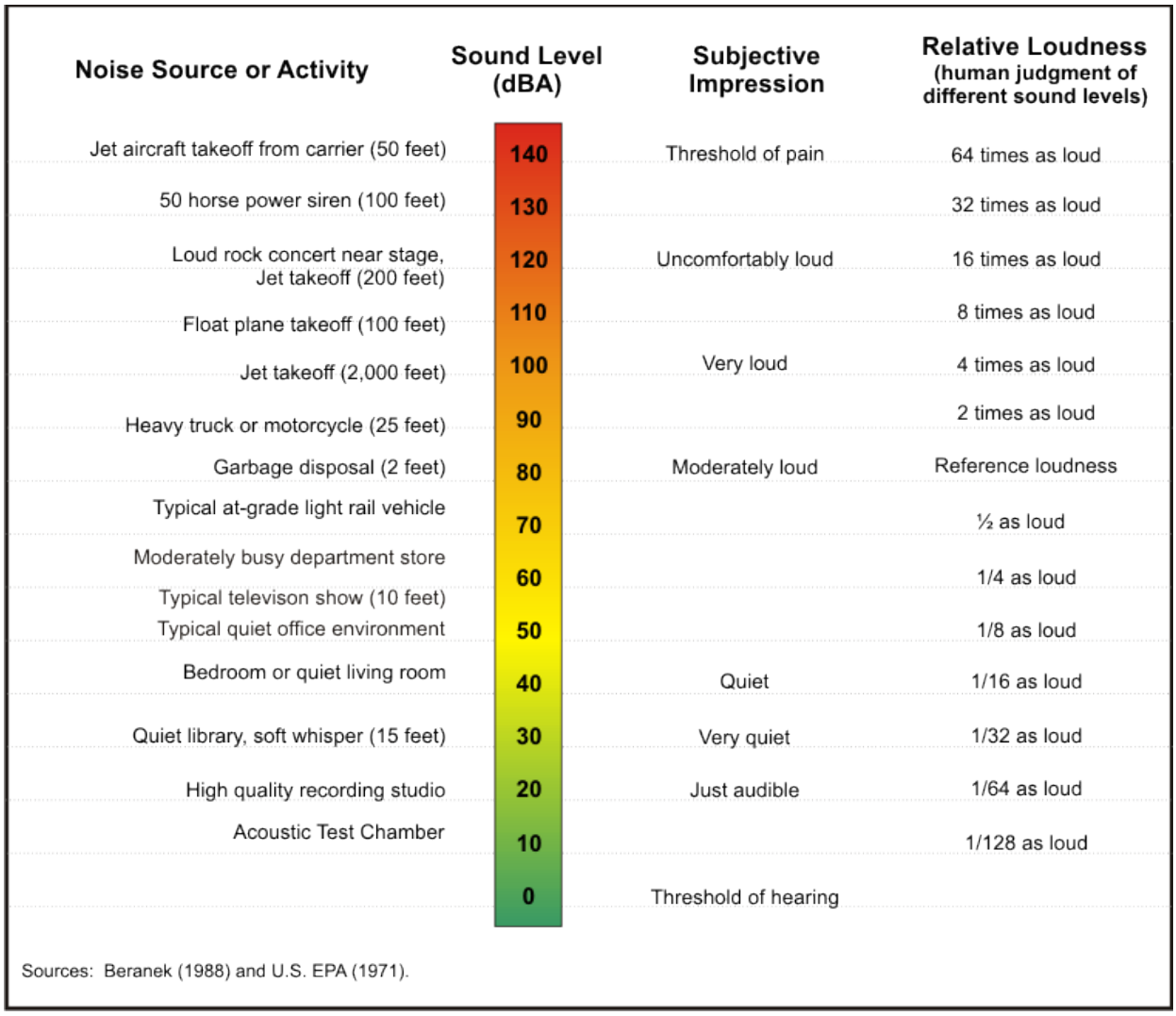


Table 3.11-2. FHWA Traffic Noise Abatement Criteria by Land Use Category

Activity Category	Hourly $L_{eq}(h)$ (dBA)	Description of Activity
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	Residential (single and multifamily units).
C	67 (exterior)	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52 (interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.

Activity Category	Hourly $L_{eq}(h)$ (dBA)	Description of Activity
E	72 (exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A–D or F. Includes undeveloped land permitted for these activities.
F	N/A	Agriculture, airports, bus yards, emergency services, industrial logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	N/A	Undeveloped lands that are not permitted

Note: The noise abatement criteria for Categories B, C, and E also apply to undeveloped land with building permits.
Leq(h) = A-weighted (dBA) hourly equivalent steady state sound levels used for impact determination and are not design standards for abatement; N/A = not applicable

Construction Noise Criteria

In Washington, daytime construction noise is exempt from regulations in the Washington Administrative Code (WAC). Table 3.11-3 presents the WAC maximum allowable nighttime noise levels, above which the governing jurisdiction would require obtaining a noise variance. WAC noise control regulations apply to park-and-ride lots and transit stations (Table 3.11-3 and Table 3.11-4).

Table 3.11-3. Washington State Noise Control Regulation

Source of Noise	Receiver of Noise:[a] Residential	Receiver of Noise:[a] Commercial	Receiver of Noise:[a] Industrial
Residential	45	57	60
Commercial	47	60	65
Industrial	50	65	70

a Maximum allowable nighttime sound level in dBA. Sound level limits are based on measurements taken at the property lines of receiving properties.
dBA = A-weighted decibels

In addition to the noise standards listed in Table 3.11-3, there are exemptions for short-term noise exceedances, including those outlined in Table 3.11-4, based on the minutes per hour that the noise limit is exceeded.

Table 3.11-4. Washington State Exemptions for Short-Term Noise Exceedances

Statistical Descriptor [a]	Minutes Exceeded Per Hour	Adjustment to Maximum Sound Level
L_{25}	15 (25% of 1 hour)	+5 dBA
$L_{8.3}$	5 (8.3% of 1 hour)	+10 dBA
$L_{2.5}$	1.5 (2.5% of 1 hour)	+15 dBA

a L_{25}, $L_{8.3}$, and $L_{2.5}$ are the noise levels that are exceeded 25%, 8.3%, and 2.5% of the time (1 hour, in this case).
dBA = A-weighted decibels

Section 00292.32 of the ODOT Standard Specifications (Section 00292.32) includes construction noise abatement measures that apply to highway construction activities within Oregon. These abatement measures are considered mitigation and are discussed in Section 3.11.7.

Federal Transit Administration Noise Criteria

The FTA Transit Noise and Vibration Impact Assessment Manual provides FTA transit noise impact criteria applicable to noise generated by light-rail transit (FTA 2018). The FTA noise impact criteria identify the following noise-sensitive land use categories:

- **Category 1:** Buildings or parks where quiet is an essential element of their purpose.
- **Category 2:** Residences and buildings where people normally sleep. This includes residences, hospitals, and hotels where nighttime sensitivity is assumed to be of utmost importance.
- **Category 3:** Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, churches, office buildings, and other commercial and industrial land uses.

Under these criteria, the degree to which transit operations are allowed to change the overall noise environment is reduced with increasing levels of existing noise. FTA's criteria include two impact levels, shown in Figure 3.11-3 and summarized below:

- **Severe Impact:** Project-generated noise in this range is likely to cause a high level of community annoyance. With severe impacts, alternative project alignments should be considered in an effort to avoid severe impacts.
- **Moderate Impact:** In this range, other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation. These other factors can include the predicted increase over existing noise levels, the types and number of noise-sensitive land uses affected, existing outdoor-indoor sound insulation, and the cost-effectiveness of mitigating noise to more acceptable levels.

No impact occurs when noise levels remain below the noise thresholds, which are dependent on land uses and existing noise levels.

Typically, state regulations are more stringent than FTA criteria, and in such cases, state regulations are used to estimate impacts from stationary noise sources. For example, the Oregon Department of Environmental Quality regulations were used to estimate impacts from the proposed expansion of the Ruby Junction Maintenance Facility and Hayden Island light-rail station (shown in Table 3.11-5). However, FTA criteria still apply and are used to determine noise impacts from stationary sources where there are no state or local noise regulations or where FTA criteria are more stringent.

Figure 3.11-3. Federal Transit Administration Transit Noise Impact Criteria

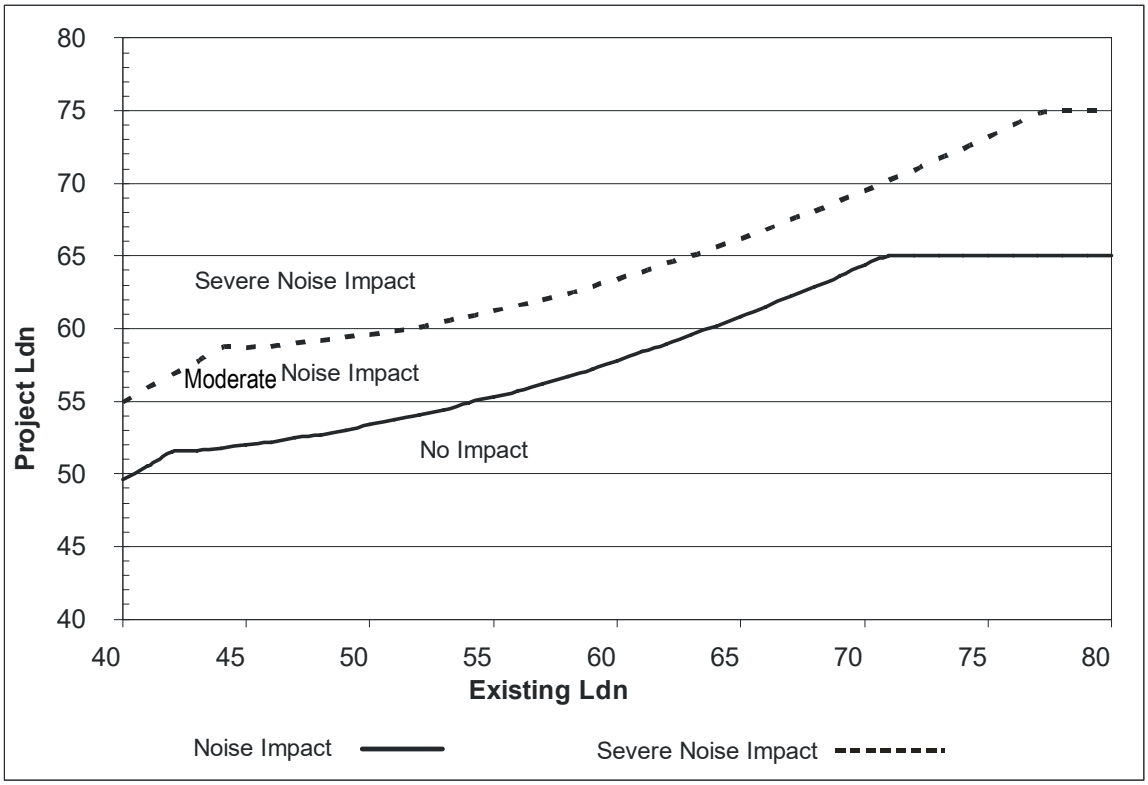


Table 3.11-5. Oregon Department of Environmental Quality Industrial and Commercial Noise Source Standards

Statistical Descriptor	Existing Noise Source (dBA): 7 a.m. to 10 p.m.	Existing Noise Source (dBA) 10 p.m. to 7 a.m.	New Noise Source (dBA): 7 a.m. to 10 p.m.	New Noise Source (dBA) 10 p.m. to 7 a.m.	New Source in Quiet Area (dBA) 7 a.m. to 10 p.m.	New Source in Quiet Area (dBA) 10 p.m. to 7 a.m.
L_1	75	60	75	60	60	55
L_{10}	60	55	60	55	55	50
L_{50}	55	50	55	50	50	45

Source: Oregon Administrative Rules 340-35-035, Tables 7, 8, and 9
a L_1, L_{10}, and L_{50} are the noise levels that are exceeded 1%, 10%, and 50% of the time (1 hour, in this case).
dBA = A-weighted decibels

City Noise Standards

In Portland, daytime construction noise up to 85 dBA is exempt, with additional exemptions for impact tools. From 7:00 p.m. to 7:00 a.m., and all day on Sundays, the City of Portland has restrictive noise regulations that apply to construction (City of Portland Municipal Code, Title 18, Noise Control). Under the noise control ordinance, virtually all major construction projects require a noise variance if work is planned during nighttime hours or on Sundays. Large projects typically require coordination with the City of Portland's Noise Review Board, which often imposes additional restrictions on construction.

The City of Vancouver has incorporated WAC noise regulations (Table 3.11-3 and Table 3.11-4) into the Vancouver Municipal Code (VMC). The City of Gresham has incorporated Oregon Department of Environmental Quality noise regulations (Table 3.11-5) into the Gresham Noise Control Code (Gresham Revised Code Article 7.20).

Understanding Vibration

How Vibration Levels Are Measured

Ground-borne vibration is a form of energy that travels from a source through the ground to another location. Two types of vibration were analyzed—vibration from the operation of the proposed light-rail extension and vibration from construction.

The severity of impact caused by vibration is related to its velocity and is discussed in terms of both inches per second and decibels, as appropriate. Velocity of vibration in decibels is noted as "VdB."

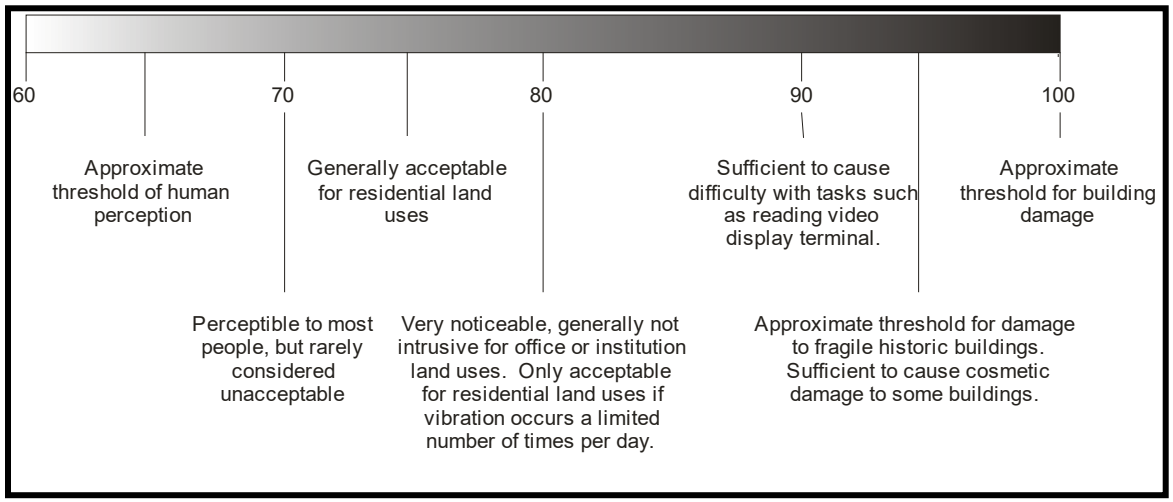
Ground-Borne Vibration vs. Ground-Borne Noise

The effects of ground-borne vibration include perceived movement of building floors, rattling of windows, or shaking of items on shelves. When ground-borne vibration creates a rumbling noise inside buildings, it is called ground-borne noise.

Typical Vibration Levels

Figure 3.11-4 gives a general idea of the effects of different levels of vibration on humans and buildings. Existing levels of building vibration from traffic and other local sources are usually in the range of 40 to 50 VdB, which is well below the range of human perception.

Figure 3.11-4. Human and Building Response to Ground-Borne Vibration Levels



Source: FTA 1995

Vibration Criteria and Analysis Methods

Vibration Criteria

FTA has developed impact criteria for acceptable levels of both ground-borne vibration and ground-borne noise that apply to light-rail transit.

Table 3.11-6 summarizes FTA's impact criteria for most buildings. Some buildings, such as concert halls, TV and recording studios, and theaters, can be very sensitive to ground-borne vibration and ground-borne noise but do not fit into the three categories shown in Table 3.11-6. Because of the sensitivity of these buildings, the

FTA has developed ground-borne vibration and ground-borne noise criteria for "special buildings," shown in Table 3.11-7.

Table 3.11-6. FTA Ground-Borne Vibration and Noise Impact Criteria

Land Use Category	Ground-Borne Vibration Impact Levels Frequent [a] Events	Ground-Borne Vibration Impact Levels Occasional Events	Ground-Borne Vibration Impact Levels Infrequent [b] Events	Ground-Borne Noise Impact Levels Frequent [a] Events	Ground-Borne Noise Impact Levels Occasional Events	Ground-Borne Noise Impact Levels Infrequent [b] Events
Category 1: Buildings where low ambient vibration is essential for interior operations.	65 VdB [c]	65 VdB [c]	65 VdB [c]	N/A [d]	N/A [d]	N/A [d]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

a "Frequent Events" is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.
b "Infrequent Events" is defined as fewer than 70 vibration events per day. This category includes most commuter-rail systems.
c This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research equipment would require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the heating, ventilation, and air-conditioning system and stiffened floors.
d Vibration-sensitive equipment is generally not sensitive to ground-borne noise.
dBA = A-weighted decibels; N/A = not applicable; VdB = vibration in decibels

Table 3.11-7. Ground-Borne Vibration and Noise Impact Levels for Special Buildings

Type of Building or Room	Ground-Borne Vibration Impact Levels Frequent [a] Events	Ground-Borne Vibration Impact Levels: Occasional or Infrequent [b] Events	Ground-Borne Noise Impact Levels: Frequent [a] Events	Ground-Borne Vibration Impact Levels: Occasional or Infrequent [b] Events
Concert Halls	65 VdB	65 VdB	25 dBA	25 dBA
TV Studios	65 VdB	65 VdB	25 dBA	25 dBA
Recording Studios	65 VdB	65 VdB	25 dBA	25 dBA

Type of Building or Room	Ground-Borne Vibration Impact Levels Frequent [a] Events	Ground-Borne Vibration Impact Levels: Occasional or Infrequent [b] Events	Ground-Borne Noise Impact Levels: Frequent [a] Events	Ground-Borne Vibration Impact Levels: Occasional or Infrequent [b] Events
Auditoriums	72 VdB	80 VdB	30 dBA	38 dBA
Theaters	72 VdB	80 VdB	35 dBA	43 dBA

Note: If the building will rarely be occupied when the trains are operating, there is no need to consider impacts. As an example, consider locating a commuter-rail line next to a concert hall. If no commuter trains will operate after 7 p.m., the trains would rarely interfere with the use of the hall.

a "Frequent Events" is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.

b "Infrequent Events" is defined as fewer than 70 vibration events per day. This category includes most commuter-rail systems.

dBA = A-weighted decibels; VdB = vibration in decibels

City Vibration Standards

The City of Portland (Chapter 33.262, Off-Site Impacts) restricts continuous, frequent, or repetitive vibrations that exceed a 0.002 gravitational constant peak. Vibrations from temporary construction and vehicles that leave the site (such as trucks, trains, airplanes, and helicopters) are exempt. Vibrations lasting less than 5 minutes per day are also exempt. Vibrations from primarily on-site vehicles and equipment are not exempt.

The City of Gresham does not regulate vibration.

The City of Vancouver has incorporated vibration regulations into the VMC, including prohibiting off-site vibration impacts that are discernible without instruments at the property line. This prohibition would apply to all nighttime construction activities and the operation of light-rail stations and park-and-ride lots. Construction activity between the hours of 7 a.m. and 8 p.m. is exempt from these vibration regulations. The operations of public streets and sidewalks, rail maintenance yards, and essential public facilities, such as the interstate highway system, are exempt from these regulations 24 hours a day.

Existing Noise Levels in the Study Area

Traffic noise levels were modeled at 875 locations representing approximately 1,204 noise-sensitive land uses within the study area. For the light-rail transit analysis, noise levels were modeled at 16 locations representing 52 noise-sensitive land uses. Some of the modeling locations used for the traffic noise analysis were also used for the transit analysis. Each of these locations has one or more noise receptors that constitute sensitive land uses, such as a residence, historic buildings, hotel, motel, or park (see sidebar). Existing outdoor noise levels range from 49 to 75 dBA L_{eq}, with 24-hour L_{dn} noise levels ranging from 53 to 75 dBA.

Overall, noise levels in the study area are dominated by traffic on I-5. The year 2019 was used for existing conditions because it aligns with the traffic study completed for the IBR Program. Under existing conditions (2019), an estimated 160 noise-sensitive land uses approach or exceed the applicable traffic noise criteria in the study area. This includes single-family and multifamily residences, along with several hotels, parks, schools, and a cemetery. Of the existing noise-sensitive land uses that exceed applicable noise criteria levels, 50 are in Portland and 110 are in Vancouver. The Noise and Vibration Technical Report provides the existing modeled locations and noise levels for each subarea summarized below.

What are noise-sensitive receptors and residential equivalents?

A noise-sensitive receptor is a property where frequent exterior human use occurs and where a lower noise level would be beneficial. The nuisance level for traffic noise is perceived differently by people depending on the situation. For instance, roadway noise may not bother people walking to a commercial establishment but may disturb people at a backyard pool or while they are sleeping. Residential equivalency is a measurement of the amount of use at special sites such as schools, parks, churches, and hospitals.

Portland Existing Modeled Traffic Noise Levels

Current noise levels approach or exceed the ODOT Noise Abatement Approach Criteria (NAAC) at 50 locations adjacent to I-5, including approximately 19 floating homes, with noise levels of 65 to 69 dBA L_{eq}. Existing noise levels at multilevel apartment units located along N Marine Drive also approach or exceed the ODOT NAAC. These apartment units have private outdoor patios facing N Marine Drive, with noise levels ranging from 65 to 71 dBA L_{eq}.

Downtown Vancouver Existing Modeled Traffic Noise Levels

The analysis of noise levels in downtown Vancouver focuses on I-5, SR 14, and associated ramps. The traffic noise model also includes local streets that influence noise in the study area. Currently, 37 noise-sensitive sites approach or exceed the WSDOT noise abatement criteria (NAC), primarily due to I-5 traffic noise. Locations that would undergo noise impacts are mostly clustered at apartment buildings located just southwest of the I-5/E Mill Plain Boulevard interchange, C Street and E 7th Street, and a newly constructed building along Washington Street between West 4th and West 5th Streets.

Fort Vancouver Existing Modeled Traffic Noise Levels

At the Vancouver National Historic Reserve (VNHR), including the Fort Vancouver National Historic Site and nearby areas, noise levels currently range from 52 to 75 dBA L_{eq}, with the highest levels at unshielded areas along I-5 and SR 14. Currently, six modeled locations along the Fort Vancouver Park Trail and Confluence Land Bridge Trail within the Fort Vancouver Historic District, and three modeled locations along the Waterfront Renaissance Trail approach or exceed the WSDOT NAC.

Vancouver East Existing Modeled Traffic Noise Levels

East of I-5 and north of E Mill Plain Boulevard, noise levels currently range from 49 to 73 dBA L_{eq}, with the highest levels at residences not located behind existing noise walls north of E Fourth Plain Boulevard. Currently, 16 modeled locations at residences and one modeled location at Marshall Park approach or exceed the WSDOT NAC.

Vancouver West Existing Modeled Traffic Noise Levels

West of I-5 and north of E Mill Plain Boulevard, current noise levels range from 49 to 75 dBA L_{eq}, with the highest levels at residences located close to I-5 both north and south of E 39th Street. Currently, noise levels at 42 residences, Kiggins Bowl, Discovery Middle School, and two offices approach or exceed the WSDOT NAC.

Existing Noise Levels for Light-Rail Transit Analysis

Existing noise level data for the light-rail analysis were taken from on-site measurements and following methods in the FTA Transit Noise and Vibration Manual. Locations in the transit corridor that were used for the traffic noise analysis were also used for the light-rail analysis. The noise levels provided represent primarily residential uses, with some uses such as hotels that include overnight sleeping. Existing noise levels ranged from 69 to 77 L_{eq} and 77 to 83 L_{dn} in downtown Vancouver; from 58 to 73 L_{eq} and 66 to 81 L_{dn} at sites in north Portland; and from 69 to 71 L_{eq} and 67 to 70 L_{dn} in the area around the Ruby Junction Maintenance Facility.

3.11.3 Long-Term Effects

No-Build Alternative

Under existing conditions (2019), there are approximately 160 traffic noise impacts to noise-sensitive land uses; that number would rise to 215 under the No-Build Alternative (2045). Background traffic growth would cause an increase in traffic noise levels throughout the study area. Under the No-Build Alternative, routine maintenance of the existing noise walls in Vancouver would occur, but no new noise walls would be constructed. Under the No-Build Alternative), none of transit improvements associated with the IBR Program would occur, so there would be no new transit noise or vibration impacts from the Program.

This analysis does not address vibration levels associated with the No-Build Alternative because no new source of vibration is anticipated under the No-Build Alternative.

Portland Modeled Traffic Noise Levels

Forty-nine of the 50 receptors where existing noise levels approach or exceed the ODOT NAAC are predicted to continue to approach or exceed the ODOT traffic noise criteria under the No-Build Alternative (2045). In addition to these 49 receptors, it is predicted that traffic noise levels at 15 more locations near I-5 and N Marine Drive will approach or exceed the ODOT traffic noise criteria under the No-Build Alternative. Noise levels under the No-Build Alternative would range from 45 to 70 dBA L_{eq} with a 1 to 2 dBA increase over existing conditions at most locations due to an increase in traffic volumes.

Under the No-Build Alternative, noise levels at the estimated 19 floating homes that currently experience noise impacts, and an additional 10 floating homes, are predicted to approach or exceed the ODOT NAAC with noise levels of 65 to 69 dBA $L_{eq.}$ At most locations, noise levels would increase by 1 to 2 dBA due to an increase in traffic volumes in 2045. Most of the remaining traffic noise levels above the ODOT NAAC are located at the apartment complexes along N Marine Drive. Under the No-Build Alternative noise levels are predicted to exceed the ODOT NAAC at the same 30 apartments under the existing conditions and an additional four apartments within the Newport Apartment complex (Noise and Vibration Technical Report, Table 4-1), with

levels ranging from 49 to 70 dBA L_{eq}. Most locations are predicted to experience an increase of 1 to 2 dBA over existing noise levels. Traffic noise levels under the No-Build Alternative also approach or exceed the ODOT NAAC at one commercial property.

Downtown Vancouver Modeled Traffic Noise Levels

Under the No-Build Alternative, traffic noise levels in downtown Vancouver are predicted to approach or exceed the WSDOT traffic noise criteria at the same 37 multifamily residences and trail as under the existing conditions, and at five additional residential units and one additional trail use (see the Noise and Vibration Technical Report, Table 4-3). No-Build Alternative noise levels would range from 51 to 73 dBA L_{eq}. Compared to existing conditions, noise levels would increase 1 to 7 dBA, with most modeled locations showing an increase of 1 to 2 dBA. Increases in noise levels would result from an increase in traffic volumes from existing conditions to the year 2045. The highest predicted noise level under the No-Build Alternative would be 73 dBA L_{eq} at the apartments under construction at 400 Washington Street.

Fort Vancouver Modeled Traffic Noise Levels

Noise levels at the VNHR under the No-Build Alternative are projected to range from 53 to 76 dBA L_{eq}, with the highest levels at unshielded areas along I-5 and SR 14. In general, noise levels are predicted to increase by 1 to 2 dBA over existing conditions within the VNHR due to an increase in traffic volumes. Currently, noise levels within the Fort Vancouver Historic District along the Fort Vancouver Trail and Confluence Land Bridge Trail, and along the Waterfront Renaissance Trail located outside the Fort Vancouver Historic District, approach or exceed the WSDOT NAC. Under the No-Build Alternative, the same sites would continue to approach or exceed the WSDOT NAC, with two additional trail use locations in the Fort Vancouver Historic District and one Historic District/office location exceeding the WSDOT NAC (see the Noise and Vibration Technical Report, Table 4-5).

North Vancouver, East of I-5 Modeled Traffic Noise Levels

Future noise levels under the No-Build Alternative at the modeling locations in this area of north Vancouver east of I-5 and north of E Mill Plain Boulevard ranged from 50 to 74 dBA L_{eq}, an increase of 1 to 3 dBA over existing noise levels. These increases are due to an increase in traffic volumes from existing conditions to the year 2045. Currently, 17 locations approach or exceed the WSDOT NAC. Under the No-Build Alternative, 30 locations approach or exceed the WSDOT NAC (Noise and Vibration Technical Report, Table 4-7). Noise levels do not approach or exceed the WSDOT NAC at the hospital, church, or cemeteries located in this subarea, but they do exceed the criteria at 25 residences and at athletic fields and other outdoor-use areas at Marshall Park.

North Vancouver, West of I-5 Modeled Traffic Noise Levels

Future No-Build Alternative noise levels at the modeling locations in this subarea north of Mill Plain Boulevard to Discovery Middle school range from 50 to 76 dBA L_{eq}, an increase of 1 to 3 dBA over existing noise levels. These increases are due to an increase in traffic volumes from existing conditions to the year 2045. Under the No-Build Alternative, the number of residences with noise levels that would approach or exceed the WSDOT NAC is predicted to increase from the current 47 locations to 65. The same locations predicted to reach the WSDOT NAC under existing conditions would also exceed the WSDOT NAC under the No-Build Alternative, along with 18 additional residences and two additional use areas at the Kiggins Bowl, one outdoor use at Discovery Middle School, and two offices (see the Noise and Vibration Technical Report, Table 4-9).

Modified LPA

Without mitigation, traffic noise impacts under the Modified LPA are expected to increase compared to existing conditions due to an increase in future traffic volumes and shift in roadway alignments. Compared to the No-Build Alternative, the Modified LPA without mitigation would be expected to have fewer traffic noise

impacts due to program acquisitions near the new Columbia River bridge alignment. Program acquisitions for the future Columbia River bridge alignment include houseboats located between Hayden Island and the Oregon mainland. Without mitigation, traffic noise impacts under the Modified LPA would occur at 198 residential equivalents. The Modified LPA, with mitigation, would replace existing noise walls in Vancouver with new noise walls as necessary for project construction. All existing noise walls that would be replaced in-kind (i.e., no changes to wall length or height) are evaluated as part of this analysis (see the Noise and Vibration Technical Report, Section 7).

Figure 3.11-5 through Figure 3.11-11 show the modeled noise impacts of the Modified LPA at locations within the study area. Potential changes in noise and vibration levels and effects for the design options were evaluated qualitatively by reviewing design changes in relation to the Modified LPA. Results from the noise analysis conducted for individual historic properties are discussed in Section 3.8, Cultural Resources.

Table 3.11-8 summarizes the major differences in impacts and benefits across the Modified LPA's bridge configurations, the one-auxiliary-lane and two-auxiliary-lane options, and the No-Build Alternative. The design options are discussed qualitatively for comparative purposes.

Table 3.11-8. Noise and Vibration Impacts and Benefits for the Modified LPA Bridge Configurations and Auxiliary Lane Options and No-Build Alternative

Modified LPA Bridge Configuration and Auxiliary Lane Design Option and No-Build Alternative	Noise and Vibration Impacts
Modified LPA with Double-Deck Fixed-Span Configuration and One Auxiliary Lane	• Without mitigation, the number of traffic noise impacts would be lower (198) in 2045 than under the No-Build Alternative due to the Program's acquisitions of houseboats located near the Columbia River bridge alignments. • With mitigation, existing noise walls in Vancouver would be replaced as necessary for project construction, which would reduce the number of traffic noise impacts to 121. • Transit vibration impacts would occur at 13 receptors in downtown Vancouver, including a 12-unit apartment complex located at E 7th Street and E C Street and a movie theater located at E 8th Street and E C Street.
Modified LPA with Single-Level Fixed-Span Configuration and One Auxiliary Lane	Similar noise and vibration impacts to the Modified LPA with the double-deck fixed-span bridge configuration, except: • Minor increases in highway noise (0 to 4 dBA at the closest noise-sensitive uses) and highway noise impacts east and west of the bridges as a result of the wider bridge spans (99 feet wider) and lower roadway deck (29 feet lower). • Users on the shared-use path across the Columbia River bridges would have less shielding and more exposure to noise from highway vehicles. • Transit vibration levels would increase for houseboats at Jantzen Beach and in downtown Vancouver due to the westward shift of the light-rail alignment from the increased width of the bridges over the Columbia River.
Modified LPA with Single-Level Movable-Span Configuration and One Auxiliary Lane	• Similar noise and vibration impacts to the single-level fixed-span configuration due to the similarity in noise source locations and distance to noise-sensitive receptors.

Modified LPA Bridge Configuration and Auxiliary Lane Design Option and No-Build Alternative	Noise and Vibration Impacts
Modified LPA with Double-Deck Fixed-Span Configuration and Two Auxiliary Lanes	Transit vibration impacts would be the same as for Modified LPA with one auxiliary lane. Traffic noise impacts before and after mitigation would be similar to the Modified LPA with one auxiliary lane, except: • Slight differences in noise levels (0 to 2 dBA at the noise-sensitive uses closest to the bridges: Sites PD-036, PD-037, DT-030 to DT-032, FV-048 to FV-052, and FV-071) are anticipated because the second auxiliary lane would bring traffic approximately 16 feet closer to noise-sensitive land uses located east and west of I-5.
No-Build Alternative	• 215 receptors would exceed highway noise thresholds. • No receptors would have moderate or severe transit noise impact levels. • No vibration impacts without the extension of light-rail.

dBA = A-weighted decibels; LPA = Locally Preferred Alternative

Figure 3.11-5. Modified LPA with Double-Deck Fixed-Span Configuration and One Auxiliary Lane – 2045 Traffic Noise Impacts – Portland Mainland

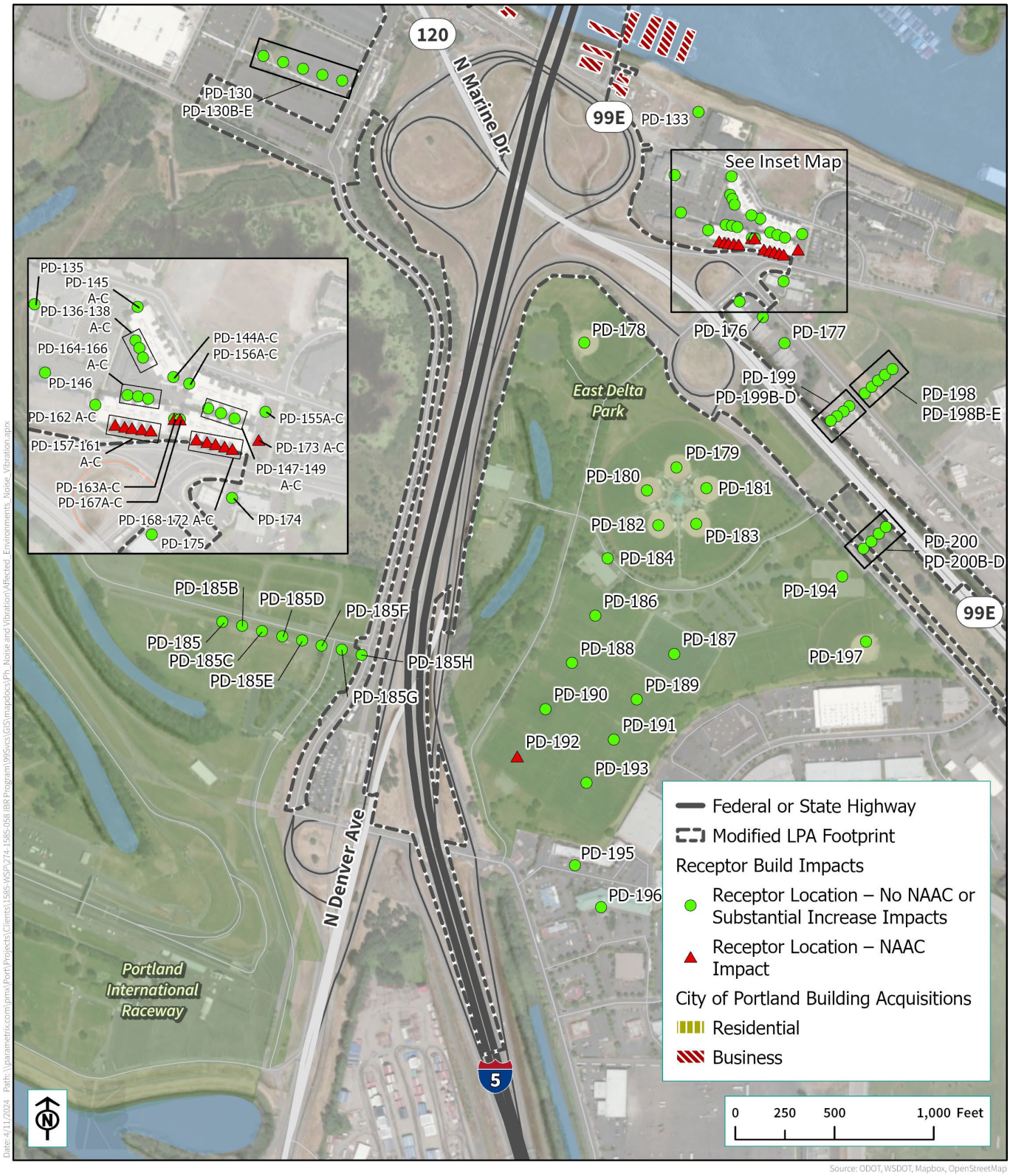


Figure 3.11-6. Modified LPA with Double-Deck Fixed-Span Configuration and One Auxiliary Lane – 2045 Traffic Noise Impacts – Portland/Hayden Island

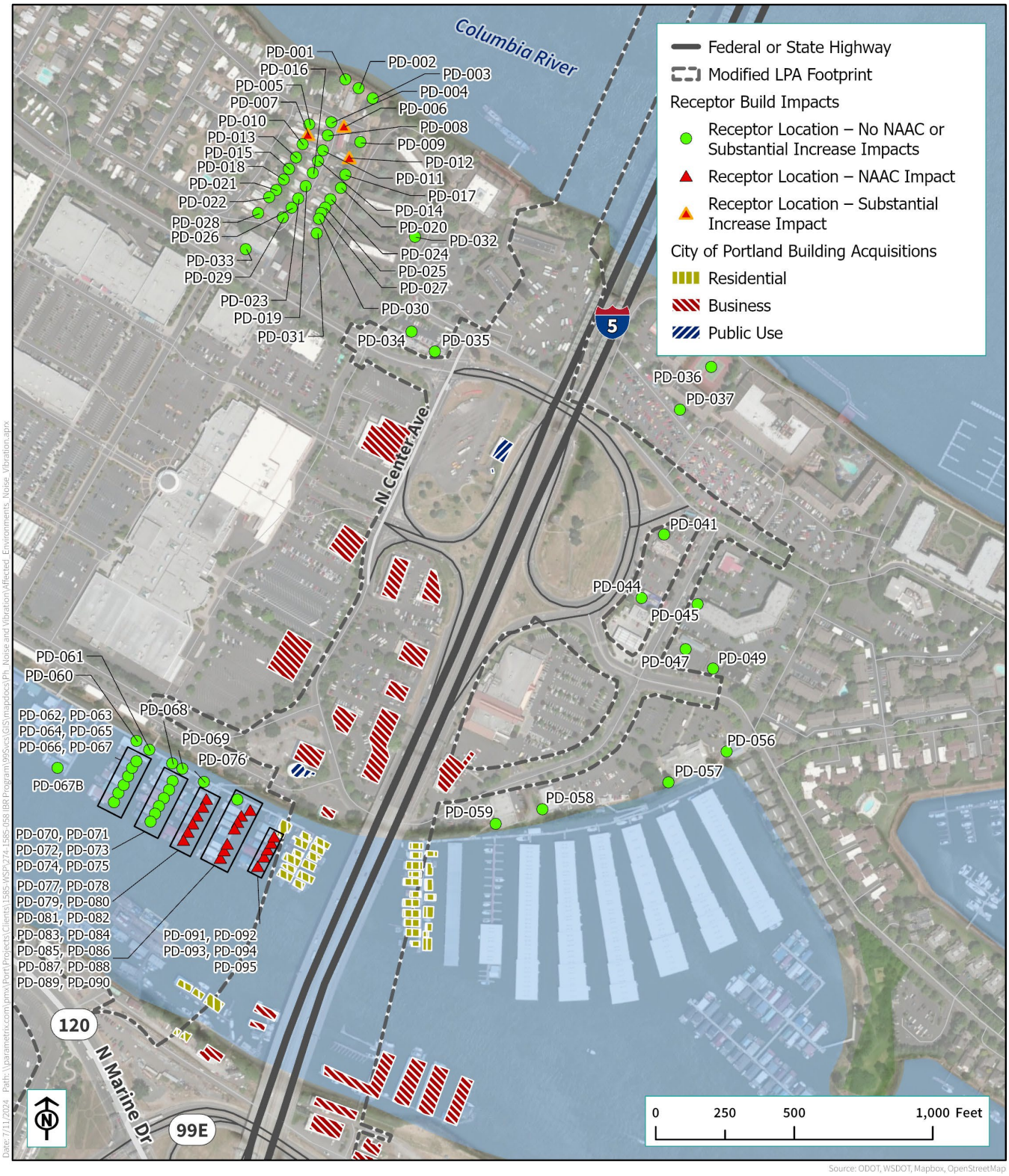


Figure 3.11-7. Modified LPA with Double-Deck Bridge Fixed-Span Configuration and One Auxiliary Lane – 2045 Traffic Noise Impacts – I-5/SR 14 Interchange

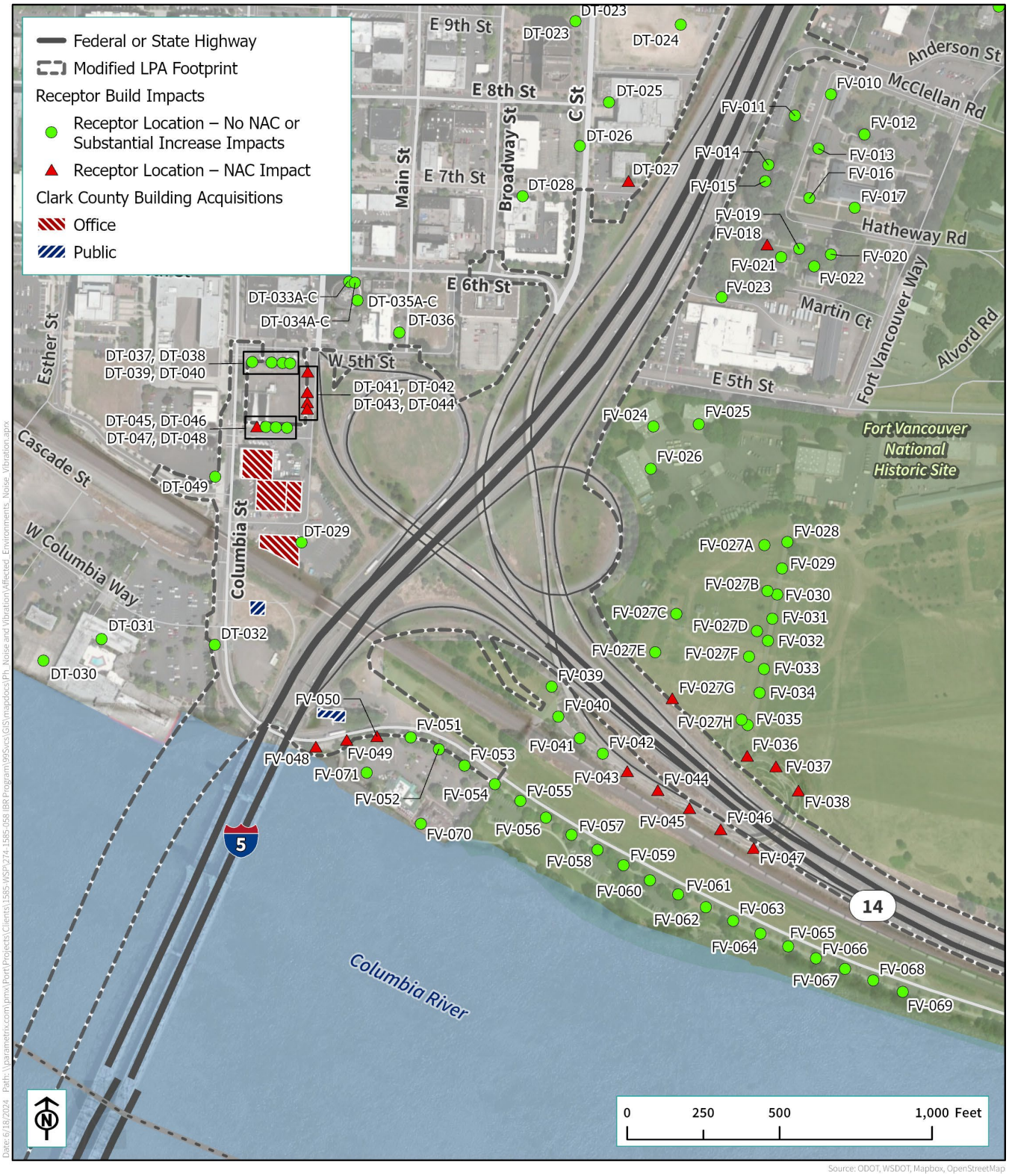


Figure 3.11-8. Modified LPA with Double-Deck Fixed-Span Configuration and One Auxiliary Lane – 2045 Traffic Noise Impacts – E 8th Street to McLoughlin Boulevard

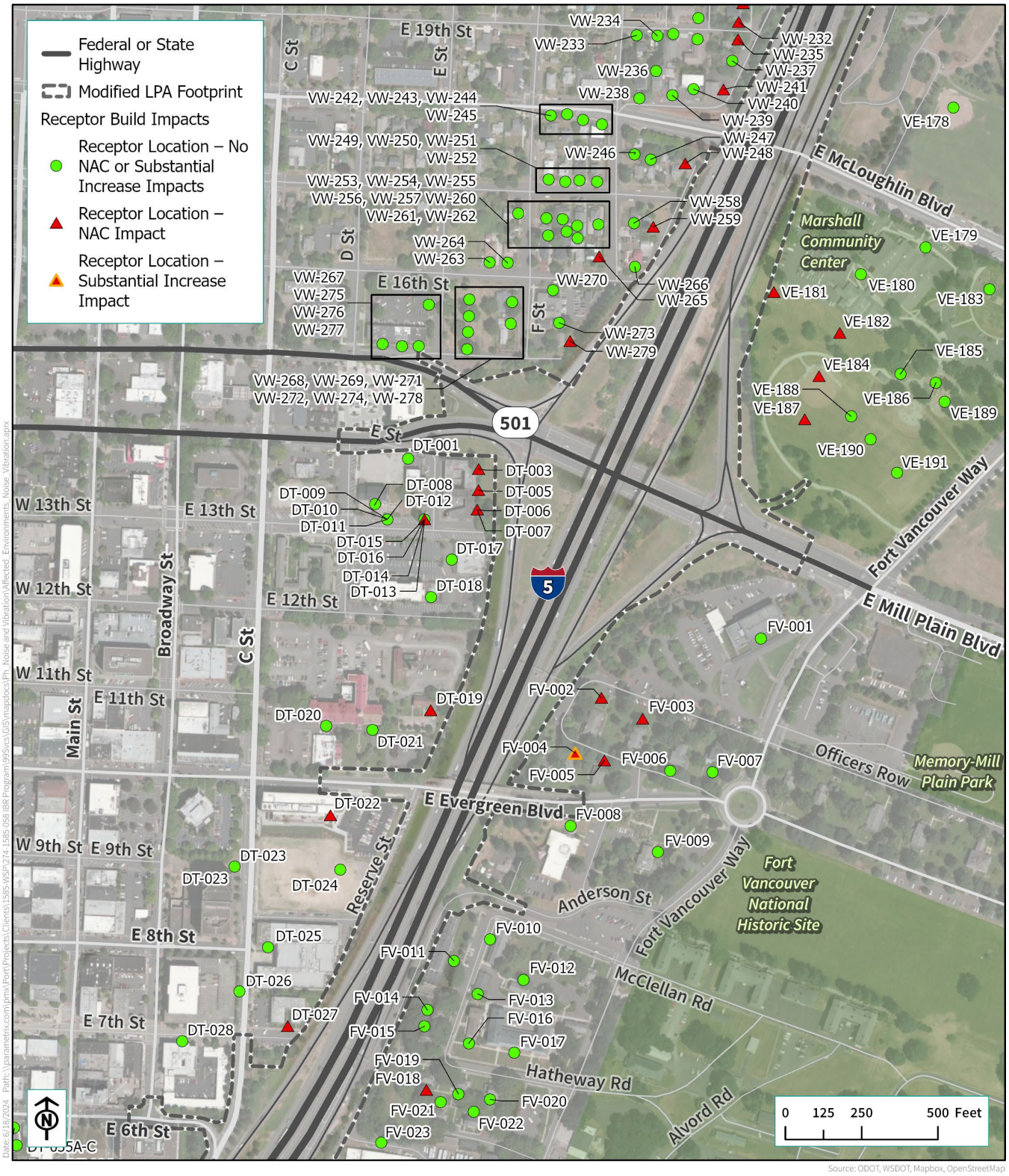


Figure 3.11-9. Modified LPA with Double-Deck Fixed-Span Configuration and One Auxiliary Lane – 2045 Traffic Noise Impacts – McLoughlin Boulevard to E 30th Street

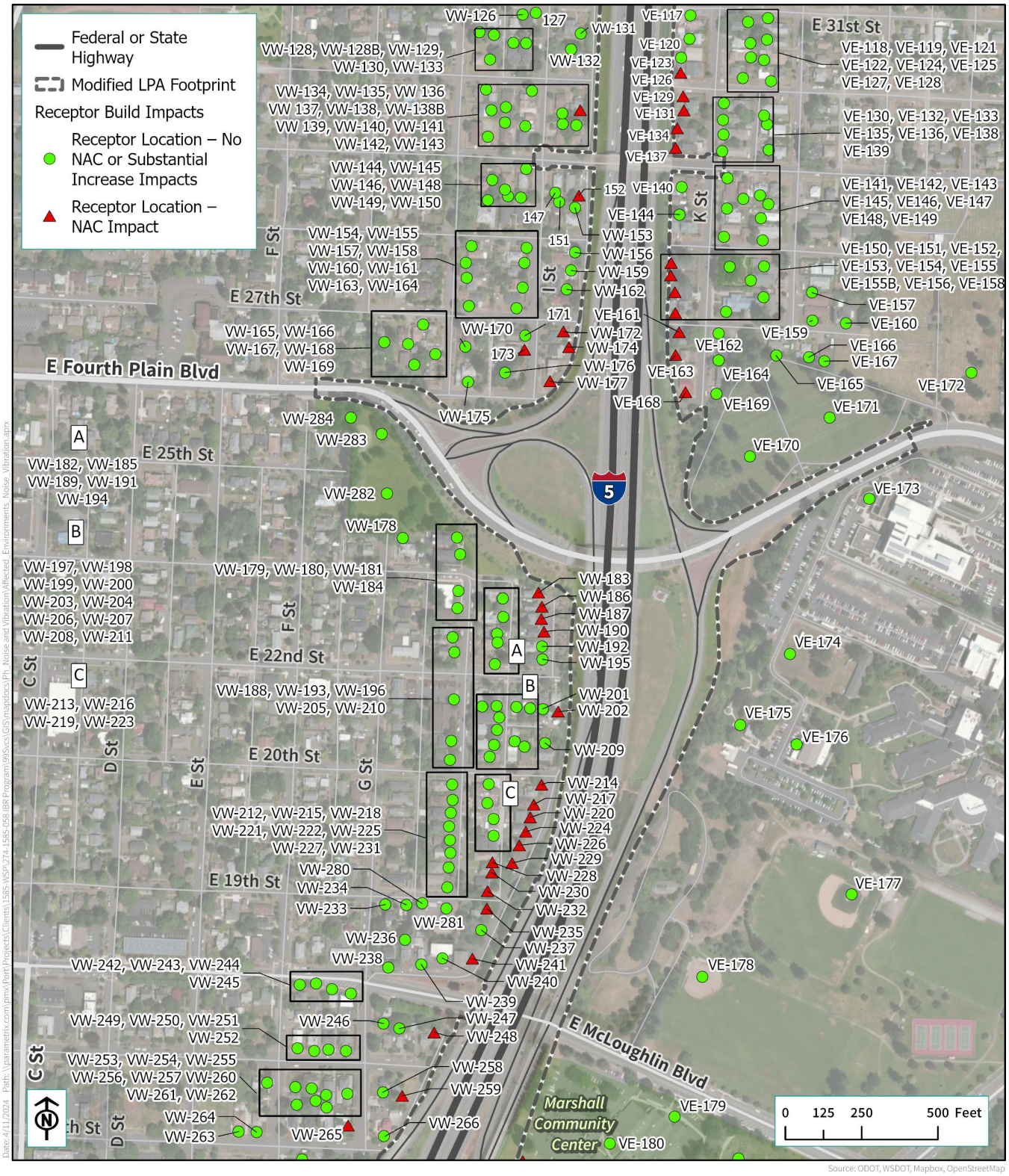


Figure 3.11-10. Modified LPA with Double-Deck Fixed-Span Configuration and One Auxiliary Lane – 2045 Traffic Noise Impacts – E 30th Street to E 39th Street

Figure 3.11-11. Modified LPA with Double-Deck Fixed-Span Configuration and One Auxiliary Lane – 2045 Traffic Noise Impacts – E 39th Street to Terminus

Portland/Hayden Island - Modified LPA Modeled Traffic Noise Levels

Under the Modified LPA with the double-deck fixed-span bridge configuration and one auxiliary lane, noise levels at modeled locations in Portland would range from 49 to 71 dBA L_{eq}. Most locations would experience an increase of 2 to 4 dBA over existing conditions, with increases of up to 11 dBA at one location, site PD-007, which represents one mobile home in the Jantzen Beach recreational vehicle (RV) park on Hayden Island. Noise levels would be 2 dBA above to 2 dBA below noise levels under the No-Build Alternative, at most locations.

The greatest increase in noise levels under the Modified LPA, with any of the design options, is predicted at the Jantzen Beach RV park, located at the north end of Hayden Island and west of I-5. Noise levels in this area are predicted to increase 4 to 11 dBA over existing conditions and 4 to 10 dBA above No-Build Alternative noise levels; this is because the Modified LPA, with any of the design options, would shift the alignment of I-5 closer to homes at the RV park. While noise levels would increase at all of the RV homes, as shown in Figure 3.11-6 the modeling showed that three of the RV homes may experience a substantial noise increase (defined as an increase of 10 dBA or greater). An existing block wall at the RV park and a nearby hotel building provides some shielding against noise, as modeled. Noise levels under the Modified LPA, with any of the design options would not approach or exceed ODOT's NAAC impact criteria at the RV park; however, the increase in noise levels would meet the threshold of 10 dBA over existing noise levels, making this a substantial increase.

Other areas that are predicted to undergo ODOT NAAC impacts include the floating homes in North Portland Harbor (sites PD-077 to PD-082, PD-084 to PD-095), the apartments located closest to N Marine Drive (PD-157 to PD-161A-C, PD-163A-C, PD-167A-C, PD-168A-C to PD-172A-C, and PD-172A-C), and one soccer field (PD-192) at Delta Park. In the area between Hayden Island and the Oregon mainline, the IBR Program would acquire 34 floating homes to allow for the new Columbia River bridge alignment. Due to this acquisition, the Modified LPA with the double-deck fixed-span bridge configuration and one auxiliary lane would result in fewer sites predicted to undergo an increase in noise than under the No-Build Alternative. Displaced homes are represented by modeled sites PD-096 to PD-127, and PD-129. As shown in Figure 3.11-6, the floating homes at the end of the dock (represented by modeled sites PD-076 and PD-083) experience additional noise shielding from the existing terrain and would not be subject to an NAAC impact. In addition to the floating home displacements, modeled sites PD-038, PD-039, PD-040, PD-042, PD-043, PD-046, PD-048, PD-050 to PD-055, PD-128, PD-131, and PD-132, which represent several commercial businesses and restaurants on N Center Avenue, would be displaced.

The Modified LPA with the double-deck fixed-span bridge configuration and one auxiliary lane would approach or exceed the ODOT NAAC at 62 locations. A substantial increase impact of 10 dBA over existing noise levels is predicted at three residences located at the Jantzen Beach RV park. Figure 3.11-5 and Figure 3.11-6 show the location of each traffic noise impact under the Modified LPA in Portland.

Downtown Vancouver - Modified LPA Modeled Traffic Noise Levels

In downtown Vancouver, traffic noise levels under the Modified LPA with the double-deck fixed-span bridge configuration and one auxiliary lane would approach or exceed the WSDOT NAC at the same 37 multifamily residences as existing conditions and at an additional four residences—one fewer than the No-Build Alternative. Traffic noise levels would approach or exceed the NAC at one office and one outdoor-use area at the Vancouver Community Library. Noise levels would range from 51 to 74 dBA L_{eq}, with noise levels within 1 dBA of existing conditions at most locations, and within a range of -1 to 6 dBA compared to existing noise levels where roadway alignment shifts closer to or further from noise receptor locations. At one undeveloped property along Columbia Street (DT-049), noise levels would be 12 dBA higher than existing conditions.

Noise levels resulting from the Modified LPA with the double-deck fixed-span bridge configuration and one auxiliary lane would be within 3 dBA of No-Build Alternative noise levels at most locations. Where roadways

would be closer to or further from noise receptor locations, the change in traffic noise levels would range from -8 to 8 dBA compared to the No-Build Alternative. The highest noise levels under Modified LPA with the double-deck fixed-span bridge configuration and one auxiliary lane would be 74 dBA L_{eq}, predicted to occur outside a building used as office and commercial space (DT-019) located north of E Evergreen Boulevard. In downtown Vancouver, no substantial noise level increases would occur. Figure 3.11-7 and Figure 3.11-8 show the location of each traffic noise impact under the Modified LPA with the double-deck fixed-span bridge configuration and one auxiliary lane in downtown Vancouver.

Compared to the Modified LPA with the double-deck fixed-span bridge configuration, one auxiliary lane and with the C Street ramps, the elimination of C Street ramps at the SR 14 interchange would result in a minor change in traffic noise levels below the common threshold of human hearing (0 to 2 dBA). This difference is due to the removal of these roadways, which would shift traffic to other roadways in the area. Compared to the Modified LPA with the double-deck fixed-span bridge configuration, one auxiliary lane, and centered I-5 mainline, the westward shift of the I-5 mainline would also shift traffic noise to the west but would result in a barely perceptible increase (2 to 3 dBA) in traffic noise levels west of I-5 near the southbound mainline and ramps. The I-5 mainline westward shift would require two additional acquisitions located east of C Street between E 7th Street and E 8th Street. One of these buildings houses commercial businesses, including a restaurant (DT-025), a theater, and a salon, and the other is an apartment building (DT-027). The design option of a centered I-5 mainline would result in traffic noise levels above the impact criteria at the apartment building, while the design option to shift the I-5 mainline west would acquire this noise-sensitive land use and thus exclude it from the total number of noise impacts.

Fort Vancouver - Modified LPA Modeled Traffic Noise Levels

The Modified LPA with the double-deck fixed-span bridge configuration and one auxiliary lane would result in the same WSDOT NAC exceedances as the No-Build Alternative at Fort Vancouver trails, one Fort Vancouver Historic Village site, and one of four offices. In the VNHR, noise levels would be above the WSDOT NAC at two residences and four total offices, with outdoor noise levels at one of the two offices predicted to experience a substantial increase of 10 dBA over existing conditions. Noise levels would range from 54 to 75 dBA L_{eq}, with a decrease of 2 dBA below existing conditions at Old Apple Tree Park and nearby trail and an increase of up to 10 dBA over existing conditions at one Fort Vancouver office, represented by site FV-004. Compared to the No-Build Alternative, traffic noise levels under the Modified LPA with the double-deck fixed-span bridge configuration and one auxiliary lane are expected to increase throughout much of the Fort Vancouver area, with an increase of 10 dBA at one site—site FV-004—and decrease by as much as 4 dBA at Old Apple Tree Park, represented by site FV-039. Figure 3.11-7 and Figure 3.11-8 show the location of each traffic noise impact in Fort Vancouver.

North Vancouver, East of I-5 - Modified LPA Modeled Traffic Noise Levels

In north Vancouver east of I-5, the Modified LPA with the double-deck fixed-span bridge configuration and one auxiliary lane would exceed the WSDOT NAC at 26 locations near the future I-5 alignment. The 26 locations include 26 of the 31 WSDOT NAC exceedances predicted under the No-Build Alternative (including 21 of the 25 exceedances at residences and five of the six outdoor-use locations at Marshall Park). No substantial increase impacts are predicted under the Modified LPA.

Noise levels would range from 49 to 73 dBA L_{eq} and would fall within 1 to 3 dBA of existing conditions at most locations. Compared to existing conditions, noise levels would range from a decrease of 5 dBA below existing conditions to an increase of 3 dBA above existing conditions. Compared to the No-Build Alternative, traffic noise levels are expected to be within 1 dBA throughout much of this subarea, with only slight increases of 0 to 2 dBA at most locations. Noise reductions of up to 6 dBA are predicted at outdoor-use areas south of the Department of Veterans Affairs (VA) Hospital from the shift in the northbound I-5 off-ramp to Fourth Plain

Boulevard. Figure 3.11-9, Figure 3.11-10, and Figure 3.11-11show the location of each traffic noise impact in north Vancouver east of I-5.

North Vancouver, West of I-5 - Modified LPA Modeled Traffic Noise Levels

In north Vancouver, west of I-5, noise levels under the Modified LPA with the double-deck fixed-span bridge configuration and one auxiliary lane would exceed the WSDOT NAC at 54 locations, which is seven more NAC impacts than existing conditions and 12 fewer NAC impacts than the No-Build Alternative. The 54 exceedance locations with the Modified LPA include the sites with an exceedance under existing conditions and the No-Build Alternative, which include residences, Kiggins Bowl, and one outdoor location at Discovery Middle School. No NAC impacts are predicted with the Modified LPA at the two offices that experience NAC impacts under existing conditions or under the No-Build Alternative.

Noise levels at this location would range from 49 to 76 dBA L_{eq}. Increases in noise levels over existing conditions would range from 2 to 12 dBA at residences between E 33rd Street and E 39th Street, where the I-5 southbound on-ramps would be shifted west (closer to residences). In this area, seven single-family homes would be displaced between E 35th Street and E 37th Street. Displaced residences are represented by modeled sites VW-056, VW-059, VW-062, VW-065, VW-068, VW-071, and VW-077. In this area, the Modified LPA with the double-deck fixed-span bridge configuration and one auxiliary lane would result in fewer sites predicted to experience increases in noise than the No-Build Alternative due to the seven displaced residences.

A 2 to 4 dBA increase in noise levels over existing conditions is predicted at most locations in this area. Compared to the No-Build Alternative, noise levels would be within 1 dBA at most locations and would have similar increases of up to 10 dBA at residences near the ramp improvements between E 33rd Street and E 39th Street. Six residences located between E 33rd Street and E 35th Street are predicted to undergo substantial noise impacts. The six residences are represented by five modeled sites: VW-080, VW-082, VW-084, VW-094, and VW-098. Figure 3.11-9, Figure 3.11-10, and Figure 3.11-11 show the location of each traffic noise impact in north Vancouver west of I-5.

Portland Light-Rail Noise

The only noise-sensitive land use between the existing light-rail alignment at the Expo Center and the Portland and Oregon boundary is several rows of floating homes in North Portland Harbor. The Modified LPA, with any of the design options, would require relocation of the first row of homes and one home on the second dock; therefore, those homes were not analyzed for noise impacts. Light-rail noise was analyzed at the nearest remaining homes based on the distance between the proposed tracks and the homes. In all, 36 homes on the west side of the proposed North Portland Harbor and Columbia River bridges were evaluated for light-rail noise. The existing L_{dn} for the homes was extrapolated from measured data and on-site inspections.

The analysis predicted noise levels below the FTA noise impact criteria under the Modified LPA, including at the nearest remaining floating homes in North Portland Harbor. At all other noise-sensitive properties in the Portland portion of the project area, noise from light-rail operations would be well below the traffic noise levels, including the manufactured home residential area along the Columbia River. The cumulative effects at receptor LRT-3 would be less than 1 dB because the train noise would be more than 10 dB lower than the existing ambient levels. Results at the floating homes in North Portland Harbor are shown in Table 3.11-9 under site LRT-3.

Portland Transit Station Noise

The analysis reviewed the noise-sensitive receptors located nearest to the station improvements under the Modified LPA, following the FTA's guidance for noise-screening distances. These included the Hayden Island Station, Expo Center Station, and Expo Center Overnight Station. The nearest noise-sensitive receptors were

located beyond the FTA noise-screening distance at each of the Portland Transit Stations. Therefore, no noise impacts are predicted at these locations.

Ruby Junction Maintenance Facility

The planned expansion of the Ruby Junction Maintenance Facility is 350 feet from the nearest homes on SE 202nd Avenue, which is located within the FTA noise-screening distance. Modeled noise levels at the nearest home that would result from overall maintenance yard improvements are predicted to be below the FTA moderate and severe impact criteria. Results are shown in Table 3.11-9 under site "OMF-1."

The other noise-sensitive land uses located closest to improvements at Ruby Junction Maintenance Facility are single-family residences at SE 196th Avenue and residences at the Mobile Park Plaza at 19776 SE Stark Street. Both noise-sensitive use areas were reviewed with the FTA noise-screening distances and are located beyond the screening distance from the planned improvements. Therefore, no noise impacts are predicted at either location.

Downtown Vancouver - Modified LPA Modeled Transit Noise and Vibration Effects

Downtown Vancouver Light-Rail Noise

The Modified LPA would have moderate noise impacts at one location between the southern Columbia River bridge landing and W 6th Street—modeled site LRT-1 (the Normandy Apartments located at 316 E 7th Street). These impacts would result from special track work (i.e. turnouts, crossovers, switches). Noise levels with light-rail operations at this location are predicted to be 67 dBA L_{dn}. The criterion for moderate impacts at site LRT-1 is 66 dBA L_{dn}. Therefore, moderate noise impacts are predicted at this location.

Downtown Vancouver Transit Station Noise

The FTA noise-screening distances were used to review the nearest noise-sensitive receptors to station improvements included in the Modified LPA: Evergreen Station, and Waterfront Station. These receptors were located beyond the FTA noise-screening distance at each of the Vancouver Transit Stations; therefore, no noise impacts are predicted.

Downtown Vancouver Park-and-Ride Noise

Two planned park-and-ride facilities with multiple options in downtown Vancouver were reviewed against the FTA noise-screening distances. Park-and-ride lots 1a and 1c, located near the planned Waterfront Station, and park-and-ride lot 2a, located near the planned Evergreen Station, were located beyond FTA noise-screening distances. Therefore, no noise impacts are predicted.

Downtown Vancouver park-and-ride lot 1b, at W 4th Street and Columbia Street, is located within the FTA noise-screening distance from the new apartments under construction at 400 Washington Street (shown as "PNR-1" on Table 3.11-9). Modeled noise levels that would result from park-and-ride lot 1b are predicted to be below the FTA moderate and severe impact criteria. Therefore, no noise impacts are predicted at 400 Washington Street. The park-and-ride lot 2b at C Street and E 7th Street is located within the FTA noise-screening distance from the Normandy Apartments located at 316 E 7th Street and the Econo Lodge located at 601 Broadway Street. Modeled noise levels that would result from park-and-ride lot 2a are predicted to be below the FTA moderate and severe impact criteria; therefore, no noise impacts are predicted at either location. Results are shown in Table 3.11-9.

Downtown Vancouver Total Transit Noise

Total transit noise was evaluated to identify any additional impact locations that weren't identified when evaluating individual noise sources. Impacts and calculated noise levels presented in Table 3.11-9 include

noise from all Modified LPA transit improvements. Calculated noise levels are unchanged from individual noise levels due to the distance from stationary noise sources from sites located near the light-rail alignment. However, all noise levels are influenced by highway noise, which is included in the evaluation of mitigation measures presented in Section 3.11.6.

Downtown Vancouver Combined Highway and Transit Noise

LRT-1 is the one location where highway noise and transit noise impacts result from the Modified LPA. Since traffic noise approaches the transit noise of 69 dBA the noise level from both sources could be 1 to 2 dB higher during the peak traffic hour of the day at this location. See Section 7.8.1 of the Noise and Vibration Technical Report for additional information.

Portland Light-Rail Vibration

Sites sensitive to vibration were reviewed, along with the location of transit improvements, to identify potential vibration impacts. In this area, the proposed extension of light-rail is on a structure in most areas and is not near vibration-sensitive buildings. The one area that includes sites sensitive to vibration near transit improvements is the area of floating homes located near the proposed light-rail bridge from the Portland mainland to Hayden Island. Because these homes are located on water, minimal transmission of vibration is expected, and no impacts are predicted. The other transit facilities included in the Modified LPA located in and around Portland are Hayden Island Station, Expo Center Station, Expo Center Overnight Station, and the Ruby Junction Maintenance Facility, located in Gresham. As no vibration-sensitive sites are located in close proximity to these sites, no impacts are predicted. Therefore, no transit-related vibration impacts are predicted in the Portland area.

Downtown Vancouver Light-Rail Vibration

Vibration levels at the Normandy Apartments located at 316 E 7th Street (LRV-1) and the mixed-use building at 801 C Street that includes the Regal City Center Cinema (LRV-2) are predicted to exceed the FTA vibration criteria due to the close proximity of special trackwork to each building. Maximum vibration levels at these sites could reach 77 to 81 VdB as shown in Table 3.11-10. The ground-borne vibration levels are due to the special trackwork near the receptors and not the vibration generated by the train passbys. Vibration levels at the Econo Lodge hotel at 601 Broadway (LRV-4) are predicted to be below the FTA vibration impact criteria. Figure 3.11-12, at the end of this section, provides an aerial view of this area and identifies the grouping of the homes and location of the proposed light-rail alignment. The Modified LPA with the I-5 mainline westward shift design option would result in higher vibration levels in downtown Vancouver due to the westward shift of the light-rail alignment; however, no additional vibration impacts are anticipated due to the distance to sensitive receptors.

Table 3.11-9. Modified LPA L_{eq} and L_{dn} for Transit Operations

Receptor [a]	Area Description [b]	Land Use	Number of Units [c]	Existing Noise [d] (dBA)	Modified LPA Primary Transit Noise Source	Modified LPA Noise Contribution [e] (dBA)	FTA Impact Criteria: Moderate (dBA)	FTA Impact Criteria: Severe (dBA)	Units with Moderate Impacts:	Units with Severe Impacts:
LRT-1	E 7th Street/E C Street	SF	12	83	Light-Rail	67	66	76	12	–
LRT-2	E 6th Street/ E C Street	Hotel	0	80	Light-Rail	65	66	76	–	–
LRT-3	Jantzen Beach Houseboats	SF	5	77	Light-Rail	65	66	76	–	–
OMF-1	SE 202nd Avenue (Gresham)	SF	3	61	Ruby Junction Maintenance Facility	56	59	64	–	–
PNR-1 [f]	400 Washington Street	MF	200	68	Park-and-Ride Lot 1b	63	64	74	–	–

a Receptors with impacts shown on Figure 3.11-21.
b General description of the area of analysis.
c Number of individual apartments or homes affected.
d Existing noise levels in L_{dn} for category 2 land use, or L_{eq} for category 1 or 3 land uses.
e Noise from operation of the Modified LPA transit source only. This is the noise level used to determine impacts with the FTA criteria. Levels in **bold** exceed FTA criteria.
f Site PNR-1 used to assess contribution of park-and-ride noise at sites at other nearby sites located similar distance to planned Park-and-Ride lots 1c and 2b. Park and Rides were evaluated using FTA methods. Noise-sensitive land uses were also included in the traffic noise modeling analysis.
Key: dBA = A-weighted decibels; FTA = Federal Transit Administration; L_{dn} = day-night equivalent sound level; L_{eq} = equivalent sound level; LPA = Locally Preferred Alternative; MF = multifamily; SF = single family; "-" = no impact

Table 3.11-10. Projected Transit Vibration Effects under the Modified LPA

Receptor [a]	Area Description [b]	Land Use	FTA Vibration Criteria [c] (VdB)	Vibration Level [d] (VdB)	Meets Criteria [e]	Number of Impacts [f]
LRV-1	E 7th Street/E C Street	MF	72	77	Y	12
LRV-2	E 8th Street/E C Street	Movie Theater	75	81	Y	1 - Movie Theater
LRV-3	Hayden Island Floating Homes	SF	72	See note [g]	See note [g]	See note [g]
LRV-4	Econo Lodge, 601 Broadway	Hotel	72	70	N	-

a Receptors with impacts shown on Figure 3.11-12. Figure 3.11-21
b General description of the area of analysis.
c FTA vibration impact criteria.
d Predicted vibration level.
e Amount the predicted level exceeds the criteria.
f Number of individual structures affected.
g Because these SF residences are on water, minimal transmission of ground vibration occurs.
FTA = Federal Transit Administration; MF = multifamily; SF = single family; VdB = vibration decibels; "-" = no impact

No transit-related vibration impacts are predicted in the Portland area. In Vancouver, vibration impacts would affect 12 multifamily residences at the Normandy Apartments at 316 E 7th Street (LRV-1) and a multi-use building at 801 C Street that includes a cinema and commercial businesses (LRV-2) shown in Figure 3.11-12.

3.11.4 Temporary Effects

No-Build Alternative

Under the No-Build Alternative, there would be no construction of replacement bridges, no removal of existing bridge, and none of the other proposed roadway, transit, or stormwater improvements associated under the Modified LPA. Because no program improvements are included in the No-Build Alternative, short-term effects would be limited to noise-sensitive land uses near ongoing maintenance activities.

Modified LPA

Construction Activities

Construction of the new Columbia River bridges, removal of the existing Interstate Bridge, and improvements to interchanges, local roads, and various transit facilities would require equipment and machinery common to roadway, transit, bridge, and structural projects. Table 3.11-11 provides a list of the typical types of equipment used for this kind of construction, the corresponding activities, and the maximum noise levels as measured at 50 feet from the noise source under normal use.

Figure 3.11-12. Downtown Vancouver Transit Noise and Vibration Analysis and Impacts

Table 3.11-11. Typical Construction Equipment, Use, and Reference Maximum Noise Level

Equipment	Typical Expected Project Use [a]	L_{max} [b]	Source [c]
Air Compressors	Used for pneumatic tools and general maintenance - all phases	70–76	a, b, c
Backhoe	General construction and yard work	78–82	b, c
Backhoe	General construction and yard work	78–82	b, c
Concrete Pump	Pumping concrete	78–82	b, c
Concrete Saws	Concrete removal, utilities access	75–80	b, c
Crane	Materials handling, removal, and replacement	78–84	b, c
Excavator	General construction and materials handling	82–88	b, c
Forklifts	Staging area work and hauling materials	72	a, b, c
Haul Trucks	Materials handling, general hauling	86	b, c
Jackhammers	Pavement removal	74–82	b, c
Loader	General construction and materials handling	86	b, c
Pavers	Roadway paving	88	b

Equipment	Typical Expected Project Use [a]	L_{max} [b]	Source [c]
Pile Drivers	Support for structure and hillside	99–105	b, c
Power Plants	General construction use, nighttime work	72	b, c
Pumps	General construction use, water removal	62	b, c
Pneumatic Tools	Miscellaneous construction work	78–86	c
Service Trucks	Repair and maintenance of equipment	72	b, c
Tractor Trailers	Material removal and delivery	86	c
Utility Trucks	General project work	72	b
Vibratory equipment	Shore up hillside to prevent slides and soil compacting	82–88	b, c
Welders	General project work	76	b, c

Sources: FTA 1995, 2018

a Typical maximum noise level under normal operation as measured at 50 feet from the noise source.

b Maximum noise level as measured at a distance of 50 feet under normal operation.

c Sources of noise levels presented:

Portland, Oregon Area Projects: Light-rail, I-5 Preservation, and Hawthorne Bridge construction projects and other measured data.

U.S. Department of Transportation construction noise documentation and other construction noise sources.

Construction Noise

The Modified LPA would be completed in the following four typical construction phases.

Preparation

Major noise-producing equipment used during the preparation stage could include concrete pumps, cranes, excavators, haul trucks, loaders, and tractor trailers. During this phase, maximum noise levels could reach 82 to 94 dBA at the nearest residences (50 to 100 feet) for normal construction activities.

Other major noise sources that may be required include the use of vibratory and impact equipment to install piles or sheet piles. Other equipment expected during this phase includes backhoes, air compressors, forklifts, pumps, power plants, service trucks, and utility trucks.

Construction

Construction impacts would persist at the construction site, and temporary noise impacts would occur at various times throughout construction and demolition over approximately a 9- to 15-year construction period. The loudest noise sources during construction of the new bridges would be pile drivers, cement mixers, concrete pumps, pavers, haul trucks, and tractor trailers. Drilled shafts would be used to reduce the number of piles driven. The cement mixers and concrete pumps would be required for construction of the superstructure. Maximum noise levels would range from 82 to 94 dBA at the closest receiver locations.

Approximately 3,311 temporary piles would be installed and removed during the multiyear construction of the Columbia River and North Portland Harbor bridges. These piles would be staged throughout the in-water construction and demolition periods. Between 100 and 400 temporary piles could be in the water at a given time.

An average of six temporary, load-bearing piles could be installed per day using one or two impact drivers. Some amount of impact pile driving in the Columbia River or North Portland Harbor would occur on approximately 735 days spread over the estimated six in-water work windows that would be required for the construction of the Columbia River bridges.

Three hundred impact strikes could be required to finish driving or proofing a given pile. This number of strikes would require approximately 30 to 45 minutes of impact hammer activity. Between two and three piles per day could be installed or proofed with an impact hammer, with an estimated total maximum number of 900 impact strikes per day if a single impact pile driver is in operation, or up to 1,800 impact strikes per day if two pile-driving rigs are operated concurrently. Actual pile production rates vary, and a typical day would likely have fewer strikes.

A bubble curtain or similarly effective noise attenuation device would be implemented during all impact pile driving, and a hydroacoustic monitoring plan would be implemented during impact pile driving to confirm the level of attenuation provided. This monitoring program would require unattenuated pile strikes in order to confirm the amount of attenuation provided by the system. Up to 75 unattenuated strikes could be required to accomplish this testing. Testing would occur up to approximately 40 days total over the course of construction. On each day of testing, unattenuated pile strikes would occur over a period of less than 10 minutes.

During construction, up to two impact pile drivers could operate simultaneously near one another. In addition, the contractor could elect to have both a vibratory and impact pile-driving rig in operation simultaneously. Operation of two pile-driving rigs simultaneously is not expected to produce greater decibel levels. Pile strikes from both drivers would need to be synchronous (within 0.0 and approximately 0.1 seconds apart) to produce higher noise levels than a single pile driver operating alone. Because this level of synchronicity is highly unlikely, the analysis assumes that pile drivers would not generate noise levels greater than that of a single pile driver. Refer to Section 3.16, Ecosystems, for additional information regarding construction noise impacts to underwater species.

The Modified LPA with any of the design options would result in temporary impacts to noise levels associated with construction of the Columbia River bridges and associated roadway and interchange improvements. The extent and nature of these impacts would be minimized and avoided to the extent possible through the implementation of best management practices (BMPs), such as implementing a bubble curtain (or similarly effective noise attenuation device) during all in-water impact pile driving.

Miscellaneous Activities

General construction activities would occur after completion of the heavy construction and would include installation of bridge railings, signage, lighting, roadway striping, and others. As shown in Table 3.11-12, many of these activities are expected to produce noise levels above 80 dBA at 50 feet for extended periods of time.

Demolition

Demolition of the existing structures would require heavy equipment such as concrete saws, cranes, excavators, hoe-rams, haul trucks, jackhammers, loaders, and tractor trailers. Maximum noise levels could reach 82 to 93 dBA at the nearest receptors.

Table 3.11-12 provides the noise levels for each of the four typical construction phases as measured at 50 feet from the construction activity. The noise levels shown in Table 3.11-12 are the typical maximums and would only occur periodically during the heaviest periods of construction. Actual hourly noise levels could be substantially lower than those stated, depending on the level of activity at that time and the distance from the work site to the noise-sensitive properties.

Table 3.11-12. Noise Levels for Typical Construction Scenarios at 50 Feet from Work Site

Scenario [a]	Equipment [b]	L_{max} [c] (dBA)	L_{eq} [d] (dBA)
Preparing for construction of new structures.	Air compressor, backhoe, concrete pump, crane, excavator, forklift, haul truck, loader, water pump, power plant, service truck, tractor trailer, utility truck, and vibratory equipment	94	87
Constructing new structures and paving roadways.	Air compressor, backhoe, cement mixer, concrete pump, crane, forklift, haul truck, loader, paver, pump, power plant, service truck, tractor trailer, utility truck, vibratory equipment, and welder	94	88
Conducting miscellaneous activities, including striping, lighting, and providing signs.	Air compressor, backhoe, crane, forklift, haul truck, loader, pump, service truck, tractor trailer, utility truck, and welder	91	83
Demolishing existing structures.	Air compressor, backhoe, concrete saw, crane, excavator, forklift, haul truck, jackhammer, loader, power plant, pneumatic tools, water pump, service truck, and utility truck	93	88

Note: Combined worst-case noise levels for all equipment 50 feet from work site.
a Operational conditions under which the noise levels are projected.
b Normal equipment in operation under the given scenario.
c L_{max} (dBA) is an average maximum noise emission for the construction equipment under the given scenario.
d L_{eq} (dBA) is an energy average noise emission level for construction equipment operating under the given scenario. For this type of equipment, the L_{eq} is approximately equal to the L_{50} (that is, noise level that is exceeded 50 percent of the time).
dBA = A-weighted decibels

The construction noise study assumed worst-case noise levels during each of the four general construction phases for periods of maximum construction activity. Actual noise levels experienced during construction would generally be lower than those described below. The information in Table 3.11-12 was used to predict construction noise levels for several distances from the project work area. Figure 3.11-13 is a graph of the construction noise level versus distance for the phases of project construction listed in Table 3.11-12.

Construction Vibration

Major vibration-producing activities would occur primarily during preparation for the new bridges and demolition of the existing bridge. Activities that have the potential to produce high levels of vibration would include pile driving, vibratory shoring, soil compacting, and some hauling and demolition activities. Vibration effects from pile driving or vibratory sheet installations could occur within 50 to 100 feet of sensitive receivers. It is unlikely that vibration levels would exceed 0.5 inches per second (approximate threshold for building damage) at distances greater than 100 feet from the construction sites. Although analysis indicates that buildings in the study area would not experience adverse vibration-related impacts from construction, owners of two historic structures (Barracks Post Hospital and Clark County Museum) have expressed concerns. See Section 3.8, Historic and Archaeological Resources, for further discussion of efforts to measure, monitor, and, if necessary, mitigate vibration impacts to these historic structures.

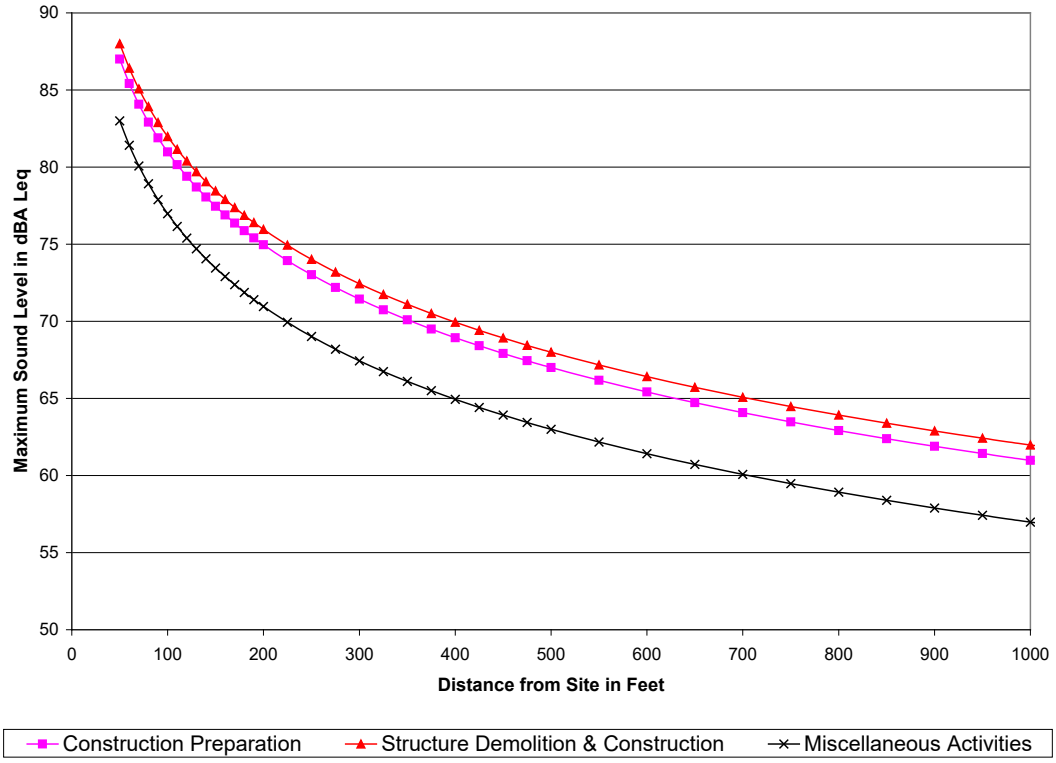
The mitigation measures intended to protect marine life from pile-driving hydroacoustic impacts, as described in Section 3.16, Ecosystems, would also reduce the potential for noise and vibration impacts to nearby noise-sensitive land uses.

3.11.5 Indirect Effects

An indirect effect of the Modified LPA on population and employment distribution and land use patterns is the promotion of more transit-oriented development around the new transit stations and support of minor

redistribution in future population and employment growth from outlying areas to the I-5 corridor, consistent with local land use plans. This increase in density and activity would likely result in further minor increases in ambient noise and vibration in the study area, and additional residents, including sensitive receptors, would be exposed to the urban noise levels in the study area. Because this new residential and commercial development is expected to occur in areas that already experience a fairly high level of background noise and vibration, and because new residents moving into that sound environment would do so by choice, indirect noise and vibration effects are anticipated to be minor.

Figure 3.11-13. Noise Level vs. Distance for Typical Construction Phases



Source: Noise and Vibration Technical Report

3.11.6 Potential Avoidance, Minimization, and Mitigation Measures

Long-Term Effects

Highway Traffic Noise Mitigation

Mitigation related to highway traffic noise, including mitigation (abatement) measures that meet ODOT's and WSDOT's feasibility and reasonableness criteria, may be recommended for inclusion in the Modified LPA. Feasibility primarily deals with engineering considerations such as whether substantial noise level reductions can be achieved or whether there would be a negative effect on property access resulting from the placement of noise walls (WSDOT 2020). Reasonableness comprises three factors: (1) if abatement is cost-effective; (2) if abatement can achieve the design goal; (3) and if the abatement is desired by benefiting receptors (WSDOT 2020). The complete evaluation of potential traffic noise abatement measures can be found in Section 7 of the Noise and Vibration Technical Report, including discussion of isolated noise receptors where mitigation would not be reasonable.

Under ODOT and WSDOT policies, the following noise abatement measures must be considered:

- Traffic management measures (for example, traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, and exclusive land designations).
- Highway design measures (for example, alteration of horizontal/vertical alignments).
- Acquisition of property rights (either in fee or lesser interest) for construction of noise barriers.
- Acquisition of real property or interests therein (predominantly unimproved property) to serve as a buffer zone to preempt development that would be adversely affected by traffic noise.
- Sound insulation of all Activity Category D land uses, including public use or nonprofit institutional structures.
- Construction of sound barriers (including landscaping for aesthetic purposes), whether within or outside the highway right of way. Interstate construction funds may not participate in landscaping. The use of landscaping for noise abatement requires a minimum of 65 feet of densely planted, mature vegetation to provide a noticeable noise abatement up to 6 dB (NCHRP 2021).

Noise mitigation was evaluated at all locations where traffic noise impacts were predicted. Noise walls were evaluated to mitigate noise impacts at 16 locations in Washington and three in Oregon. Fourteen of the 16 noise walls in Washington (Noise Walls 1 through 9 and Noise Walls 11, 11A, 12, 14, and 15) were found to meet WSDOT criteria for the placement of a feasible noise wall. However, only 10 locations—Noise Walls 1 through 8, Noise Wall 11A, and Noise Wall 12—met WSDOT criteria for the placement of both a feasible and reasonable noise barrier. Included in the 10 recommended noise walls, Noise Walls 2 through 8 would replace existing noise walls.

Two of the three noise walls evaluated in Oregon (Noise Walls 16 and 17) did not meet ODOT criteria for the placement of a feasible noise wall. The third noise wall evaluated in Oregon (Noise Wall 18) met ODOT criteria for the placement of both a feasible and reasonable noise barrier.

Noise mitigation results would be the same for the Modified LPA with all bridge configurations, one or two auxiliary lanes, and the SR 14 Interchange without C Street ramps. The only difference in highway traffic noise mitigation between the Modified LPA design options is that under the I-5 mainline shifted west design option, Noise Wall 12 would not be recommended because the noise-affected property would be acquired.

The 11 feasible and reasonable noise walls are listed below and described in Section 7.2.1.1 of the Noise and Vibration Technical Report. The general location of each feasible and reasonable noise wall is described below and shown on Figure 3.11-14 to Figure 3.11-20. Table 3.11-13 summarizes each noise wall evaluation.

- Noise Wall 1: west side of I-5 from the southbound on-ramp from Main Street to E 39th Street.
- Noise Wall 2: west side of I-5 between E 39th Street and E 33rd Street.
- Noise Wall 3: east side of I-5 between E 33rd Street and SR 500.
- Noise Wall 4: west side of I-5 between E 33rd Street and E 29th Street.
- Noise Wall 5: east side of I-5 between E 33rd Street and E 29th Street.
- Noise Wall 6: west side of I-5 between E 29th Street and E 26th Street/E Fourth Plain Boulevard.
- Noise Wall 7: east side of I-5 between E 29th Street and E Fourth Plain Boulevard.
- Noise Wall 8: west side of I-5 between E 4th Plain Boulevard and E McLoughlin Boulevard.
- Noise Wall 11A: east side of I-5 between E Evergreen Boulevard and Officers Row.
- Noise Wall 12: west side of I-5 between E 7th Street and E 8th Street.
- Noise Wall 18: north side of N Marine Drive and east of I-5.

Table 3.11-13. Noise Wall Analysis Summary

Wall	No. of Impacts [a]	Length (feet)	Height (feet)	No. of Impacts Benefited [b]	Feasible?	Achieves Design Goal?	Total Benefits [c]	Planning Level Cost [d]	Cost Allowance / Cost per Benefited Receiver [e]	Cost Reasonable? [e]	Wall Recommended?
1	10	898	12	7	Yes	Yes	15	$555,530	$664,736	Yes	Yes
2	10	1,727	8	10	Yes	Yes	15	$712,631	$717,379	Yes	Yes
3	3	1,845	14	3	Yes	Yes	40	$1,333,086	$1,455,607	Yes	Yes
4	1	970	10	10	Yes	Yes	18	$500,617	$794,174	Yes	Yes
5	17	986	10	17	Yes	Yes	18	$509,391	$1,053,875	Yes	Yes
6	10	986	10	8	Yes	Yes	11	$508,875	$579,889	Yes	Yes
7	10	1,104	10	10	Yes	Yes	10	$570,291	$708,706	Yes	Yes
8	21	1,496	16	15	Yes	Yes	38	$1,235,337	$1,723,771	Yes	Yes
9	4	898	18	4	Yes	Yes	8	$834,224	$327,620	No	No
10	6	1,089	16	0	No	No	0	N/A	N/A	No	No
11	11	1,172	18	4	Yes	Yes	6	$1,088,765	$269,404	No	No
11A	4	464	6	3	Yes	Yes	3	$143,682	$150,495	Yes	Yes
12	6	540	10 to 12	6	Yes	Yes	6	$316,782	$322,044	Yes	Yes
13	24	497	12	4	No	No	12	N/A	N/A	No	No
14	4	1,132	8 to 20	4	Yes	Yes	8	$1,062,702	$352,185	No	No
15	8	1,041	14	3	Yes	Yes	3	$719,185	$150,494	No	No
16	3	3,114	24	0	No	N/A	0	N/A	N/A	No	No

Wall	No. of Impacts [a]	Length (feet)	Height (feet)	No. of Impacts Benefited [b]	Feasible?	Achieves Design Goal?	Total Benefits [c]	Planning Level Cost [d]	Cost Allowance / Cost per Benefited Receiver [e]	Cost Reasonable? [e]	Wall Recommended?
17	18	1,828	24	0	No	N/A	0	N/A	N/A	No	No
18	12	1,029	12 to 16	12	Yes	Yes	28	$436,770	$15,599	Yes	Yes

Note: N/A = not applicable for walls that do not meet feasibility. Details of all wall evaluations are presented in the Noise and Vibration Technical Report.

a Impacts based on WSDOT NAC, ODOT NAAC, and Substantial Increase thresholds with 2045 Modified LPA.

b Impacts benefited based on reduction from 2045 Modified LPA with existing noise walls in place.

c Total benefits based on reduction from 2045 Modified LPA without existing noise in place.

d Planning level cost calculated from WSDOT's planning level cost of $51.61 per square foot and ODOT's planning level cost of $30 per square foot for wall heights up to 16 feet and $37.50 per square feet for wall heights from 17 to 25 feet.

e WSDOT Cost allowance and ODOT wall cost per benefited receiver.

f Cost reasonableness based on WSDOT Noise Policy Reasonableness guidelines and ODOT's Noise Manual Cost Effectiveness Criteria.

LPA = Locally Preferred Alternative; NAAC = Noise Abatement Approach Criteria; NAC = Noise Abatement Criteria; ODOT = Oregon Department of Transportation; WSDOT = Washington State Department of Transportation

Statement of Likelihood

Based on the findings of this analysis, ODOT and WSDOT will further evaluate traffic noise abatement measures in the form of noise walls during the final design of the Modified LPA. The 11 noise wall locations (10 in Washington and 1 in Oregon) determined to be feasible and reasonable (Noise Walls 1, 2, 3, 4, 5, 6, 7, 8, 11A, 12, and 18) will be re-assessed in detail during final design.

The 11 noise walls would mitigate impacts at 76 residences or residential equivalent receiver locations and would benefit an additional 125 residences or residential equivalents. The combined preliminary cost for the 11 recommended noise walls totals approximately $6,823,000. If conditions change substantially during final design of the Modified LPA, the mitigation measure may no longer be feasible and reasonable and, therefore, would not be constructed as part of the Program. A final decision will be made upon the completion of the final design, a cost-estimating process, and the public involvement process, which includes balloting of benefitted receptors.

The IBR Program Team will also continue to evaluate installation of a tall safety barrier or sound barrier along the elevated light-rail transit structure between E 6th Street and E 8th Street in downtown Vancouver to mitigate transit noise impacts at site LRT-1. LRT-1 represents the Normandy Apartments at 316 E 7th Street in downtown Vancouver. A 3- to 4-foot acoustically absorbent wall or 6-foot reflective wall would be effective at reducing transit noise levels at this location by 7 to 10 dBA.

As described in Section 7.8.1 of the Noise and Vibration Technical Report, there is one location (the Normandy Apartments at 316 E 7th Street in downtown Vancouver) where the Modified LPA would have highway noise impacts and transit noise impacts. Additional information is presented in Section 7.8.1 of the Noise and Vibration Technical Report to support the recommendation to include both the highway traffic noise barrier (Noise Wall 12) and a sound barrier along the elevated structure (at site LRT-1).

Light-Rail Noise and Vibration Mitigation

Light-Rail Noise Mitigation

Table 3.11-14 summarizes the single transit noise impact location, mitigation measures, and future light-rail noise levels after mitigation. Aerial photos of the analysis areas and mitigation are shown in Figure 3.11-21.

Portland Light-Rail Noise Mitigation

No transit noise impacts are predicted in Portland; therefore, no mitigation is needed.

Vancouver Light-Rail Noise Mitigation

- Install tall safety barriers or sound barriers along the elevated structure to mitigate the noise impacts at site LRT-1, which represents the Normandy Apartments located at E 7th Street and E C Street in downtown Vancouver. A 3- to 4-foot acoustically absorbent wall or 6-foot reflective wall would reduce noise levels at this location by 7 to 10 dBA.
- Equip all light-rail track curves with a radius of less than 300 feet with wayside lubricators. After construction of the alignment, during the initial testing, if additional curves are identified with wheel squeal, install wayside track lubricators, as necessary.

Figure 3.11-14. Modified LPA with Double-Deck Fixed-Span Configuration and One Auxiliary Lane – 2045 Evaluated Noise Walls – Portland Mainland

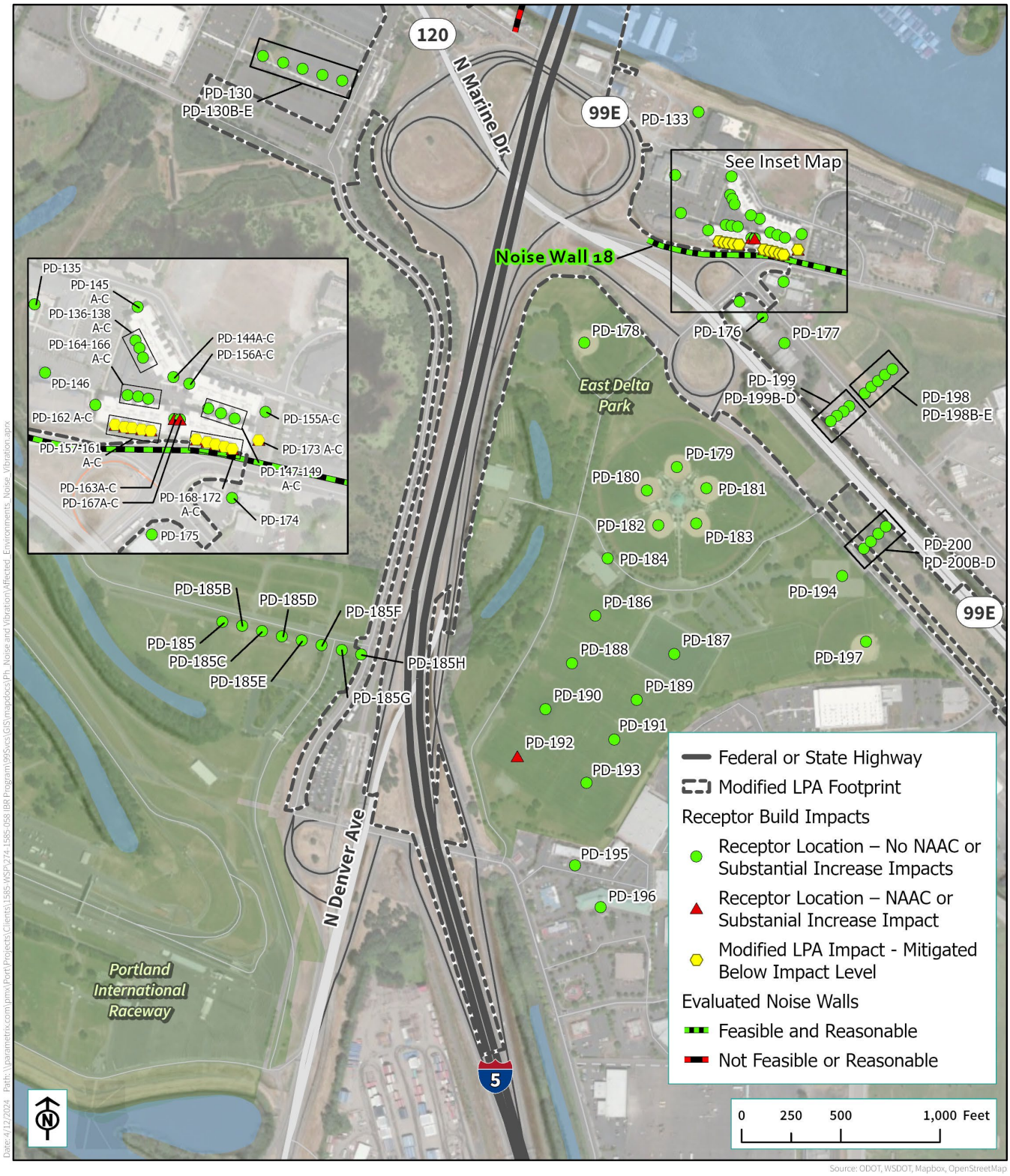


Figure 3.11-15. Modified LPA with Double-Deck Fixed-Span Configuration and One Auxiliary Lane – 2045 Evaluated Noise Walls – Portland/Hayden Island

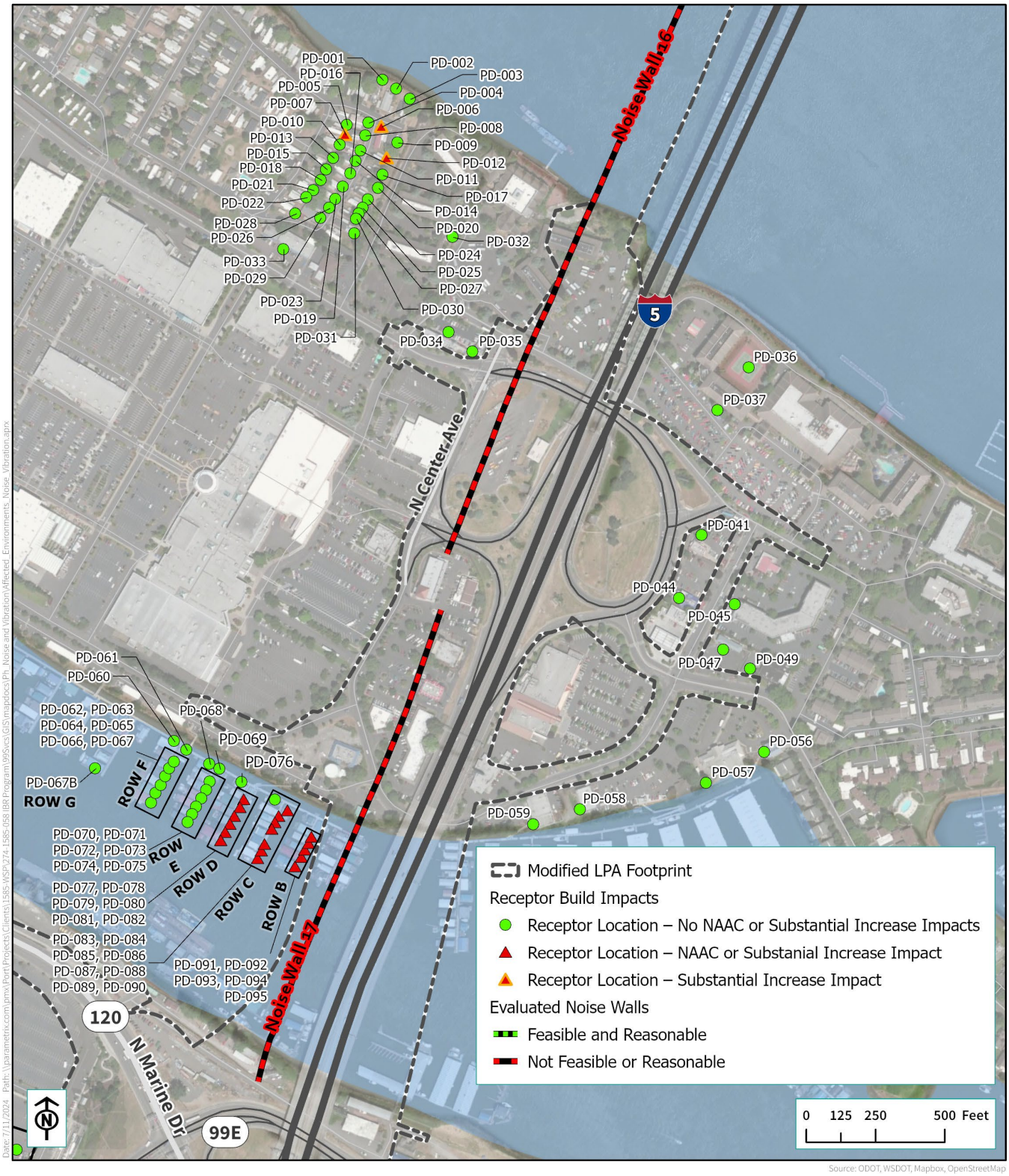


Figure 3.11-16. Modified LPA with Double-Deck Fixed-Span Configuration and One Auxiliary Lane – 2045 Evaluated Noise Walls – I-5 / SR 14 Interchange

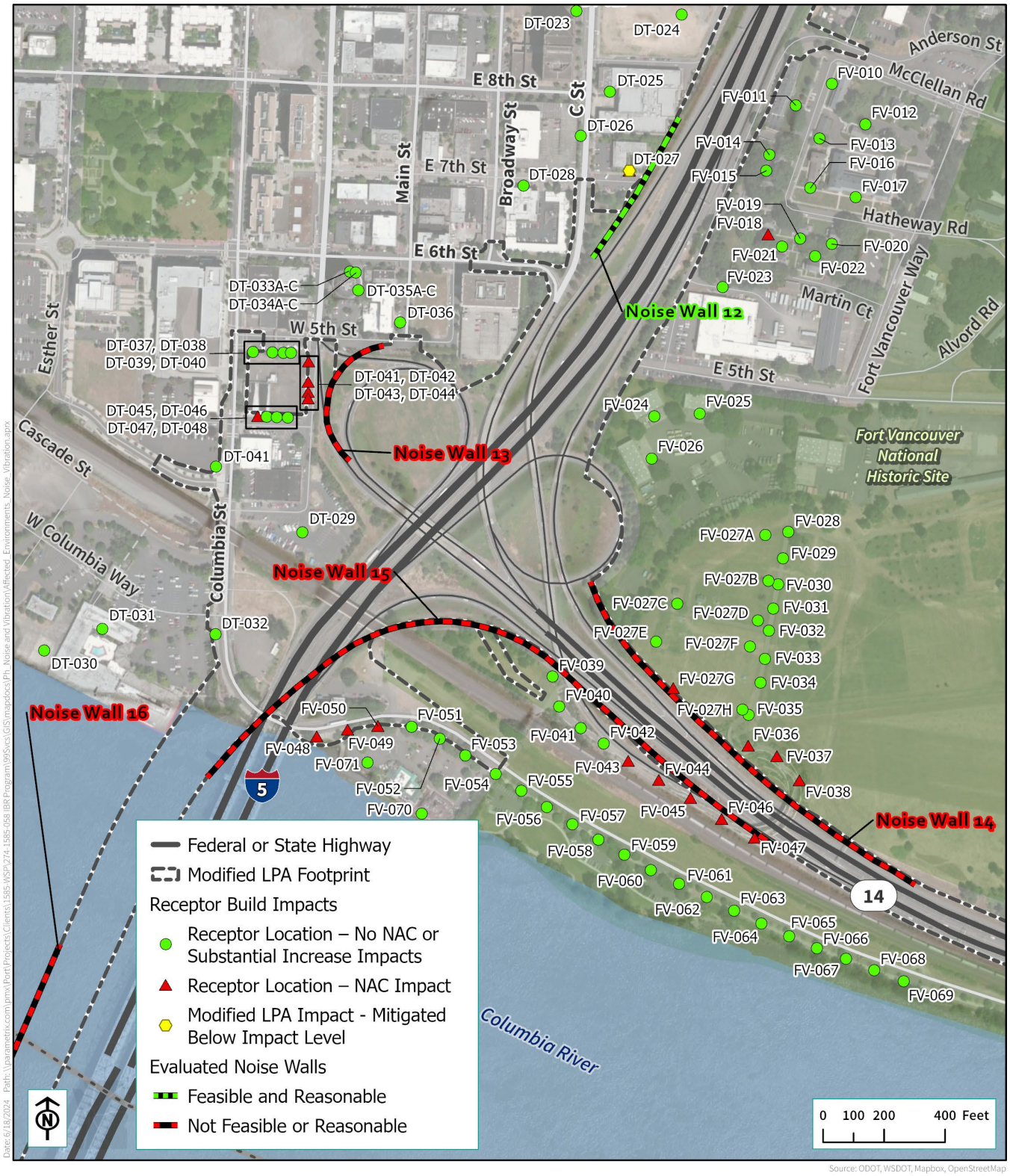


Figure 3.11-17. Modified LPA with Double-Deck Fixed-Span Configuration and One Auxiliary Lane – 2045 Evaluated Noise Walls – E 8th Street to McLoughlin Boulevard

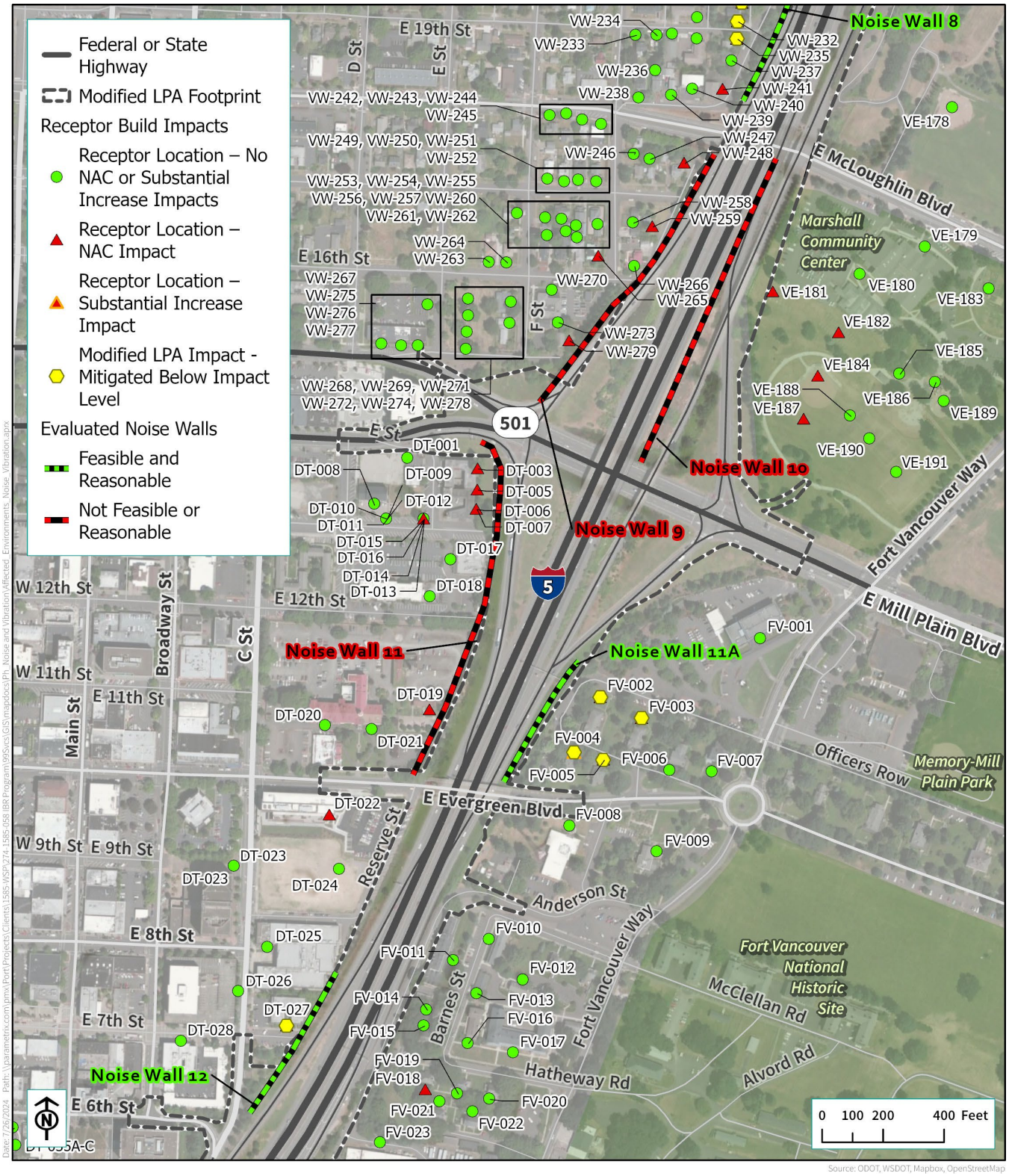


Figure 3.11-18. Modified LPA with Double-Deck Fixed-Span Configuration and One Auxiliary Lane – 2045 Evaluated Noise Walls – McLoughlin Boulevard to E 30th Street

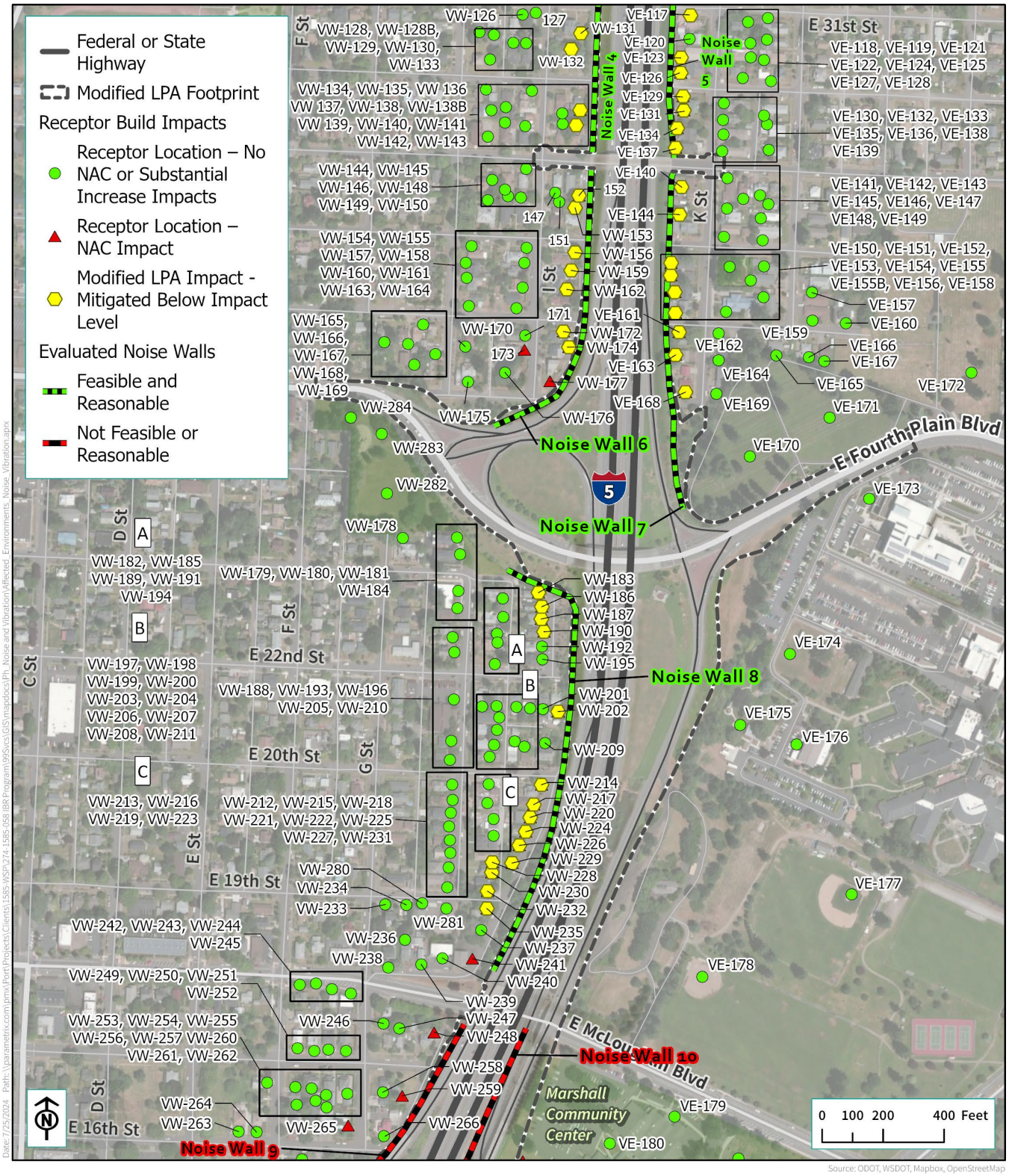


Figure 3.11-19. Modified LPA with Double-Deck Bridge Fixed-Span Configuration and One Auxiliary Lane – 2045 Evaluated Noise Walls – E 30th Street to E 39th Street

Figure 3.11-20. Modified LPA with Double-Deck Bridge Fixed-Span Configuration and One Auxiliary Lane – 2045 Evaluated Noise Walls – E 39th Street to Northern Terminus

Table 3.11-14. Noise Mitigation Analysis

Receptor [a]	Area Description [b]	Land Use	Number of Units [c]	Existing Noise [d] (dBA)	Light-Rail Noise [e] (dBA)	Project Noise with Mitigation [f] (dBA)	FTA Moderate Impact Criteria [g] (dBA, L_{dn})	Impacts [h]	Mitigation [i]	Residual Impacts [j]
LRT-1	E 7th Street/E C Street	SF	12	83	69	64	66	12	Wall	0

a Receivers shown on Figure 3.11-21.
b General description of the area of analysis.
c Number of individual apartments or homes affected.
d Existing noise levels in L_{dn} for category 2 land use, or L_{eq} for category 1 or 3 land uses (see Table 3.11-6 for categories).
e Noise from operation of the light-rail only. This is the noise level used to determine impacts under the FTA criteria.
f Exterior noise level with mitigation.
g FTA impact criteria.
h Number of units adversely affected by project noise.
i Mitigation measures.
dBA = A-weighted decibel; FTA = Federal Transit Administration; SF = single family

Figure 3.11-21. Light-Rail Noise and Vibration Impacts Post-Mitigation

Light-Rail Vibration Mitigation

Portland Vibration Mitigation

No vibration impacts are predicted in Portland; therefore, no mitigation is needed.

Vancouver Vibration Mitigation

- Use resilient rail fasteners to mitigate vibration impacts along direct fixation track way. Resilient rail fasteners typically reduce vibration levels by 5 VdB, which would not reduce all the predicted vibration levels below the FTA 72 VdB criteria for residential land uses. Receivers LRV-1 and LRV-2, with predicted levels of 77 VdB and 81 VdB, respectively, would be the only locations where there is still a potential for vibration impact following mitigation.
- Perform additional testing to ensure that the vibration levels at LRV-1 and LRV-2 would be below the 72 VdB criteria (Figure 3.11-9).

Table 3.11-15 summarizes the vibration levels with and without mitigation. Figure 3.11-21 shows the vibration impacts and proposed mitigation in downtown Vancouver.

Table 3.11-15. Modified LPA Vibration Mitigation Analysis

Location	Receptor	Area Description [b]	Land Use	FTA Vibration Criteria [c] (VdB)	Vibration Level [d] (VdB)	Vibration Level with Mitigation [e] (VdB)	Number of Potential Impacts with Mitigation [f]
Vancouver	LRV-1	E 7th Street/E C Street	MF	72	77	72	12
	LRV-2	E 8th Street/E C Street	Theater	72	81	76	1 - Theater

a Receptors shown on Figure 3.11-21.
b General description of the area of analysis.
c FTA vibration impact criteria.
d Predicted vibration level.
e Predicted vibration level with mitigation.
f Number of individual structures affected.
FTA = Federal Transit Administration; MF = multifamily; SF = single family; VdB = vibration decibels

Table 3.11-16 summarizes the long-term noise and vibration impacts that would result from the Modified LPA with the double-deck bridge configuration and one auxiliary lane. The Noise and Vibration Technical Report documents that, aside from the differences discussed above for the I-5 mainline westward shift design option, noise levels would be similar for the other design options. Table 3.11-8 summarizes the major differences in impacts and benefits across the Modified LPA's bridge configurations, the one-auxiliary-lane and two-auxiliary-lane options, and the No-Build Alternative. As detailed in Table 3.11-8, the difference in noise levels between design options result from the distance between the nearest noise-sensitive land uses and the design options, minimal change in traffic noise shielding from roadway alignments to noise-sensitive land uses, and no large change in peak hour traffic between design options.

Table 3.11-16. Comparison of Effects of the Modified LPA with the Double-Deck Bridge Configuration and One Auxiliary Lane without and with Mitigation

Technical Considerations	Modified LPA without Mitigation	Modified LPA with Mitigation
Number of receptors that exceed highway noise thresholds	198	121
Number of receptors with moderate transit noise impact levels	12	0
Number of receptors with severe transit noise impact levels	0	0
Number of receptors with transit vibration impacts	13	13

Noise/Vibration Mitigation Summary

Table 3.11-17 summarizes IBR Program mitigation related to noise and vibration during operation and construction.

Table 3.11-17. Noise/Vibration Mitigation Summary

IBR Program Area	Noise/Vibration Mitigation during IBR Program Operation	Noise/Vibration Mitigation during IBR Program Construction
Portland Mainland	Highway: Noise Wall 18 Light-Rail: Equip all light-rail track curves with a radius of less than 300 feet with wayside lubricators. After construction of the alignment, during the initial testing, if additional curves are identified with wheel squeal, install wayside track lubricators, as necessary.	• Comply with ODOT construction noise abatement measures (§ 00290.32 Noise Control) at the time of construction. • If a specific noise impact complaint occurs during the construction of the Modified LPA, implement noise mitigation measures outlined in this section as directed by the engineer. • In addition to § 00290.32, ODOT would also implement additional noise abatement methods, including: • Limit activities that produce the highest noise levels (such as hauling, loading spoils, jack hammering, and using other demolition equipment) from 7:00 a.m. to 7:00 p.m. Maximum noise levels associated with pile driving could reach 105 dBA at distances of 50 feet. Mitigation of the noise associated with pile driving would, when possible, include drilled shafts or auguring rather than driving piles (however, using an auger is not likely to be feasible or practical for all locations) or limiting the times the activity could take place. Other less effective methods of reducing noise from pile driving include coating the piles, using pile pads, or using piston mufflers. In the event that pile driving exceeds the limits set forth in Table 3.11-4, a noise variance would be requested from the local jurisdiction. • Keep a construction log for each of the construction staging areas. The log would contain general construction information such as the time an activity took place, type of equipment used, and other information that might help with potential noise effects. • Establish a complaint hotline to investigate noise complaints and compare them to the construction

IBR Program Area	Noise/Vibration Mitigation during IBR Program Operation	Noise/Vibration Mitigation during IBR Program Construction
		logs. A construction monitoring and complaint program would help to ensure that all equipment meets state, local, and any manufacturer's specifications for noise emissions. Equipment not meeting the standards would be removed from service until proper repairs were made and the equipment retested for compliance. This procedure would apply to all haul trucks, loaders, excavators, and other equipment that would be used extensively at the construction sites and that would contribute to potential noise effects. • Use equipment complying with pertinent equipment noise standards of the EPA. • Monitor all activities that might produce vibration levels at or above 0.5 inches per second if structures are near the construction activity, in compliance with WSDOT and ODOT requirements. This would include pile driving, vibratory sheet installation, soil compacting, and other construction activities with the potential to cause high levels of vibration. • For historic built properties within 500 feet of construction, monitor construction activities where construction-related vibration would exceed 0.2 inches per second for transient vibrations and 0.1 inches per second for continuous vibrations.
Portland/Hayden Island	Highway: None. Light-Rail: Equip all light-rail track curves with a radius of less than 300 feet with wayside lubricators. After construction of the alignment, during the initial testing, if additional curves are identified with wheel squeal, install wayside track lubricators, as necessary.	Same as Portland Mainland.
I-5/SR 14 Interchange	Highway: Noise Wall 11A, Noise Wall 12	Same as Portland Mainland with the following clarification for WSDOT:

IBR Program Area	Noise/Vibration Mitigation during IBR Program Operation	Noise/Vibration Mitigation during IBR Program Construction
	Light-Rail: Install tall traffic safety barriers or sound barriers along the elevated structure to mitigate the noise impacts at site LRT-1, which represents the Normandy Apartments. A 3- to 4-foot acoustical absorbent wall or 6-foot reflective wall would be effective at reducing noise levels at this location by 7 to 10 dBA. Equip all light-rail track curves with a radius of less than 300 feet with wayside lubricators. After construction of the alignment, during the initial testing, if additional curves are identified with wheel squeal, install wayside track lubricators, as necessary. Use resilient rail fasteners to mitigate for vibration impacts located along direct fixation track way. Resilient rail fasteners typically reduce vibration levels by 5 VdB, which would bring all the predicted vibration levels to, or below, the FTA 72 VdB criteria for residential land uses. Receivers LRV-1 and LRV-2, with predicted levels of 77 VdB and 81 VdB, respectively, would be the only locations where there is still a potential for vibration impact. Perform additional testing to ensure that the vibration levels at LRV-1 and LRV-2 would be below the 72 VdB criteria	Although WSDOT does not have noise control provisions, WSDOT would voluntarily comply with ODOT Standard Specification for Construction, § 00290.32 Noise Control (2015) for work completed in Washington.
E 8th Street to McLoughlin Boulevard	Highway: None Light-Rail: Equip all light-rail track curves with a radius of less than 300 feet with wayside lubricators. After construction of the alignment, during the initial testing, if additional curves are identified with wheel squeal, install wayside track lubricators, as necessary.	Same as I-5/SR 14 Interchange.
McLoughlin Boulevard to E 30th Street	Highway: Noise Wall 6, Noise Wall 7, Noise Wall 8 Light-Rail: None.	Same as I-5/SR 14 Interchange.
E 30th Street to E 39th Street	Highway: Noise Wall 2, Noise Wall 3, Noise Wall 4, Noise Wall 5 Light-Rail: None.	Same as I-5/SR 14 Interchange.

IBR Program Area	Noise/Vibration Mitigation during IBR Program Operation	Noise/Vibration Mitigation during IBR Program Construction
E 39th Street to Terminus	Highway: Noise Wall 1 Light-Rail: None.	Same as I-5/SR 14 Interchange.

Notes:
A final decision will be made upon the completion of the final design, a cost-estimating process, and the public involvement process. Additional vibration mitigation measures intended to protect marine life are described in Section 3.16, Ecosystems. Additional mitigation measures related to built historic resources are described in Section 3.8, Cultural Resources.

Temporary Effects

Construction noise and vibration BMPs applicable to the Modified LPA with any design option are discussed below.

Construction Noise

Regulatory Requirements

- Comply with ODOT construction noise abatement measures (§ 00290.32 Noise Control) at the time of construction.
- If a specific noise impact complaint occurs during the construction of the Modified LPA, implement noise mitigation measures outlined in this section as directed by the engineer.

Although WSDOT does not have noise control provisions, WSDOT would voluntarily comply with § 00290.32 for work completed in Washington.

Program-Specific Mitigation

In addition to § 00290.32, ODOT and WSDOT would also implement additional noise abatement methods, including:

- Limit activities that produce the highest noise levels (such as hauling, loading spoils, jack hammering, and using other demolition equipment) to 7:00 a.m. to 7:00 p.m. Maximum noise levels associated with pile driving could reach 105 dBA at distances of 50 feet. Mitigation of the noise associated with pile driving would, when possible, include drilled shafts or auguring rather than driving piles (however, using an auger is not likely to be feasible or practical for all locations) or limiting the times the activity could take place. Other less effective methods of reducing noise from pile driving include coating the piles, using pile pads, or using piston mufflers. In the event that pile driving exceeds the limits set forth in Table 3.11-4, a noise variance would be requested from the local jurisdiction.
- Keep a construction log for each of the construction staging areas. The log would contain general construction information such as the time an activity took place, type of equipment used, and other information that might help with potential noise effects.
- Establish a complaint hotline to investigate noise complaints and compare them to the construction logs. A construction monitoring and complaint program would help to ensure that all equipment meets state, local, and any manufacturer's specifications for noise emissions. Equipment not meeting the standards would be removed from service until proper repairs were made and the equipment retested for compliance. This procedure would apply to all haul trucks, loaders, excavators, and other equipment that would be used extensively at the construction sites and that would contribute to potential noise effects.
- Use equipment complying with pertinent equipment noise standards of the U.S. Environmental Protection Agency.

Construction Vibration

Regulatory Requirements

- Monitor all activities that might produce vibration levels at or above 0.5 inches per second if structures are near the construction activity, in compliance with WSDOT and ODOT requirements. This would include pile driving, vibratory sheet installation, soil compacting, and other construction activities with the potential to cause high levels of vibration.
- For historic built properties within 500 feet of construction, monitor construction activities where construction-related vibration would exceed 0.2 inches per second for transient vibrations and 0.1 inches per second for continuous vibrations.

Additional vibration mitigation measures intended to protect marine life are described in Section 3.16, Ecosystems. Additional mitigation measures related to built historic resources are described in Section 3.8, Cultural Resources.

Program-Specific Mitigation

No program-specific mitigation measures are proposed for vibration levels during construction.

3.12 Energy

Federal, state, and local policies (as discussed in the Energy Technical Report) support energy conservation. Transportation energy efficiency is primarily regulated through vehicle efficiency requirements. There are no regulatory standards for transportation facility energy efficiency. Operational energy consumption was evaluated using Oregon Metro's regional travel demand model. The information presented in this section is based on the Energy Technical Report.

3.12.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with energy has been updated in this Draft SEIS to include:

- Revised methodology based on ODOT's updated Air Quality Manual and WSDOT's Guidance on Addressing Air Quality, Greenhouse Gas Emissions, and Energy for WSDOT projects.
- Updated data and models, such as the FHWA Infrastructure Carbon Estimator and the FTA Greenhouse Gas (GHG) Estimator to measure emissions and energy consumption from the construction and maintenance of transportation projects, and the U.S. Environmental Protection Agency's (EPA) latest version of MOtor Vehicle Emission Simulator (MOVES) that estimates emissions and energy consumption from on-road vehicles.
- Updated scenarios for electric vehicle assumptions.
- Change in transportation modeling and analysis.
- Changes to the project footprint, as necessitated by changed conditions, and in existing land uses resulting in changes to proximity to sensitive receptors.

Table 3.12-1. compares the impacts and benefits of the CRC LPA to those of the Modified LPA as a result of the changes listed above. Based on the analysis described in this section, the effects of the Modified LPA would be similar to those of the CRC LPA. Although the methodologies and units used to report energy use have changed since the CRC Final EIS, both the CRC LPA and Modified LPA would reduce energy consumption and GHG emissions.

Table 3.12-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects as Identified in this Section	Explanation of Differences
Annual energy use during operations	Approximately 324,940 BTU of regional transportation energy consumption (mmBtu/day) [a]	Approximately 271,187 BTU of regional transportation energy consumption (mmBtu/day)	• Updates to the MOVES modeling tool, which includes fuel economy and fuel efficiency standards that have been adopted since 2011. • Changes in underlying assumptions about energy consumption from

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects as Identified in this Section	Explanation of Differences
			transit agencies. Values used for the CRC LPA were system-wide whereas values used for the Modified LPA are based on attributable changes.
Total GHG emissions during operations	Approximately 24, 746 metric tons/day (2030)	Approximately 26,325 metric tons/day (2045)	• Same as annual energy use during operations (above).
Vehicle Miles Traveled	Approximately 36.4 million (2030 9-hour regional VMT)	Approximately 58.9 million (2045 daily regional VMT)	• VMT for the CRC LPA was reported for a 9-hour period, whereas VMT for the Modified LPA is reported for a daily (24-hour) period. • Variations in methodology, such as the base year of analysis.
Construction impacts to energy consumption and GHG emissions	Approximately 11,447,104 mmBTU and 871,265 $MTCO_2e$	Approximately 2,601,017 mmBTU and a range of 412,627 to 469,444 $MTCO_2e$	• Updates to methodology and availability of FHWA Infrastructure Carbon Estimator

a CRC estimates on energy use are based on a different underlying assumption about energy consumption. CRC values are system-wide energy values based on data from transit agencies. IBR values are based only on changes due to the Program.

CRC = Columbia River Crossing; BTU = British thermal units; FHWA = Federal Highway Administration; GHG = greenhouse gas; IBR = Interstate Bridge Replacement; mmBTU = one million British thermal units; MOVES = MOtor Vehicle Emission Simulator; MTCO2e = metric tons of carbon dioxide equivalent; VMT = vehicle miles traveled

3.12.2 Existing Conditions

The energy analysis considered effects within the "traffic assignment area," which is the area where the Modified LPA would affect vehicle traffic. The study area and traffic assignment area are shown in Figure 3.12-1.

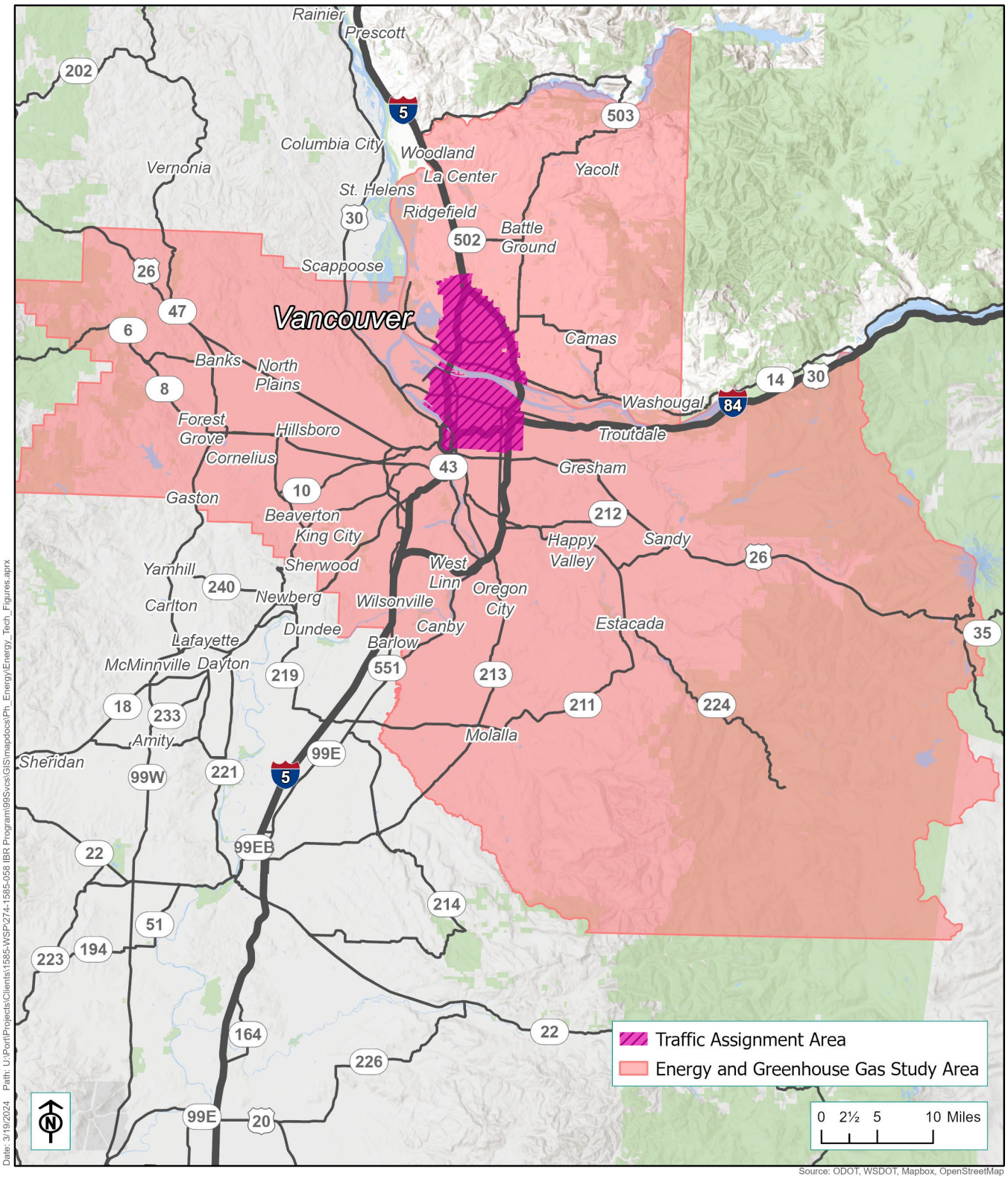
To represent existing conditions, energy consumption was estimated for the analysis year 2015; 2015 corresponds to the base year of the regional travel demand model that serves as the basis for the regional emissions analysis. More recent regional data was not available. The EPA MOVES model, version 3.1.0, was used to estimate energy consumption from the roadway links in the study area. Long-term effects to energy consumption from roadway maintenance, transit maintenance, and transit operations are demonstrated as an increase or decrease to a baseline condition; therefore, the energy consumption from existing roadway maintenance, transit maintenance, and transit operations in the study area were not quantified. The analysis for transit operations focused on new transit operations and stations that would be implemented as part of the Modified LPA.

National Energy Demand Projections

The U.S. Energy Information Administration projects that energy consumption in the transportation sector will remain lower than 2019 levels through 2050 because travel significantly decreased in 2020 as a result of

COVID-19 lockdowns and because improvements in fuel economy and a shift to electrification will offset projected resumed travel growth. As a result, energy consumption by light-duty and heavy-duty vehicles is projected to remain lower than 2019 levels through 2045.

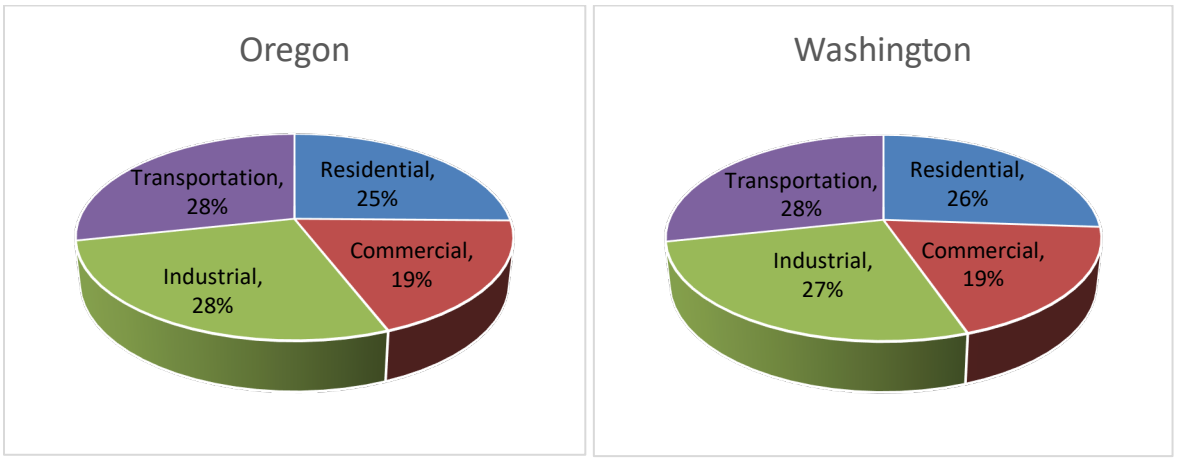
Figure 3.12-1. Energy Study Area and Traffic Assignment Area



Washington and Oregon Energy Trends

Transportation accounts for a substantial portion of the energy consumed in Oregon and Washington—approximately 28% for both states (Figure 3.12-2). Petroleum (e.g., gasoline, diesel, and jet fuel) was the predominant source of transportation-related energy consumption in Oregon and Washington in 2020, at approximately 98% for each state. Natural gas and electric vehicles accounted for the remaining 2% of transportation energy consumption.

Figure 3.12-2. State Energy Consumption by End-Use Sector, 2020



Source: EIA 2022

In 2020, Oregon ranked 29th out of the 50 states for transportation energy consumption, with 279 trillion British thermal units (Btu) of transportation energy consumed, and 35th in transportation energy consumption per capita, at approximately 65.8 million Btu (EIA 2022). Washington ranked 18th in transportation energy consumption, with 505 trillion Btu of transportation energy consumed, and 38th in transportation energy consumption per capita, with about 65.4 million Btu consumed per capita in 2020.

3.12.3 Long-Term Benefits and Effects

This analysis compares the Modified LPA's potential adverse and beneficial effects to those of the No-Build Alternative, including the type and amount of energy consumed in construction and operation.

Table 3.12-2 summarizes the effects of the Modified LPA, design options, and No-Build Alternative on energy. Additional information is provided in the sections that follow.

Table 3.12-2. Summary of Energy Effects from the Modified LPA, the Design Options, and the No-Build Alternative

1	2	3	4	5	6	7
Effect	No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5 or I-5 Westward Shift, All Park-and-Ride Site Options	Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5, All Park-and-Ride Site Options	Modified LPA with Single-Level Fixed-Span Configuration, [a] One Auxiliary Lane, C Street Ramps, Centered I-5, All Park-and-Ride Site Options	Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, All Park-and-Ride Site Options	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Without C Street Ramps, Centered I-5, All Park-and-Ride Site Options
Total Regional Transportation Energy Consumption (mmBtu/day)	• 271,933 in 2045 without electric vehicles. • 190,771 in 2045 with electric vehicles.	• 271,187 in 2045 without electric vehicles (-0.27% compared to No-Build Alternative). • 190,302 in 2045 with electric vehicles (-0.25% compared to No-Build Alternative).	• Similar to the effects listed in Column 3. Modeling results estimate a non-statistically significant difference of less than 0.1%.	• Similar to effects listed in Column 3, but would slightly reduce operational emissions due to the reduced profile grade of the new Columbia River bridges.	• Similar to effects listed in Column 5, except it would increase energy consumption due to the electricity required to raise and lower the bridge and as a result of idling that would be anticipated by a portion of the queued vehicles on the freeway during bridge closures.	• Similar to effects listed in Column 3, but would create additional congestion on local streets due to the removal of the C Street ramps, which would decrease vehicle efficiency, resulting in increased energy consumption.

a The long-term effects associated with the single-level fixed-span configuration would be the same for all bridge type options.

Energy consumption for the Modified LPA and the No-Build Alternative was estimated for 2045 using the travel demand model results, which includes consideration of shifts from vehicles to transit (Table 3.12-3). Carbon dioxide equivalent (CO_2e) was estimated as part of this analysis, and the results are presented in Section 3.19, Climate Change.

The EPA MOVES model, version 3.1.0, was used to estimate energy consumption and emissions of CO_2e from the study area roadway links. The MOVES model does not include assumptions about future electric vehicle use beyond what is included in federal fuel economy standards. However, by 2045 WSDOT and ODOT expect that the use of electric vehicles in Oregon and Washington will have increased substantially. To reflect the anticipated future use of electric vehicles, the Oregon Department of Environmental Quality provided MOVES input files and a post-processing methodology to create two scenarios comparing the No-Build Alternative and the Modified LPA: one with MOVES defaults for electric vehicles and one with assumptions about the region's transition to electric vehicles. The electric vehicle scenario assumes that by 2045, 52% of all passenger vehicles would be electric and thus would have zero tailpipe emissions of CO_2e. Increased adoption of electric medium-duty and heavy-duty trucks were also included. Emissions of CO_2e from electric vehicles were calculated based on estimates of the carbon intensity of the local power supply and estimates of the electricity needed to power an electric vehicle.

No-Build Alternative

Roadway and Transit Operations and Maintenance

Due to federal fuel and engine regulations, the energy efficiency of motor vehicles is expected to increase substantially over the next two decades. As a result, the energy consumed by roadway operations under the No-Build Alternative in 2045 would be lower than existing energy consumption (Table 3.12-3), despite an increase in annual VMT in the study area over this same period.

Table 3.12-3. Daily Energy Consumption in the Study Area and Traffic Assignment Area

Parameter	Existing (2015)	No-Build (2045) without Electric Vehicles	Modified LPA (2045) without Electric Vehicles	Modified LPA Difference from No-Build without Electric Vehicles	No-Build Alternative with Electric Vehicles (2045)	Modified LPA with Electric Vehicles (2045)	Modified LPA Difference from No-Build with Electric Vehicles
Daily Regional VMT [a]	43,017,600	59,042,000	58,950,700	-0.15%	59,042,000	58,950,700	-0.15%
Total Regional Transportation Energy Consumption (mmBtu/day)	290,732	271,933	271,187	-0.27%	190,771	190,302	-0.25%
Daily Traffic Assignment Area VMT	11,267,300	14,349,500	14,270,500	-0.55%	14,349,500	14,270,500	-0.55%

Parameter	Existing (2015)	No-Build (2045) without Electric Vehicles	Modified LPA (2045) without Electric Vehicles	Modified LPA Difference from No-Build without Electric Vehicles	No-Build Alternative with Electric Vehicles (2045)	Modified LPA with Electric Vehicles (2045)	Modified LPA Difference from No-Build with Electric Vehicles
Total Traffic Assignment Area Energy Consumption (mmBtu/day)	76,557	67,466	66,704	-1.13%	47,863	47,380	-1.01%

Note: Results from this table were generated using the MOVES model.

a Daily VMT represents regional link-level data provided by the IBR Program transportation analysts for the MOVES analysis. The VMT used for the MOVES analysis could be slightly different from the Regional VMT reported in the Transportation Technical Report due to differences in how VMT is allocated to specific roadway segments. Note that this daily VMT differs from the analysis for air quality, which evaluates a specific roadway network.

LPA = Locally Preferred Alternative; mmBtu = million British thermal units; VMT = vehicle miles traveled

The No-Build Alternative would not modify the energy consumption necessary for transit operations, roadway maintenance, or transit maintenance.

Modified LPA

Roadway Operations

Similar to the No-Build Alternative, compared to the existing condition VMT is expected to increase approximately 37% by 2045 under the Modified LPA; however, vehicle efficiency would lower estimated energy consumption within the region and within the traffic assignment area (Table 3.12-2).

Looking only at the traffic assignment area, 2045 energy consumption under the Modified LPA is estimated to decrease by approximately 1.01% compared to the No-Build Alternative. This is the same for the Modified LPA with the double-deck fixed-span configuration and the single-level fixed-span configuration (all bridge type options). The single-level movable-span configuration could increase energy consumption as a result of idling by queued vehicles on the roadways during bridge closures and potentially the energy required to raise and lower the bridge opening.

Compared to the Modified LPA with one auxiliary lane, the regional modeling results estimate a slight decrease in energy consumption with the Modified LPA with two auxiliary lanes. However, the decrease is not statistically significant (less than 0.03%). An additional analysis using an operational model output for changes in speed and congestion on the I-5 corridor show that energy consumption with the Modified LPA with two auxiliary lanes could decrease 0.5% compared to the Modified LPA with one auxiliary lane.

The Modified LPA without the C Street ramps at the I-5 and SR 14 interchange would result in additional congestion on local streets and increased energy consumption. Because this analysis is based on the regional travel demand model, this potential increase is not quantified. The Modified LPA with the centered I-5 mainline or mainline shifted west would have the same long-term energy consumption. All of the park and ride site options could equally encourage transit use, which was accounted for in the regional travel demand model and reflected in the energy consumption modeling results for the Modified LPA.

Energy consumption is different between the scenarios with and without electric vehicles because electric vehicles also require energy, but they shift the demand from petroleum to the electrical grid. The extension of Tri-County Metropolitan Transportation District (TriMet) and Clark County Public Transit Benefit Area

Authority (C-TRAN) service, the tolling of the river crossing, and active transportation would reduce overall VMT increases that would otherwise be anticipated from the added capacity associated with the Modified LPA.

Transit Operations

Energy consumption from transit operations would increase under the Modified LPA due to the increase in electricity needs for new transit vehicles, stations and park and ride facilities (Table 3.12-4). The additional energy needs for new transit vehicles and new transit facilities are less than 8% of the energy consumption from on-road vehicles. Energy consumption estimates in Table 3.12-4 reflect the new, additional energy needs for transit operations.

Table 3.12-4. Modified LPA Transit Operations Energy Consumption

Transit Element	Energy Consumption (mmBtu/year)
Light-Rail Vehicles	2,638
Transit Stations	1,146

Source: FTA Greenhouse Gas Emissions Estimator output model 2023 (available in the Energy Technical Report Appendix B)
mmBtu = million British thermal units

Roadway and Transit Maintenance

The annual energy consumption estimate for additional routine roadway maintenance (sweeping, restriping, and landscaping), transit vehicle maintenance, and light-rail track maintenance under the Modified LPA is approximately 11,000 million British thermal units (mmBtu) per year.

Collisions

The Modified LPA would meet current design standards and would decrease the level of traffic congestion, which would reduce collision frequency. During traffic incidents, new shoulders would be used for maintenance and emergencies, which would reduce congestion in the general purpose lanes. Reducing the congestion caused by collisions would in turn reduce energy consumption compared to the No-Build Alternative because of the reduction in idling traffic. This reduction in energy consumption was not quantified due to methodology constraints, which are described in more detail in the Energy Technical Report.

Bridge Openings

While there is no standard methodology to estimate how many drivers turn off their engines during a bridge opening, it is expected that at least a portion of drivers on the highway leave their vehicles idling during a bridge opening. Therefore, the Modified LPA with the double-deck fixed-span configuration and the single-level fixed-span configuration would be expected to reduce energy consumed by idling traffic during bridge openings. The Modified LPA with the single-level fixed-span configuration (all bridge type options) would further slightly reduce energy consumption due to the lower profile grade of the new Columbia River bridges (approximately 29 feet lower than the Modified LPA's double-deck fixed-span bridge configuration). The Modified LPA with the single-level movable-span configuration would also reduce energy consumption with a lower profile grade; however, compared to the Modified LPA with the fixed-span configurations, the Modified LPA with the single-level movable-span configuration may include additional energy consumption from the electricity required to raise and lower the vertical lift, and the energy consumption from idling vehicles would be similar to the No-Build Alternative.

3.12.4 Temporary Effects

No-Build Alternative

The No-Build Alternative does not propose construction of new transportation facilities. Accordingly, no definable construction energy consumption is associated with the No-Build Alternative.

Modified LPA

Construction of the Modified LPA would include construction of the new bridges and removal of the existing Interstate Bridge. Using FHWA's Infrastructure Carbon Estimator (ICE) modeling tool, Table 3.12-5 presents estimated construction energy consumption for the Modified LPA over the construction period. The Modified LPA with two auxiliary lanes would have a wider I-5 roadway (approximately 4% larger total pavement area), resulting in an increase in energy consumption during construction compared to the Modified LPA with one auxiliary lane. However, the ICE modeling tool is a planning-level tool that cannot capture the quantity of this increase for this analysis.

Table 3.12-5. Modified LPA Energy Consumption from Construction Activities

Project Element	Total Energy Consumption (mmBtu)
Materials	2,244,692
Transportation	107,794
Construction	248,531
Total	**2,601,017**

Source: FHWA Infrastructure Carbon Estimator (ICE) model output 2023 (available in the Energy Technical Report Appendix A)
a Values calculated from the ICE model
mmBtu = million British thermal units

Design data are not available at a level of detail required to estimate the potential construction-related energy consumption among design options. Design options that require a greater volume of materials (e.g. the single-level movable-span configuration) would require a greater amount of energy to power additional construction equipment; however, design data to needed determine the material volumes and associated equipment use would not be available until final design.

3.12.5 Indirect Effects

The energy analysis of the Modified LPA is based on travel demand modeling that includes expected growth and planned projects in the region, including growth facilitated by the Modified LPA consistent with local and regional land use plans (see Section 3.4.4). The Modified LPA is not expected to create other effects that would cause indirect impacts to energy use and GHG emissions. Energy consumption could be affected by induced changes in patterns of land use, population density, or population growth rate. Land use changes would be expected to occur in compliance with local land use plans. Section 3.4, Land Use and Economics, evaluates the potential for induced land use growth associated with the Modified LPA.

3.12.6 Potential Avoidance, Minimization, and Mitigation Measures

Long-Term Effects

Regulatory Requirements

State-level legislation and policy in Oregon and Washington support reducing emissions from transportation to minimize contributions to climate change; however, there are no specific requirements for mitigation in federal, state, or local regulations. The Program supports state, regional, and local goals to reduce GHG emissions. To help facilitate a shift from single-occupancy vehicles, the Program would improve multimodal transportation options, including:

- Extended light-rail
- Expanded active transportation facilities
- Demand management (e.g., variable-rate tolling)
- Operation and maintenance efficiencies

Program-Specific Mitigation

- Use energy-efficient electrical systems for transit stations and other electrical needs to decrease energy consumption.

Temporary Effects

Regulatory Requirements

- In Oregon, comply with ODOT Standard Specifications Section 290.
- In Washington, company with WSDOT Standard Specifications Division 1-07.

Program-Specific Mitigation

- All work in Washington and Oregon will follow the WSDOT Environmental Manual, Chapter 425: Air Quality, Energy, and Greenhouse Bases, including:
  - Minimize delays to traffic during peak travel times.
  - Minimize unnecessary idling of on-site diesel construction equipment.
  - Educate vehicle operators to shut off equipment when not in active use to reduce emissions from idling.
  - Prepare a traffic control plan with detours and strategic construction timing (e.g., night work) to move traffic through the area and reduce backups and delays to the traveling public to the extent practicable.
- Continue to consider advances in energy-reducing and/or energy-saving materials and methods.

3.13 Electric and Magnetic Fields

This section assesses whether electric and magnetic fields (EMF) generated by light-rail transit (LRT) facilities, which use an overhead electrical supply, would cause adverse effects. The information in this section is based on the Electromagnetic Fields Technical Report.

3.13.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with EMF has been updated in this Draft SEIS to include:

- Updates to methodology for evaluating EMF.
- Changes in the project footprint necessitated by changed conditions resulting in shifting the light-rail transit alignment and locations of substations and a new overnight facility.

Based on the analysis in this section, the effects of the Modified LPA would be similar to those of the CRC LPA. The Modified LPA and the CRC LPA would both result in an increase in EMF exposure near the light-rail alignment, including at substations and within light-rail vehicles. Exposure levels in both cases would remain below applicable exposure guidelines. However, there would be changes between the CRC LPA and the Modified LPA in sensitive land uses exposed to EMF, as described in Table 3.13-1.

Table 3.13-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects as Identified in This Section	Explanation of Differences
Sensitive Land Uses	• Northernmost electrical substation would be located between 17th Street and McLoughlin Boulevard in Vancouver, land currently in residential use. The five residential parcels closest to the substation would be acquired. • New transit-oriented development activities and sensitive uses would be located a considerable distance from proposed substation locations.	• Proposed Evergreen substation would be located approximately 100 feet south of a multifamily residential complex. EMF levels from the station would be below the public exposure guidelines. • The other three proposed substations are not near residential buildings or other EMF-sensitive land uses.	Differences are due to the change in the LRT alignment in downtown Vancouver (shifted from downtown streets to along I-5) and the change in the northern LRT terminus.

CRC = Columbia River Crossing; EIS = Environmental Impact Statement; LPA = Locally Preferred Alternative; LRT = light-rail transit

3.13.2 Existing Conditions

Current Guidelines and Regulations

Federal regulations set limits for EMF exposure in the workplace and in public areas that apply to AM and FM radio, television, and wireless sources (47 Code of Federal Regulations 1.1307(b)). Schools, daycare facilities, hospitals, senior living facilities, research facilities, and universities are considered sensitive receptors to EMF. The FTA has adopted guidance on approaches to preventing and reducing community environmental, health, and safety impacts from transit-generated EMF and electromagnetic radiation, including best management practices for light-rail systems.

The International Commission on Non-Ionizing Radiation Protection (ICNIRP), in association with the World Health Organization and the American Conference of Governmental Industrial Hygienists, has developed voluntary occupational guidelines for EMF exposure, shown in Table 3.13-2.

Table 3.13-2. Exposure Guidelines for Power Frequency (60 Hz) Electromagnetic Fields

Exposure at 60 Hz	Electrical Field (kV/m)	Magnetic Field (mG)
International Commission on Non-Ionizing Radiation Protection		
Occupational	8.3	10,000
General Public	4.2	2,000
American Conference of Governmental Industrial Hygienists		
Occupational Exposure Should Not Exceed this Level	25	10,000
Prudence Dictates Use of Protective Clothing Above this Level	15	–
Exposure of Workers with Cardiac Pacemakers Should Not Exceed this Level	1	1,000

Sources: ICNIRP 2010; ACGIH 2015
Hz = hertz; kV/m = kilovolts per meter; mG = milligauss

EMF Generation and the Existing TriMet Light-Rail System

The main sources of EMF associated with LRT are the traction power system elements for the TriMet MAX LRT system. Table 3.13-3 shows the strength of the magnetic field at distances of 30, 65, and 100 feet from the light-rail tracks. As shown in Table 3.13, the magnetic field strength weakens rapidly as distance from the tracks increases. The highest measured value (167 milligauss [mG]) is well below the ICNIRP standard of 2,000 mG for public exposure to magnetic fields.

Units for Electric and Magnetic Fields

Voltage is similar to “electrical pressure” in an electrical line. This pressure produces an electrical field that extends out from the line and is measured in volts per meter (V/m). Current, in an active electrical line, also produces a magnetic field around the line. Magnetic fields are measured in units of gauss (G). Since most magnetic fields are weak, these fields are typically measured in milligauss (mG or 1/1,000th of a gauss).

Electrical systems can be either direct current (DC) or alternating current (AC). The electricity in wall sockets and power lines is alternating current. Direct current powers the MAX light-rail system in Portland. The frequency of alternating current is measured in hertz (Hz).

Table 3.13-3. Magnetic Field Strength at Distance from TriMet's Light-Rail Tracks (mG)

Direction	30 Feet	65 Feet	100 Feet
Horizontal	167.0	44.6	13.3
Vertical	17.8	8.2	3.4

Source: Edelson and Holmstrom 1998
mG = milligauss

Direct current magnetic fields measured in 2008 at TriMet's light-rail substations ranged from 107 to 601 mG at the perimeter of the buildings and from 47 to 551 mG at light-rail stations. Magnetic field measurements taken inside light-rail cars fluctuated between approximately 0.38 and 8.13 mG at approximately seat height (CRC 2011), indicating that EMF emissions are extremely low within the light-rail vehicles used in the existing light-rail system. All the field intensities measured in TriMet's system are below the public exposure guidelines.

The analysis in this section includes a review of the EMF measurements reported in the CRC EMF technical report (CRC 2011), updated with similar and more recent rail systems approved and in operation since 2011. Because the proposed light rail extension with the Modified LPA would include system elements consistent with the existing TriMet MAX light rail system (such as power levels, substation ratings, and facility and system design), EMF levels along the light rail extension would be identical to those produced along the current TriMet MAX light rail system in Portland. Therefore, the data from the CRC EMF technical report is sufficient to assess potential EMF exposure levels for the Modified LPA.

3.13.3 Long-Term Benefits and Effects

Table 3.13-4 summarizes the effects of the No-Build Alternative, Modified LPA, and design options on EMF. Detailed analysis of the effects is provided in the following sections.

Table 3.13-4. Summary of No-Build Alternative and Modified LPA Effects on Electric and Magnetic Fields

No Build Alternative	Modified LPA (all design options)
No change.	EMF emissions would increase slightly at certain locations along the light rail extension but would remain well below exposure guidelines.

No-Build Alternative

Existing EMF levels in the study area are a function of global background magnetic fields and EMF generated by nearby sources (e.g., utility power cables, office equipment, internal building wiring, and any other electrical apparatus). EMF levels fluctuate over time, depending on the operation of these nearby sources. Under the No-Build Alternative, there would be no change in existing EMF levels.

Modified LPA

There would be no changes to existing EMF sources or levels related to the highway components of the Modified LPA, including the one or two auxiliary lane options, the option with or without the C Street ramps, the option to shift the I-5 mainline to the west, the single-level fixed-span configuration option (all bridge types), or the single-level movable-span configuration option.

The light-rail trains would be powered by electricity, creating EMF fluctuations each time a train passes by. In the study area overall, EMF levels under the Modified LPA would be similar to those under the No-Build

Alternative. Within and near the new light-rail right of way, near new substations, and within the light-rail vehicles, EMF emissions would increase slightly compared to the No-Build Alternative but would remain well below exposure guidelines. The Modified LPA with the single-level fixed-span configuration and the single-level movable-span option would shift the LRT alignment across the Columbia River slightly west of the double-deck fixed-span configuration but EMF levels would remain well below exposure guidelines.

Figure 3.13-1 illustrates the locations of the light-rail substations proposed under the Modified LPA and the adjacent land uses. The proposed Evergreen substation would be located approximately 100 feet south of a multifamily residential complex in downtown Vancouver. Based on measurements taken at similar traction power substations, EMF levels from the Evergreen substation would be below the general public exposure guidelines shown in Table 3.13-1. The other three proposed substations are not near residential buildings or other EMF-sensitive land uses.

The Modified LPA would produce EMF from LRT, which is powered by electricity. However, the EMF intensities would be below exposure guidelines for risks to human health.

3.13.4 Temporary Effects

Construction of the Modified LPA, including construction of the Columbia River bridges and removal of the Interstate Bridge, would require electrical power (i.e., through the use of generators) for certain activities (e.g., to operate certain tools and lighting equipment) but is not expected to result in appreciable changes to EMF levels in the study area. Magnetic fields from generators and associated cables at accessible distances would be well under the maximum short-term exposure limits (ICNIRP 2008, 2020).

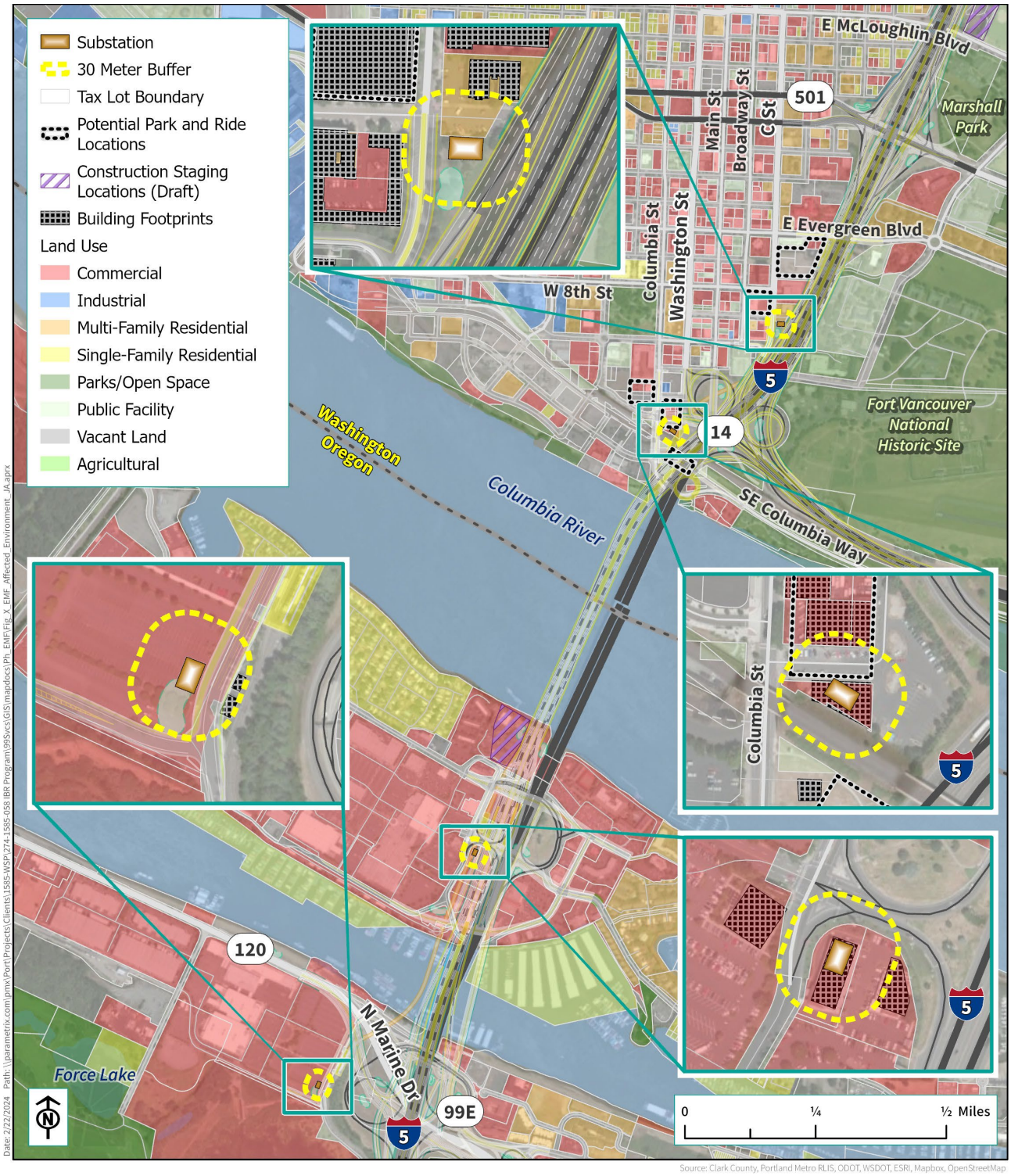
3.13.5 Indirect Effects

After decades of study and human exposure a direct link between EMF levels and adverse health impacts has not been firmly established (ICNIRP 2010). Consequently, no indirect effects from EMF are anticipated from the Modified LPA or the No-Build Alternative.

3.13.6 Potential Avoidance, Minimization, and Mitigation Measures

The levels of EMF anticipated to result from the Modified LPA are less than the exposure standards for both the workplace and the public; therefore, mitigation would not be necessary. The IBR Program would follow FTA guidance on best management practices for avoiding and minimizing EMF levels from light-rail systems.

Figure 3.13-1. Modified LPA Proposed Light-Rail Substations and Existing Land Uses



3.14 Water Quality and Hydrology

In urban areas, pollutants that wash off roadways during storms, such as automotive fluids, heavy metals, and small particles, degrade water quality in rivers and streams. The design and placement of roadways and stormwater systems can affect the quality and flow of water discharged from these features and the hydrology of the surrounding area. Placing structures such as bridge piers or roadways on a levee, in a waterway or its floodplain could affect the severity of floods during storm events. For this reason, modification to a levee or construction in waterways and their floodplains is strictly regulated and must consider the incremental contribution toward flood conditions.

What is the difference between water quality and hydrology?

In this analysis, water quality refers to the characteristics of the water—its temperature and oxygen levels, how clear it is, and whether it contains pollutants. Hydrology refers to the flow of water—its volume, where it drains, and how quickly the flow rate changes in a storm.

The information presented in this section is based on the Water Quality and Hydrology Technical Report. Additional detail on the impact of water quality to fish is in Section 3.16, Ecosystems. Additional detail on groundwater resources can be found in Section 3.17, Geology and Groundwater. Additional detail on potential changes in precipitation patterns as a result of climate change is in Section 3.19, Climate Change.

3.14.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with water quality and hydrology has been updated in this Draft SEIS to include:

- Changes to federal, state, and local regulations and permits.
- Changes in permitting processes, most notably for the Clean Water Act (CWA) Section 401 Water Quality Certification and Section 402 National Pollutant Discharge Elimination System (NPDES).
- Updates to Section 303(d)-listed impaired waters.
- Changes to climate predictions and modeling tools.
- Changes to constituents of emerging concern, including 6PPD-quinone.
- Addition, removal, and updating of data sources as appropriate.
- Expansion of the Ruby Junction Maintenance Facility in 2014.
- Changes in the project footprint necessitated by changed conditions.

Table 3.14-1 compares the impacts and benefits of the CRC LPA to those of the Modified LPA as a result of the changes listed above. Based on the analysis described in this section, water quality, hydrology, and stormwater management effects of the Modified LPA would be similar to those of the CRC LPA.

Table 3.14-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects as Identified in this Section	Explanation of Differences
Water Quality	Beneficial effect on receiving water quality, as the design of the proposed facilities would include BMPs to remove pollutants in runoff from all roadway surfaces within the project footprint.	Beneficial effect on receiving water quality, as the design of the proposed facilities would include BMPs to remove pollutants in runoff from all roadway surfaces within the project footprint.	Negligible
Hydrology	Potential to cause long-term hydrologic effects to waterbodies due to an increase in impervious surfaces.	Potential to cause long-term hydrologic effects to waterbodies due to an increase in impervious surfaces.	Negligible
Stormwater management	• Could cause changes in peak flows and runoff volumes in local receiving waters because of the increased impervious surfaces in the study area. • Would improve treatment of existing impervious surfaces.	• Could cause changes in peak flows and runoff volumes in local receiving waters because of the increased impervious surfaces in the study area. • Would improve treatment of existing impervious surfaces.	Negligible
New and Rebuilt Impervious Surfaces (acres)[a]	267 acres (PGIS)	207 acres (CIA)	The design footprint of the Modified LPA has been reduced.
Total Suspended Solids Discharged from Impervious Surfaces (lbs/year)	19,579 lbs/year	16,694 lbs/year	The design footprint of the Modified LPA has been reduced. Pollutant loads are a function of treated and untreated areas. Both the CRC LPA and the Modified LPA would manage and treat all stormwater runoff from existing, new, or rebuilt impervious surfaces.

Note: Data are approximate and rounded.

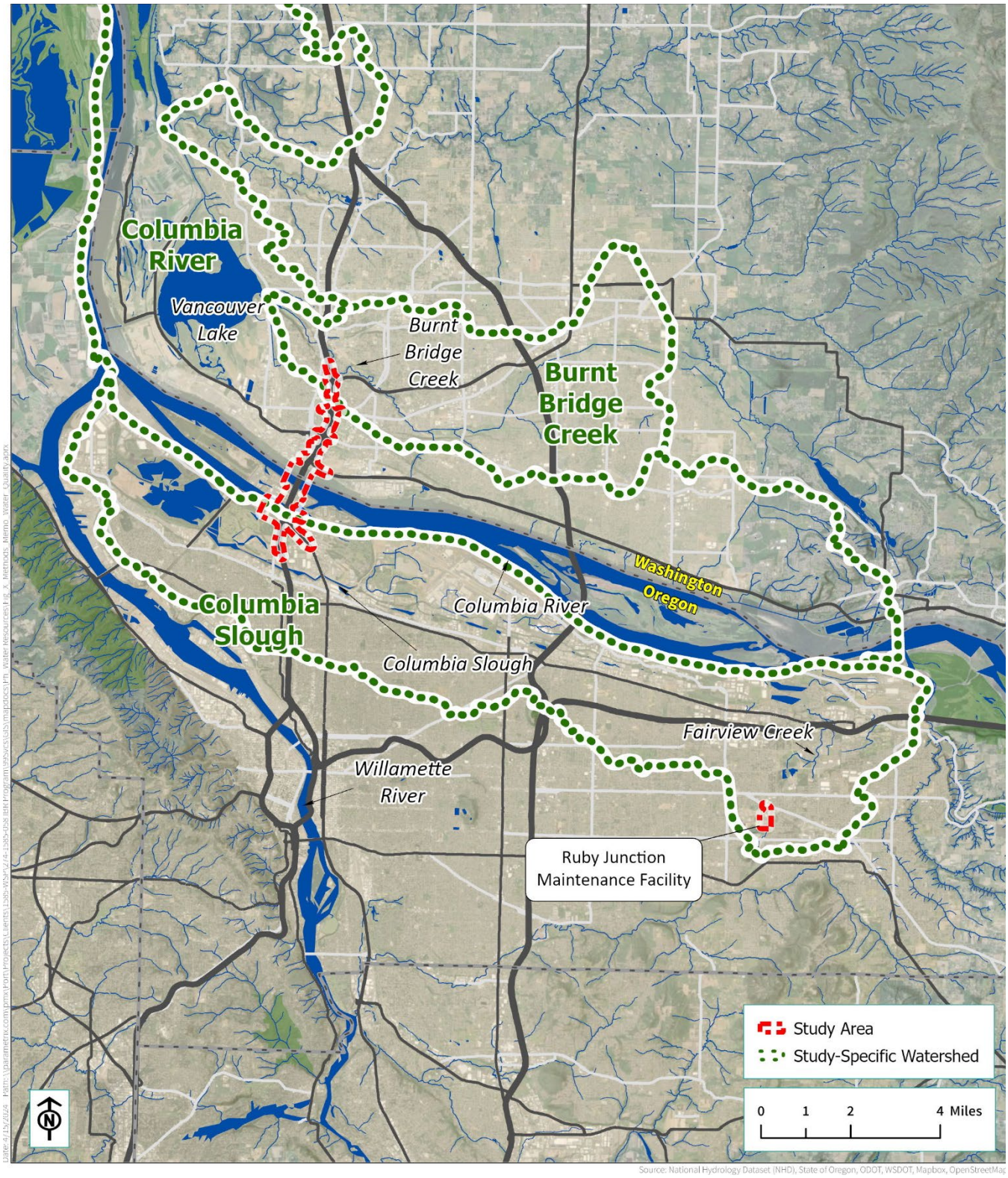
a Terminology and methodology was updated between the CRC project and IBR Program to be consistent with current regional stormwater management guidance. CIA encompasses both PGIS and non-PGIS.

BMP = best management practice; CIA = contributing impervious area; CRC = Columbia River Crossing; EIS = Environmental Impact Statement; lbs = pounds; LPA = Locally Preferred Alternative; N/A = not applicable; PGIS = Pollution Generating Impervious Surfaces

3.14.2 Existing Conditions

For this analysis, waterbodies and their contributing watersheds have been delineated based on their hydrologic connectivity to the study area. Watersheds into which runoff is, or could be, discharged are referred to as "receiving waters." Figure 3.14-1 shows the study area and watersheds.

Figure 3.14-1. Water Quality and Hydrology Study Area and Study-Specific Watersheds



Hydrology

The study area lies within the main Columbia River valley, except for a small area north of the SR 500 interchange that is located in the Burnt Bridge Creek watershed. Burnt Bridge Creek flows into Vancouver Lake before discharging to the Columbia River. The Columbia River and North Portland Harbor (a branch of the Columbia River south of Hayden Island) both cross under I-5 within the study area, while the Columbia Slough and Burnt Bridge Creek cross I-5 south and north of the study area, respectively. As a result of the Portland Metro Levee System, runoff from the Delta Park area between North Portland Harbor and the lower Columbia Slough, which was formerly part of the Columbia River floodplain, is now discharged to the lower Columbia Slough via pump stations. The Columbia Slough, which parallels the Columbia River floodplain, discharges near the confluence of the lower Willamette River and Columbia River.

What is a watershed?

A watershed is an area of land from which all precipitation and surface water drains to the same place and, generally, the same waterbody. Watersheds vary in shape and size, as determined by topography and geology, and can cross county, state, and national boundaries.

The study area around the Ruby Junction Maintenance Facility in Gresham, Oregon lies within the 100-year floodplain of Fairview Creek (Figure 3.14-2). Fairview Creek discharges into the upper Columbia Slough downstream of the maintenance facility.

In the study area, floodplains designated by the Federal Emergency Management Agency (FEMA) include those adjacent to the Columbia Slough, the Columbia River, and Burnt Bridge Creek (Figure 3.14-2). These floodplains are confined to the immediate vicinity of the streams by levees or, in the case of Burnt Bridge Creek, by steep slopes. For reference, the FEMA-modeled water surface elevation of the 100-year floodplain at the existing Interstate Bridge crossing of the Columbia River is approximately 32 feet referenced to the North American Vertical Datum of 1988.

Local Climate

The climate within the study area is characterized by short, dry, warm summers, with a typically cool and wet spring, fall, and winter. The Coast Range to the west of the study area offers limited shielding from Pacific Ocean storms, while the Cascade Mountains to the east provide an orographic lift of moisture-laden westerly winds, resulting in moderate rainfall. See Section 3.19, Climate Change, for a discussion of potential climate change trends.

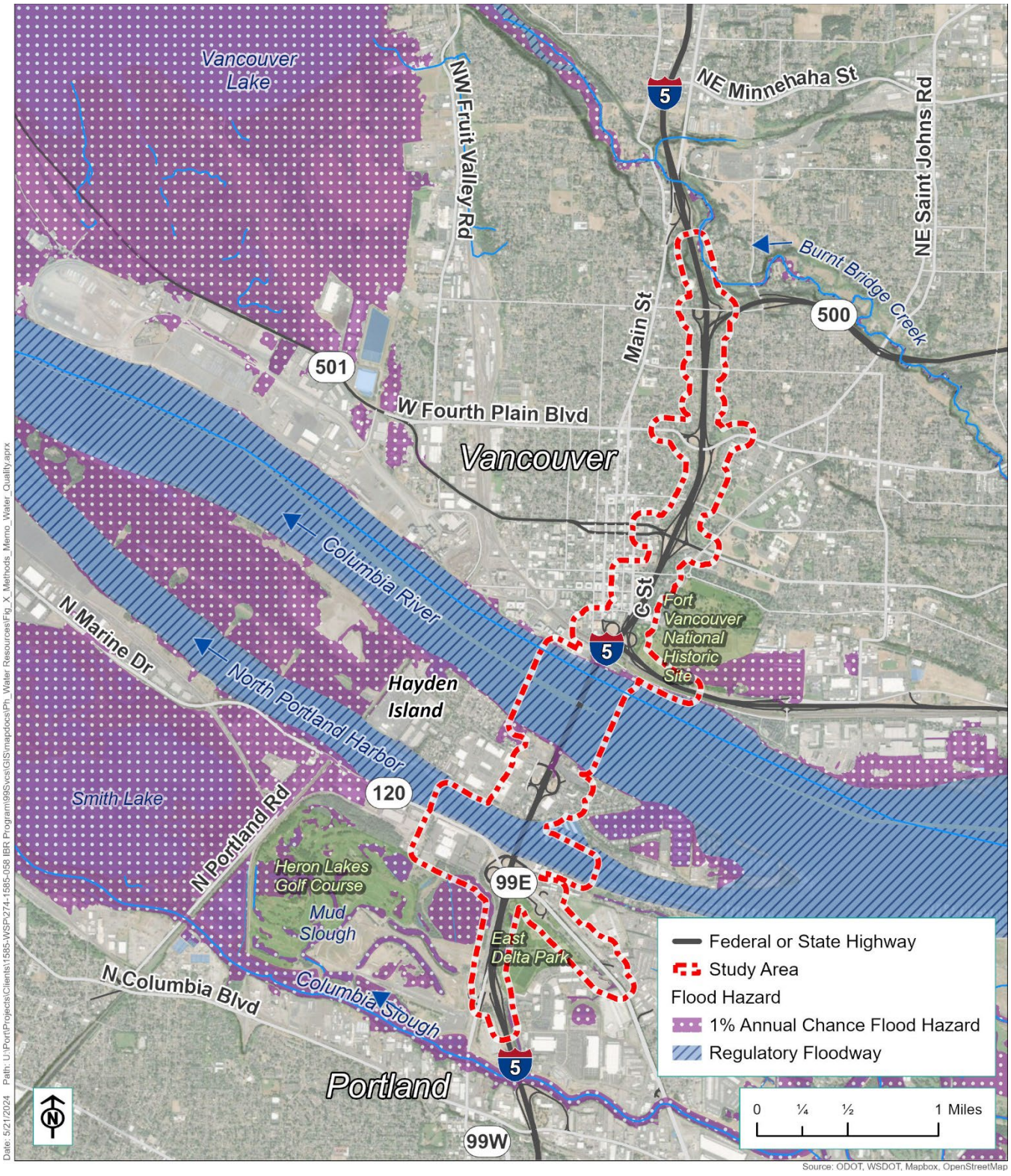
Receiving Waters

Columbia Slough

The Columbia Slough is a slow-moving, low-gradient drainage channel running nearly 19 miles from Fairview Lake in the east to the Willamette River in the west. The slough is a remnant of the historical system of lakes, wetlands, and channels that once dominated the south floodplain of the Columbia River. Its watershed drains approximately 32,700 acres of land in portions of Troutdale, Fairview, Gresham, Maywood Park, Wood Village, and unincorporated Multnomah County. The slough and areas to its north are currently intensively managed to provide drainage and flood control with pumps, weirs, and levees.

The slough is divided into upper, middle, and lower reaches. The upper and middle reaches receive water from Fairview Lake, Fairview Creek, and Wilkes Creek, as well as groundwater, natural springs, and overland flow and stormwater outfalls from industrial, commercial, and residential land uses in the surrounding area. The lower reach is tidally influenced while flows in the middle and upper reaches are controlled by pumping and gravity gates.

Figure 3.14-2. Federal Emergency Management Agency Floodplain Boundaries in the Study Area



Columbia River and North Portland Harbor

Within the study area, the Columbia River and North Portland Harbor are a constrained and highly managed waterway primarily influenced by upstream dams. Development of the hydropower system on the Columbia River has significantly influenced peak seasonal flows in the river, as well as their velocity and timing. Annual spring flows to the Columbia River estuary have been reduced on average by 50% to 55% from historical levels, while winter flows between October and March have increased by 35% compared to historical rates. The Columbia River is tidally influenced in its lower reaches below the Bonneville Dam, including the study area. Flows and water surface elevations in this area are influenced by tidal fluctuations, resulting in minimal streamflow at times and daily elevation changes.

The study area in the vicinity of the Columbia River is highly urbanized with a complex system of roadways (including I-5, state highways, local access roads, and residential streets), parking lots, and other impervious surfaces. Over the past 150 years, historical off-channel areas have been filled, rechanneled, diverted, and otherwise developed for agricultural and urban use. The channelization of the watershed has combined with the development of the hydropower system to dramatically alter the historical hydrologic regime.

For the stormwater analysis, the Columbia River watershed has been divided into the south and north sides of the river. The Columbia River South watershed includes the portion of the study area that discharges to North Portland Harbor and to the Columbia River south of the Oregon-Washington state line, including the Hayden Island area. The Columbia River North watershed includes the study area from the Oregon-Washington state line north to the SR 500 interchange.

Burnt Bridge Creek

Burnt Bridge Creek is a small tributary to the lower Columbia River. It originates east of Vancouver and flows west to its outlet at Vancouver Lake, then drains into the Columbia River via Lake River. Within the study area, the creek meanders through Leverich Park, northeast of the I-5/SR 500 interchange, before turning north to parallel I-5. Within the study area, development in the vicinity of Burnt Bridge Creek is similar to the vicinity of Columbia River.

Historically, Burnt Bridge Creek has been prone to flooding. Development of the study area has increased peak flows, reduced base flows, and altered the timing of flows compared to historical conditions. Several actions have been taken to reduce or relieve flooding, including channel modification, installation or upsizing of culverts, installation of storm lines, and construction of drainage systems. Additional flow control elements, along with stormwater treatment facilities and habitat enhancements, were added as part of the Burnt Bridge Creek Greenway Improvement Project.

Fairview Creek

Fairview Creek is a 5-mile-long urban stream that originates in a wetland near Grant Butte in Gresham and drains to Fairview Lake, approximately 11 miles east of the study area. Fairview Creek is a tributary to the eastern portion of the Columbia Slough. Historically, Fairview Creek had been a tributary of the Columbia River, but water from the wetlands where it originates was diverted into an artificial channel that drains into the Columbia Slough, which is a tributary of the Willamette River. In 1960, water managers built a dam along Fairview Creek to create Fairview Lake for water storage and recreation. The creek's 6.5-square-mile watershed receives stormwater runoff from the cities of Gresham, Wood Village, and Fairview.

Water Quality

States are required to monitor and regulate water quality in their rivers and streams under Section 303(d) of the CWA. Waterbodies that fail to meet the water quality standards for one or more pollutants are referred to as being "303(d)-listed." Under Section 303(d), states also must develop action plans to address water quality concerns, including setting Total Maximum Daily Loads (TMDLs) for particular pollutants in a waterway.

Table 3.14-2 presents the 303(d)-listed waterways in the study area and water quality standards they do not currently meet. Table 3.14-2 also shows the pollutants for which TMDLs have been established.

Table 3.14-2. Water Quality-Limited Waterways within the Study Area

Waterway	303(d) Listing Factors	Established TMDLs
Columbia Slough	• Toxics (iron) • Biocriteria [a] • Aquatic weeds	• Toxics (lead, PCBs, DDE/DDT, dieldrin, dioxin) • Eutrophication (pH, dissolved oxygen, phosphorus, and chlorophyll a) • Bacteria • Temperature
Columbia River (includes North Portland Harbor)	• In Oregon: – Toxics (PCBs, PAHs, DDT metabolites [4,4'-DDE]) • In Washington: – Vinyl chloride	• Dioxin • Total dissolved gas • Temperature
Burnt Bridge Creek	• Eutrophication (dissolved oxygen, pH) • Fecal coliform bacteria • Temperature	• None
Fairview Creek	• Biocriteria [a]	• Bacteria • Temperature

a Biological criteria (biocriteria) are a way of describing the qualities that must be present to support a desired condition in a waterbody. Biocriteria are based on the numbers and kinds of organisms present and are regulatory-based biological measurements. Oregon Department of Environmental Quality defines biocriteria as the measure by which "Waters of the State must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities" (Oregon Administrative Rule 340-041-0011).

4,4'-DDE = dichlorodiphenyldichloroethylene; DDT = dichlorodiphenyltrichloroethane; PAH = polycyclic aromatic hydrocarbon; PCB = polychlorinated biphenyl; TMDL = Total Maximum Daily Load

Stormwater

The purpose of stormwater management strategies is to reduce stormwater runoff peak flows and pollutants discharged into receiving waters from impervious surfaces. Measures (e.g., installing perimeter protection/silt fences, inspecting equipment, implementing spill containment, restricting work during rain or wet weather) used to achieve these reductions are referred to as best management practices (BMPs), and are established in regulatory permits and guidance (see Section 3.14.6, Potential Avoidance, Minimization, and Compensatory Mitigation Measures, for more detail). Current regulations require BMPs when roadways are reconstructed or when new impervious surface is added. BMPs have been shown to effectively reduce sediment, metals, and other pollutants from runoff. Their effectiveness in removing polycyclic aromatic hydrocarbons (PAHs), microplastics, and

What is stormwater infiltration?

Stormwater infiltration is the process by which stormwater sinks into the soil, becoming groundwater that, in turn, feeds rivers and lakes. Stormwater infiltration can occur naturally, where soil conditions and geography allow, or in artificially created stormwater infiltration facilities.

constituents of emerging concern, including 6PPD-quinone (a byproduct of tire dust that is toxic to salmonids), are less well known.

Within the study area, surface water runoff from I-5 is generally confined to the paved roadway by continuous curbs and concrete barriers. Closed (pipe) drainage systems convey flows to surface water outfalls. Runoff from the bridges across North Portland Harbor and the Columbia River drains through scuppers to the water surface below. Most stormwater from I-5, including interchange areas, currently flows directly into receiving waters without treatment to remove roadway pollutants. There are several minor exceptions:

- The Burnt Bridge Creek watershed includes a treatment and infiltration pond that reduces sediment, metals, and other pollutants from runoff. Overflows from this pond are discharged to an existing wet pond in the vicinity that provides infiltration.
- A 3-acre area within the Columbia Slough watershed infiltrates in adjacent pervious area and does not discharge to existing outfalls.
- About 3 acres of runoff from SR 14 is dispersed to adjacent areas, where it infiltrates or evaporates.
- Runoff from the existing Ruby Junction Maintenance Facility partially drains to Fairview Creek through a proprietary stormwater filtration system and partially is infiltrated using dry wells contributing to groundwater within the Columbia Slough watershed.

Table 3.14-3 shows the existing impervious area and treated and untreated stormwater areas for each receiving waterbody in the study area. The contributing impervious area (CIA) represents the acreage of impervious surface within the study area that drains to each waterbody. Of the 177.6 total acres of CIA within the study area, approximately 21.2 acres are infiltrated. The remaining 156.4 acres discharge to receiving waters without treatment.

Table 3.14-3. Existing Impervious Area and Treated and Untreated Stormwater (acres)

Receiving Waterbody	Total Contributing Impervious Area	Infiltrated Impervious Area	Treated Impervious Area Draining to Outfall(s)	Untreated Impervious Area Draining to Outfall(s)
Columbia Slough	38.5	3.0	0.0	35.5
Columbia River South (Oregon)	45.8	0.0	0.0	45.8
Columbia River North (Washington)	76.4	3.0	0.0	73.4
Burnt Bridge Creek	9.6	7.9	0.0	1.7
Fairview Creek	7.3	7.3	0.0	0.0
Total	**177.6**	**21.2**	**0.0**	**156.4**

3.14.3 Long-Term Benefits and Effects

Table 3.14-4 summarizes the water quality and hydrology effects of the Modified LPA, including design options, and No-Build Alternative followed by a discussion of the effects.

Table 3.14-4. Summary of Water Quality and Hydrology Effects from the Modified LPA Design Options and No-Build Alternative

Water Quality and Hydrology Consideration	No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, with or without C Street Ramps, Centered I-5 or I-5 Westward Shift, all Park-and-Ride Site Options	Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5, all Park-and Ride Site Options	Modified LPA with Single-Level Fixed-Span Configuration[a], One Auxiliary Lane, C Street Ramps, Centered I-5, all Park-and-Ride Site Options	Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, all Park-and-Ride Site Options
Water Quality and Stormwater Management	• No change, (area would remain untreated until stormwater treatment could be addressed according to state prioritization and available funding).	• Beneficial effect on receiving water quality (due to BMPs to remove pollutants). • Could cause changes in peak flows and stormwater runoff volumes.	• Beneficial effect on receiving water quality (due to BMPs to remove pollutants) with slight increase to pollutant loads. • Could cause changes in peak flows and stormwater runoff volumes.	• Beneficial effect on receiving water quality (due to BMPs to remove pollutants). • Could cause changes in peak flows and stormwater runoff volumes.	• Potential for additional and accidental minor spills of materials and pollutants used for maintenance and operation of the movable-span configuration.
Contributing Impervious Area	178 acres total: • 0 acres treated. • 21 acres infiltrated. • 157 acres untreated.	207 acres total: • 190 acres treated. • 17 acres infiltrated. • 0 acres untreated.	211 acres total: • 194 acres treated. • 17 acres infiltrated. • 0 acres untreated.	211 acres total: • 193 acres treated. • 18 acres infiltrated. • 0 acres untreated.	214 acres total: • 197 acres treated. • 17 acres infiltrated. • 0 acres untreated.
Total Suspended Solids	• 120,272 lbs/year.	• 16,694 lbs/year.	• 17,037 lbs/year.	• 16,984 lbs/year.	• 17,336 lbs/year.
Hydrology	• No change (continued release of stormwater with degraded quality into receiving waters).	• Potential to cause long-term hydrologic effects due to an increase of 30 acres of contributing impervious area.	• Potential to cause long-term hydrologic effects due to an increase of 34 acres of contributing impervious area.	• Potential to cause long-term hydrologic effects due to an increase of 33 acres of contributing impervious area.	• Potential to cause long-term hydrologic effects due to an increase of 37 acres of contributing impervious area.

a The long-term effects associated with the single-level fixed-span configuration would be approximately the same for all bridge type options.
BMP = best management practice; lbs = pounds

No-Build Alternative

Under the No-Build Alternative, most of the existing impervious surface area along roadways in the study area would remain untreated, which would allow for the continued release of stormwater with degraded quality into the study area's receiving waters. However, with no way to quantify future emissions or other pollutants, such as 6PPD-quinone and for the purposes of the present analysis, it is assumed that the No-Build Alternative would maintain existing water quality conditions and would not result in long-term changes (either increased or decreased impacts). Therefore, in this section, the No-Build Alternative is discussed only in comparison to the Modified LPA.

Modified LPA

The Modified LPA includes a stormwater conveyance and detention system that would comply with all federal, state, and local water quantity and quality standards at the time of construction. The proposed design for the Modified LPA includes inlets, catch basins, and gravity pipe drainage systems that would collect and convey runoff from the new bridges, transit guideway, and road improvements to stormwater treatment facilities. The treatment facilities would reduce total suspended solids, particulates, and dissolved metals to the maximum extent practicable before runoff reaches surface waters or is infiltrated.

The Modified LPA would also cross the Portland Metro Levee System with the extension of light-rail north from Expo Center, with modifications to the I-5 mainline north of North Victory Boulevard, with the North Portland Harbor bridges, and with local road revisions of N Marine Drive and N Expo Road. Such modifications may include activities to restore temporarily disturbed portions of the levees, or permanent modifications where proposed infrastructure would intersect with the existing levees or where access to the levees would change as a result of reconfiguration of the roadways. Modifications may also include improvements to existing levee function, if such improvements are requested or required. Modifications or improvements would be coordinated with the USACE and the Urban Flood Safety and Water Quality District for consistency with the planned future condition of the levees. The assessment presented below of long-term effects to water quality and hydrology associated with the Modified LPA includes effects associated with potential modifications to the federal levee system.

The Modified LPA would manage flow control and runoff in the Burnt Bridge Creek watershed and at the Ruby Junction Maintenance Facility via detention and infiltration. In the North Portland Harbor area runoff from some existing impervious surfaces, and a few sections of new or modified roadway with the Modified LPA, would be conveyed, treated, and discharged to the Columbia Slough. All other runoff generated by the Modified LPA, regardless of bridge configuration, would be conveyed, treated, and discharged within the watershed in which it is generated.

The Modified LPA would increase contributing impervious surface compared to existing conditions. Table 3.14-5 shows how the Columbia River bridge configurations would change the amount of CIA by acre. The Modified LPA with the I-5 mainline westward shift, SR 14 interchange without C Street ramp, and the different park-and-ride site options would not increase the amount of CIA compared to the Modified LPA alone, and therefore would have the same hydrology, water quality, and stormwater effects as the Modified LPA with one auxiliary lane and the double-deck fixed-span configuration.

The long-term hydrological effects resulting from changes in impervious area would be a small percentage of the study area watersheds, ranging from an increase of 0.007% in the Columbia Slough watershed to a decrease of -0.011% in the Fairview Creek watershed. The Modified LPA with two auxiliary lanes would result in a slight increase in the CIA compared to the Modified LPA with one auxiliary lane because of the additional pavement. Compared to the Modified LPA with the double-deck fixed-span configuration, the single-level fixed-span and movable-span configurations would have a greater amount CIA from the wider dimensions of the bridges and interchanges.

Table 3.14-5. Contributing Impervious Area by Bridge Configuration

Bridge Configuration	Columbia Slough (acres)	Columbia River South (acres)	Columbia River North (acres)	Burnt Bridge Creek (acres)	Fairview Creek (acres)	Total Project (acres)
No-Build Alternative (Existing Conditions)	38.5	45.8	76.4	9.6	7.3	177.6
Modified LPA with One Auxiliary Lane and Double-Deck Fixed-Span Configuration	40.7	51.6	97.4	10.7	6.8	207.2
Modified LPA with Two Auxiliary Lanes and Double-Deck Fixed-Span Configuration	41.1	52.3	100.2	10.7	6.8	211.1
Modified LPA with Single-Level Configuration[a] and One Auxiliary Lane	40.4	52.4	100.2	10.7	6.8	210.5

a The single-level fixed-span and single-level movable-span configurations (any bridge type options) would result in the same amount of CIA.

Hydrology

The addition of impervious surface, such as new roadway, within a watershed generates additional stormwater runoff and reduces stormwater infiltration into groundwater. These changes have the potential to increase flooding, alter peak flows, increase runoff volumes to local receiving waters, and decrease water infiltration and groundwater recharge. The magnitude of the effects depends on a variety of factors, including the degree of increase in CIA and the characteristics of the receiving water. The Modified LPA would comply with the stormwater design requirements in place at the time of construction, including requirements that may be updated to reflect climate-induced changes to rainfall patterns.

The change in flow volume fluctuation, peak flows, and runoff quantities in these waterbodies would be minimal for any of the Modified LPA bridge configurations compared to the No-Build Alternative. These impacts would be further minimized using flow controls (engineered measures to control the amount and velocity of stormwater discharging into a receiving water) for discharges to Fairview Creek and Burnt Bridge Creek. Flow control would not be required for the Columbia River or Columbia Slough, because they are considered large waterbodies that are exempt from flow control requirements (BES 2020).

In 2024, the City of Portland updated its building code and zoning code for development within floodplains. The updates are intended, in part, to comply with the recommendations of the 2016 Federal Emergency Management Agency (FEMA) National Flood Insurance Program Biological Opinion (BO) that was issued by NOAA Fisheries in 2016. For the FEMA-designated floodways in the study area—in compliance with Executive Order 11988 for Floodplain Management—a location hydraulic study would be conducted for the Modified LPA and the analysis would be included in the Final SEIS. Based on a preliminary hydraulic assessment, there may be a small net rise to the base flood elevation of the Columbia River and North Portland Harbor. During the final design phase, this preliminary assessment would be confirmed with the hydraulic analysis once design concepts progress to a sufficient level of detail. If the hydraulic analysis shows a resulting rise in the base flood elevation, mitigation would be explored. Mitigation measures could include alternative pier cap shapes to improve hydraulic efficiency and cutting of soils to compensate for reduced flood storage capacity. Currently, the potential areas of cut are anticipated to be entirely within the footprint of the Modified LPA. The

results of hydraulic analysis and coordination with the City of Portland would determine whether the needed cut volume would require the acquisition of additional property. If mitigation measures cannot reduce base flood elevation change from the IBR Program to zero net rise, the change would be documented in a floodplain evaluation report and a public notice that would include the reasons for this finding and alternatives considered. Prior to construction, a floodplain permit from the City of Portland would be required. If the Modified LPA results in a net rise of base flood elevations, a Conditional Letter of Map Revision would be required from FEMA prior to issuing the floodplain permit.

No new or expanded roads or facilities are proposed for the Burnt Bridge Creek floodway. A small area within the study area at the Ruby Junction Maintenance Facility is mapped within the 100-year floodplain of Fairview Creek. The new or expanded roads or facilities with the Modified LPA would not encroach upon the Special Flood Hazard Area for Fairview Creek and, therefore, no increase in 100-year flood elevations is expected.

Water Quality

Runoff from transportation facilities is typically associated with a number of pollutants, including suspended sediments, nutrients, PAHs, oils and grease, antifreeze from leaks, cadmium and zinc from mechanical and tire wear, 6PPD-quinone from tire wear and road dust, and copper from wear and tear of brake pads, bearings, metal plating, and engine parts. The Modified LPA includes the extension of light-rail into downtown Vancouver and other transportation systems management and travel demand management measures, which could reduce the number of vehicles, and therefore tires (i.e., the source of 6PPD-quinone), on study area roads compared to the No-Build Alternative. The Modified LPA would have a substantial beneficial effect on water quality because it would include stormwater treatment facilities to remove pollutants in runoff from all roadway surfaces within the project footprint. Methods proposed for mitigation and treatment of runoff are detailed in Section 3.14.6.

All design options would have similar impacts to water quality. The Modified LPA with two auxiliary lanes would have a greater increase in impervious surface and result in slightly increased pollutant loads, as compared to the Modified LPA with one auxiliary lane. The Modified LPA with the single-level movable-span configuration could have the potential for additional pollutants and minor long-term water quality impacts; it is difficult to collect stormwater from the movable portion of the bridge structure when lifting, lifted, and lowering, as well as accidental spills that could flow directly into the waterbody during over-water maintenance of the movable span. No matter which design option is selected, the Modified LPA would include stormwater treatment facilities that would treat runoff from all roadway surfaces within the project footprint.

For various pollutants, Table 3.14-6 shows the levels of reduction predicted under the Modified LPA with one auxiliary lane and double-deck fixed-span configuration compared to the No-Build Alternative. The greatest reduction would be in suspended solids, which would be reduced by approximately 86% compared to the No-Build Alternative.

Table 3.14-6. Contributing Impervious Area and Annual Pollutant Load Estimates for the Modified LPA

Environmental Metric	No-Build Alternative	Modified LPA with One Auxiliary Lane, Double-Deck Fixed-Span
Treated CIA (acres)	0.0	189.7
Infiltrated CIA (acres)	21.2	17.5
Untreated CIA (acres)	156.4	0.0
Total CIA (acres)	177.6	207.2

Environmental Metric	No-Build Alternative	Modified LPA with One Auxiliary Lane, Double-Deck Fixed-Span
Total Suspended Solids (lbs/year)	120,272	16,694
Total copper (lbs/year)	25.0	7.6
Dissolved copper (lbs/year)	6.3	5.7
Total zinc (lbs/year)	153.3	39.8
Dissolved zinc (lbs/year)	48.5	26.6

CIA = contributing impervious area; lbs = pounds

As shown in Table 3.14-4, the Modified LPA with one auxiliary lane and a double-deck fixed-span configuration would increase the CIA within the study area by 29.6 acres to 207.2 acres, as compared to the No-Build Alternative. The Modified LPA with the two auxiliary lanes and double-deck fixed-span configuration would increase the CIA within the study area by 33.5 acres, as compared to the No-Build Alternative, and the Modified LPA with the one auxiliary lane and single-level fixed-span or movable-span configuration would increase CIA by 32.9 acres.

Contributing impervious area (CIA)

For the Modified LPA, the CIA is defined as all new, rebuilt, or replaced impervious surface areas and contiguous existing impervious area that contribute stormwater runoff. The CIA does not include runoff from impervious surface area outside the Modified LPA footprint that flows through outfalls that would not be modified.

Of the total CIA, the Modified LPA would treat stormwater runoff from 189.7 acres and runoff from 17.5 acres would be infiltrated. This accounts for all the stormwater runoff from existing, new, or reconstructed impervious surface area within the project footprint, including runoff from bridges over the Columbia River. While infiltrated areas would not receive treatment, runoff would be naturally filtered through ground percolation before entering receiving waters through groundwater.

As discussed in Section 3.1, Transportation, daily traffic volume models show that the Modified LPA would slightly decrease vehicle miles traveled within the study area. Decreasing vehicle miles traveled would reduce idling and brake pad wear, which may reduce the amount of copper and other traffic-related pollutants currently carried by corridor runoff. The Modified LPA with a fixed-span bridge configuration would further reduce idling and brake pad wear compared to the Modified LPA with a movable-span bridge configuration, where traffic on I-5 would be stopped during a bridge lift.

Routine winter maintenance activities over a larger roadway area could also affect water quality under the Modified LPA. Highway sanding can result in large quantities of gravels and particulates making their way into adjacent waterbodies. Similarly, chemical anti-icing and de-icing agents can result in contaminants making their way into adjacent waterbodies. However, impacts from winter maintenance activities are expected to be minimal because the frequency of use is relatively low (approximately 30 days a year), and runoff from the roadways would be treated to reduce potential pollutant loads from these activities.

Stormwater

As described, the Modified LPA could cause changes in peak flows and runoff volumes in local receiving waters because of the increased CIA in the study area. The amount of flow control (detention or retention) provided, in combination with the stormwater treatment facilities, would be evaluated per regulatory guidance as the Modified LPA design progresses; the updated analysis would be provided in the Final SEIS. As

noted in the discussion of hydrology above, the Modified LPA would comply with the stormwater design requirements in place at the time of construction, including requirements that may be updated to reflect climate-induced changes to rainfall patterns.

Within the Columbia Slough and the Columbia River watersheds, Oregon and Washington regulations do not require flow control for stormwater runoff. These large waterbodies are exempt from flow control requirements for direct discharges unless the stormwater conveyance systems carrying the flows have capacity limitations. Therefore, there are no flow control facilities proposed for the Modified LPA in these watersheds.

Within the Burnt Bridge Creek watershed, stormwater flow (volume) control is required by the Washington State Department of Ecology. Runoff from the Modified LPA would continue to discharge to an existing infiltration pond in the Burnt Bridge Creek watershed; overflow from this infiltration pond during extreme runoff events is discharged to Burnt Bridge Creek via a spillway and open channel. Although the Modified LPA design would increase the total CIA within the Burnt Bridge Creek watershed, it would reduce the total impervious surface area draining to this existing infiltration pond through the replacement of other existing water quality facilities with enhanced stormwater treatment. The Modified LPA would thereby reduce the overall volume of stormwater to the infiltration pond, reducing the frequency of discharges to Burnt Bridge Creek during extreme flow events. Therefore, no negative long-term effects on stormwater are likely for this watershed as a result of the Modified LPA.

For the Fairview Creek watershed, the Modified LPA would adhere to the City of Gresham's stormwater management requirements by infiltrating the stormwater. Thus, the Modified LPA would not have long-term effects on stormwater quantity for the watershed.

3.14.4 Temporary Effects

No-Build Alternative

The No-Build Alternative would not result in construction activities and would not have temporary effects on water quality and hydrology.

Modified LPA

The Modified LPA with any of the bridge configuration and bridge type options and with one or two auxiliary lanes and potential levee modifications would have similar temporary effects on hydrology, water quality, and stormwater as described below.

Hydrology

Construction of the Modified LPA, including construction of the new bridges and removal of the existing bridge would place temporary obstructions in the Columbia River and North Portland Harbor. Large temporary structures may be present in these areas for several years to assist with the construction of the Columbia River and North Portland Harbor bridges and the demolition of the existing bridge structures. The Modified LPA would also use cofferdams at some pier complexes to isolate the work area from active flow in the Columbia River and contain waste material and sediments. Given the scale of the Columbia River, its width, volume, and flow rates and the regulation of river flows by upstream dams, the hydraulic effect of these temporary

What are cofferdams?

A cofferdam is a temporary, watertight enclosure used to isolate work areas from surrounding waters. The Modified LPA could require cofferdams to isolate work areas in the Columbia River where new bridge pier foundations are constructed near the shore or where existing piers are removed.

structures is expected to be minor. Construction of the Modified LPA would require a floodplain permit from local jurisdictions and a hydraulic analysis to ensure there are no temporary adverse effects on the Columbia River's hydrologic regime.

Construction of depressed roadway sections (i.e., sections below the surrounding ground level) can have effects on groundwater. Construction below grade and near or beneath the water table may require groundwater pumping for dewatering. Pumping may affect groundwater flows to nearby waterways, as well as groundwater quality and stormwater quantity. However, since pumping would likely occur when the water table and river stages are high (e.g., during winter flows), this is not likely to have a substantial effect on the hydrology of affected waterways.

No temporary effects on the hydrology of Fairview Creek are anticipated for the expansion of the Ruby Junction Maintenance Facility since the required stormwater treatment facilities, which include infiltration for the entire expansion area, would be constructed ahead of and in preparation for construction of the expanded facilities.

Water Quality

Although there are numerous sources of chemical pollutants, there is a low risk that chemicals would actually enter the receiving waters. All reasonable precautions would be taken to avoid and minimize water quality impacts during construction activities including staging, construction of the new bridges, removal of the existing bridge, and modifications to levees. The measures are outlined in Section and would be developed in more detail once site--specific environmental analyses are conducted. The measures would ensure that water quality impacts during construction are minimized through the use of BMPs specified in the temporary erosion and sediment control plans (TESCPs) and spill prevention, control, and countermeasures (SPCC) plans developed for all necessary NPDES permits. Temporary effects on the quality of receiving waters within the study area may still be possible and may include the following:

- Increased turbidity due to ground disturbance around waterways associated with construction or staging.
- Discharge of pollutants to surface waters due to equipment leaks or spills in the vicinity of waterways.
- Groundwater contamination due to upland ground improvement activities including deep soil mixing with cementitious material and/or aggregate.
- Sediment and contaminant migration into groundwater or surface water from equipment pressure or steam cleaning operations following construction periods.
- Discharge of pollutants to surface waters due to the use of fertilizers, pesticides, or herbicides during restoration or revegetation activities.
- Contamination of groundwater due to direct infiltration of toxic contaminants during groundwater pumping from locations of known existing groundwater contamination.
- Infiltration of polluted surface water into groundwater.
- Increased turbidity due to riverbed disturbance during in-water work.
- Release of pollutants due to spills or leaks of cement during pier footing and column construction.
- Construction material or other objects falling into the Columbia River and North Portland Harbor during the construction of the new bridges and demolition of the old bridge.
- Release of existing contaminated sediments due to disturbance of riverbed sediments containing hazardous materials during in-water work. Sampling and analyzing potentially hazardous sediments prior to construction is addressed in the IBR Hazardous Materials Technical Report.

Throughout the study area, construction improvements would disturb the ground, which may expose soil to erosion from wind, rain, and runoff. Waterbodies in the study area could receive sediment-laden runoff by way of stormwater inlets, ditches, or other forms of conveyance, which could result in increased turbidity and excessive sediment deposits. Construction equipment operating on land could release pollutants (e.g., petroleum-based fuel or other fluids) or construction materials that could enter waterbodies by way of stormwater inlets, ditches, or other forms of conveyance.

Dewatering during construction may create a cone of depression and the potential for the movement of contaminated groundwater from nearby hazardous materials sites. A hazardous materials analysis indicated that there are potential high-risk sources of contamination near proposed depressed road sections.

Staging area activities also have the potential to increase stormwater runoff and pollutant loading. Staging areas would meet all applicable permit and stormwater requirements during and following their use. As with all construction activities, impacts to water quality would be minimized through the use of BMPs specified in the TESCPs and SPCC plans developed for all necessary NPDES permits.

Following construction, the use of fertilizers, pesticides, or herbicides during restoration and revegetation activities may affect the water quality of receiving waters. Their use, however, would be minimized, especially near receiving waters. The Modified LPA would adhere to requirements described in ODOT Standard Specifications 01040.00 to 01040.90 and/or WSDOT Standard Specification 8-02 “Roadside Restoration.”

Stormwater

Construction activities related to the Modified LPA would increase stormwater runoff within the study area and create temporary effects related to hydrology and water quality. In general, potential temporary effects could result from increased stormwater runoff due to ground disturbance, increased potential for pollutants in runoff in and around construction and staging sites and equipment, and increased construction-generated stormwater runoff due to groundwater pumping during depressed roadway construction.

The Columbia River and North Portland Harbor would experience an increase in stormwater volumes due to the impervious surfaces of nearby staging areas, barges, temporary work bridges, and other structures related to overwater construction. Temporary construction effects are not anticipated to affect Fairview Creek because stormwater is currently treated or infiltrated on-site at the creek, and this would continue during and after construction. Therefore, additional measures to treat stormwater are not needed. Stormwater conveyed off-site would require prescribed treatment to ensure that runoff was not turbid or contaminated.

3.14.5 Indirect Effects

Population growth and land use development are anticipated to occur under both the Modified LPA and the No-Build Alternative. Development can affect water quality and hydrology by increasing the amount of impervious area (for example, by adding rooftops and parking lots); this, in turn, increases stormwater runoff quantities and pollutant loads, resulting in potential impacts to receiving waters and floodplains. As described in Section 3.4, Land Use and Economic Activity, the Modified LPA is expected to facilitate higher-density development—such as transit-oriented development around light-rail stations—in already urbanized areas, consistent with local land use plans. Concentrating growth can help conserve natural resources from the potentially adverse effects of development on the urban periphery, such as habitat loss and contamination from stormwater runoff. Conversely, the No-Build Alternative, because it would not provide new high-capacity transit, would be less likely to result in dense growth and hence would be less protective of natural resources.

Any new development or redevelopment facilitated by the Modified LPA would have to comply with the relevant laws, regulations, policies, and codes in force at the time. These requirements, which include restrictions on tree removal, stormwater treatment and floodplain regulations, and environmental zone and

critical areas protections, would limit negative impacts from development and redevelopment. These regulations require avoidance or minimization of impacts on environmentally sensitive resources, including those that address water quality and hydrology and floodplains. In light of these protections, indirect effects from the Modified LPA and potential future development are expected to be minimal.

3.14.6 Potential Avoidance, Minimization, and Compensatory Mitigation Measures

Long-Term Effects

Regulatory Requirements

- As design progresses, conduct a detailed hydraulic analysis of the affected floodplains. If a rise in the base flood elevation is predicted, assess mitigation through floodplain excavation (cut/fill balance) activities within the footprint of the Modified LPA and determine whether additional land may be required to accomplish the required mitigation. Conduct a location hydraulic study to document the impacts, mitigation measures, evaluation of alternatives, and findings in accordance with the provisions of 23 CFR 650A.
- Work with the City of Portland to ensure flood storage compensation does not jeopardize threatened and endangered species and their habitat (revised Floodplain Development Code Chapter 24.50 Flood Hazard Areas).
- Comply with ODOT and WSDOT stormwater management requirements and the Cities of Portland and Vancouver regulations for the portions of the Modified LPA along City-managed roads during construction and for the long-term treatment of stormwater runoff prior to discharge into receiving waters.
- Select and design water quality BMPs to ensure compliance with all federal, state, and local regulatory requirements, including construction and municipal stormwater permit requirements issued through CWA Section 401, to reduce suspended solids, particulates, and dissolved metals; to reflect the latest climate models; and to treat newly identified pollutants like 6PPD-quinone.
- Construct flow control facilities to infiltrate or reduce the flow rates of all study area runoff, pursuant to local regulatory requirements. Mitigation for increased runoff to the Columbia Slough or the Columbia River would not be required because these water bodies are exempt from stormwater quantity management. However, the effects of increased runoff would be reduced using stormwater infiltration. This would allow groundwater recharge to continue and minimize the increase in runoff volumes and peak discharges.

Program-Specific Mitigation

Hydrology

- Offset potential rise in the base flood elevation through floodplain excavation (cut/fill balance) activities as determined through a location hydraulic study.
- In the Burnt Bridge Creek watershed, construct infiltration facilities to provide complete infiltration of all Program-related runoff, such as providing underground injection control requirements, to the extent practicable, for the wellhead protection zone present in the watershed to manage stormwater volumes. As design progresses, select site-specific BMP facilities**.**

- Prepare stormwater monitoring plan(s) to evaluate the long-term performance and effectiveness of the updated stormwater conveyance and treatment systems. Based on the findings, complete modifications or enhancements to the system(s) to meet discharge performance criteria.
- Compensate for additional fill in floodplains to achieve a no net loss of floodplain as a result of removal of materials within the City of Portland Floodplain Hazard Areas.

Water Quality

Where applicable in the project area, the following proposed water quality treatment facilities would be used to treat stormwater runoff and mitigate the increase in contributing impervious surfaces. Definitions of these treatment facility types are presented in Section 7.2.2 of the Water Quality and Hydrology Technical Report.

- Treat stormwater runoff through bioretention ponds/planters, biofiltration swales, bioslopes (Oregon), and/or media filter drains (Washington) that provide water quality treatment via infiltration through a phosphorus-free, compost-amended soil medium and/or vegetation. Vegetation also provides uptake of some water.
- Water quality treatment facilities that have demonstrated effectiveness for advanced treatment will be designed according to each jurisdiction's specifications, such as the Washington State Department of Ecology's Technology Assessment Protocol program (Washington), the 2020 Stormwater Management Manual (Portland), and Vancouver's Surface Water Management Program.

Temporary Effects

Regulatory Requirements

Regulatory requirements for temporary effects of stormwater runoff during construction would include compliance with ODOT, WSDOT, Portland, and Vancouver's regulations including the preparation of an SPCC plan and pollution control plan (PCP), and TESCP. In addition, all federal, state, and local permits related to water quality and hydrology would be obtained. See Section 8 in the Water Quality and Hydrology Technical Report for a complete list of required federal, state, and local permits.

Spill Prevention/Pollution Control Measures

- Require the contractor to prepare an SPCC plan and PCP prior to beginning construction. These plans would be provided to the National Oceanic and Atmospheric Administration Marine Fisheries Service (NOAA Fisheries) for review and approval. The SPCC plan and PCP would identify the appropriate spill containment materials, as well as the means and methods of implementation, response, and reporting, in the event of a spill. All elements of the SPCC plan and PCP would be available at the project site at all times. For additional details, consult ODOT Standard Specification 00290.00 to 00290.90 and WSDOT Standard Specification 1-07.15.

Site Erosion/Sediment Control Measures

- Require the contractor to prepare and implement a TESCP to minimize impacts associated with clearing, vegetation removal, grading, filling, compaction, or excavation. The BMPs identified in the TESCP would be used to control sediments in areas impacted by vegetation removal or ground-disturbing activities. Additional temporary control measures may be required beyond those described in the TESCP if it appears pollution or erosion may result from weather, the nature of the materials, or progress on construction. For additional details, consult ODOT Standard Specifications 00280.00 to 00280.90 and WSDOT Temporary Erosion and Sediment Control Manual M3109.02.

- Stabilize all exposed soils as directed in measures prescribed in the TESCP. Hydro-seed all bare soil areas following grading activities and revegetate all temporarily disturbed areas with native vegetation indigenous to the location. For additional details, consult ODOT Standard Specifications 01030.00 to 01030.90 and WSDOT Temporary Erosion and Sediment Control Manual M3109.02.
- Where site conditions support vegetative growth, plant native vegetation indigenous to the location in areas temporarily disturbed by construction activities. Revegetation of construction easements and other areas would occur after the project is completed. Trees would be planted when consistent with highway safety standards. Riparian vegetation would be replanted with species native to geographic region. Planted vegetation would be maintained and monitored to meet regulatory permit requirements. For additional details, consult ODOT Standard Specifications 01040.00 to 01040.90 and WSDOT Temporary Erosion and Sediment Control Manual M3109.02.

Program-Specific Mitigation

Hydrology

- Minimize changes to groundwater hydrology by limiting groundwater pumping to areas where it cannot be avoided.

Water Quality

- Study, test, and remediate sites with existing soil or groundwater contamination near construction areas before any construction. See Section 3.18, Hazardous Materials for specific mitigation actions.
- Conduct in-water work during approved periods for the Columbia River as approved by the Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, NOAA Fisheries, and the U.S. Fish and Wildlife Service. See Section 3.16, Ecosystems, for specific mitigation measures.
- Stage construction equipment used for in-water work activities above the ordinary high-water mark. Only the operational portion of construction equipment would enter the active stream channel (below the ordinary high-water mark).
- If in-water dredging is required outside of a cofferdam, use a clamshell bucket within the established in-water work windows. Dredging, handling, and disposal of dredged materials shall be conducted consistent with the requirements and conditions of the regulatory permits issued for the Modified LPA.
- If required, monitor turbidity and provide a rest period to allow turbidity, if any, to dissipate between in-water work activities.

3.15 Wetlands and Other Waters

Wetlands and other waters perform valuable functions for fish, wildlife, environmental quality, and surrounding human communities. The federal Clean Water Act (CWA) gives environmental oversight for waters and wetlands to the U.S. Army Corps of Engineers (USACE). The CWA also gives the U.S. Environmental Protection Agency (EPA) and USACE jurisdictional oversight for "traditional navigable waters" of the U. S. State governments generally share the regulatory control with the USACE.

Wetlands and other waters regulated by the CWA are called jurisdictional wetlands and other waters. Federal and state laws require projects that could impact wetlands and other waters to first avoid and minimize impacts where possible. Impacts to jurisdictional waters, such as adding or removing bridge piers or other structures in a river, or filling, excavating, or building in a wetland, require joint federal, state, and local permitting. If impacts are unavoidable, the project must compensate for these impacts by restoring or creating new wetlands or other waters to ensure that the overall environmental functions they provide are not diminished. Some jurisdictions also restrict activities in areas within a certain distance of wetlands, known as buffer zones.

The information presented in this section is based on the Wetlands and Other Waters Technical Report. In addition, Section 3.14, Water Quality and Hydrology, and Section 3.16, Ecosystems, provide more information about the relationship between wetlands, fish and wildlife habitat, and water quality.

Are all wetlands, rivers, and streams "jurisdictional"?

Complex regulations determine which wetlands and other waters are jurisdictional. All wetlands and other waters that are potentially jurisdictional were considered in this analysis, and this section refers to them all as simply wetlands or other waterways. Final determinations of the boundaries and legal status of each would be made by the appropriate agencies during the permit process after the NEPA process is complete.

3.15.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with wetlands and other waters has been updated in this Draft SEIS to include:

- Updated determination of waters of the U.S. based on recent decisions from the U.S. Supreme Court and the subsequent updated conforming rule issued by EPA and USACE.
- Updates to methodology for wetland evaluations and updated plant species lists developed by EPA and USACE.
- Updates to existing conditions based on fieldwork to identify and confirm wetland boundaries within the study area.
- Changes in the project footprint necessitated by changed conditions. Updates to proposed mitigation or compensation for wetland and wetland buffer effects to reflect current guidance.

Table 3.15-1 compares the impacts and benefits of the CRC LPA to the Modified LPA as a result of the changes listed above. Based on the analysis in this section, the effects of the Modified LPA, including design options, would be similar to those of the CRC LPA.

Table 3.15-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA [a] Effects as Identified in This Section	Explanation of Differences
Wetland Fill	0 acres	0.58 acres	• Additional wetlands were identified on mainland Oregon between N Martin Luther King Jr. Boulevard and N Union Court. The design change that altered local access to N Union Court would alter additional wetland impacts.
Wetland Buffer Fill	0.41 acres	7.39 acres	• Additional wetlands were identified on mainland Oregon between N Martin Luther King Jr. Boulevard and N Union Court. The design change that altered local access to N Union Court would result in additional wetland impacts. • The City of Portland expanded Environmental Overlay Zone areas, and the regulations that accompany them increased the acreage of wetland buffer impacts.
Other Waters (Fill/Restoration)	0.76 acres (net fill)	- 0.13 acres (net restoration)	• New techniques in pile cap installation would reduce the amount of benthic habitat impacts, coupled with the removal of the existing bridge footings, would result in a net restoration of fill in other waters.

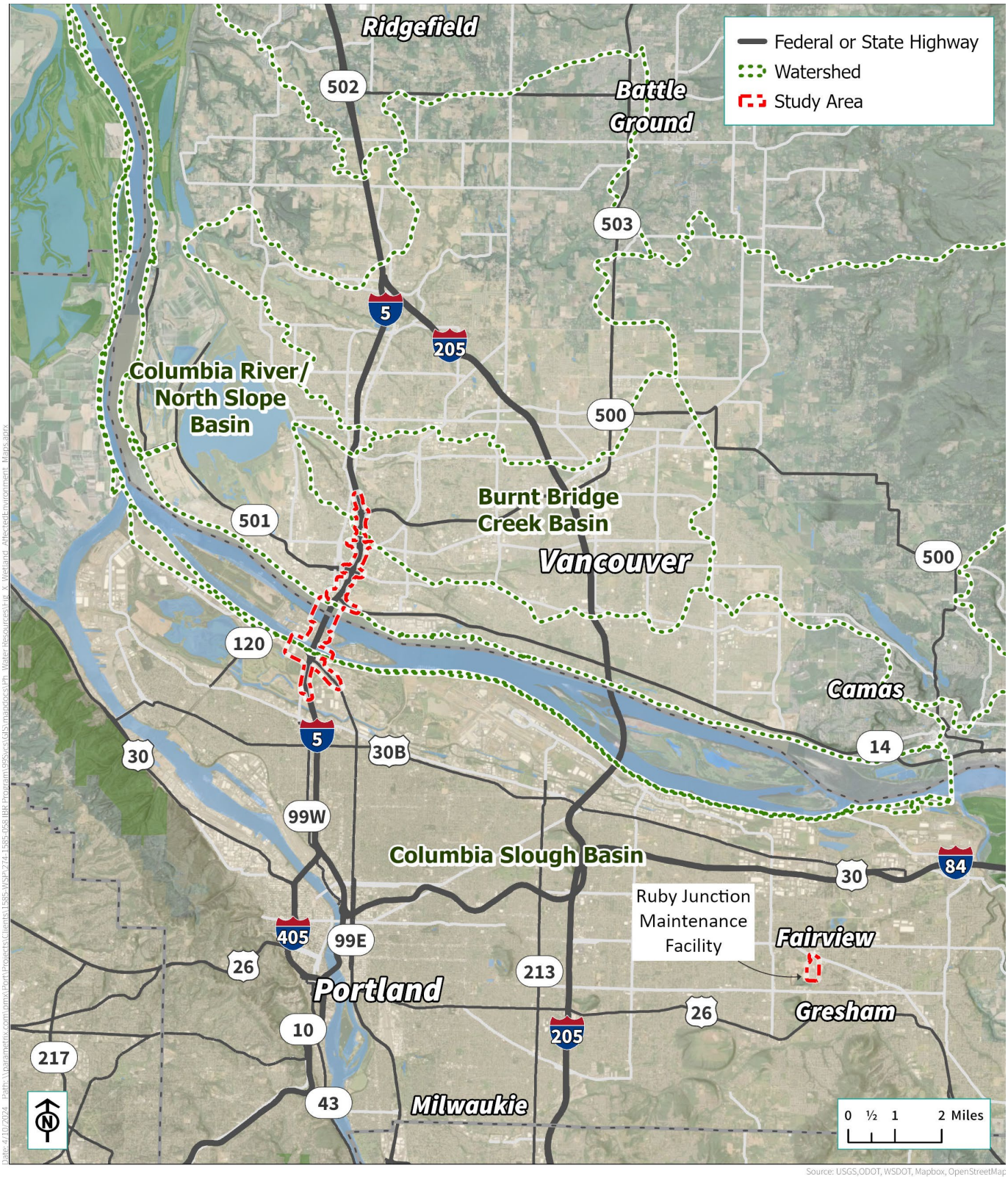
Note: Data are approximate and have been rounded.
a The Modified LPA effects are based on the double-deck-fixed-span configuration with one auxiliary lane.

3.15.2 Existing Conditions

The existing conditions for wetlands and other waters includes information on resources that were initially delineated in 2008 as part of the CRC project, updated with new information from the City of Portland's Wetland Inventory Project and field-identified wetland boundaries in 2022 and 2023. A preliminary wetland and other waters delineation report will be published once field delineations have been completed. Field delineations should be completed in 2024 and results from the field delineations will be included in the final environmental impact statement.

The study area for the wetlands and other waters analysis is shown in Figure 3.15-1. The study area is the area that could experience direct impacts from the construction and operation of the Modified LPA, including the expansion of the Ruby Junction Maintenance Facility in Gresham, Oregon.

Figure 3.15-1. Wetlands and Other Waters Study Area



Wetlands in Oregon

There are large wetland systems to the east and west of the study area in Oregon that are remnants of the extensive wetland system that existed on the floodplain of the Columbia River before development. These

wetland systems were changed by the construction of dikes and levees, which drained land and added fill material to low spots, first for agricultural purposes and then for urban development. In addition, constructed wetlands were established to manage stormwater runoff near the roadway in the study area. Despite the reduction in area, the remaining wetlands in the study area perform important functions and have high value due to their rarity and wildlife value.

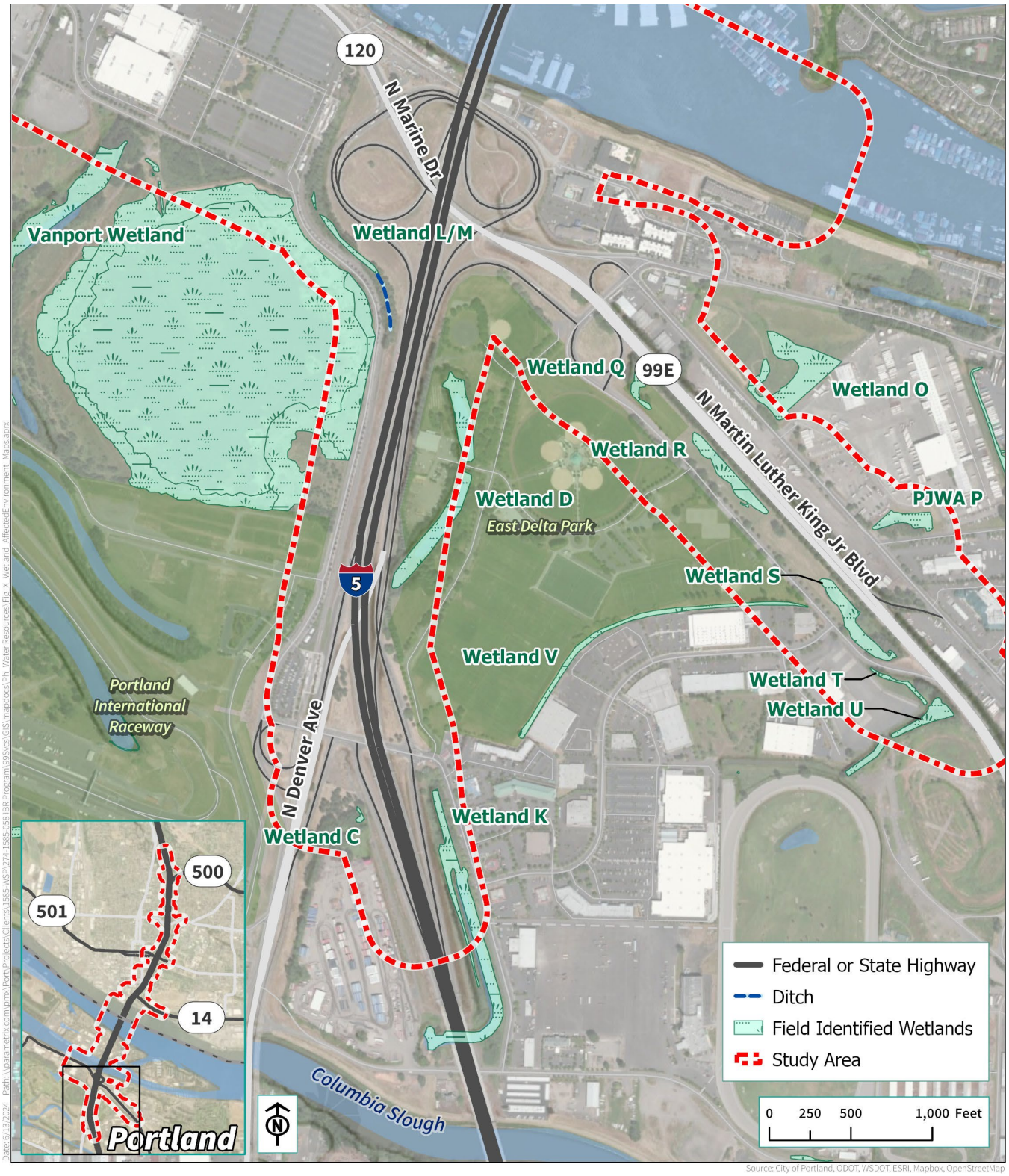
The study area in Oregon includes a complex of small wetland systems, some of which are connected by culverts, near the I-5 roadway. These wetlands are remnants of the former slough system that have been modified to increase drainage and convey stormwater from the surrounding area to the Columbia Slough. Within the Columbia Slough watershed, there are 13 identified wetlands and, potentially, a jurisdictional ditch that intersects the study area, shown in Figure 3.15-2. The wetlands are identified alphabetically, in the order they were identified in the field or by off-site databases, in Table 3.15-2. No wetlands were identified in the Ruby Junction Maintenance Facility area.

Table 3.15-2. Wetlands Identified within the Study Area in Oregon

Wetland ID	Wetland Type	Size (acres)
Wetland C	PEM	0.07
Wetland D	PFO/SS/EMHx	2.67
Wetland K	PUBHh	3.0
Wetlands L/M	PFOC	0.34
Wetland O	PEM	2.63
Potentially Jurisdictional Wetland/Water Area P (PJWA P)	PEM	0.61
Wetland Q	PEM	0.30
Wetland R	PEM	0.97
Wetland S	PEM	1.10
Wetland T	PEM	0.18
Wetland U	PEM	0.55
Wetland V	PEM	1.18
Vanport Wetland	PFO/SS/EMHx	66.6

Note: No wetlands were identified at the Ruby Junction Maintenance Facility.
Key: PEM = palustrine emergent; PFOC = palustrine, forested, seasonally flooded; PFO/SS/EM = palustrine forested/scrub-shrub/emergent; PFO/SS/EMHx= palustrine, forested/scrub-shrub/emergent, permanently flooded, excavated; PUBHh = palustrine, unconsolidated bottom, permanently flooded, excavated.

Figure 3.15-2. Field-Identified Wetlands and Other Waters - Oregon



Source: CRC Wetland Data (2011); City of Portland (2023)

Wetlands in Washington

Within the study area in Washington, there are two delineated wetland systems within the Burnt Bridge Creek watershed, shown in Figure 3.15-3 and listed in Table 3.15-3. No wetlands were identified in the Columbia River/Columbia Slope watershed. Figure 3.15-3 also shows Wetland B and the WSDOT Burnt Bridge wetland complex, which were identified during the CRC project analysis. These wetland systems are shown for additional context; however, they are outside of the current study area.

Table 3.15-3. Wetlands Identified within the Study Area in Washington

Wetland ID	Wetland Type	Size (acres)
Wetland H	PEMA	0.12
PJWA I (Kiggins Bowl wetlands)	PFO	1.00

N/A= Not available; PEMA= palustrine emergent, temporarily flooded; PJWA = Potential Jurisdictional Water/Wetland Area; PFO = palustrine forested

Other Waters

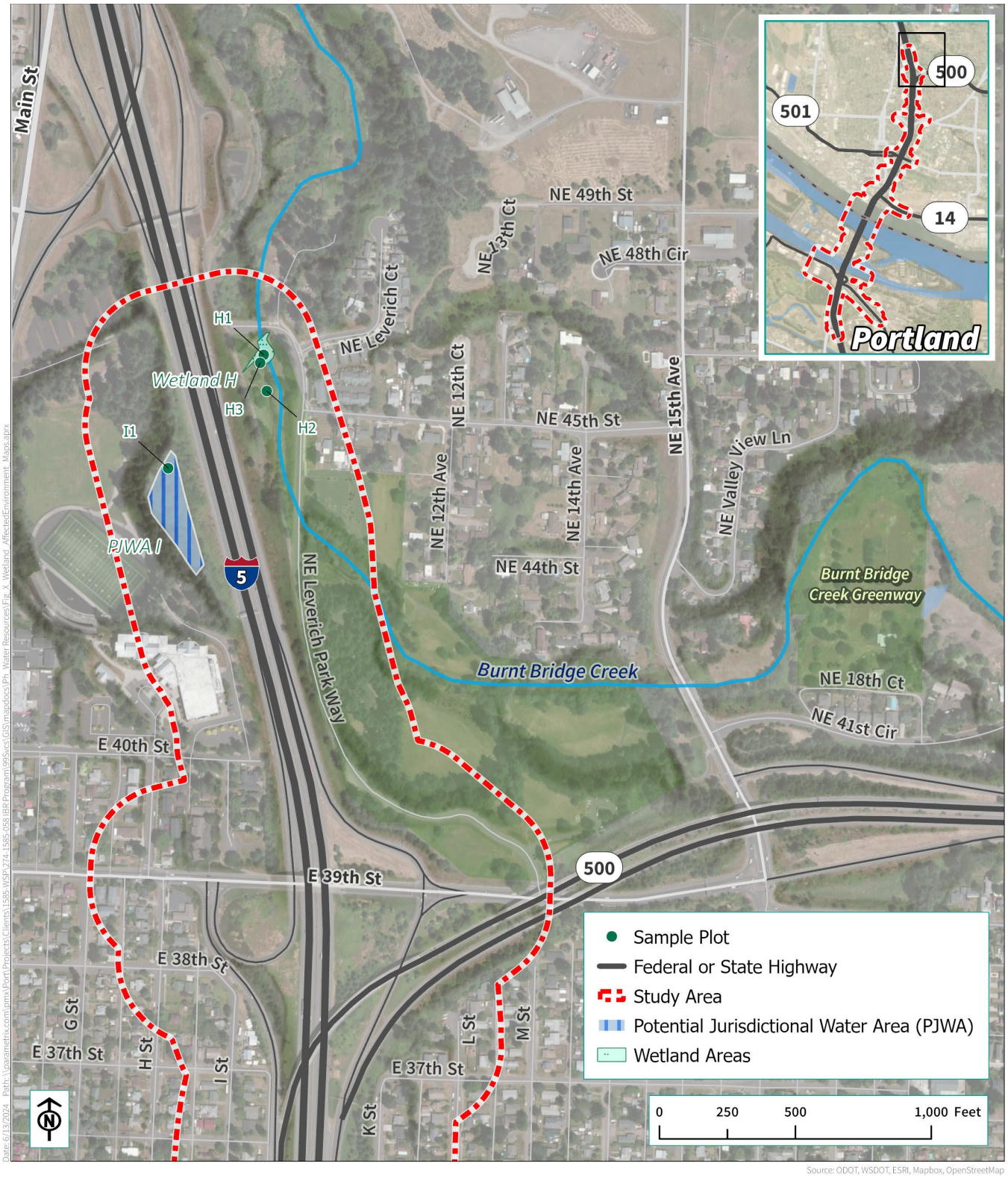
The study area contains two regulated waters of the state and U.S.—the Columbia River and Burnt Bridge Creek—and one potentially regulated water (ditch) of the state and U.S. The Columbia River (including North Portland Harbor, which is also known as the Oregon Slough) between the Oregon mainland and Hayden Island) is also classified as a "traditional navigable water" of the U.S. EPA and USACE have jurisdictional oversight for "[a]ll waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to ebb and flow of the tide" (33 CFR Section 328.3(a)(1); 40 CFR Section 120.2(a)(1)). "Traditional navigable water" includes all the navigable waters of the U.S., as defined in 33 CFR Part 329. Table 3.15-4 provides a description of jurisdictional waters in the study area.

Modified LPA

The subsections below describe the long-term impacts that would occur with the Modified LPA. Anticipated filling or reduction of wetlands and other waters, and their buffers, as a result of the Modified LPA are mapped in Figure 3.15-4 and Figure 3.15-5. The acreage of fill or reduction to individual wetlands and their buffers is shown in Table 3.15-5.

As described in Chapter 2, activities associated with the Modified LPA would likely require both temporary and permanent modifications to portions of the Portland Metro Levee System, which is a system of federal flood control levees along the south bank of the Columbia River/North Portland Harbor. Modifications may include activities to restore temporarily disturbed portions of the levees, permanent modifications where proposed infrastructure would intersect with the existing levees, or where access to the levees would change as a result of reconfigured roadways. Modifications may also include improvements to existing levee function, if such improvements are requested or required. Modifications or improvements would be coordinated with USACE and Urban Flood Safety and Water Quality District for consistency with the planned future condition of the levees. The assessment of long-term effects to wetlands and other waters presented below includes those associated with potential modifications to the federal levee system.

Figure 3.15-3. Field-Identified Wetlands and Other Waters - Washington



Source: CRC Wetland Data (2011)

Table 3.15-4. Other Jurisdictional and Potential Jurisdictional Waters within the Study Area

Waters	Description	Designation Type
Potential Jurisdictional Ditch (No name/ID given) (Oregon)	A stormwater ditch, adjacent to Wetland System L/M, within the city of Portland. The ditch enters the wetland system and flows to the Vanport wetland through two culverts. The ditch is located at the toe of a roadway prism and receives stormwater runoff from the roadway prism slope and TriMet light-rail tracks. This ditch was not considered a jurisdictional resource by DSL in 2008.	• Jurisdictional waterway status will be evaluated during permitting process.
Columbia River/North Portland Harbor (Oregon Slough) (Oregon and Washington)	At RM 106, this traditional navigable waterway is highly managed and confined by levees. It is relatively free flowing compared to upstream reaches. Stream flow and stage height are affected by: • Bonneville Dam management and other upstream dams. • Tidal shifts in the Pacific Ocean. • Heavy barge traffic. Shorelines within the cities of Portland and Vancouver.	• Traditional navigable waters of the U.S. regulated by USACE. • Regulated waterway of the state and U.S. • Local designations: - City of Portland Environmental Overlay Zone. - Critical Area and Shoreline of the state designations by the City of Vancouver/State of Washington.
Burnt Bridge Creek (Washington)	Perennial stream located in Burnt Bridge Creek watershed within the city of Vancouver.	• Regulated waterway of the state and U.S. • Critical Area and Shoreline of the state designations by the City of Vancouver/State of Washington.

DSL = Oregon Department of State Lands; RM = river mile; TriMet = Tri-County Metropolitan Transportation District of Oregon; USACE = U.S. Army Corps of Engineers

Table 3.15-5. Long-Term Impacts to Wetlands and Other Waters from the Modified LPA

Wetlands or Other Waters	Affected Resources	Modified LPA (with the Double-Deck Fixed-Span Configuration) Wetland Fill and Other Water Fill/Restoration (acres)
Wetlands	C	0
	D	0
	H	0
	K	0
	L/M (Expo Road wetlands)	0.002
	O	0
	PJWA P	0
	Q	0.3
	R	0.21
	S	0.02

Wetlands or Other Waters	Affected Resources	Modified LPA (with the Double-Deck Fixed-Span Configuration) Wetland Fill and Other Water Fill/Restoration (acres)
	T	0
	U	0
	V	0
	PJWA I (Kiggins Bowl wetlands)	0
	Vanport wetland	0.05
	Total Wetland Impact	**0.58**
Wetland Buffers	C	0
	D	0.36
	H	0.06
	K	0
	L/M	0.56
	O	0
	PJWA P	0
	Q	0.95
	R	0.91
	S	0.7
	T	0.24
	U	0.11
	V	0
	PJWA I (Kiggins Bowl wetland buffer)	0
	Vanport wetland buffer	3.5
	Total Wetland Buffer Impact	**7.39**
Other Waters	Columbia River/North Portland Harbor fill	0.91
	Columbia River/North Portland Harbor removal	-1.04
	Total Other Waters	**-0.13 (net restoration)**

LPA = Locally Preferred Alternative; PJWA = Potentially Jurisdictional Water Area

3.15.3 Long-Term Benefits and Effects

Long-term impacts occur when an alternative results in removal or fill within jurisdictional wetlands, regulated wetland buffers, or other waters of the state or U.S. The following process has been used to determine long-term impacts on wetlands and other waters:

- Map project components relative to wetlands and other waters, and their buffers, identified in Section 3.15.2.
- Evaluate impacts to the functions of wetlands and other waters.
- Quantify the area of wetlands, other waters, and designated buffers affected.

No-Build Alternative

No filling or reduction of wetlands or wetland buffers would result from the No-Build Alternative. Untreated stormwater would continue to be discharged into wetlands and other waters in the study area. Development would continue to occur along roadways in the study area, which would increase impervious surfaces that would discharge into wetlands and other waters.

Wetlands and Buffers

The Modified LPA, including each of the design options, would permanently excavate or fill approximately 0.58 acres of wetlands, all of which would be in Oregon. The wetlands that would experience the largest impacts are Wetland Q, with 0.3 acres of fill, and Wetland R, with 0.21 acres of fill. This fill and reduction in wetland size would result in a loss of wetland functions.

The Modified LPA, including each of the design options, would also permanently excavate or fill a total of approximately 7.39 acres of wetland buffer. Almost all of this impact would be in Oregon, with the buffers of the Vanport wetland, Wetland Q, and Wetland R experiencing the largest impacts. In Washington, 0.06 acres of wetland buffer would be impacted at Wetland H, which is associated with Burnt Bridge Creek.

Other Waters

The Modified LPA would construct new in-water permanent bridge piers in the Columbia River and North Portland Harbor for the Columbia River bridges and the bridges over North Portland Harbor. The Modified LPA with the double-deck fixed-span configuration would result in 0.91 acres of filled river bottom. Demolition of the foundations for the existing Interstate Bridge in the Columbia River and North Portland Harbor would restore 1.04 acres of river bottom. Therefore, construction of the Modified LPA with the double-deck fixed-span configuration would result in a net restoration of approximately 0.13 acres of waterway.

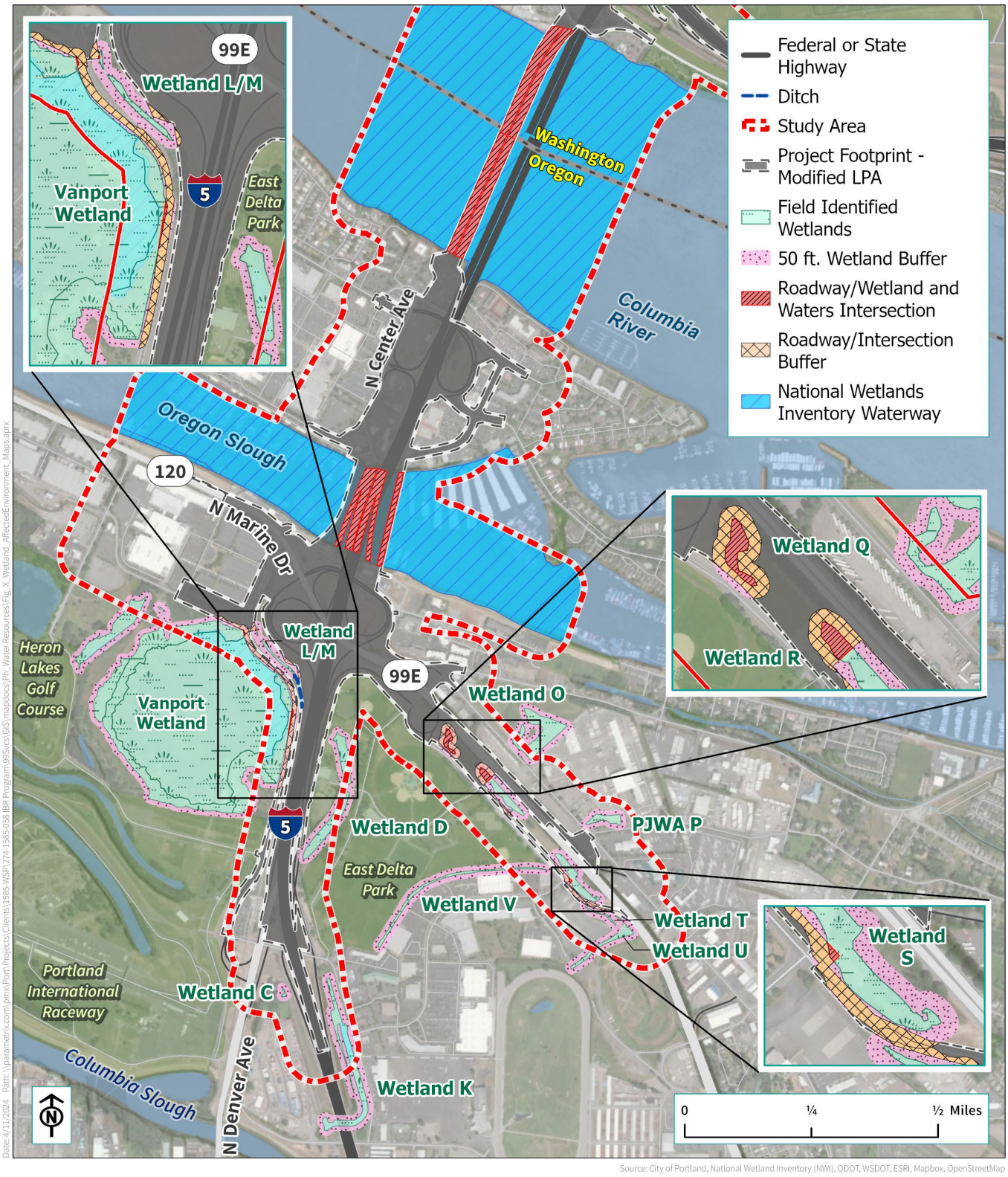
The Modified LPA with single-level fixed-span configuration would have a slightly larger permanent width than the double-deck fixed-span configuration. The Modified LPA with single-level fixed-span configuration would fill approximately 1.07 acres of waterway for new bridge foundations and would restore approximately 1.04 acres by removing the existing bridge foundations, resulting in a net loss of approximately 0.03 acres of in-water area.

The Modified LPA with single-level movable-span configuration would have a slightly larger in-water footprint than the fixed-span configurations. The Modified LPA with the single-level movable-span configuration would fill approximately 1.11 acres of waterway and would restore approximately 1.04 acres by removing the existing bridge foundations. This would result in a net loss of approximately 0.07 acres of in-water area. The Modified LPA with the single-level movable-span configuration would also have the potential for minor water quality impacts associated with the maintenance and operation of the lift span, including the potential accidental discharge of cleaning, painting, and maintenance chemicals.

Comparison of Bridge Configurations and Design Options

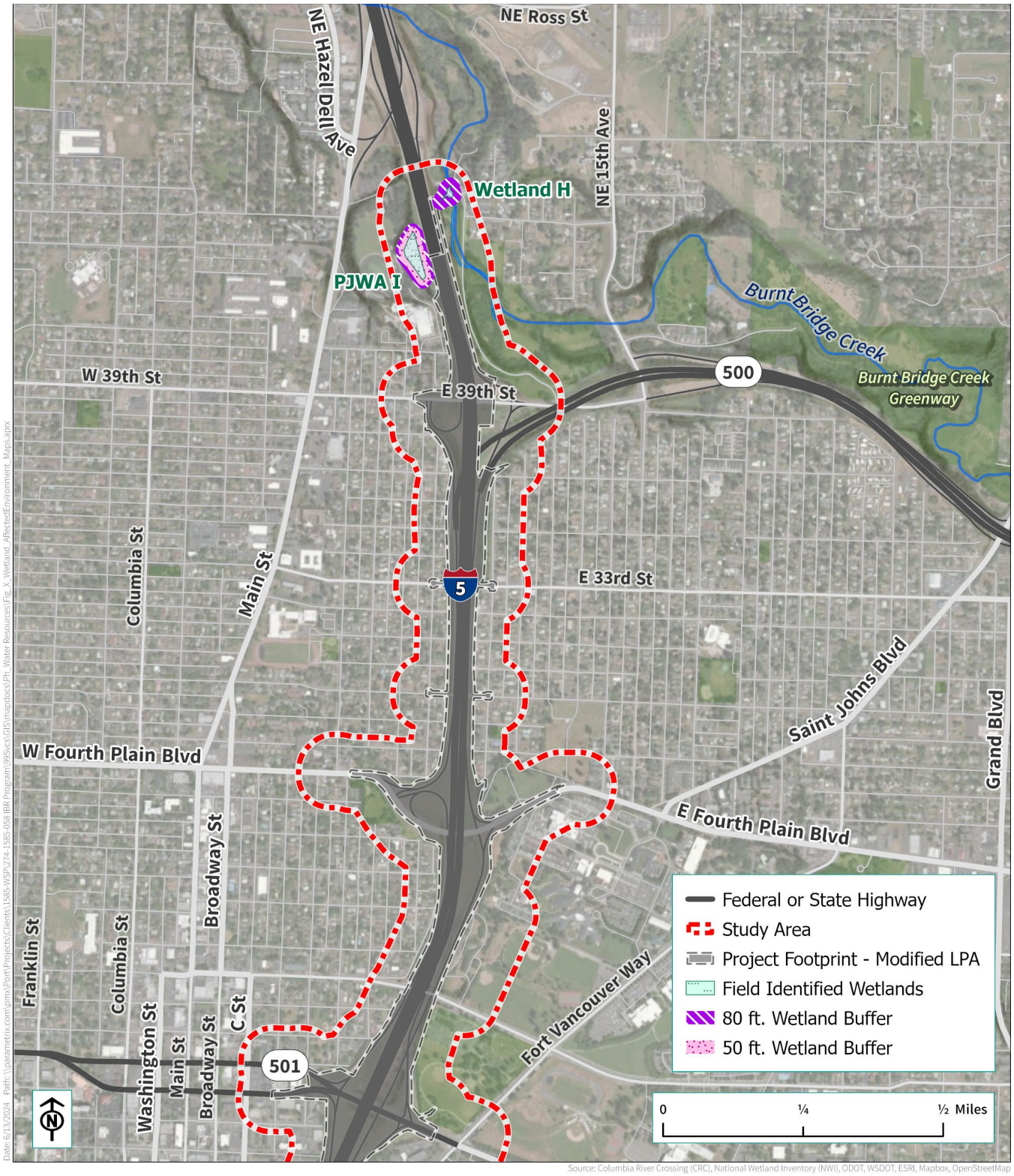
When comparing the No-Build Alternative and the Modified LPA with the double-deck fixed-span configuration, the Modified LPA has more wetland and wetland buffer impacts but less net fill within other waters (Table 3.15-6). The design options of a centered I-5 mainline or westward shift, with or without the SR 14 C Street ramps, and the park-and-ride site options would not result in different effects to wetlands and other waters. All of the Modified LPA bridge configurations would have the same amounts of direct, temporary, or indirect wetland and wetland buffer impacts. However, the bridge configurations would have differing amounts of fill to other waters, as discussed above and shown in Table 3.15-6.

Figure 3.15-4. Modified LPA Filling or Reduction of Wetlands and Other Waters – Oregon



Source: CRC Wetland Data (2011); City of Portland (2023)

Figure 3.15-5. Modified LPA Filling or Reduction of Wetlands and Other Waters – Washington



Source: CRC Wetland Data (2011)

Table 3.15-6. Long-Term Effects Comparison of Alternatives and Bridge Configurations

Alternative and Bridge Configuration	Wetlands (acres)	Wetland Buffers (acres)	Other Waters (acres)	Other Waters - Net Change (acres)
No-Build Alternative	0	0	0	0
Modified LPA with Double-Deck Fixed-Span Configuration [a]	0.58	7.39	0.91 (fill) - 1.04 (removal)	-0.13 (restoration)
Modified LPA with Single-level Fixed-Span Configuration [a, b]	0.58	7.39	1.07 (fill) -1.04 (removal)	0.03 (loss)
Modified LPA with Single-level Movable-Span Configuration [a]	0.58	7.39	1.11 (fill) -1.04 (removal)	0.07 (loss)

Data are approximate and have been rounded.

a Effects would be the same with one or two auxiliary lanes.

b Effects would be the same for all single-level fixed-span bridge type options

3.15.4 Temporary Effects

Construction of the Modified LPA would include construction of the new bridges and removal of the existing Interstate Bridge. The temporary effects analysis includes areas where construction activities would occur outside of the permanent project footprint. Temporarily affected areas were assumed to be restored following construction, with functions returning to pre-construction performance after a period of time. The time to be considered at pre-construction performance varies by agency and can be as long as two years or as short as six months depending on the individual agency's guidance.

No-Build Alternative

The No-Build Alternative would not result in temporary effects on wetlands or other waters.

Modified LPA

Wetlands

In Oregon, approximately 2.56 acres of wetlands (Wetland L/M, Wetland R, Wetland S, Wetland T, and Wetland U) and 7.11 acres of wetland buffer would have a temporary disturbance to wetland vegetation due to construction activities.

In Washington's Burnt Bridge Creek watershed, approximately 1.19 acres of wetland buffer at Wetland H and PJWA I would have a temporary disturbance to wetland vegetation due to construction activities.

Other Waters

Temporary effects on the North Portland Harbor and the Columbia River would vary depending on the specific in-water construction methods used to construct the new bridge structures and deconstruct the existing bridge structures. Temporary effects could include fill for temporary piles to support construction platforms and work trestles. For further discussion, refer to Section 3.14, Water Quality and Hydrology.

In the Columbia River, the Modified LPA with the double-deck fixed-span configuration would temporarily displace approximately 1.52 acres of in-water area, with about 86% of these effects resulting from the use of cofferdams during construction and demolition. Construction of either the single-level fixed-span (all bridge type options) or the single-level movable-span configuration would have similar temporary effects, with the

exception of slightly more in-water area temporarily displaced within cofferdams (an increase of approximately 0.42 acre compared to the double-deck fixed-span configuration).

In North Portland Harbor, approximately 0.40 acres of benthic habitat would be temporarily displaced, with approximately 60% of these effects resulting from drilled shaft isolation casings.

The Burnt Bridge Creek waterway may be temporarily affected from increased turbidity and loss of canopy cover related to construction of the Modified LPA, depending on the specific construction methods employed.

3.15.5 Indirect Effects

Indirect effects from the Modified LPA on wetlands and other waters of the state and U.S. could be caused by the following:

- As described in Section 3.4.4, the Modified LPA is likely to facilitate denser urban development in accordance with local and regional land use plans, particularly in areas with new light rail transit service. Such development could result in the loss of wetland buffers, along with increased public access to wetland areas resulting from increased multimodal access points to these areas. These indirect effects may introduce nuisance plant species and disrupt wildlife activity and other functions performed by existing wetlands.
- Changes could occur in runoff entering wetlands as a result of increases in impervious surfaces and requirements to capture and treat the resulting stormwater runoff. These changes may result in alterations in hydrologic inputs; however, stormwater treatment would have positive indirect effects on water quality in wetlands and other waters.

In addition, the No-Build Alternative would continue to discharge untreated stormwater within the study area into wetlands and other waters.

For further discussion of indirect effects on hydrologic, wildlife, or plant effects from the Modified LPA, refer to Section 3.14, Water Quality and Hydrology, and Section 3.16, Ecosystems.

3.15.6 Potential Avoidance, Minimization, and Compensatory Mitigation Measures

Long-Term Effects

Regulatory Requirements

- Develop the Modified LPA consistent with the applicable federal, state, and local agency regulatory mitigation related to filling or removing material in wetlands and other waters of the U.S. and state.
- Prepare a compensatory mitigation plan that satisfies applicable federal, state, and local regulatory requirements, and that demonstrates no net loss of function and values of wetland resources.

Program-Specific Mitigation

- Continue to evaluate mitigation to offset losses of wetland and waters functions and values, including wetland buffers, as the Modified LPA design progresses.
- In cooperation with federal, state, and local agencies, tribes, and conservation groups, identify agency-approved compensatory mitigation banks and potential permittee responsible mitigation (PRM) sites in both Oregon and Washington to fulfill the compensatory requirements for permanent, temporary, and indirect impacts.

- For unavoidable impacts to Vanport wetlands, increased mitigation ratios would be required because it is an existing wetland mitigation site.

Temporary Effects

Regulatory Requirements

- Implement appropriate high visibility/exclusionary fencing around avoided wetlands and other waters prior to the start of construction.
- Implement appropriate sediment and erosion control procedures during construction activities.
- Replace vegetation temporarily cleared for construction activity in accordance with local regulatory guidance.
- Avoid working outside of the in-water work window without first seeking an exception.
- Offset unavoidable temporary impacts that cannot be minimized through best management practices through the purchase of credits from a mitigation bank or PRM, similar to the mitigation used for certain long-term effects.

Program-Specific Mitigation

- Avoid and minimize short-term impacts to wetland resources in final design to the extent practicable.
- Restore temporarily disturbed wetland and wetland buffer habitats consistent with applicable regulatory requirements.

3.16 Ecosystems

Ecosystems comprise communities of organisms and the habitat that supports those communities. Ecosystems can exist at varying scales, including smaller systems within larger ones. Both natural and human factors can affect ecosystems, and ecosystem health can affect the quality of human life.

The information presented in this section is based on the Ecosystems Technical Report. A Biological Assessment has also been prepared for compliance with Section 7 of the Endangered Species Act. In addition, Section 3.14, Water Quality and Hydrology, and Section 3.15, Wetlands and Other Waters, provide more information on the Modified LPA's effects on the study area's environment.

3.16.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision, as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with ecosystems has been updated in this Draft SEIS to include:

- Species of interest (SOI[1]) lists have been updated with input from federal, state, and local resource management agencies and tribal resource staff.
- SOI life history and habitat requirements have been updated to reflect changes in best available science.
- Species' presence, associated habitat types, and baseline habitat conditions have been updated as applicable.
- Supplemental field surveys have been conducted to validate or update baseline assumptions.
- Federal, state, local, and tribal regulations and policies regarding ecosystem management, evaluation of effects, and compensatory mitigation have been updated.
- Effects analyses have been updated to reflect changes in scientific understanding of certain events and pollutants (such as emerging research related to 6PPD-quinone in stormwater).
- Changes in the project footprint necessitated by changed conditions.

Table 3.16-1 compares the impacts and benefits of the CRC LPA to those of the Modified LPA and identifies the reasons for the differences. Based on the analysis in this section, the effects of the Modified LPA would be similar to those of the CRC LPA.

[1] SOI is not a specific category of governmental or nongovernmental organization-designated species but refers to native species identified through tribal, local, state, and federal coordination as locally important due to their regulatory status, rarity, and/or special habitat considerations.

Table 3.16-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects as Identified in this Section	Explanation of Differences
Permanent benthic habitat displacement (shallow and deep-water habitat)	• Approximately 0.21 acres of benthic habitat displacement from new bridges. • Approximately 0.64 acres of benthic habitat restoration from bridge removal (benefit). • Net restoration of approximately 0.43 acres of benthic habitat (benefit).	• Approximately 0.91 acres of benthic habitat displacement from new bridges. • Approximately 1.04 acres of benthic habitat restoration from bridge removal (benefit). • Net restoration of approximately 0.13 acres of benthic habitat (benefit).	• Bridge design updates and refined assumptions regarding construction impacts. • Proposed removal of existing North Portland Harbor bridge would result in a greater quantity of benthic habitat restoration.
Permanent water-surface level overwater shading	• Approximately 1.34 acres of new shading at the water surface. • Approximately 0.44 acre of surface-level shading removal (benefit). • Approximately 0.91 acre of net increase in surface-level shading removal (benefit).	• Approximately 1.04 acres of new shading at the water surface.	• Refined design of Columbia River bridges' foundations. • CRC LPA included removal of a portion of the existing dock at the Port of Vancouver's Terminal 1, which is not part of the Modified LPA.
Permanent elevated overwater shading	• Not quantified.	• Approximately 19.87 acres of elevated overwater shading from new bridges' decks. • Approximately 11.65 acres of elevated shading removal (benefit). • Net increase of approximately 8.22 acres of elevated overwater shading.	Elevated shading from bridges' decks was not quantified for the CRC LPA.
New Contributing Impervious Area (CIA)	• Approximately 41.5-acre increase in CIA compared to the No-Build Alternative. • Treatment would be provided for all post-project CIA, most of which is currently untreated (benefit).	• Approximately 29.6-acre increase in CIA compared to the No-Build Alternative. • Treatment would be provided for all post-project CIA (including adjacent non-project CIA that contributes stormwater to CIA associated with the project), most of which is currently untreated (benefit).	Changes in design.
Permanent and Temporary Impacts to Sensitive	• Permanent and temporary impacts to approximately: – 33.7 acres of Priority Habitats in Washington	• Permanent loss of terrestrial habitats and vegetation, including approximately: – 0.79 acres of riparian buffer in Washington	• Changes in design and changes in regulatory classifications for terrestrial habitats.

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects as Identified in this Section	Explanation of Differences
Terrestrial Habitats	– 117.7 acres of designated Critical Areas in the City of Vancouver – 52.6 acres of lands designated Habitat Conservation Areas by Title 13 of Metro's Urban Growth Management Functional Plan – 41.5 acres within City of Portland environmental zones (ezones)	– 0.15 acres of Biodiversity Area in Washington – Less than 0.01 acres of mapped oak woodland in Washington – 0.06 acres of wetland buffer in Washington – 0.58 acres of wetland in Oregon – 7.39 acres of wetland buffer in Oregon – 1.12 acres of area designated as "High" value riparian/wildlife habitat, and 6.20 acres of area designated as "Medium" value riparian/wildlife habitat in Oregon • Temporary disturbance of terrestrial habitats and vegetation, including approximately: – 1.15 acres of riparian buffer in Washington – 2.87 acres of Biodiversity Area in Washington – 0.03 acres of mapped oak woodland in Washington – 1.19 acres of wetland buffer in Washington – 2.56 acres of wetland in Oregon – 7.11 acres of wetland buffer in Oregon – 4.60 acres of area designated as "High" value riparian/wildlife habitat, and 5.70 acres of area designated as "Medium" value riparian/wildlife habitat in Oregon	• CRC evaluated impacts by Metro's Title 13, which has been replaced by habitat designations in the City of Portland's NRI. • CRC did not quantify areas of temporary disturbance separately from areas of permanent displacement.
Temporary Impacts to Aquatic Habitats during construction	• Approximately 1.81 acres temporary benthic habitat displacement.	• Approximately 2.06 acres temporary benthic habitat displacement.	Changes in design and refined assumptions regarding construction means and methods.

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects as Identified in this Section	Explanation of Differences
	• Approximately 9.04 acres temporary overwater shading. • Handling and disturbance of fish during in-water work area isolation activities. • Temporarily elevated turbidity, and potential for accidental introduction of pollutants or debris. • Temporarily elevated underwater and terrestrial noise levels. • Overwater lighting. • Changes in avian predation pressure on juvenile salmonids.	• Approximately 15.61 acres temporary overwater shading. • Handling and disturbance of fish during in-water work area isolation activities. • Temporarily elevated turbidity, and potential for accidental introduction of pollutants or debris. • Temporarily elevated underwater and terrestrial noise levels. • Overwater lighting. • Changes in avian predation pressure on juvenile salmonids.	

Note: Data are approximate and rounded.
CIA = Contributing Impervious Area; CRC = Columbia River Crossing; EIS = Environmental Impact Statement; LPA = Locally Preferred Alternative; Metro = Oregon Metro; NRI = Natural Resource Inventory

3.16.2 Existing Conditions

This evaluation includes a primary and a secondary study area. Figure 3.16-1 shows the ecosystem's primary study area, and Figure 3.16-2 shows the secondary study area. The primary study area includes all areas that could experience direct long-term effects from the Modified LPA. The secondary study area is larger and includes all areas where construction-related (temporary) effects and indirect effects could occur. Where the more general term "study area" is used, it refers to both study areas.

The primary and secondary study areas include portions of the mainstem Columbia River, associated tributaries, and nearby terrestrial habitats on the Oregon and Washington sides of the Columbia River. The secondary study area extends to include downstream portions of the Columbia River mainstem to the mouth, and offshore coastal waters between Northern California and Alaska. This section describes the condition of the study area's aquatic, terrestrial, and botanical resource habitats and the species that use these habitats.

Aquatic Resources

This section describes aquatic resources (aquatic species and their habitat) in the primary and secondary study areas, which include the Columbia Slough, the Columbia River and North Portland Harbor, Burnt Bridge Creek, Fairview Creek, and Pacific Ocean coastal waters.

Aquatic Habitat

Columbia Slough

The Columbia Slough is a slow-moving, low-gradient drainage canal that flows from Fairview Lake (east) to the Willamette River (west) and consists of upper, middle, and lower reaches. The study area includes a portion of the lower reach. The lower Columbia Slough habitat supports a variety of aquatic species, including juvenile salmonids and other native and non-native fish species, freshwater shrimp, and crawfish.

Anadromous fish (those that migrate from salt water to fresh water to spawn) can access a portion of the lower Columbia Slough up to an impassable levee at river mile 8.3.

Figure 3.16-1. Ecosystems Primary Study Area

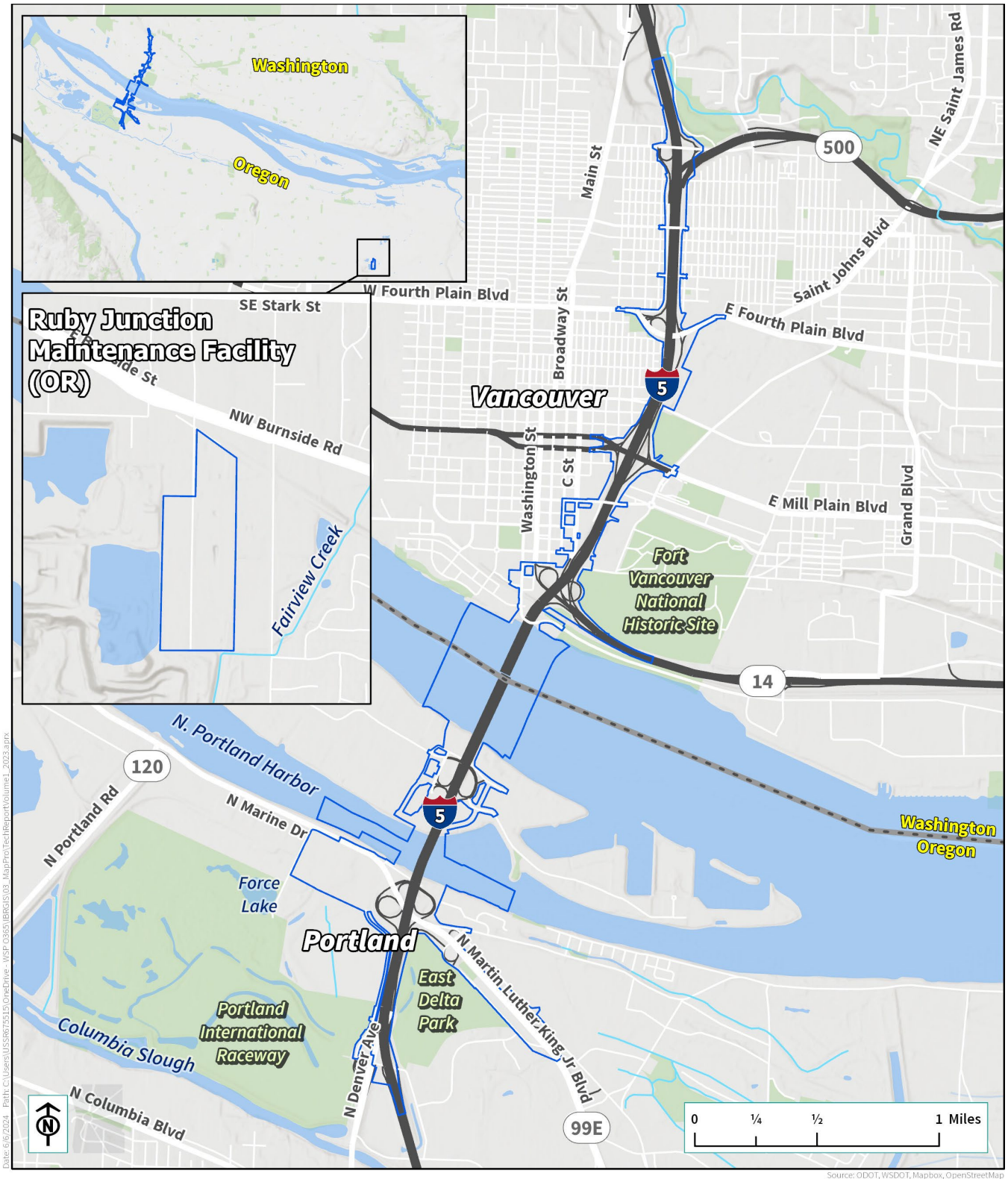
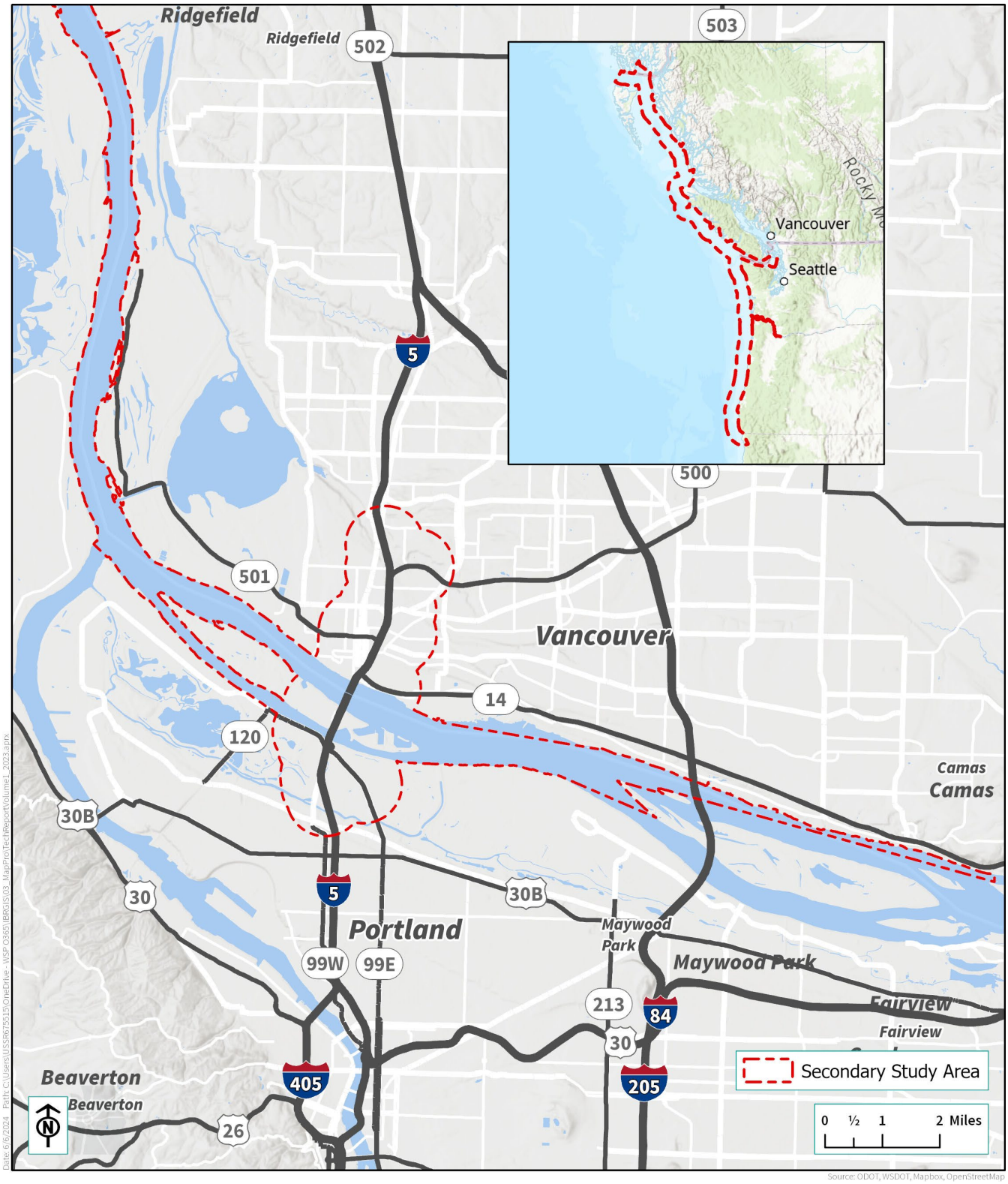


Figure 3.16-2. Ecosystems Secondary Study Area



The Columbia Slough is listed under 303(d) of the Clean Water Act for failing to meet water quality standards for aquatic weeds, high levels of iron, and biocriteria. In addition, water temperatures often exceed levels considered suitable for juvenile salmonids, particularly in summer. Channel alterations, water diversions, and upstream dams on the Willamette and Columbia Rivers have reduced the flow rate, resulting in excess sedimentation and high levels of heavy metal contaminants. The contaminated sediments impact the health and habitat of the benthic organisms living in and along the waterway, resulting in low biodiversity. Development has contributed to industrial and stormwater discharges, increased pollutant and turbidity levels, and decreased the oxygen available for fish within the waterway.

What are benthic organisms?

In freshwater biology, benthic organisms are organisms living along a river, stream, or lakebed. Types of benthic organisms found in the study area include some species of snails, shrimp, and crayfish.

Columbia River and North Portland Harbor

The study area is located within the lower Columbia River subbasin. The Columbia River and its tributaries form the dominant aquatic system in the Pacific Northwest. The 1,214-mile-long Columbia River drains 259,000 square miles of the northwestern U.S. and southern British Columbia, Canada, into the Pacific Ocean. There are more than 250 reservoirs and around 150 hydroelectric projects in the Columbia River Basin, including 18 mainstem dams on the Columbia and its main tributary, the Snake River. Saltwater intrusion from the Pacific Ocean extends approximately 23 miles upstream from the Columbia River mouth at Astoria. Coastal tides influence the flow rate and river level up to Bonneville Dam at river mile 146.1.

Within the primary study area, the Columbia River is a highly managed waterbody whose flow is influenced primarily by upstream dams and also by Pacific Ocean tides. North Portland Harbor is a large side channel of the Columbia River located along the southern banks of Hayden Island. Developed uses of the river include commercial transport, power generation, irrigation, and recreation. The State of Washington, City of Vancouver, City of Portland, and Metro have designated the Columbia River and its shoreline as environmental zones subject to regulation.

Hydroelectric dams upstream impound water, raising the river's temperature and making fish passage more difficult by creating bottlenecks where predators have easy access to migrating salmon. Within the primary study area in Oregon, the Columbia River/North Portland Harbor waters are 303(d)-listed for toxic chemicals such as polycyclic aromatic hydrocarbons (PAHs); polychlorinated biphenyl (PCBs), dichlorodiphenyltrichloroethane (DDT) metabolites (DDE 4,4') and arsenic (DEQ 2020). Within the primary study area in Washington, the Columbia River is on the 303(d) list for temperature and PCBs (Ecology 2021). Within the primary study area, water depths in the Columbia River range between approximately 0 and 50 feet, with an average depth of approximately 27 feet. The Columbia River federally authorized navigation channel is dredged to an average depth of about 43 feet. Water depths in North Portland Harbor range between 0 and 20 feet, with an average water depth of approximately 14 feet.

Shallow-water habitat is present in the primary study area on both the Oregon and Washington sides of the river. It is influenced by flow and sediment input from tributaries and the mainstem river that eventually settles to form shoals and shallow flats. Juvenile salmonids in particular use this shallow-water habitat extensively for migrating, feeding, and holding. In general, rearing and outmigrating juveniles use shallow-water habitats more extensively, whereas adult fish rely on deeper-water habitats. The Columbia River also provides habitat for many non-anadromous native fish species, marine mammals, and benthic organisms, as well as substantial populations of non-native invasive species.

Burnt Bridge Creek

Burnt Bridge Creek flows through the city of Vancouver and is a direct tributary to Vancouver Lake, which drains into the lower Columbia River via Lake River. The creek drains one of the most heavily urbanized subbasins within Clark County and is 303(d)-listed within the study area for failing to meet water quality standards for temperatures, dissolved oxygen, fecal coliform bacteria, and pH (Ecology 2021). Physical habitat has been significantly modified throughout Burnt Bridge Creek, and habitat function has been diminished from historical conditions. The creek's upper reaches were historically a series of associated wetlands and marshes that have been filled, ditched, and drained. In addition, most of the tributary streams have been channelized or routed underground. However, the watershed has undergone significant restoration work in recent years to reconstruct side-channel wetland and floodplain areas and improve habitat. The creek provides suitable habitat for several salmonid species, as well as native resident fish species.

Fairview Creek

Fairview Creek is an urban creek that flows from spring-fed wetlands on the northeast side of Grant Butte in Gresham, Oregon, to Fairview Lake, a tributary to the eastern portion of the Columbia Slough. It passes close to the southeast corner of the Ruby Junction Maintenance Facility (Figure 3.16-1). The creek has been physically changed by the construction of dikes and levees, channelization, and historical gravel mining activity. These activities have altered the creek's hydrology, increased sedimentation, and reduced water quality. The waterway is 303(d)-listed for failing to meet water quality standards for biocriteria. In recent decades, some restoration of stream and riparian habitat has occurred through land acquisitions, conservation easements, riparian planting projects, and installation of large woody debris and boulders.

Anadromous salmonids are not currently present in Fairview Creek because there is an impassable barrier between the lower and middle sections of the Columbia Slough, approximately 10 miles downstream of Fairview Creek. In addition, high temperatures and other conditions within the creek limit habitat suitability for anadromous salmonids, although the creek likely provides suitable habitat for resident native and introduced fish.

Pacific Coastal Waters

The secondary study area includes marine waters off the Pacific coast where salmonid species from the Columbia River are available as prey for Southern Resident killer whales (SRKW), also known as orcas. This area encompasses the whale's entire coastal range from the mouth of the Columbia River and its plume, south as far as central California, and north as far as southeast Alaska. Effects on salmon and steelhead within the primary study area could in turn affect the SRKW prey base that occurs within these waters in the secondary study area. The diet of the SRKW is composed almost entirely of salmon, with adult male orcas needing approximately 325 pounds of salmon to meet their daily prey energy requirements. Although their diet tends to vary slightly throughout the year, including smaller amounts of salmon species such as coho, chum, and steelhead, about 80% of their total diet comes from Chinook salmon (SROTF 2018; Hanson et al. 2021).

The abundance of salmon has declined significantly since the late 1800s and early 1900s due to the compounded effects of harvest, habitat modifications, water-quality and water-quantity impacts, predation, and impacts to their own prey base (SROTF 2018). The Southern Resident Orca Task Force has identified impacts to prey availability—specifically, the availability of Chinook salmon—as a key threat to the recovery of the SRKW.

Aquatic Species of Interest

Approximately 20 aquatic SOI may be found within the primary and secondary study areas. The term "species of interest" is not a specific regulatory category; it refers to native species identified as locally important due

to their regulatory status, rarity, and/or special habitat considerations and coordinated with tribes and local, state, and federal agencies. This includes species listed under the federal Endangered Species Act (ESA), as well as other state and local designations. Table 3.16-2 presents a list of aquatic SOI that may occur within the primary and/or secondary study areas.

Table 3.16-2. Aquatic Species of Interest Potentially Occurring within the Study Area

Species Type	Species Common Name	Species Scientific Name	ESU or DPS [a]	Federal ESA Status [b]	State Status (OR) [c]	State Status (WA) [d]	Other Special Regulatory Status [e]
Fish	Chinook salmon	*Oncorhynchus tshawytscha*	Lower Columbia River (LCR) ESU	LT; Critical Habitat	SC	Not listed; PHS	EFH; SGCN-OR; SGCN-WA
			Upper Willamette River (UWR) ESU	LT; Critical Habitat	SC	Not listed; PHS	EFH; SGCN-OR; SGCN-WA
			Upper Columbia River (UCR) Spring-Run ESU	LT; Critical Habitat	SC	Not listed; PHS	EFH; SGCN-OR; SGCN-WA
			Snake River Spring/ Summer-Run ESU	LT; Critical Habitat	LT	Not listed; PHS	EFH; SGCN-OR; SGCN-WA
			Snake River Fall-Run ESU	LT; Critical Habitat	LT	Not listed; PHS	EFH; SGCN-OR; SGCN-WA
	Chum salmon	*Oncorhynchus keta*	Columbia River ESU	LT; Critical Habitat	S	Not listed; PHS	EFH; SGCN-OR; SGCN-WA
	Coho salmon	*Oncorhynchus kisutch*	LCR ESU	LT; Critical Habitat	E	Not listed; PHS	EFH; SGCN-OR; SGCN-WA
	Sockeye salmon	*Oncorhynchus nerka*	Snake River ESU	LE; Critical Habitat	Not listed	Not listed; PHS	EFH
	Steelhead	*Oncorhynchus mykiss*	LCR DPS	LT; Critical Habitat	S	C; PHS	EFH; SGCN-OR; SGCN-WA

Species Type	Species Common Name	Species Scientific Name	ESU or DPS [a]	Federal ESA Status [b]	State Status (OR) [c]	State Status (WA) [d]	Other Special Regulatory Status [e]
Fish			UWR DPS	LT; Critical Habitat	S	Not listed; PHS	EFH; SGCN-OR; SGCN-WA
			Middle Columbia River DPS	LT; Critical Habitat	S	C; PHS	EFH; SGCN-OR; SGCN-WA
			UCR DPS	LT; Critical Habitat	S	C; PHS	EFH; SGCN-OR; SGCN-WA
			Snake River Basin DPS	LT; Critical Habitat	S	C; PHS	EFH; SGCN-OR; SGCN-WA
	Cutthroat trout	*Oncorhynchus clarkii clarkii*	Southwestern Washington/ Columbia River Coastal DPS	Not listed	S	Not listed; PHS	SOC (USFWS-WA) SGCN-OR; SGCN-WA
	Bull trout	*Salvelinus confluentus*	Columbia River DPS	LT; Critical Habitat	SC	C; PHS	SGCN-OR; SGCN-WA
	Pacific eulachon	*Thaleichthys pacificus*	Southern DPS	LT; Critical Habitat	Not listed	Not listed; PHS	SGCN-OR; SGCN-WA
	North American green sturgeon	*Acipenser medirostris*	Southern DPS	LT; Critical Habitat	SC	Not listed; PHS	SGCN-OR; SGCN-WA
	White sturgeon	*Acipenser transmontanus*	N/A	Not listed	S	Not listed; PHS	SGCN-OR; SGCN-WA
	Pacific lamprey	*Entosphenus tridentata*	N/A	Not listed	S	Not listed; PHS	SOC (USFWS-WA); SOC (USFWS-OR); SGCN-OR; SGCN-WA
	River lamprey	*Lampetra ayresi*	N/A	Not listed	Not listed	C; PHS	SGCN-WA
	Leopard dace	*Rhinichthys falcatus*	N/A	Not listed	Not listed	C; PHS	SGCN-WA

Species Type	Species Common Name	Species Scientific Name	ESU or DPS [a]	Federal ESA Status [b]	State Status (OR) [c]	State Status (WA) [d]	Other Special Regulatory Status [e]
Marine Mammals	Killer whale	*Orcinus orca*	Southern Resident DPS	LE; Critical Habitat	Not listed	LE; PHS	MMPA; SGCN-OR; SGCN-WA
	Steller sea lion	*Eumetopias jubatus*	Eastern DPS	Not listed	Not listed	Not listed; PHS	MMPA; SGCN-OR
	California sea lion	*Zalophus californianus*	N/A	Not listed	Not listed	Not listed; PHS	MMPA
	Harbor seal	*Phoca vitulina*	N/A	Not listed	Not listed	Not listed; PHS	MMPA; SGCN-OR
Invertebrates	Western ridged mussel	Gonidea angulata	N/A	Under review	Not listed	Not listed	SGCN-OR; SGCN-WA
	California floater	*Anodonta californiensis*	N/A	Not listed	Not listed	C; PHS	SGCN-OR; SGCN-WA

a DPS = distinct population segment; ESU = evolutionarily significant unit; N/A = not applicable

b ESA = Endangered Species Act; Federal status: LT = Listed Threatened, LE = Listed Endangered, Not listed = No status designated; Critical Habitat = designated critical habitat (NOAA Fisheries n.d.; USFWS 2021a).

c Oregon State status: LT = Listed Threatened, S=Sensitive; SC = Sensitive Critical, Not listed = No status designated; (OCS 2016; ODFW 2021a; 2021b).

d Washington State status: C = Candidate, Not listed = No State Status; PHS = WDFW priority habitats and species (WDFW 2022, 2023).

e Other Special Regulatory Status: EFH = Essential Fish Habitat designated; SOC=Federal Species of Concern; MMPA = Marine Mammal Protection Act; SGCN-OR = Species of Greatest Conservation Need in Oregon (OCS 2016); SGCN-WA = Species of Greatest Conservation Need in Washington (WDFW 2015)

Terrestrial Resources

This section describes "terrestrial resources" in the study area, which includes non-aquatic habitats and wildlife species that these habitats support, including birds, mammals, amphibians, reptiles, and insects.

Terrestrial Habitat

Terrestrial habitats within the study areas are generally small and fragmented and have been modified from their historical conditions. Nevertheless, these areas provide habitat for various native mammals, birds, amphibians, and reptiles.

Table 3.16-3 lists approximate acreages of terrestrial habitat types within the study areas. Figure 3.16-3 shows the approximate extent and location of these habitat types. The predominant habitat type is the "Urban and Mixed Environs" classification, interspersed with small, isolated patches of wetland or forest habitats. The most intact terrestrial habitat areas adjoin the Vanport wetland in the south and the Burnt Bridge Creek Greenway in the north. The Ruby Junction Maintenance Facility is not shown on Figure 3.16-3 because the area is entirely developed and classified as "Urban and Mixed Environs."

Table 3.16-3. Acres of Terrestrial Habitat Classification within the Primary and Secondary Study Areas

Habitat Classification	Primary Study Area (acres)	Secondary Study Area (acres)	Total Area (acres)
Urban and Mixed Environs	396	4,518	4,914
Agriculture, Pasture, and Mixed Environs	0.3	141	141
Westside Riparian – Wetlands	17	608	625
Herbaceous Wetlands	0.3	74	74
Westside Lowlands Conifer – Hardwood Forest	1.3	122	123
Westside Oak and Dry Douglas Fir Forest and Woodlands	<0.1	53	53
Total	**415**	**5,516**	**5,930**

Urban and Mixed Environs

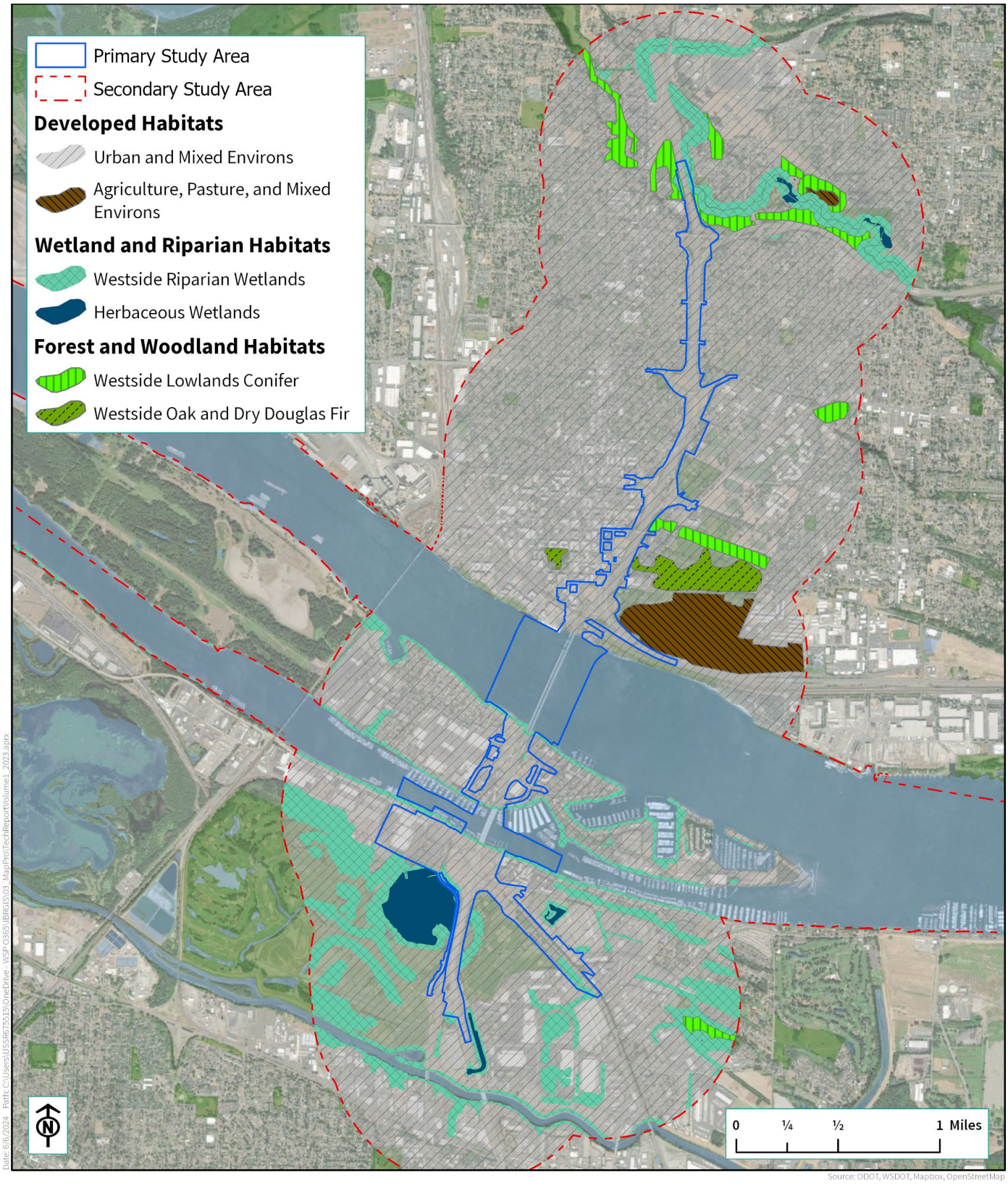
Although urban environments are usually considered to provide relatively low-quality habitat, some terrestrial wildlife species have adapted to these conditions. For example, bridges and other structures can provide nesting and perching habitat for certain migratory bird species. Examples of SOI associated with this habitat type include bald eagle, peregrine falcon, other migratory bird species, *Myotis* bats, Townsend's big-eared bat, and monarch butterfly. Because the study area is highly urbanized, suitable habitat for wildlife is fragmented, and passage is restricted. I-5 and other roads serve as barriers to passage and are unsuitable and dangerous corridors for most terrestrial wildlife.

Agriculture, Pasture, and Mixed Environs

The south end of the Fort Vancouver National Historic Site and the west end of the Pearson Field is a mowed/ maintained pasture that falls more closely within the "Agriculture, Pasture, and Mixed Environs" habitat type. This habitat type includes unimproved pastures, predominantly grassland sites and often abandoned fields that have little or no active management such as irrigation, fertilization, or herbicide applications (Johnson and O'Neil 2001). The "Agriculture, Pasture, and Mixed Environs" habitat type is used by a wide diversity of native species, particularly birds and small mammals. These areas also provide excellent foraging opportunities for raptors and other birds of prey. They are also prone to invasion by exotic species, due to their relatively high level of disturbance.

Examples of SOI associated with this habitat type include streaked horned lark, bald eagle, peregrine falcon, other migratory birds, *Myotis* bats, and Townsend's big-eared bat (Johnson and O'Neil 2001).

Figure 3.16-3. Habitat Classifications within the Primary and Secondary Study Areas



Wetland and Riparian Habitat

Wetland and riparian habitats within the study area are fragmented and disturbed from their natural condition, though they continue to provide habitat functions. There are narrow bands of riparian habitat adjacent to surface waters, including the Columbia River, North Portland Harbor, Columbia Slough, Burnt Bridge Creek, and Fairview Creek.

Herbaceous wetlands are present in the Vanport wetland system south of the Expo Center, immediately surrounding the open water pond/wetland system east of I-5 near Delta Park and east of I-5 along Whitaker Road. Herbaceous wetlands provide many habitat functions that are similar to forested and shrub-dominated wetlands. In general, they provide habitat for a variety of wildlife adapted to wetlands and riparian areas within an urban environment, including a variety of small mammals, amphibians, reptiles, migratory birds, waterfowl, and raptors. Examples of SOI associated with this habitat type include bald eagle, peregrine falcon, purple martin, other migratory birds, *Myotis* bats, Townsend's big-eared bat, pond turtles, painted turtles, and northern red-legged frog.

Forest and Woodland Habitat

Within the study area, the "Westside Lowlands Conifer – Hardwood Forest" habitat type is limited to small, isolated patches associated with Burnt Bridge Creek. These areas provide limited habitat function due to their isolated and fragmented nature. However, the habitat may provide for migratory birds' nests, and raptors may perch and use these areas for foraging in adjacent habitats. Examples of SOI associated with this habitat type include the bald eagle, peregrine falcon, other migratory birds, *Myotis* bats, and Townsend's big-eared bat.

The "Westside Oak and Dry Douglas Fir Forest and Woodlands" habitat type occurs in two small patches within the study area, one in the northern portion of Esther Short Park and one at the Fort Vancouver National Historic Site. These areas generally provide a similar suite of habitat functions as "Westside Lowlands Conifer – Hardwood Forest" habitats. However, oak woodlands can provide some unique functions due to their relative rarity in the landscape and their different structural composition.

Terrestrial Species of Interest

Table 3.16-4 presents a list of terrestrial SOI, including birds, mammals, amphibians/reptiles, and insects, that may occur within the study areas, along with their regulatory status.

Table 3.16-4. Terrestrial Species of Interest Potentially Occurring within the Study Area

	Species Common Name	Species Scientific Name	Federal Status [a]	State Status (OR) [b]	State Status (WA) [c]	Other Special Regulatory Status [d]
Birds	Streaked horned lark	*Eremophila alpestris strigata*	LT; Critical Habitat	SC	LE; PHS	MBTA; SGCN-OR; SGCN-WA
	Bald eagle	*Haliaeetus leucocephalus*	Not listed	Not listed	Not listed	BGEPA; MBTA; SGCN-WA
	Peregrine falcon	*Falco peregrinus anatum*	Not listed	S	Not listed	MBTA; SGCN-OR; SGCN-WA

	Species Common Name	Species Scientific Name	Federal Status [a]	State Status (OR) [b]	State Status (WA) [c]	Other Special Regulatory Status [d]
	Purple martin	*Progne subis*	Not listed	SC	Not listed	MBTA; SGCN-OR; SGCN-WA
	Willow flycatcher	*Empidonax traillii*	Not listed	SC	Not listed	MBTA; SGCN-OR
	Common loon	*Gavia immer*	Not listed	Not listed	S; PHS	MBTA; SGCN-WA
	Great blue heron	*Ardea Herodias*	Not listed	Not listed	PHS	MBTA
	Other migratory birds	Multiple Species	N/A	N/A	N/A	MBTA
Mammals	Columbian white-tailed deer	*Odocoileus virginianus ssp. Leucurus*	LT	S	LT; PHS	SGCN-OR; SGCN-WA
	Long-legged myotis	*Myotis volans*	Not listed	S	Not listed; PHS [e]	SGCN-OR
	Fringed myotis	*Myotis thysanodes*	Not listed	S	Not listed; PHS [e]	SGCN-OR
	Long-eared myotis	*Myotis evotis*	Not listed	Not listed	Not listed; PHS [e]	SGCN-OR
	Townsend's big-eared bat	*Corynorhinus townsendii*	Not listed	SC	C; PHS	SGCN-OR; SGCN-WA
	Silver-haired bat	*Lasionycteris noctivagans*	Not listed	S	Not listed; Candidate	SGCN-OR; SGCN-WA
Reptiles and Amphibians	Western pond turtle	*Actinemys marmorata*	Not listed	S	LE; PHS	SGCN-OR; SGCN-WA
	Painted turtle	*Chrysemys picta*	Not listed	SC	Not listed	SGCN-OR; SGCN-WA
	Northern red-legged frog	*Rana aurora*	Not listed	S	Not listed	SGCN-OR; SGCN-WA

	Species Common Name	Species Scientific Name	Federal Status [a]	State Status (OR) [b]	State Status (WA) [c]	Other Special Regulatory Status [d]
Insects	Monarch butterfly	*Danaus plexippus*	C	Not listed	Not listed	N/A

a Federal ESA status: LT = Listed Threatened, LE = Listed Endangered, C = Candidate, Not listed = No status designated; Critical Habitat = designated critical habitat (NOAA Fisheries 2021; USFWS 2021a).
b Oregon State status: LT = Listed Threatened, LE = Listed Endangered, S=Sensitive, SC = Sensitive Critical, Not listed = No status designated (ODFW 2021a, 2021b).
c Washington State status: LT = Listed Threatened, LE = Listed Endangered, S=Sensitive, C=Candidate, PHS = WDFW priority habitat species; (WDFW 2022, 2023).
d Other Special Regulatory Status: SOC=Federal Species of Concern; PHS = Priority Habitats and Species; BGEPA = Bald and Golden Eagle Protection Act; MBTA = Migratory Bird Treaty Act; SGCN-OR = Species of Greatest Conservation Need in Oregon (OCS 2016); SGCN-WA = Species of Greatest Conservation Need in Washington (WDFW 2015); N/A = Not Applicable
e Roosting concentrations of *Myotis* bats are considered Priority Species by WDFW, where they occur.

Botanical Resources

Botanical Species of Interest

Table 3.16-5 lists the botanical SOI, their protection status, and suitable habitat that may occur in the primary study area. Most habitats within the study area have low suitability for these species, and they have not been documented in the primary study area.

Table 3.16-5. Botanical Species of Interest Potentially Occurring within the Primary Study Area

Species Common Name	Species Scientific Name	Federal Status [a]	State Status (OR) [b]	State Status (WA) [c]	Habitat Suitability in Primary Study Area	Typical Flowering Window
Golden paintbrush	*Castilleja levisecta*	T	E	T	Low – Agriculture, Pasture and Mixed Environs	April–June
Kincaid's lupine	*Lupinus oreganus*	T	T	T	Low – Agriculture, Pasture and Mixed Environs	April–June
Nelson's checkermallow	*Sidalcea nelsoniana*	T	T	E	Low – Agriculture, Pasture and Mixed Environs	Late May–July
Willamette Daisy	*Erigeron decumbens*	E	E	Not listed	Low – Agriculture, Pasture and Mixed Environs	June–July

Species Common Name	Species Scientific Name	Federal Status [a]	State Status (OR) [b]	State Status (WA) [c]	Habitat Suitability in Primary Study Area	Typical Flowering Window
Tall bugbane	*Actaea elata var. elata*	Not listed	Not listed	S	Low – Westside Riparian – Wetlands and Westside Lowlands Conifer – Hardwood Forest	May–August
Small-flowered trillium	*Trillium albidum ssp. Parviflorum*	Not listed	Not listed	S	Low – Westside Riparian – Wetlands and Westside Lowlands Conifer – Hardwood Forest	March–May
Western ladies-tresses	*Spiranthes porrifolia*	Not listed	Not listed	S	Low – Herbaceous Wetlands and Westside Riparian – Wetlands	May–August
Columbia cress	*Rorippa columbiae*	Not Listed	C	T	Low – Herbaceous Wetlands and Westside Riparian – Wetlands	April–October

a Federal Endangered Species Act status: C = Candidate; E = Endangered; Not listed = No status designated; P = Proposed; SOC = Species of Concern; T = Threatened (USFWS 2021b).

b Oregon State status: E = Endangered; Not listed = No status designated; T = Threatened, S=Sensitive; SC = Sensitive Critical (ORBIC 2021).

c Washington State status: C=Candidate; E = Endangered; PHS = Washington State priority species; S=Sensitive; T = Threatened, (WNHP 2021)

Noxious Weeds

Table 3.16-6 identifies 14 species of noxious weeds known or expected to occur within the primary study area. Noxious weeds are defined at the state level by the Oregon State Weed Board and the Washington State Noxious Weed Control Board. No noxious weeds designated under state law as requiring eradication are known or expected to occur within the primary study area.

Table 3.16-6. Noxious Weed Species Occurring within the Primary Study Area

Botanical Name	Common Name
Centaurea × gerstlaueri (*Centaurea pratensis)*	Meadow knapweed
Cirsium arvense	Canada thistle
Cirsium vulgare	Bull thistle
Clematis vitalba	Old man's beard
Conium maculatum	Poison hemlock
Convolvulus arvensis	Field bindweed
Cytisus scoparius	Scotch broom
Daucus carota	Wild carrot
Geranium robertianum	Herb-Robert's
Hedera helix	English ivy
Hypericum perforatum	St. John's wort
Phalaris arundinacea	Reed canarygrass or Ribbongrass
Fallopia japonica	Japanese knotweed
Rubus armeniacus	Himalayan blackberry

Federal, State, and Local Habitat Designations

Federal, state, and local regulatory frameworks designate important and/or protected habitat for ecosystem resources within the study areas. Table 3.16-7 summarizes these designations. Note that many of these designated areas overlap. For example, the open water habitat within the Columbia River is designated critical habitat for several species of ESA-listed fish, essential fish habitat for Pacific salmon, a Washington Department of Fish and Wildlife (WDFW) priority habitat, a designated Critical Area in the city of Vancouver, and a Portland environmental overlay zone (ezone).

Table 3.16-7. Federal, State, and Local Habitat Designations within the Study Areas

	Agency	Limits of Jurisdiction	Resource Designation	Description
Federal	NOAA Fisheries and USFWS	U.S.	Critical Habitat for ESA-listed species	Specific geographic areas contain features essential to the conservation of an endangered or threatened species and may require special management and protection.
	NOAA Fisheries	U.S.	Essential Fish Habitat	Waters and substrate that are necessary to fish for spawning, breeding, feeding, or growth to maturity. EFH has been designated for three categories of fish: Pacific salmon, groundfish, and coastal pelagic species.

	Agency	Limits of Jurisdiction	Resource Designation	Description
Oregon	Oregon DSL and ODFW	Oregon – Statewide	Habitats of Conservation Concern	Habitats of conservation concern within Oregon that provide important benefits to OCS Strategy Species. 11 Strategy Habitats have been designated.
	City of Portland	City of Portland	Environmental Overlay Zones	Establishes Environmental Protection zones and Environmental Conservation zones in Portland to protect important natural resource areas.
	Metro	Multnomah, Clackamas, and Washington Counties	Habitat Conservation Areas	Classifies regionally significant fish and wildlife habitat as Habitat Conservation Areas. Separate categories exist for Riparian and Upland Wildlife habitats.
Washington	WDFW	Washington – Statewide	Priority Habitats	Specifically designated habitat types that have been determined to have unique or significant value. WDFW has designated 20 priority habitats within the state.
	Ecology	Washington - Statewide	Shoreline Management Areas	The Shoreline Management Act defines certain waterbodies as "Shorelines of the State," and local jurisdictions establish shoreline management areas in which development activities are regulated.
	City of Vancouver	City of Vancouver	Critical Areas Ordinance	The Growth Management Act requires all cities and counties in Washington to adopt regulations protecting "critical areas" to preserve the natural environment, wildlife habitat, and sources of fresh drinking water. Five categories are defined, including fish and wildlife habitat conservation areas (FHWCAs). The City of Vancouver has a CAO that defines and regulates development activities within FHWCAs.

CAO = Critical Areas Ordinance; DSL = Department of State Lands; Ecology = Washington Department of Ecology; EFH = essential fish habitat; ESA = Endangered Species Act; Metro = Oregon Metro; NOAA Fisheries = North American Oceanic and Atmospheric Administration Fisheries Service; ODFW = Oregon Department of Fish and Wildlife; USFWS = U.S. Fish and Wildlife Service; WDFW = Washington Department of Fish and Wildlife

3.16.3 Long-Term Benefits and Effects

Table 3.16-8 summarizes the ecosystem effects of the Modified LPA, including design options, and the No-Build Alternative, followed by a discussion of the effects.

Table 3.16-8. Summary of Ecosystems Effects from the Modified LPA, Including Design Options, and No-Build Alternative

1	2	3	4	5	6	7
Effect Category	No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5 or I-5 Westward Shift, all Park-and-Ride Site Options	Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5, all Park-and-Ride Site Options	Modified LPA with Single-Level Fixed-Span Configuration, [a] One Auxiliary Lane, C Street Ramps, Centered I-5, all Park-and-Ride Site Options	Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, all Park-and-Ride Site Options	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Without C Street Ramps, Centered I-5, all Park-and-Ride Site Options
Aquatic resources (total net change compared to the existing condition)	• Continued impacts from untreated stormwater from approximately 156.4 acres of existing CIA. • Potential for injury and habitat degradation in the case of a bridge failure.	• Benthic habitat impact: -0.13 acres (net restoration). • Overwater Shading (Water Surface): +1.04 acres. • Overwater Shading (Elevated Deck): +8.22 acres. • Beneficial effect of stormwater treatment for all post-project CIA, including approximately 156.4 acres of existing impervious area that is currently untreated.	• Similar to effects listed in Column 3, except would result in a greater amount of elevated overwater shading. • Overwater Shading (Elevated Deck): +13.02 acres.	• Benthic habitat impact: +0.03 acres. • Overwater Shading (Water Surface): +1.41 acres. • Overwater Shading (Elevated Deck): +10.78 acres.	• Benthic habitat impact: +0.07 acres of in-water area. • Overwater Shading (Water Surface): +1.58 acres. • Overwater Shading (Elevated Deck): +10.78 acres.	• Same as effects listed in Column 3.
Permanent impacts to terrestrial resources in Oregon (acres)	• Potential for injury and habitat degradation in the case of a bridge failure.	• “High” wildlife/riparian value habitats: 1.12. • “Medium” wildlife/riparian value habitats: 6.20. • Wetlands: 0.58. • Wetland Buffers: 7.39.	• Same as effects listed in Column 3.	• Same as effects listed in Column 3.	• Same as effects listed in Column 3.	• Similar to effects listed in Column 3, except would slightly reduce impervious surface.
Permanent impacts to terrestrial resources in Washington (acres)	• Potential for injury and habitat degradation in the case of a bridge failure.	• Riparian buffers: 0.79. • Biodiversity Areas: 0.15. • Oak Woodlands: <0.01. • Wetlands: 0. • Wetland Buffers: 0.06.	• Same as effects listed in Column 3.	• Same as effects listed in Column 3.	• Same as effects listed in Column 3.	• Same as effects listed in Column 3.

a The long-term effects associated with the single-level fixed-span configuration would be the same for all bridge types, unless otherwise specified.

No-Build Alternative

Under the No-Build Alternative, the existing Interstate Bridge, North Portland Harbor bridge, and I-5 interchanges would remain. Regular and intermittent maintenance activities would continue to be required, which have the potential to result in long-term impacts to aquatic and terrestrial species and habitats, including potential impacts to birds nesting on the existing Interstate Bridge. Stormwater from impervious surfaces within the primary study area would continue to enter aquatic habitat surface waters largely untreated. If a major earthquake event occurred that resulted in the existing Interstate Bridge over the Columbia River failing or collapsing, fish and wildlife species in the immediate vicinity and in aquatic habitats both upstream and downstream could be struck by falling debris and injured or killed. Fallen debris would also diminish habitat suitability and contribute chemical contaminants that could affect aquatic species and habitats upstream and downstream of the bridge.

Modified LPA

The subsections below describe the long-term impacts that would occur with the Modified LPA. As described in Chapter 2, several design options are being evaluated as part of the Modified LPA. Where impacts would differ associated with a design option, a comparison of the impacts associated with each design option is provided. The with or without C-Street ramp option, I-5 mainline westward shift or centered option, and the park and ride site options evaluated as part of the Modified LPA would not result in different levels or types of long-term effects to ecosystem resources and are, therefore, not specifically addressed further.

As described in Chapter 2, the construction activities associated with the Modified LPA would likely require both temporary and permanent modifications to portions of the Portland Metro Levee System, which is a system of federal flood control levees located along the south bank of the Columbia River within the primary study area. Such modifications may include activities to restore temporarily disturbed portions of the levees, or permanent modifications where proposed infrastructure would intersect with the existing levees, or where access to the levees would change as a result of reconfiguration of the roadways. Modifications may include improvements to existing levee function if such improvements are requested or required. Modifications or improvements would be coordinated for consistency with the planned future condition of the levees under the Levee Ready Columbia project. The assessment of long-term effects to ecosystem resources associated with the Modified LPA presented below includes those associated with potential reconstruction of, or modifications to, the federal levee system.

Aquatic Resources

Under the Modified LPA, bridge removal and replacement would result in direct permanent impacts to sensitive aquatic habitats in the Columbia River and North Portland Harbor. These impacts would include physical alteration of benthic habitat and changes in overwater shading. The Modified LPA would not directly impact or displace aquatic habitat in Burnt Bridge Creek, the Columbia Slough, or Fairview Creek. Table 3.16-9 summarizes the permanent aquatic habitat impacts associated with the Modified LPA.

Table 3.16-9. Permanent Benthic Habitat and Overwater Shading Aquatic Impacts Summary

Impact to Columbia River and North Portland Harbor	Double-Deck Fixed-Span Configuration (acres)	Single-Level Fixed-Span Configuration (acres) [a]	Single-Level Movable-Span Configuration (acres)	Restored Area from Removal of Existing Bridge (acres)	Total Net Change (acres)
Benthic Habitat Loss	0.91	1.07	1.11	-1.04	• Double-deck fixed-span: -0.13 • Single-level fixed-span: +0.03 • Single-level movable-span: +0.07
Overwater Shading (Water Surface)	1.04	1.41	1.58	0.00	• Double-deck fixed-span: +1.04 • Single-level fixed-span: +1.41 • Single-level movable-span: +1.58 acres.
Overwater Shading (Elevated Deck) [b]	19.87	24.13	24.13	-11.65	• Double-deck fixed-span: +8.22 • Single-level fixed-span: +10.78 • Single-level movable-span: +10.78

a The permanent benthic habitat and overwater shading impacts associated with the single-level fixed-span configuration would be the same for all bridge types.

b The addition of a second auxiliary lane in each direction would increase the amount of elevated overwater shading by approximately 4.8 acres compared to one auxiliary lane.

Benthic Habitat Impacts

For the Modified LPA with the double-deck fixed-span configuration, in-water piers to support the new Columbia River and North Portland Harbor bridges would displace approximately 0.91 acres of benthic habitat. Removal of the existing Interstate Bridge, including their underwater support structures, would result in the restoration of approximately 1.04 acre of benthic habitat. Thus, the Modified LPA with the double-deck fixed-span configuration would result in a net restoration of approximately 0.13 acres of benthic habitat. The Modified LPA with the single-level fixed-span configuration would require 24 more drilled shafts than the double-deck fixed-span configuration, which would result in a greater benthic impact of 1.07 acres and a 0.03-acre net reduction in benthic habitat. The Modified LPA with the single-level movable span configuration would require 36 more drilled shafts than the double-deck fixed-span configuration, resulting in a total benthic impact of 1.11 acres and a 0.07-acre net reduction in benthic habitat. It is important to note that the existing Interstate Bridge would remain in place during construction of the new Columbia River bridges; once the new bridges have been constructed the existing Interstate Bridge would be demolished.

Changes to benthic habitats could affect a variety of aquatic species, including:

- Adult and juvenile salmon, steelhead, and bull trout
- Adult green sturgeon, white sturgeon, Pacific eulachon, Pacific lamprey, and river lamprey

- Adult and juvenile native resident fish (e.g., sculpins, threespine sticklebacks, dace, and suckers)
- Freshwater invertebrates

However, the extent of the effect would be minor, given the relatively small area that would be affected and the net area that would be restored by the Modified LPA.

The addition of a second auxiliary lane in each direction would not change the amount benthic habitat impact compared to the one auxiliary lane option.

Overwater Shading Impacts

In addition to affecting benthic habitat, the Modified LPA's new bridges would increase the area of shading over the Columbia River and North Portland Harbor. Shading from overwater structures can affect the growth of aquatic vegetation, reduce habitat suitability for salmon and other native fish, and create habitat for species that prey on juvenile salmonids. The amount and duration of the effects can vary with the height of the overwater structures (increased structure height diminishes the intensity of shading by providing a greater distance for light to diffuse and refract around the bridges' decks); the orientation of the structure (a north–south-oriented structure creates a shadow that moves throughout the day); the density of piling or drilled shafts supporting the structure (an open structure supported by widely-spaced drilled shafts allows light to penetrate beneath the structure); and the material and reflectivity of the structure (concrete and steel are lighter and more reflective of ambient light than darker materials such as timber piles).

The structures with the greatest potential for overwater shading at the water's surface are the shaft caps for the new Columbia River bridges. The Modified LPA with the double-deck fixed-span configuration would result in a total of approximately 1.04 acres of shading at the Columbia River water surface. The Modified LPA with the single-level fixed-span configuration would require larger drilled shaft caps and would result in an increase of approximately 1.41 acres of shading at the Columbia River water surface. The Modified LPA with the single-level movable-span configuration would also require larger drilled shaft caps and would result in increased shading at the Columbia River water surface. The shaft caps for the movable spans would result in an increase of approximately 1.58 acres of shading at the Columbia River water surface. For all configurations, these shaded areas would be small relative to the amount of available habitat in the vicinity, and salmonids and other aquatic species would have access to suitable habitats outside the shaded areas. Therefore, the increased shading is not expected to have an appreciable effect on habitat function. The North Portland Harbor bridges would not have shaft caps at the water's surface and would therefore not result in overwater shading at the water's surface.

The replacement bridges would result in new elevated overwater shading from the bridges' decks and removal of elevated overwater shading from the existing bridge decks. However, with any of the bridge configurations, the height of the bridges' decks would minimize the potential for elevated overwater shading to result in reduced habitat function. The new Columbia River and North Portland Harbor bridges with the Modified LPA with the double-deck fixed-span configuration would have a total of approximately 19.87 acres of new elevated overwater shading, and the removal of the existing bridge would reduce elevated overwater coverage by approximately 11.65 acres, for a net increase of approximately 8.22 acres of elevated overwater coverage. Compared to the Modified LPA with the double-deck fixed-span configuration, the Modified LPA with the single-level fixed-span configuration would increase elevated overwater shading by 4 acres, and the Modified LPA with the single-level movable-span configuration would increase elevated overwater shading by approximately 5 acres.

The addition of a second auxiliary lane in each direction would not change the amount of surface-water shading, but would increase the amount of elevated overwater shading by approximately 4.8 acres compared to the one auxiliary lane option.

Floodplain Fill

Removal or placement of material within a floodplain can affect aquatic habitat by affecting peak and base flow conditions. While the Modified LPA would require both removal and placement of material below the 100-year floodplain elevation, its location on the Columbia River, where flows are regulated in part by upstream dams, makes the potential for changes in flow less pronounced. While specific volumes have not yet been calculated, it is anticipated that the net change in fill within the regulatory floodplain would be relatively small due to local code requirements. In 2024, the City of Portland updated its building code and zoning code that apply to development within floodplains. The updates are intended in part to bring the City's code into compliance with the recommendations of the 2016 Federal Emergency Management Agency (FEMA) National Flood Insurance Program BO that was issued by NOAA Fisheries in 2016. The cities of Fairview and Vancouver also regulate cut and fill activities within the floodplain through their environmental approval process. Pursuant to Executive Order 11988, a Location Hydraulic Study would be conducted to evaluate potential impacts to the floodplain, and to document the impacts, mitigation measures, alternatives, and findings following the provisions of 23 Code of Federal Regulations 650A.

The Modified LPA would also require both removal and placement of material within the functional floodplain, which is the portion of the regulatory floodplain that is below the ordinary high-water mark (OHWM). Specific quantities have only been estimated at this time and would depend substantially on final design and permitting details. It is estimated that the Modified LPA would install up to approximately 62,400 cubic yards of new material within the functional floodplain of the Columbia River and North Portland Harbor, and would remove approximately 13,250 cubic yards of existing material from within the functional floodplain. It is estimated, therefore, that the Modified LPA would result in a net increase of up to approximately 55,000 cubic yards of material within the functional floodplain. Most of this volume would be associated with the pile shaft caps for the Columbia River bridges, which are approximately 20 feet thick, and most of which would be below the OHWM elevation. Despite this increase, the Modified LPA would fully comply with applicable requirements to maintain floodplain function as described above, and would maintain floodplain function and hydrologic processes at the site.

Given the limited extent of functioning floodplain within the footprint of the Modified LPA, and the regulatory requirements to balance cut and fill within the floodplain and to maintain or improve floodplain function, the effects on floodplain function from construction of the Modified LPA are expected to be minimal.

Hydraulic Shadowing

Piers and other structures in the water can create areas of reduced water velocity immediately downstream of the structure. This phenomenon is referred to as a hydraulic shadow. Hydraulic shadowing may affect habitat suitability for native fish by creating low-velocity eddies that have the potential to increase exposure to predation, interfere with movement patterns, and alter sediment transport. Increased hydraulic shadowing may also benefit some fish by creating areas where they can rest during periods of high flow.

The Modified LPA, with any of the Columbia River bridge configurations, would create a hydraulic shadow extending up to approximately 1,600 feet downstream of each pier, with velocities in the range of 0 to 3 feet per second. The hydraulic shadow of the North Portland Harbor bridges would extend up to approximately 400 feet downstream of each pier, with velocities ranging from 0 to 2 feet per second. Although the length of the hydraulic shadow would increase compared to the existing conditions, the change to aquatic habitat suitability for native fish would be minor. In both cases, the area that would be affected by the hydraulic shadow is a relatively small area and the range of water velocities found in the hydraulic shadow are within the range fish encounter in the natural environment.

Stormwater Effects

The Modified LPA would install new impervious surfaces and rebuild existing impervious surfaces, which could contribute pollutants to stormwater and affect water quality and water quantity in the Columbia River, North Portland Harbor, Columbia Slough, Fairview Creek, and Burnt Bridge Creek. Stormwater runoff from roads and highways contains pollutants that can be toxic to aquatic life, even at very low concentrations. Pollutants commonly occurring in stormwater runoff include suspended solids, nutrients, oil and grease, agricultural chemicals, dissolved metals, and other organic chemicals. There is emerging research related to 6PPD-quinone, a chemical in tires, which has been linked to mortality of coho salmon under certain conditions (Tian et al. 2021), and may also be negatively affecting other aquatic species including Chinook salmon and steelhead (Brinkmann et al. 2022; Lo et al. 2023). However, among the Pacific salmonid species, coho salmon are the most sensitive to 6PPD-quinone and the most exposed to pollutants in urban stormwater runoff, given their habitat preference for small, lowland streams (Ecology 2022).

Table 3.16-10 compares the increase in contributing impervious area (CIA), which could potentially increase the amount of pollutants entering stormwater, for each configuration of the Modified LPA. The Modified LPA with the double-deck fixed-span configuration would add approximately 29.6 acres of CIA but would treat or infiltrate 207.2 acres of CIA. The Modified LPA with the single-level fixed-span and single-level movable-span configurations would increase the CIA by 32.9 acres (an increase of approximately 3.3 acres compared to the double-deck configuration). The addition of a second auxiliary lane in each direction would increase the amount of post-project CIA by approximately 3.9 acres under each configuration compared to the one auxiliary lane option.

Water quality treatment would be provided for all post-project CIA, including approximately 156.4 acres of existing impervious area that is currently untreated. This would represent treatment of over six times the area of net new CIA associated with the Modified LPA. The net effect on water quality and aquatic habitat would be a substantial net improvement for all design options compared to the No-Build Alternative. See Section 3.14, Water Quality and Hydrology, for additional information.

Table 3.16-10. Post-Project Increase in Contributing Impervious Area

	Double-Deck Fixed-Span Configuration	Single-Level Fixed-Span Configuration [a]	Single-Level Movable-Span Configuration
Increase in Contributing Impervious Area (acres) [b]	29.6	32.9	32.9

a The increase in contributing impervious area would be the same for all bridge types.
b The addition of a second auxiliary lane in each direction would increase the amount of post-project contributing impervious area by approximately 3.9 acres under each bridge design option compared to the one auxiliary lane option.

The Modified LPA with the single-level movable-span configuration would also require grease and other lubricants for the maintenance and operation of the lift span, which poses a potential risk that these substances could enter surface waters. However, the bridges would be operated in a manner that is compliant with applicable state water quality standards, and appropriate best management practices (BMPs) would be employed to maintain compliance with these requirements.

Overwater Lighting

Artificial light sources on overwater structures can affect fish and other aquatic species, including delayed migration and increased exposure to predation. The Modified LPA would install permanent lighting on the replacement bridges and would remove a source of overwater lighting on the existing bridge. The Modified LPA, with any of the configurations, is not expected to result in an increase in the amount of light on the water's surface. Permanent lighting for the bridges' decks would use directional, shielded lighting to control

glare and direct light onto the bridges' decks to the extent practicable. The bridges' decks with the Modified LPA would also be solid surfaces, which would reduce the amount of light illuminating the water's surface compared to the existing bridge.

Avian (Bird) Predation

Avian (bird) predation of juvenile salmonids is a limiting factor for salmon recovery in the Columbia River Basin. Other species subject to avian predation include adult and juvenile Pacific eulachon and lamprey. The existing Interstate Bridge and North Portland Harbor bridge provide perching opportunities for fish-eating birds such as Caspian terns, double-crested cormorants, and various gull species, though there is no evidence these species use the bridges extensively. The Modified LPA, with any of the configurations, may reduce the potential for avian predation. While the steel superstructure of the existing Interstate Bridge provide opportunities for birds to perch, the new Columbia River bridges would likely provide relatively fewer overhead perching opportunities. However, this would depend in part on the final design of the superstructure. Perching opportunity on the replacement North Portland Harbor bridges would be comparable to that on the existing North Portland Harbor bridge, though it could be slightly higher given the increase in the total number of structures.

Terrestrial Resources

As summarized in Table 3.16-11, the Modified LPA would result in the loss of small quantities of sensitive terrestrial habitats. The habitat designations shown in Table 3.16-11 overlap and are not cumulative. The amount of terrestrial habitat loss would be the same with one or two auxiliary lanes and all of the bridge design configurations.

The Modified LPA would also restore terrestrial areas that are currently displaced by existing infrastructure (the existing bridges and roadways). While a specific restoration plan has not yet been developed, these areas would be restored consistent with federal, state, and local regulatory requirements, and would provide new terrestrial habitat function.

Table 3.16-11. Permanent Loss of Sensitive Terrestrial Habitats

Sensitive Terrestrial Habitat (Oregon)	Permanent Loss of Sensitive Terrestrial Habitat (acres)
"High" wildlife/riparian value habitats	1.12
"Medium" wildlife/riparian value habitats	6.20
Wetlands	0.58
Wetland Buffers	7.39
Sensitive Terrestrial Habitat (Washington)	
Riparian Buffers	0.79
Biodiversity Areas	0.15
Oak Woodlands	<0.01
Wetlands	0
Wetland Buffers	0.06

Sensitive Terrestrial Habitats in Oregon

In Oregon, the Modified LPA would result in a permanent loss of approximately 7.32 acres of terrestrial habitats identified as having a "high" or "medium" combined wildlife/riparian value in Portland's Natural Resource Inventory (NRI). Most of the impacts would occur within disturbed terrestrial riparian habitats on the shorelines of Hayden Island, on the south shoreline of North Portland Harbor, near the Vanport wetland, and in a partially forested area south of Martin Luther King, Jr. Boulevard. The Modified LPA would also result in approximately 0.58 acre of permanent wetland fill, and approximately 7.39 acres of wetland buffer impact in Oregon, within areas designated as having "high" or "medium" wildlife/riparian value in Portland's NRI.

The Modified LPA would require the removal of trees. Tree removal reduces habitat complexity, can affect water temperature, and reduces the potential for large woody debris (an important component of fish habitat) to accumulate. Riparian areas adjacent to the Columbia River and North Portland Harbor in Oregon are armored with riprap and provide little riparian function. The Modified LPA would likely require removal of some trees that have established along the riprapped banks. Some tree removal would also be required in areas mapped as having "high" or "medium" combined wildlife/riparian value in Portland's NRI, primarily associated with wetlands and adjacent buffer areas. Tree removal would be conducted consistent with the City's Title 11 Tree Ordinance.

Sensitive Terrestrial Habitats in Washington

In Washington, permanent loss of sensitive terrestrial habitats would be minimal, as Modified LPA improvements would occur largely within a developed transportation corridor. In addition, the Modified LPA has been designed to avoid encroaching into sensitive resources, to the extent practicable.

The Modified LPA would result in a permanent loss of approximately 0.79 acres of riparian buffers, 0.15 acres of a designated biodiversity area, 0.01 acres of area mapped as oak woodland, and 0.06 acres of wetland buffer in Washington. Most of the loss would occur within terrestrial riparian habitat associated with Burnt Bridge Creek. While this riparian habitat is mostly disturbed vegetation on a sloping embankment between I-5 and NE Leverich Park Way some tree removal adjacent to Burnt Bridge Creek would be required. Some of this riparian buffer may be able to be restored and/or enhanced, and net unavoidable impact would be offset through compensatory mitigation.

Nesting Bird and Roosting Bat Habitat

The Modified LPA would require the removal of both natural features (trees and vegetation) and human-made structures (the existing bridges) that provide documented or potentially suitable habitat for nesting birds and roosting bats.

Activities with the potential to disturb nesting migratory birds, such as nest removal, would be conducted consistent with the provisions of the Migratory Bird Treaty Act (MBTA), which requires that nests of migratory birds be removed only when nests are inactive. However, the loss of a specific nesting structure could still be significant, particularly if similar replacement structures are not available.

The Modified LPA would require the removal of the existing Interstate Bridge, which has been a peregrine falcon nest site since 2001. Its removal would eliminate a suitable nesting structure and, while there are likely alternate nesting sites in the vicinity, could appreciably disrupt peregrine breeding, foraging, and/or nesting activity. Peregrines that use the existing Interstate Bridge would be forced either to find alternative nesting structures in the vicinity of the bridge or move outside of the study area. Providing an alternate nesting structure would greatly reduce the potential nesting impact.

Terrestrial Wildlife Passage

Terrestrial wildlife passage is severely limited in the primary study area due to the highly developed urban setting. The existing shoreline and riparian areas are narrow and provide limited suitable passage and habitat function for terrestrial species. Under the Modified LPA, landside piers for the Columbia River bridges may continue to obstruct wildlife movement along the shoreline, though this may be offset by the removal of the existing landside bridge piers. Options for improving wildlife passage are limited, given the developed nature of the corridor. Design efforts to avoid and minimize impacts to riparian habitat, would likely maintain or improve terrestrial wildlife passage in the long term.

Botanical Resources

The Modified LPA would have limited permanent vegetation removal, as construction activities would primarily occur within disturbed areas adjacent to existing roadway infrastructure. The Modified LPA would permanently remove native vegetation within a few relatively small areas of functioning riparian and wetland habitats. This removal would be avoided and minimized to the extent practicable through project design, and consistent with federal, state, and local regulations. Compensatory mitigation would offset the net loss in habitat function. The net result is expected to increase habitat quality for botanical resources.

No botanical SOI are known or expected to occur within the areas that would be permanently disturbed. Therefore, the Modified LPA would not impact botanical SOI species.

3.16.4 Temporary Effects

No-Build Alternative

The No-Build Alternative would not have construction-related temporary effects.

Under the No-Build Alternative, the existing Interstate Bridge and roadways would continue to require regular, intermittent maintenance activities, which have the potential to disturb aquatic and terrestrial species and habitats. Potential impacts from maintenance activities include temporarily impaired water quality, temporary underwater and/or terrestrial noise, and temporary vegetation impacts.

Maintenance activities could potentially impact birds nesting on the existing Interstate Bridge or within the vicinity. Activities with the potential to impact nesting migratory birds, such as nest removal, would be conducted consistent with the provisions of the MBTA which requires that nests of migratory birds be removed only at times when nests are inactive. Active nests (those with live eggs and/or viable chicks) are to be left undisturbed until they are no longer active.

Typical construction BMPs would likely be implemented during maintenance activities to minimize impacts to fish and wildlife species and habitats.

Modified LPA

The subsections below describe the short-term impacts that would occur associated with the Modified LPA, including potential modifications to the Portland Metro Levee System. As described in Chapter 2, several design options are being evaluated as part of the Modified LPA. Where impacts would differ associated with one or more of the design options, the subsections below provide a comparison of the impacts associated with each design option.

Certain design options that are being evaluated as part of the Modified LPA (the C-Street ramp options, I-5 mainline westward shift options, and the two park and ride site options) would not result in different levels or types of short-term effects to ecosystem resources, and these design options are not specifically addressed further in this section.

Aquatic Resources

In-water construction activities related to construction of the new bridges and demolition of the existing bridges within the Columbia River and North Portland Harbor could temporarily affect aquatic species and their habitats. This could include temporary disturbance of benthic habitat, overwater shading from work structures, work area isolation and fish salvage, water-quality impairment from turbidity or contaminants, overwater construction lighting, hydroacoustic events, and disturbance or displacement of individuals.

In-Water Work Timing

To minimize impacts to aquatic species and their habitats, certain work within the Columbia River and North Portland Harbor would have defined timing restrictions. Between 2005 and 2011, a set of project-specific in-water work timing restrictions were developed for the CRC LPA through extensive coordination with regulatory agencies, tribal partners, and other interested parties. These work timing restrictions were reviewed with agencies, tribes, and other interested parties in several meetings between 2022 and 2023 for the Modified LPA. Based on the outcome of these discussions, it was concluded that the timing restrictions that were developed for the CRC LPA were likely also the preferred windows to apply to construction of the Modified LPA. The following timing restrictions have therefore been proposed for the construction of the Modified LPA.

- Impact pile driving would be confined to September 15 through April 15 of each year.
- In-water debris removal with a bucket dredge would be confined to November 1 and February 28 of each year.

All other in-water and overwater construction activities would be conducted year-round and in compliance with permit conditions.

Temporary Benthic Habitat Impacts and Overwater Shading

In the Columbia River and North Portland Harbor, temporary impacts to benthic habitat and temporary overwater shading would result from the installation of temporary work platforms, bridges and piers, temporary isolation systems, cofferdams, casings, barges, and temporary piles associated with these structures. These temporary features are necessary to support construction and would be designed by a contractor after a contract is awarded. Table 3.16-12 provides a summary of these temporary aquatic habitat impacts.

In the Columbia River, the Modified LPA with the double-deck fixed-span configuration would temporarily displace approximately 1.52 acres of benthic habitat, with about 86% of these effects from cofferdams during construction and demolition. The Modified LPA with the single-level fixed-span configuration and the Modified LPA with the single-level movable-span configuration would have similar temporary effects, generally, however these two single-level design options would have approximately 0.42 acres more benthic in-water area temporarily displaced within cofferdams. This increase in acreage of temporary benthic habitat impact would not, however, result in a different net effect on ecosystems compared to the Modified LPA with the double-deck fixed-span bridge configuration. Overwater shading in the Columbia River is estimated to temporarily affect approximately 7.89 acres, with approximately half of these temporary effects resulting from temporary work platforms, bridges, and piers, and half resulting from barges.

In North Portland Harbor, approximately 0.40 acres of benthic habitat would be temporarily displaced, with approximately 60% of these effects resulting from drilled shaft isolation casings. Overwater shading in North Portland Harbor would temporarily affect approximately 7.72 acres, of which 62% would be due to temporary work platforms, bridges, and bents.

Table 3.16-12. Temporary Aquatic Habitat Impacts Summary

Temporary In-Water and Overwater Work Elements	Columbia River Temporary Benthic Impact (acres)	Columbia River Temporary Overwater Shading (acres)	North Portland Harbor Temporary Benthic Impact (acres)	North Portland Harbor Temporary Overwater Shading (acres)
Work Platforms/ Bridges/Piers and Associated Piles	0.18	4.23	0.13	4.78
Other Temporary Piles	0.01	0	0.01	0
Suspended Shaft Cap Isolation System	0	0.25	-	-
Sheet Pile Cofferdams (Construction)	0.44	0	-	-
Sheet Pile Cofferdams (Demolition)	0.86	0	-	-
Drilled Shaft Isolation Casings	-	-	0.24	0
Barges and Barge Mooring Piles (Construction)	0.01	2.75	0.02	2.41
Barges and Barge Mooring Piles (Demolition)	0.01	0.65	0.01	0.53
Total	**1.52**	**7.89**	**0.40**	**7.72**

Work Area Isolation and Fish Salvage

Certain in-water work activities would need to be isolated from the active flow of the Columbia River and North Portland Harbor, either for construction purposes or to reduce potential effects on fish and aquatic habitats. Areas that would be isolated in this manner include drilled shaft isolation casings and temporary sheet pile cofferdams. Sheet pile cofferdams for construction of Piers 2 and 7, and the drilled shaft isolation casings in North Portland Harbor, would be dewatered to provide a work area for construction. Sheet pile cofferdams for demolition of the existing Interstate Bridge (if used) would not be dewatered. Regardless of whether they are de-watered or not, isolation of in-water work areas would temporarily disturb benthic habitats and would temporarily limit access to these areas for fish.

Fish salvage would be conducted both during and after the installation of the sheet pile cofferdams (those for construction and for demolition) to remove fish from within the isolated work area. Since the drilled shaft isolation casings would be screened prior to installation, fish salvage would not be required within these structures prior to dewatering. These fish salvage operations would involve capture, direct handling, and transporting of fish, resulting in some risk that the process may harass, injure, or kill individual fish. Similarly, mortality is likely if a fish remains trapped in an isolated work area during construction.

Temporary Impacts to Water Quality

Water quality can be temporarily affected during both in-water and upland construction activities through the accidental release of construction materials or wastes to the water or through the disturbance of sediment

which generates turbidity. Upland ground-disturbing activities can also lead to erosion, causing turbidity in adjacent waterbodies.

Construction of the Modified LPA, with any of the configurations, would likely result in temporary, localized turbidity during in-water work in the Columbia River and North Portland Harbor from activities such as pile installation and removal, drilled shaft casing installation and removal, upland ground improvements, cofferdam installation and removal, and barge operations. Construction of the Modified LPA, with any of the configurations, has the potential to result in the release of chemical and/or debris into surface waters from sources such as overwater construction work, concrete installation, spills of fuels or other chemicals, upland ground improvements, and demolition of the existing bridge.

The Modified LPA would require avoidance and minimization measures, including a spill prevention, control, and countermeasures plan, pollution control plan, and an erosion and sediment control plan. A Water Quality Protection and Monitoring Plan would also be required to satisfy 401 Water Quality Certifications monitoring and reporting requirements. Construction of the Modified LPA would comply with permit requirements.

Temporary water quality impacts during construction could result in behavioral responses from fish or other aquatic species, including temporary avoidance and reduced foraging abilities. These types of responses have been documented in fish at very low turbidity levels. Since construction activities may occur year-round, all species and life stages of fish in the Columbia River and North Portland Harbor could be exposed to reduced water quality conditions. The extent and duration of exposure to elevated levels of turbidity are expected to be limited and short term, and the minimization measures identified in Section 3.16.5 that would be implemented would be sufficient to minimize effects.

Temporary Overwater Lighting

Temporary overwater lighting would be required throughout construction and demolition to provide adequate lighting for barges, work platforms/bridges, construction of the replacement bridges' decks, and demolition of the existing structures. Overwater lighting associated with temporary work structures may affect migratory movement and/or increase predation pressure within the study area for adult and outmigrating juvenile salmon, steelhead, and bull trout. Temporary lighting would not constitute a complete barrier to migrating juvenile fish; however, migrating juvenile salmonids, Pacific eulachon, Pacific lamprey, river lamprey, and other native resident fish that gather under light sources could be exposed to a higher risk of predation. Overwater lighting is not known to affect green or white sturgeon, given their preference for deep-water habitats. Similarly, seals and sea lions are not expected to significantly alter their behavior or movement in response to temporary overwater lighting.

Elevated Underwater Noise

Temporarily elevated underwater noise can alter behavior, physical injury or increase mortality in aquatic species, depending on the intensity and characteristics of the sound, the distance from the noise source, the location in the water column, and other factors. The primary sources of underwater noise associated with the Modified LPA are impact pile driving, vibratory pile driving, drilled shaft oscillation, and noise from vessels.

Impact Pile Driving

Impact pile driving is the loudest potential underwater noise source that would be required for construction of the Modified LPA. The Modified LPA has been designed to minimize the likelihood of impacts resulting from pile installation activities. Pile installation would be performed to the greatest extent possible using a vibratory hammer, though piles may need to be driven to final tip elevation or proofed, as necessary, with an impact hammer. Proofing is the process of striking piles with an impact hammer to verify their load-bearing capacity. A bubble curtain would be implemented during all in-water impact pile driving to reduce the extent of underwater noise generated.

NOAA Fisheries has established specific decibel level thresholds for injury and disturbance from underwater noise associated with impact pile driving. Injury thresholds have been established for noise from a single pile strike (peak thresholds) and for exposure to noise from multiple strikes over a period of time (cumulative thresholds). A disturbance threshold has also been established for levels of underwater noise during impact pile driving that could cause disturbance but would not result in injury.

Impact pile driving during construction of the Modified LPA would result in noise levels that would temporarily exceed these injury and disturbance thresholds within portions of the Columbia River and North Portland Harbor, and exposed fish may have an increase in lethal and sublethal injuries. The extent of the injury would depend on several factors, including the size of the fish, duration of exposure, proximity to the source (the pile being driven), and size of the pile.

All species and life stages of salmon, steelhead, eulachon, lamprey, green sturgeon, white sturgeon, and other resident fish would be subject to potential injury and disturbance if present during impact pile driving. Bull trout would not be affected by impact pile driving because they are not expected to be present in the area where construction-related underwater noise could occur.

Impact pile driving can also affect marine mammals. Steller and California sea lions and harbor seals could potentially be exposed to elevated noise levels during pile driving that could result in injury or harassment. Harassment of marine mammals is regulated under the Marine Mammal Protection Act, and appropriate authorization would be secured in the form of a Letter of Authorization. A marine mammal monitoring plan would also be developed and implemented to avoid and minimize the extent of any unavoidable harassment of marine mammals during impact pile driving.

Vibratory Pile Driving, Drilled Shaft Oscillation, and Wiresaw Operation

Noise generated during vibratory pile driving, drilled shaft oscillation, and operation of an underwater wiresaw does not generally result in injury to fish but can result in behavioral effects such as startling, momentary disruption in feeding, or avoidance of the area. Depending on site conditions, behavioral effects may be more significant with consequences for survival and reproduction. For example, avoidance of the study area could cause delays in feeding or migration that could in turn affect spawning or outmigration success.

All species and life stages of salmon, steelhead, eulachon, lamprey, green sturgeon, white sturgeon, and other resident fish that use aquatic habitats within the Columbia River and North Portland Harbor could be exposed to these effects when they are present in the portion of the primary and secondary study areas where underwater noise would be elevated during vibratory pile driving, drilled shaft oscillation, and operation of an underwater wiresaw. Bull trout would not be affected by noise from these activities, because they are not expected to be present in the area where construction-related underwater noise could occur.

Adult and/or juvenile fish present within the area where underwater noise would be temporarily elevated during vibratory pile driving, drilled shaft oscillation, and operation of an underwater wiresaw may be exposed to levels of underwater noise that could result in behavioral disturbance. This activity is unlikely to injure fish or significantly interfere with behaviors such as migration, rearing, or foraging. Thus, vibratory pile driving, drilled shaft oscillation, and operation of an underwater wiresaw are not likely to adversely affect these species.

Noise associated with vibratory pile driving, drilled shaft oscillation, and operation of an underwater wiresaw can also affect marine mammals. Steller and California sea lions and harbor seals could potentially be exposed to elevated noise levels during these activities that could result in harassment. Appropriate authorization under the Marine Mammal Protection Act would be secured in the form of a Letter of Authorization. A marine mammal monitoring plan would also be developed and implemented to avoid and

minimize the extent of any unavoidable harassment of marine mammals during impact vibratory pile driving, drilled shaft oscillation, and operation of an underwater wiresaw.

Vessel Noise

Various types of vessels, including barges, tugboats, and small craft, would be present during construction. These vessels would move and operate within the Columbia River and North Portland Harbor on a year-round basis. Such vessels already use this portion of the study area in relatively high numbers; therefore, the vessels to be used in the construction of the Modified LPA do not represent a new noise source, only a potential increase in the frequency and duration of this type of activity.

Avian Predation

Construction of the Modified LPA is not expected to have an appreciable effect on avian predation pressure on juvenile salmonids, Pacific eulachon, lamprey, or other native fish. Temporary overwater structures are not likely to attract large concentrations of avian predators, compared to such features as nesting islands, water impoundments, or dam tailraces. However, avian predators are known to congregate on overwater structures, and construction of the Modified LPA would temporarily increase the number of available perches. It is therefore possible that avian predation pressure could temporarily increase to some extent within the primary study area.

Terrestrial Resources

Construction activities associated with the Modified LPA would result in temporary disturbance of terrestrial habitats in Oregon and Washington. This could include vegetation removal, grading, or other forms of temporary access and construction activities. Table 3.16-13 summarizes the approximate area of each resource that may be temporarily disturbed. Note that the habitat designations differ by state as a result of differing regulatory frameworks and resource inventories. In some cases, the habitat designations also overlap, so the quantities are not cumulative.

Table 3.16-13. Temporary Disturbance of Sensitive Terrestrial Habitats

	Terrestrial Habitat	Temporary Disturbance of Sensitive Terrestrial Habitat (acres)
Oregon	“High” riparian/wildlife value habitats	4.6
	“Medium” riparian/wildlife value habitats	5.7
	Wetlands	2.56
	Wetland Buffers	7.11
Washington	Riparian Buffers	1.15
	Biodiversity Areas	2.87
	Oak Woodlands	0.03
	Wetlands	0
	Wetland Buffers	1.19

Sensitive Terrestrial Habitats in Oregon

In Oregon, construction of the Modified LPA would result in temporary disturbance of approximately 2.56 acres of wetland, 7.11 acres of wetland buffer, and approximately 10.3 acres of habitat identified as having a "high" or "medium" combined wildlife/riparian value in Portland's NRI. This would occur primarily within disturbed terrestrial riparian habitats on the shorelines of Hayden Island, on the south shoreline of North Portland Harbor, near the Vanport wetland, and in a partially forested area south of Martin Luther King Jr. Boulevard.

Construction of the Modified LPA would include revegetating temporarily disturbed riparian areas and other sensitive habitats in Oregon consistent with federal, state, and local regulations, for no net loss of habitat function.

Sensitive Terrestrial Habitats in Washington

In Washington construction of the Modified LPA would result in temporary disturbance of approximately 1.15 acres of riparian buffers, approximately 2.87 acres of a designated biodiversity area, approximately 0.03 acres of priority oak woodland habitat and approximately 1.19 acres of wetland buffer in Washington. This would primarily occur within terrestrial riparian habitat associated with Burnt Bridge Creek, which provides only moderate habitat function, as it is immediately adjacent to I-5. Construction of the Modified LPA would also disturb a small portion of an area designated as priority oak woodland habitat. However, the only area affected would be a grassy shoulder adjacent to I-5. No oak trees or vegetation would be removed within this location, and there would be no loss of oak woodland habitat function in this location.

Construction of the Modified LPA would include revegetating temporarily disturbed riparian areas and other sensitive habitats in Washington consistent with federal, state, and local regulations, for no net loss of habitat function.

Terrestrial Noise and Disturbance

Terrestrial noise, lights, vegetation removal, and other roadway and transit construction disturbances could negatively affect the breeding, foraging, and dispersal of terrestrial species such as raccoons, bats, reptiles, and other terrestrial wildlife. Temporarily elevated noise can result in a range of potential wildlife reactions, which can include altered vocal behavior, changes in vigilance and foraging behavior, and changes in body condition. These responses could in turn result in increased energy expenditure or movement into less desirable locations with potentially greater exposure to predation. Lights used for nighttime work could disturb nocturnal animals such as owls or bats or disrupt the flight patterns of night-migrating birds.

To minimize impacts to migratory birds, all activities would be conducted consistent with the MBTA. Although the existing Interstate Bridge does not provide ideal roosting habitat for bats, several bat species that may pass near and use them for temporary roosting could be affected by construction disturbance. Short-term effects on raccoons, bats, reptiles, and other terrestrial wildlife could also result from temporary vegetation clearing.

Terrestrial Wildlife Passage

Construction equipment mobilization, storage, and use on or near riverbanks may temporarily affect wildlife passage. Wildlife species could alter their behavior to avoid construction activities, which in turn could increase the risks of human-wildlife conflicts and wildlife mortality.

Botanical Resources

Temporary vegetation disturbance associated with the construction of the Modified LPA are expected to be relatively minor and to occur primarily within disturbed areas adjacent to existing roadway infrastructure. The Modified LPA would temporarily disturb native vegetation within a few relatively small areas of functioning

riparian and wetland habitats. Disturbance would be avoided and minimized to the extent practicable through project design and consistent with applicable federal, state, and local regulations. Compensatory mitigation would offset the net loss in habitat function.

No botanical SOI are known or expected to occur within the areas that would be temporarily disturbed. Therefore, botanical SOI are not expected to be impacted by the construction of the Modified LPA.

3.16.5 Indirect Effects

No-Build Alternative

No indirect effects are anticipated to result from the No-Build Alternative.

Modified LPA

Changes in Land Use and Traffic

Transportation system changes can have different types and degrees of effects on land use, including increased growth and changes in land use patterns. These effects can result in indirect effects on ecosystem resources by increasing the amount, rate, or location of development.

As described in Section 3.4.4, the Modified LPA is likely to facilitate denser urban development as provided in local and regional land use plans, particularly in areas with new light rail transit service. The proposed new station areas in downtown Vancouver and Hayden Island are within a highly developed corridor, where habitat for terrestrial species is of limited quantity and quality. Because the Modified LPA is expected to encourage more compact development and/or redevelopment within existing urban areas that have limited terrestrial resources and habitat, it is likely to reduce the potential loss of habitat and impervious surface throughout the region.

Applicable federal, state, and local environmental regulations would minimize impacts from any such development or redevelopment activities. Local regulations require the avoidance and minimization of impacts to sensitive resources, including shorelines, wetlands, and riparian habitats. As such, indirect changes in land use patterns are not expected to result in adverse effects to ecosystem resources.

The Modified LPA also has the potential to affect how traffic moves through the study area. The tolling program could cause some drivers to seek an alternate crossing at the I-205 bridge. If enough vehicles were to divert to an alternate route, this could result in effects such as changes in the distribution of stormwater pollutants. A regional travel demand model was run for both the No-Build Alternative and the Modified LPA, which indicates that the Modified LPA would result in an approximately 2% shift in the relative distribution of crossings at the I-205 bridge. The model also indicates that improvements in transit would likely result in an approximately 1% decrease in the total number of vehicle miles travelled per weekday in the Portland Metropolitan region. These relatively minor changes would not result in measurable indirect effects on ecosystem resources.

Prey Base for Southern Resident Killer Whales

Impacts on juvenile and adult salmon and steelhead and their habitat resulting from the Modified LPA could indirectly affect the food source for the ESA-listed SRKW. However, given the large numbers of fish in the Columbia River, the temporary nature of effects on individual fish, and the long-term beneficial effects on fish habitat that are anticipated because of mitigation and conservation measures, construction of the Modified LPA is not expected to have measurable effects on the distribution or abundance of potential food sources for the SRKW.

Federal Navigation Channel Dredging

Within the vicinity of the Interstate Bridge, there are four federally authorized navigation projects on the Columbia River: three federally authorized navigation channels that pass beneath the Interstate Bridge (the primary navigation channel, barge channel, and alternate barge channel) and the federally authorized Upper Vancouver Turning Basin located immediately downstream of the Interstate Bridge.

The federal navigation projects would be maintained with the Modified LPA. However, the primary navigation channel would be swapped with the existing barge channel, which would move the primary navigation channel closer to the center of the river than its current location. No changes are proposed to authorized or maintained channel depths, and no dredging is proposed or reasonably certain to occur as a result of the Modified LPA. The existing bathymetry at the locations of the proposed channels provide sufficient depth. Therefore, the reconfiguration of the navigation channels that would occur under the Modified LPA is not expected to result in adverse indirect effects to ecosystem resources.

3.16.6 Potential Avoidance, Minimization, and Mitigation Measures

The design of the proposed Columbia River bridges has been modified to avoid and minimize impacts. Examples of these modifications include reducing the number of in-water piers, timing restrictions on in-water work, enhancement of the proposed stormwater treatment to exceed regulatory minimums, and configuration changes to avoid and minimize impacts to sensitive aquatic and terrestrial habitats. It is anticipated that the Biological Opinion that will be issued by the National Marine Fisheries Service (NMFS) would include additional conservation measures (reasonable and prudent measures) and terms and conditions that are necessary and appropriate to minimize the effects from the incidental take of listed fish.

Construction methods have also been refined to avoid long-term impacts, such as developing an alternative shaft cap isolation system for four of the Columbia River bridges' piers, which would avoid the need for cofferdams and concrete seals in these locations.

Long-Term Effects

Regulatory Requirements

- Provide stormwater quality and quantity treatment that meets or exceeds applicable regulatory requirements for all post-project CIA.

Program-Specific Mitigation

- Avoid and minimize long-term impacts to ecosystem resources in final design to the extent practicable.
- Provide compensatory mitigation for unavoidable impacts to ecosystem resources, consistent with applicable federal, state, and local regulatory requirements.
- Prepare a compensatory mitigation plan that satisfies applicable federal, state, and local regulatory requirements, and that demonstrates no net loss of function of ecosystem resources.
- Provide an alternate nesting structure, either on the new Columbia River bridges or within the vicinity, to offset removal of an existing peregrine falcon nest from demolition of the existing Interstate Bridge.

Temporary Effects

Regulatory Requirements

The following impact avoidance and minimization measures would be implemented as regulatory requirements to avoid and minimize potential effects to ecosystem resources.

General Measures and Conditions

- Perform all work according to the requirements and conditions of the regulatory permits that are issued for the Modified LPA.
- Require contractor to prepare a Water Quality Protection and Monitoring Plan (WQPMP) to satisfy the monitoring and reporting requirements of the 401 Water Quality Certifications that are ultimately issued for the project. The WQPMP would be provided to NOAA Fisheries for review and approval prior to implementation. The WQPMP would identify the timing and methodology for water-quality sampling during construction of the Modified LPA, as well as methods of implementation and reporting. If, in the future, a standard water-quality monitoring plan is adopted by ODOT and/or WSDOT, this plan, with the agreement of NOAA Fisheries, may replace the contractor plan.
- In compliance with ODOT and WSDOT policy and construction administration practice in Oregon and Washington, have one or more Department of Transportation inspectors on site during construction. The role of the inspector(s) would be to monitor compliance with contract and permit requirements.
- If in-water dredging is required outside of a cofferdam, use a clamshell bucket. Dredging and handling and disposal of dredged materials shall be conducted consistent with the requirements and conditions of the regulatory permits issued for the Modified LPA.
- Prohibit work barges from grounding out.
- Dispose of excess or waste materials in an appropriate manner consistent with applicable local, state, and federal regulations; do not dispose of or abandon waste materials waterward of the OHWM or allow them to enter waters of the state.
- All pumps must employ a fish screen that meets the following specifications:
    - An automated cleaning device with a minimum effective surface area of 2.5 square feet per cubic foot per second and a nominal maximum approach velocity of 0.4 feet per second, or no automated cleaning device, a minimum effective surface area of 1 square foot per cubic foot per second and a nominal maximum approach rate of 0.2 feet per second; and
    - A round or square screen mesh that is no larger than 0.094 inches (2.38 millimeters [mm]) in the narrow dimension, or any other shape that is no larger than 0.069 inches (1.75 mm) in the narrow dimension; and
    - Each fish screen must be installed, operated, and maintained according to NOAA Fisheries fish screen criteria.

Spill Prevention/Pollution Control Measures

- Require contractor to prepare a spill prevention, control, and countermeasure (SPCC) plan and pollution control plan (PCP) prior to beginning construction. These plans would be provided to NOAA Fisheries for review and approval. The SPCC plan and PCP would identify the appropriate spill containment materials; as well as the means and methods of implementation, response, and reporting. All elements of the SPCC plan and PCP would be available at the project site at all times. For additional detail, consult ODOT Standard Specification 00290.00 to 00290.90.

- Require contractor to designate at least one employee as the erosion and spill control (ESC) lead. The ESC lead would be responsible for the implementation of the SPCC plan and PCP.
- Maintain applicable spill response equipment and material designated in the SPCC plan and PCP at the job site.
- With the exception of barges and stationary large equipment (cranes, oscillators) operating from barges or work platforms, fuel and maintain equipment at least 150 feet from the OHWM of any waterbody using secondary containment to minimize potential for spills or leaks entering the waterway.
- Clean and inspect all equipment to be used for construction activities prior to arriving at the project site, to ensure no potentially hazardous materials are exposed, no leaks are present, free of noxious weeds, and the equipment is functioning properly. Daily inspection and cleanup procedures would be identified.
- Should a leak be detected on heavy equipment used for the project, immediately remove the equipment from the area, and do not use again until adequately repaired. Where off-site repair is not practicable, the SPCC plan and PCP would document measures to be implemented to prevent and/or contain accidental spills in the work/repair area to ensure no contaminants escape containment to surface waters and cause a violation of applicable water-quality standards.
- Operate construction equipment from on top of floating barges, from the decks of temporary work bridges and platforms, the decks of the existing or replacement bridges, or from portions of the streambank above the OHWM. Barges and support vessels would be operated in the water.
- Provide suitable containment measures for all equipment (including barges, work decks, stationary power equipment, and storage facilities) in the SPCC plan and PCP to prevent and/or contain accidental spills to ensure that no contaminants escape containment to surface waters and cause a violation of applicable water-quality standards.
- Design and install temporary work bridges and platforms, cofferdams, and drilled shaft isolation casings consistent with the ODOT Hydraulics Manual, which establishes criteria to avoid these structures being overtopped during high water events.
- Process water generated on site from construction, demolition or washing activities would be contained and treated to meet applicable water-quality standards before entering or reentering surface waters.
- Do not conduct paving, chip sealing, or stripe painting activities during periods of rain or wet weather.
- In the SPCC plan and PCP, establish a concrete truck chute cleanout area to properly contain wet concrete as part of ODOT Standard Specification 00290.30(a).

Site Erosion/Sediment Control Measures

- Require contractor to prepare and implement a temporary erosion and sediment control plan (TESCP) to minimize impacts associated with clearing, vegetation removal, grading, filling, compaction, or excavation. The BMPs identified in the TESCP would be used to control sediments from all vegetation removal or ground-disturbing activities. Additional temporary control measures may be required beyond those described in the TESCP if it appears pollution or erosion may result from weather, nature of the materials or progress on the work. For additional detail, consult ODOT Standard Specifications 00280.00 to 00280.90.
- As part of the TESCP, delineate clearing limits with orange barrier fencing wherever clearing is proposed in or adjacent to a stream/wetland or its buffer and install perimeter protection/silt fence as

needed to protect surface waters and other critical areas. Location would be specified in the field, based upon site conditions and the TESCP. For additional silt fence detail, consult ODOT Standard Specification 00280.16(c).

- Require contractor to designate at least one employee as the ESC lead. The ESC lead would be responsible for the implementation of the SPCC plan and PCP and would also be responsible for ensuring compliance with all local, state, and federal erosion and sediment control requirements.
- All TESCP measures would be inspected and maintained as required by applicable permit requirements. Contractor would also conduct maintenance and repair of TESCP measures as described in ODOT Standard Specifications 00280.60 to 00280.70.
- For landward construction and demolition, locate project staging and material storage areas a minimum of 150 feet from surface waters, in currently developed areas such as parking lots or managed fields, unless a site visit by an ODOT/WSDOT biologist determines (and an ODOT/NOAA Fisheries liaison confirms) that the topographic features or other site characteristics allow for site use closer to the edge of surface waters.
- Complete excavation activities under dry or dewatered conditions where practicable. All surface water flowing toward the excavation would be diverted through utilization of cofferdams and/or berms. Cofferdams and berms must be constructed of sandbags, clean rock, steel sheeting, or other non-erodible material.
- Limit bank shaping to the extent as shown on the approved grading plans. Minor adjustments made in the field would occur only after engineer's review and approval.
- Install biodegradable erosion control blankets on areas of ground-disturbing activities on steep slopes (1V:3H or steeper) that are susceptible to erosion and within 150 feet of surface waters. Areas of ground-disturbing activities that do not fit the above criteria would implement erosion control measures as identified in the approved TESCP. For additional erosion control blanket detail, consult ODOT Standard Specification 00280.14I.
- Cover erodible materials (material capable of being displaced and transported by rain, wind or surface water runoff) temporarily stored or stockpiled for use in project activities to prevent sediments from being washed from the storage area to surface waters. Temporary storage or stockpiles must follow measures as described in ODOT Standard Specification 00280.42.
- Stabilize all exposed soils as directed in measures prescribed in the TESCP. Hydro-seed all bare soil areas following grading activities and revegetate all temporarily disturbed areas with native vegetation indigenous to the location. For additional details, consult ODOT Standard Specifications 01030.00 to 01030.90.
- Where site conditions support vegetative growth, plant native vegetation indigenous to the location in areas temporarily disturbed by construction activities. Revegetation of construction easements and other areas would occur after the project is completed. Trees would be planted when consistent with highway safety standards. Riparian vegetation would be replanted with species native to geographic region. Planted vegetation would be maintained and monitored to meet regulatory permit requirements. For additional detail, consult ODOT Standard Specifications 01040.00 to 01040.90.

Pile Installation and Removal Best Management Practices

- Use a vibratory hammer to drive steel piles to the maximum extent practicable, to minimize noise levels.

- Conduct impact pile driving below the OHWM between September 15 and April 15. Vibratory pile installation and removal (as well as certain other in-water construction activities) may occur on a year-round basis, provided they are conducted in compliance with all regulatory approvals.
- No more than two impact pile drivers would be operated simultaneously within the same waterbody channel.
- Employ a bubble curtain or other similarly effective noise attenuation device during all impact pile driving conducted in water depths greater than 2 feet (0.67 meters).
- Develop and implement a hydroacoustic monitoring plan, based on the template developed by the Fisheries Hydroacoustic Working Group, in coordination with FHWA and FTA to confirm the effectiveness of the noise attenuation devices and that predicted noise levels adequately capture the area of the potential onset of injury. The plan would be provided to NOAA Fisheries for review and approval prior to any impact pile-driving activity commencing.
- Prepare a marine mammal monitoring plan and establish injury protection zones for marine mammals.
- Install cones or other anti-perching devices on open-ended pipe piles to discourage perching by piscivorous birds.
- Remove temporary piles with a vibratory hammer, or by direct pulling, and prohibit intentionally breaking by twisting or bending.
- In the event that a temporary pile cannot be removed, cut or press the pile 3 feet below the mudline. At locations where hazardous materials are present or adjacent to utilities, temporary piles may be cut off at the mud line with underwater torches, if such activity would not conflict with navigation elements.

Work Area Isolation and Fish Salvage Best Management Practices

- Develop a Temporary Water Management Plan, consistent with the requirements of ODOT Special Provision Section 00245.03, and provide to NOAA Fisheries for review and approval prior to any work area isolation of fish salvage activities.
- Install cofferdams and isolation casings in a manner that minimizes fish entrapment. Sheet piles would be installed from upstream to downstream, lowered slowly until contact with the substrate.
- Screen drilled shaft isolation casings at the bottom, to minimize potential for fish entrapment during installation. Screen shall have maximum openings of approximately 3/32 inch (2.38 mm) measured on a diagonal (NOAA Fisheries 2022).
- Conduct fish salvage according to the best practices established in the biological opinion for ODOT's Federal Aid Highway Programmatic consultation.
- Have a qualified fishery biologist[2] conduct and supervise fish capture and release activity to minimize risk of injury to fish.
- Prepare a fish salvage report and submit to NOAA Fisheries, U.S. Fish and Wildlife Service (USFWS), Oregon Department of Fish and Wildlife (ODFW), and WDFW following project completion.

[2] The qualified biologist shall have a bachelor's degree in biology, fisheries, or equivalent and a minimum of 2 years of experience identifying northwest fish and aquatic species. If electrofishing is required, the lead biologist shall be competent with electrofishing procedures and have completed at least 100 hours of fish salvage following NOAA Fisheries, USFWS, ODFW, and/or WDFW fish salvage/fish removal protocols.

- Make a reasonable effort to capture ESA-listed fish known or likely to be present in an in- water isolated work area using methods that minimize the risk of injury. Attempts to seine and/or net fish would precede the use of electrofishing equipment.
- If electrofishing must be used, conduct consistent with NOAA Fisheries "Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act" (NOAA Fisheries 2000), or most recent version.

Work Area Lighting BMPs

- Conduct construction activities consistent with local, state and federal permit restrictions for allowable work hours. If work occurs at night, temporary lighting may be required to provide better visibility for driver and worker safety. If temporary lighting is required, contractor would use directional lighting with shielded luminaries to control glare and direct light onto work area, not surface waters.

Program-Specific Mitigation

- Avoid and minimize short-term impacts to ecosystem resources in final design to the extent practicable.
- Restore temporarily disturbed terrestrial habitats consistent with applicable regulatory requirements.
- Provide compensatory mitigation for unavoidable impacts to ecosystem resources, consistent with applicable federal, state, and local regulatory requirements.
- Conduct activities with the potential to impact nesting migratory birds, such as nest removal, consistent with the provisions of the MBTA, which requires nests of migratory birds to be removed only at times when nests are inactive.

3.17 Geology and Groundwater

The Pacific Northwest is a complex, geologically active region. Bridges are vital links in the transportation system and are often especially vulnerable during seismic events. This section identifies, describes, and evaluates the long-term and temporary effects of geologic hazards, as well as geologic and hydrogeologic (groundwater) conditions. The information presented in this section is based on the Geology and Groundwater Technical Report.

3.17.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with geology and groundwater has been updated in this Draft SEIS to include:

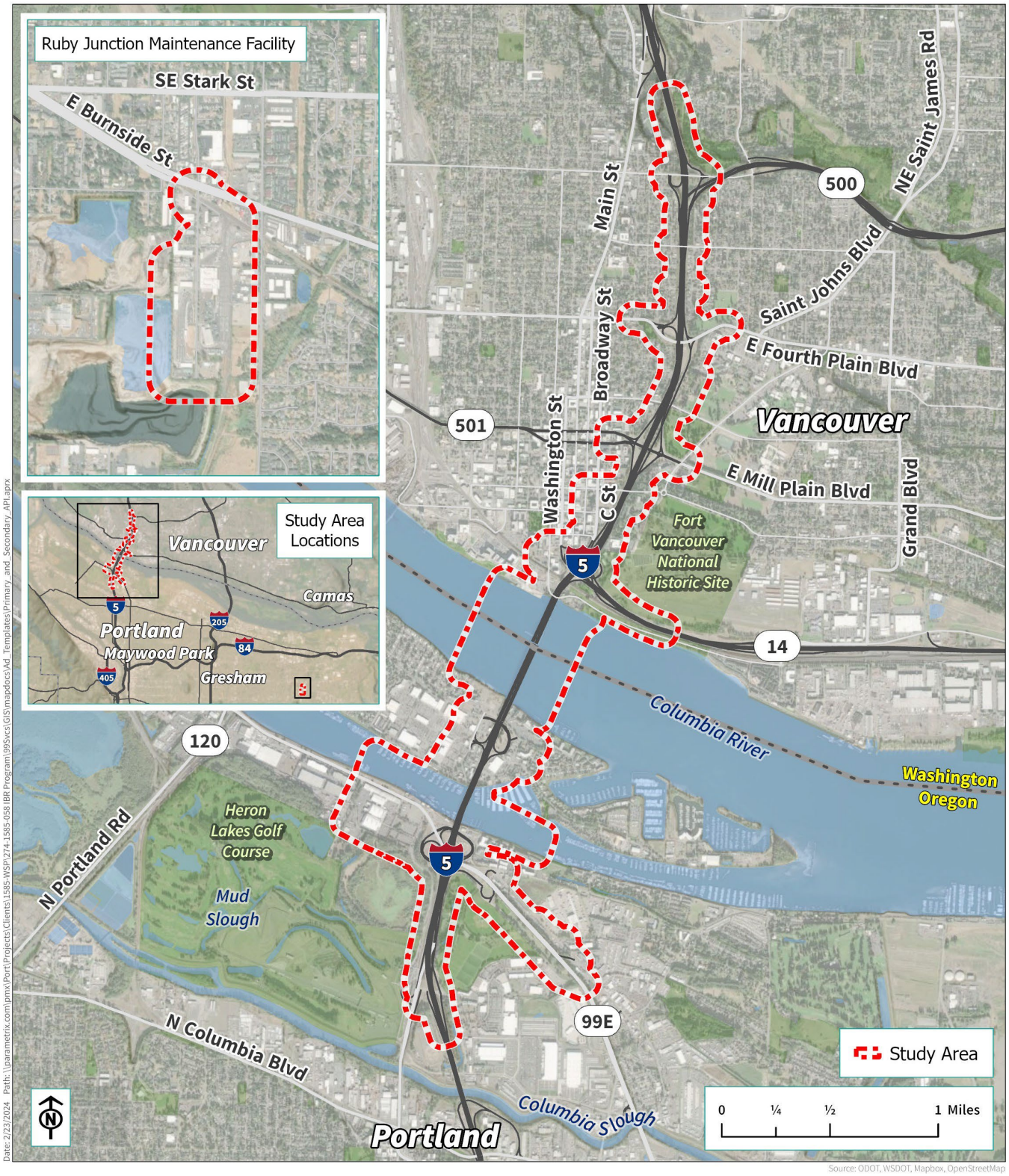
- Additional information about the increased risk for seismicity in the Cascadia Subduction Zone (CSZ).
- Additional consideration of geologic strata in the study area to accommodate new seismic standards.
- Changes in the project footprint necessitated by changed conditions resulted in shifting the LRT alignment and modifying interchange designs.
- Updated assessments of the long-term and temporary effects of geologic hazards on the Modified LPA.
- Updated engineering to address geological and seismic conditions, including new design requirements established by WSDOT and ODOT in 2020.

Based on the analysis described in this section, geologic and groundwater resource impacts of the Modified LPA would be similar to the CRC LPA. Despite changes in seismic standards since 2013, both the Modified LPA and CRC LPA would improve seismic resiliency compared to the existing Interstate Bridge. The improved seismic resiliency would improve public safety and structural stability in the event of a seismic event, reduce the potential for soil erosion and slope failure, and decrease the risk of damage to the new Columbia River bridges due to scour from a lahar event.

3.17.2 Existing Conditions

The geology and groundwater study area (Figure 3.17-1) is within the CSZ, a convergent plate boundary system where the Pacific Ocean plate descends beneath the North American plate. The CSZ makes the region subject to serious geologic and seismic hazards such as earthquakes, tsunamis, and volcanic eruptions that can put people and infrastructure at risk. The study area contains specific geologic and groundwater conditions that influence the design, location, and construction techniques.

Figure 3.17-1. Geology and Groundwater Study Area



Geologic Resources

The study area is relatively flat, with steeper slopes in the northern portion near Burnt Bridge Creek. Unconsolidated deposits of granular material such as sand, gravel, cobbles, and boulders underlie the study area and surrounding areas. These deposits provide a valuable aggregate mineral resource in the region. In addition, volcanic bedrock occurs deep below the surface.

Geologic Hazards

Several types of earthquakes could occur in the study area. The most damaging potential earthquake would be caused by a shift in a large offshore fault located approximately 120 miles west of I-5. Such a shift could generate an earthquake with a moment magnitude (M_w) as high as M_w9.0. Effects from earthquakes result from ground motion amplification, soil instability, soil liquefaction, lateral spreading, seismic-generated water waves, and earthquake-induced landslides. Although moment magnitude is only one factor contributing to earthquake damage, earthquakes with high moment magnitudes can cause massive destruction.

Steep slopes, such as those in the Burnt Bridge Creek area, can be prone to erosion and landslides. However, there is no evidence of notable erosion or landslides in the study area.

Volcanic eruptions are not likely to occur within the study area. However, if Mt. Hood or another nearby Cascade volcano were to erupt, there is potential for some ashfall to accumulate in the study area and a large temporary increase in sediment load in the Columbia River. In the event of a Mt. Hood eruption, lahars (volcanic material flows) could carry sediment into the Sandy River, then into the Columbia River upstream of the study area.

What is moment magnitude (Mw)?

The moment magnitude scale, developed in the 1970s, is a method of measuring the strength of an earthquake. It has replaced the more familiar Richter scale because it can accurately measure a wider range of earthquake strengths. Like the Richter scale, the moment magnitude scale is *logarithmic*; an earthquake with M_w 6.0, for example, is about 32 times as strong as one with M_w 5.0. Moment magnitude scale measurements are similar to, but not precisely equal to, Richter scale measurements.

What is a lahar?

A lahar is a flow of volcanic material (such as rock debris and gases) and water that travels quickly and can cover great distances. Lahars typically flow downstream of a volcano within a river valley.

Groundwater Resources

The primary groundwater resource in the study area is the Troutdale Aquifer System in Clark County, Washington and Multnomah County, Oregon. Within Clark County, the aquifer is designated as a sole source aquifer (SSA). In addition, Vancouver has designated the entire area within the city boundaries as a Critical Aquifer Recharge Area. Groundwater from the SSA in Washington and in Oregon is used for industry, irrigation, heat exchange, and drinking water. Under Section 1424(e) of the Safe Drinking Water Act, projects that seek federal funding and have the potential to contaminate an SSA are subject to U.S. Environmental Protection Agency review and approval.

Within the study area, the Troutdale Aquifer System is composed of multiple unconsolidated sedimentary deposits in the Portland Basin and includes aquifer recharge areas and discharge areas. In aquifer recharge areas, groundwater is replenished through precipitation, infiltration from the Columbia River and streams, percolation of water through pervious surfaces, and contributions from drywells and underground sewage disposal. Discharge areas are where groundwater is withdrawn from wells or where it emerges from the subsurface in springs, streams, or underwater where it discharges to the Columbia River.

What is a sole source aquifer?

EPA defines a sole source aquifer as an aquifer or aquifer system that supplies at least 50% of the drinking water consumed in the area overlying the aquifer and one for which there is no alternative source or combination of drinking water sources that could physically, legally, and economically act to supply those dependent upon the aquifer.

No drinking water supply wells are currently used within the study area in Oregon. Within the study area in Washington, the city of Vancouver relies entirely on groundwater from the Troutdale Aquifer System. Within downtown Vancouver, groundwater flow is influenced by pumping from water supply wells. In accordance with federal and state regulations, Vancouver has established Special Wellhead Protection Areas around these wells, within which certain activities, such as hazardous material and municipal waste disposal, septic systems, and infiltration systems, are restricted to protect groundwater quality. A Special Wellhead Protection Area is located within the northern portion of the study area.

Groundwater Quality

Contaminants from commercial and industrial activities in Vancouver and Portland have resulted in areas of diminished groundwater quality. Information available from the Oregon Department of Environmental Quality and Washington Department of Ecology indicates that contaminants such as chlorinated solvents, petroleum products, and metals are found in groundwater at various locations in the study area.

As stipulated in the Safe Drinking Water Act and Washington Administrative Code Chapter 290, suppliers of drinking water must monitor for and meet primary and secondary drinking water standards. Beginning in approximately January 1979, the City of Vancouver has sampled and analyzed groundwater from its wells for the following classes of compounds: inorganics, volatile organic compounds, herbicides, pesticides, insecticides, radionuclides, fumigants, dioxins, and nitrate. A review of water quality data by the Washington State Department of Health indicates that none of these contaminants have been detected at or above their allowable limits in groundwater at any Vancouver water stations since the 1980s.

3.17.3 Long-Term Benefits and Effects

Table 3.17-1 summarizes the effects of the No-Build Alternative, Modified LPA, and design options on geology and groundwater. Detailed analysis of the effects is provided in the following sections.

Table 3.17-1. Summary of No-Build Alternative and Modified LPA Effects on Geology and Groundwater

1	2	3
No-Build Alternative	Modified LPA with Double-Deck or Single-Level Fixed-Span Configuration,[a] One or Two Auxiliary Lanes, with or without C Street Ramps, Centered I-5 or I-5 Westward Shift, all Park-and-Ride Site Options	Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, all Park-and-Ride Site Options
• No change (seismic deficiencies remain, would not affect geologic resources, would sustain existing impacts to degradation of the groundwater quality).	• Improved public safety, minimizing damage to infrastructure, and limiting potential economic disruption due to seismic improvements. • Slight potential for increased use of materials that could spur expansion and/or opening of surface mines. • Benefits to groundwater as a result of stormwater management and treatment.	• Similar to effects listed in Column 2, but would require more substantial river piers and pier foundations to support the movable spans.

a The long-term effects associated with the single-level fixed-span configuration would be the same for all bridge type options, unless otherwise specified.

No-Build Alternative

Geologic Hazards

The No-Build Alternative would maintain the existing I-5 infrastructure in the study area and would not provide seismic improvements to the Interstate Bridge or other I-5 structures. The existing structures were built before modern seismic codes were developed and could be substantially damaged in an earthquake. The No-Build Alternative would also not address the risks of increased scour from potential flooding and sediment load due to upstream, seismic induced landslides or lahars resulting from regional volcanic activity.

Geologic Resources

The No-Build Alternative would have limited need for geologic resources for I-5 operation and maintenance. The No-Build Alternative would not affect local surface mining resources or expand local quarries.

Groundwater Resources

The No-Build Alternative would not provide stormwater management or treatment, and therefore existing impacts to degradation of the groundwater quality in the study area would continue.

Modified LPA

Geologic Hazards

Earthquakes

The Modified LPA would have the long-term benefit of improving public safety, minimizing damage to infrastructure, and limiting potential economic disruption in the event of an earthquake. The new Columbia River and North Portland Harbor bridges, as well as ramp and interchange structures and transit facilities, would be built to modern seismic safety standards. Design of the Modified LPA would apply advancements in

earthquake engineering, structural safety standards, and site-specific geological and seismic risk information in the study area, which would improve public safety and structural stability during an earthquake. To meet current design standards, the Columbia River bridges with the Modified LPA would include more substantial foundation elements than the existing Interstate Bridge. The single-level movable-span configuration may require more substantial foundation elements than the fixed-span configurations. This is because mechanical tolerances for this type of bridge may require additional support for a seismic event.

The Modified LPA would stabilize weak soils along the Columbia River, on Hayden Island, around Marine Drive, and at Burnt Bridge Creek that are susceptible to liquefaction during seismic events through ground improvements such as soil mixing or stone columns.

The Ruby Junction Maintenance Facility expansion area lies entirely within an area classified as Seismic Hazard Zone D – Least Hazard. Construction of the Modified LPA would not increase seismic effects hazards at the facility.

Soil Liquefaction

Soil liquefaction is a phenomenon associated with earthquakes in which sandy to silty, water-saturated soils behave like fluids. As seismic waves pass through saturated soil, the structure of the soil distorts, and spaces between soil particles collapse, causing ground failure. In general, young, loose sediment and areas with high water tables are the most vulnerable to liquefaction.

Non-Seismic Settling

In the Portland area, there are a number of flood control levees located within the study area. Additionally, enhancements to the levee system and some new structures that will be a part of the levee system are in the planning stages. The Modified LPA includes structures and significant fills placed in the vicinity of the existing or planned levee sections that could induce longer term settling of soils, which may cause a reduction in the overflow elevations for the levees. Structure foundation elements that penetrate the levees can compromise the ability of the levee to retain water and increase seepage.

In areas on both sides of the Columbia River, Hayden Island, and throughout the study area, the placement of construction fill, retaining walls, or other structures for the Modified LPA could result in non-seismic soil settling. The potential for non-seismic settling would be addressed as a part of the geotechnical design for the Modified LPA.

Steep Slopes, Soil Erosion, and Landslides

The Modified LPA would minimize construction on steep slopes. The roadway design would include retaining walls or other stabilization techniques to reduce the potential for soil erosion and slope failure hazards. In the Burnt Bridge Creek area, which has steep slopes, the design includes grading of slope angles, management of stormwater volume and flow to reduce erosion, and revegetation of disturbed areas.

As noted above, landslides are not known to occur within the study area. The Modified LPA would address the risks of increased scour that could result from potential landslides upstream caused by a major CSZ event. New bridge pier design would decrease the risk of bridge damage in the event of changes in river flow and/or sediment loads due to upstream landslides in the river.

The Ruby Junction Maintenance Facility expansion area is generally flat without steep slopes. No long-term effects on geologic hazards are anticipated in this area.

Volcanoes

The Modified LPA would include design measures to address the risks of increased scour from potential volcano-related impacts and decrease the risk of damage to the new Columbia River bridges due to lahar effects upstream of the study area.

In the event of a volcanic eruption within the Cascade region, the prevailing wind patterns would carry the majority of ash to the northeast, away from the study area. Therefore, ash accumulation is not anticipated to pose risks to the new bridges under the Modified LPA.

Groundwater Resources

The Modified LPA would provide long-term benefits to groundwater as a result of stormwater management and treatment throughout the study area. The associated reduction in pollutants from treatment of highway runoff would benefit the groundwater quality for the Troutdale SSA and groundwater flows that contribute to the Columbia River and Burnt Bridge Creek. There would be no adverse effects on groundwater resources.

3.17.4 Temporary Effects

No-Build Alternative

The No-Build Alternative would not have construction-related temporary effects on existing geologic hazards, geologic resources, or groundwater resources.

Modified LPA

The Modified LPA would require excavating filling, drilling, and grading activities during construction. Because the movable parts would be more sensitive to foundation settlement and movement during a seismic event, the single-level movable-span configuration may require slightly more construction effort and materials to construct the relatively larger river piers and pier foundations.

Geologic Hazards

Earthquakes

Construction of the Modified LPA, including construction of the new bridges and removal of the existing Interstate Bridge, would follow the American Association of State Highway and Transportation Officials standards. Temporary structures would incorporate appropriate seismic design. Although this would not provide the same level of resiliency as the completed infrastructure, it would minimize risks from earthquakes during construction.

Non-Seismic Settling

Although the design of the Modified LPA would address potential non-seismic settlement, if not correctly designed and constructed, new structures with the Modified LPA could experience settling during construction. Settling around structures occurs as soil conditions adjust to the weight of new structures. Settling can result in various adverse effects, such as roadway cracks and compromised foundations, which would require repair during construction. The greatest potential for settling is likely to occur on Hayden Island and along the shoreline of the Columbia River, where fill materials were previously used to extend shorelines and fill depressions.

In the Portland area, there are a number of flood control levees located within the study area. These levees could be impacted by the proposed construction and settlements could generate low spots in the levee system.

Potential non-seismic settlement could be present in areas of the Modified LPA where retaining walls and other structures are planned. Construction of retaining walls and backfilling could result in adverse effects from settling, if not properly engineered and compacted. In addition, ground improvement methods could be used during construction to provide beneficial structural performance in the Modified LPA. In areas where retaining walls are proposed at the edge of the project footprint, the Modified LPA would comply with current standards for geotechnical assessment, design, and construction to minimize the potential for settlement on adjacent properties. With the correct design and construction methods, the risks of settlement would be minimal.

Soil Erosion

Soil erosion could occur during construction if not controlled. Construction activities could expose erosive soils to wind and stormwater. Soil erosion has the potential to temporarily plug stormwater catch basins; deposit soil surface water on roadways; diminish surface water quality in the Columbia River, Vanport Wetland, and Burnt Bridge Creek; and undermine existing roadways and structures. The Modified LPA would expose approximately 415 acres of near-surface soils to potential erosion from excavation, fill, clearing, and grading during construction. Best management practices for erosion control, as described in Section 3.17.5, would be incorporated into construction specifications to minimize the potential for these hazards.

Geologic Resources

The Modified LPA would require large amounts of geologic resources during construction, including topsoil, fill, aggregate, and rock. Project-created demand could require existing aggregate mines to expand or new mine sites to be developed. Local geologic resources are not unique but are limited in number, material types, and volumes; approximately 33 mine sites are present within 10 miles of the study area.

Groundwater Resources

The Modified LPA is not expected to have substantial temporary effects on groundwater resources. Construction techniques for deep bridge foundations would be designed to minimize the need for groundwater dewatering. Dewatering may be necessary in areas where roadway sections are depressed and there is a shallow water table, but the volume of water produced is expected to be small and would come from shallow depths, not connected with groundwater resource production. Stormwater protection measures, including spill prevention plans, would be in place during construction to protect groundwater and surface water.

3.17.5 Indirect Effects

Geologic Hazards

The greatest risk from earthquakes under the Modified LPA occurs on Hayden Island and near the Columbia River and North Portland Harbor. Earthquake effects include ground motion amplification and soil liquefaction, which have a high potential to impact public safety, cause structural damage, and result in economic disruption. Compared to the No-Build Alternative, the Modified LPA may attract development near Vancouver's waterfront and Hayden Island, which is consistent with local land use plans (see Section 3.4.4). New and retrofitted buildings and structures would be built to current seismic safety standards, potentially enhancing public safety and decreasing the likelihood of structural and economic damage and disruption.

A flood protection system consisting of levees and flood walls is presently located on the southern edge of the Oregon Slough. The Modified LPA would necessarily cross these embankments and structures. Construction for the Modified LPA could introduce additional loads on the ground around these and cause some settlements, potentially generating low spots in the flood control system. Proper design and planning for the foundation elements would minimize these risks. In addition, the Program would carefully design foundation

elements that might be required to penetrate any levee elements or affect the stability of the levees in any way.

Groundwater Resources

Currently, stormwater in the study area is not treated. Over time, enhanced stormwater management requirements and treatment standards would likely improve local groundwater quality, particularly for the Troutdale Aquifer System.

Geologic Resources

Depending on the nature of long-term maintenance needs for the Modified LPA, there is the potential for increased use of materials such as aggregate and concrete for the project. This slight increase in demand for these materials could sustain mines or quarries over the long term. Mining operators would have to comply with federal, state, and local laws to minimize potential environmental damage.

3.17.6 Potential Avoidance, Minimization, and Mitigation Measures

Long-Term Effects

Regulatory Requirements

- Design structures to comply with federal, state, and city building seismic codes and standards and apply advancements in earthquake science and construction materials and updates in the conceptual model.
- Design systems to minimize contamination of groundwater resources in compliance with Vancouver Municipal Code Chapter 14.26 Water and Sewers – Water Resources Protection and Portland City Code Title 21.35, Well Head Protection, and any applicable Washington and Oregon regulations.

Program-Specific Mitigation

- Design structures to consider stormwater infiltration or other changed conditions near shallow footings, retaining walls, and other structures that could increase the potential for soil liquefaction during a future seismic event.
- Design the Modified LPA to accommodate a range of future conditions resulting from climate change to provide resilience for geologic concerns, such as increased erosion and scour, as feasible.
- Conduct site-specific assessments of existing geologic hazards such as, but not limited to, faults, ancient landslides, steep cut slopes, non-seismic settlements, and soil liquefaction during design of the Modified LPA, as feasible. Site-specific assessments should include the use of geotechnical drilling, test pitting, material testing, geophysical techniques, subsurface displacement monitoring (inclinometers) and monitoring well installation, as feasible. Assessment would include recommended options for avoiding or mitigating geologic hazards.
- Consider the use of light weight fills or geoform in areas adjacent to existing flood control levees and structures to minimize the potential for settlements.
- Assess soil stabilization techniques to minimize the potential for soil liquefaction and non-seismic settlements during design of the Modified LPA. Stabilization techniques may include, but are not limited to, the use of soil mixing, compaction grouting, jet grouting, and stone columns.
- Locate stormwater treatment facilities, to the extent possible, away from City of Vancouver well head protection zones for WS-1 and WS-3, and the Cascade Expansion groundwater protection area in Gresham for the Ruby Junction location.

Temporary Effects

Regulatory Requirements

- Prepare and implement erosion control and stormwater pollution prevention plans and grading plans during construction. Plans would adhere to ODOT and WSDOT guidelines.
- Prepare and implement stormwater discharge permits for construction.
- Conduct inspection and observation monitoring of all Modified LPA elements during construction and long-term operations to ensure that appropriate construction and maintenance measures are being taken.

Program-Specific Mitigation

- Evaluate local geologic resources for future material needs.
- Recycle or reuse aggregate, quarry rock, asphalt, and concrete materials to the extent practical.

3.18 Hazardous Materials

This section identifies, describes, and evaluates potential temporary and long-term hazardous materials-related effects resulting from the No-Build Alternative and construction and operation of the Modified LPA. This section also describes measures to help avoid or mitigate adverse effects.

The information in this section is based on the Hazardous Materials Technical Report, which contains additional detail including analysis methods, an inventory and maps of recognized environmental conditions (RECs), and potential RECs identified through environmental data reports and desktop site assessment tools.

3.18.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with hazardous materials has been updated in this Draft SEIS to include:

- Updated assessment methodologies based on state and federal laws and requirements and lead agency environmental standard operating procedures.
- Updated datasets for hazardous material sites based on current database searches and the study area for the Modified LPA.
- Updated long-term and temporary property acquisitions for the Modified LPA.
- Changes in the project footprint necessitated by changed conditions resulted in shifting the LRT alignment and modifying interchange designs.

Table 3.18-1 compares the impacts of the CRC LPA and the IBR Modified LPA as a result of the changes listed above. A detailed description of impacts and benefits to hazardous materials from the IBR Modified LPA and design options follows. Based on the analysis described in this section, the hazardous materials effects of the Modified LPA would be the same as or similar to the effects of the CRC LPA.

3.18.2 Existing Conditions

This section identifies existing hazardous materials sites within the study area, RECs on those sites, and other potential sources of pollutants in the study area, including stormwater runoff and spills.

Hazardous Materials Sites within the Study Area

The hazardous materials study area includes the limits of ground disturbance for the Modified LPA plus the maximum standard 1-mile database search radii established by ASTM E1527-21 for conducting environmental site assessments. A study area–level environmental database search identified 579 sites that could potentially contain hazardous materials. Of these, 358 were identified in Washington and 221 in Oregon.

The Ruby Junction Maintenance Facility is also identified as a small-quantity generator for hazardous wastes including solvents, batteries, and paints. Oregon Department of Environmental Quality (DEQ) files for the Ruby Junction property indicate that cleanup activities for leaking underground storage tanks (LUSTs) at the site were completed in 1994 and 1998. DEQ also identifies seven potentially contaminated sites within 500 feet of the proposed expanded facility boundaries.

Table 3.18-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects Identified in this Section	Explanation of Differences
Property acquisition	• Moderate potential for increased liability from the acquisition of contaminated sites. • Moderate potential for long-term beneficial effects on human health and safety from cleanup and remediation of contaminated areas on acquired sites.	• Similar potential to the CRC LPA for increased liability from the acquisition of contaminated sites. • Similar beneficial effects on human health and safety from cleanup and remediation of contaminated areas on acquired sites.	Approximate risk from property acquisition would be similar between the CRC LPA and the Modified LPA, as the overall number of sites affected by the two projects would be similar.
Surface water and groundwater quality	Beneficial effects from updates in stormwater conveyance and treatment, which would reduce pollutants in stormwater runoff and improve surface water and groundwater quality.	Same as the CRC LPA.	Risk to surface water and groundwater quality from the two projects would be similar, due largely to anticipated stormwater improvements providing beneficial effects.
Hazardous materials spill potential	Reduced spill risk due to reduced traffic congestion and collisions.	Same as the CRC LPA.	Risk due to hazardous material spill potential is similar for the two projects, as highway congestion and resultant collisions would be reduced under both the CRC LPA and the Modified LPA.

CRC = Columbia River Crossing; EIS = environmental impact statement; LPA = locally preferred alternative

The list of sites identified in the study area–level search was refined to focus on potential hazardous materials sites identified on properties proposed for acquisition by the IBR Program, or within sufficient proximity to potentially affect parcels proposed for acquisition. See the Hazardous Materials Technical Report for detailed discussion of the hazardous materials site identification and review process and methodology. In accordance with FTA Standard Operating Procedure (SOP) 19 (FTA 2016) and FHWA guidance, Phase I Environmental Site Assessments (Phase I ESAs) were completed for all properties proposed for acquisition. This included 137 total properties, consisting of 52 full parcels and 85 partial parcels. The purpose of the Phase I ESAs was to identify potential RECs, controlled RECs, (CRECs), or historical RECs (HRECs) on or near the properties proposed for acquisition.[1] Temporary construction easements were also identified and evaluated, as well as possible construction staging areas.

[1] ASTM Standard E1527-21 defines a Recognized Environmental Condition as, "…the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. De minimis conditions are not recognized environmental conditions."

A total of 78 separate Phase I ESA reports were produced, encompassing 69 parcels in Washington and 68 parcels in Oregon. These reports cover all properties that would be acquired under any of the Modified LPA design options. Conclusions from the Phase I ESAs were used to determine the need for a Phase II ESA or other additional assessment on individual parcels. The findings of Phase II ESAs, as required, would be included in the Final SEIS and ROD.

Recognized Environmental Conditions

The RECs identified during the Phase I ESA process are related to historical and current land uses on the potentially acquired properties. Some of the land uses that resulted in the identification of RECs on potentially acquired properties include the following:

- Automobile maintenance and repair.
- Boat maintenance and repair.
- Vehicle fueling (gas stations).
- Waste disposal (landfills).
- Chemical or hazardous materials storage, including underground and aboveground storage tanks (UST/AST) and LUSTs.
- Military use.

Figure 3.18-1 through Figure 3.18-9 show the locations of Phase I ESAs and identified RECs in the study area.

Each Phase I ESA provides recommendations for additional study, if appropriate. Though individual Phase I ESAs recommend more specific actions, general categories that the recommendations fall into include:

- No Further Environmental Investigation.
- Hazardous building materials survey (HBMS) – recommended for sites with structures that may require demolition (it should be noted that a recommendation for a HBMS does not reflect the identification of a REC on the relevant property).
- Contaminated media management plan – recommended for sites with known but well-characterized contamination that could be managed during construction.
- Simple Phase II ESA – recommended for sites with known or suspected contamination that is not fully characterized but not expected to be significant based on the Phase I ESA.
- Complex Phase II ESA – recommended for sites with known contamination which is not completely characterized and has the potential to extend to additional media or adjacent parcels.

Additional recommendations may apply to some sites based on site-specific conditions.

An HREC is defined as, "…a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted use criteria established by a regulatory authority, without subjecting the property to any required controls."

A CREC is defined as, "…a REC resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority, with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls."

Figure 3.18-1. Overview of Phase I ESA Locations and RECs in the Study Area

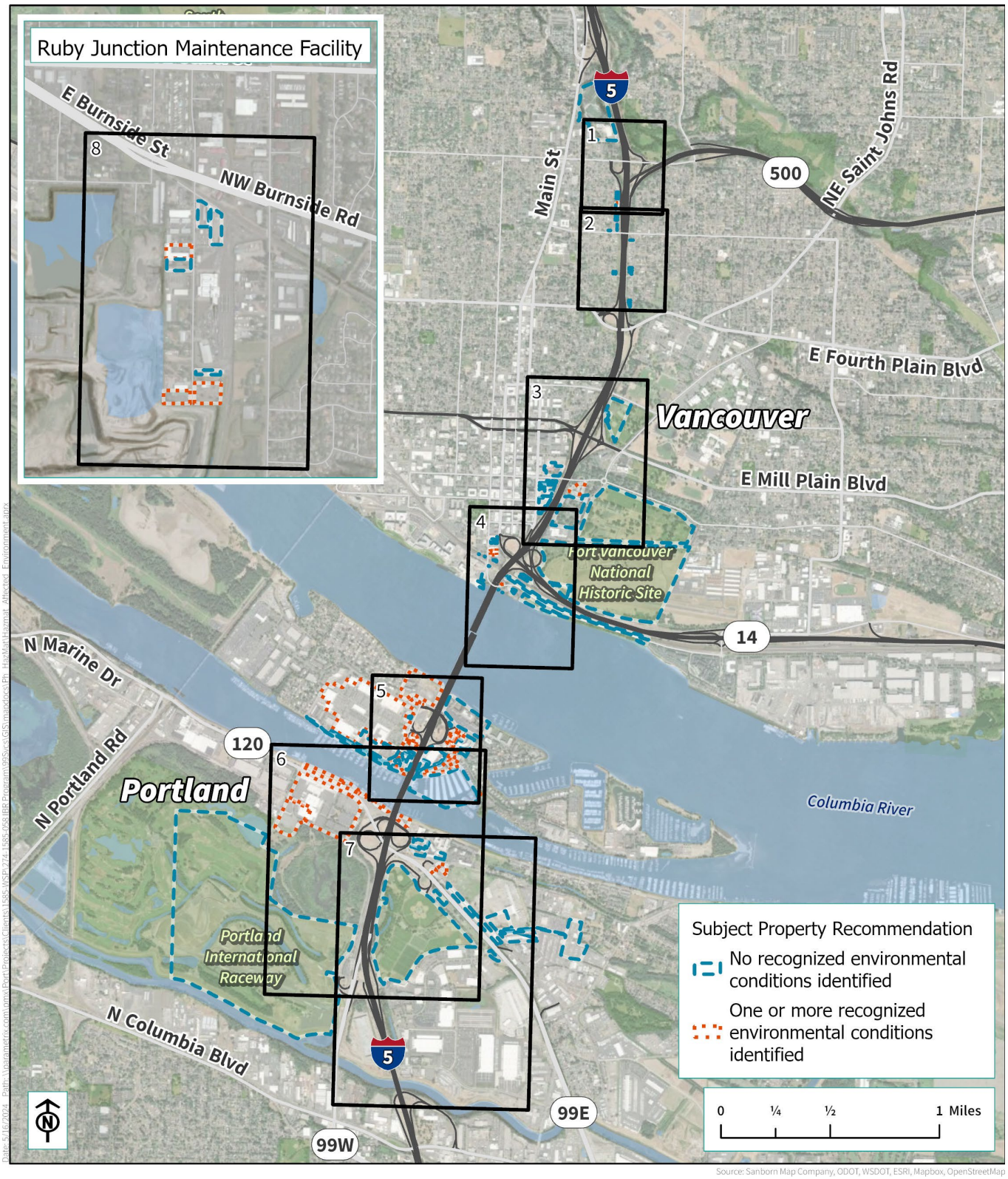


Figure 3.18-2. Phase I ESA Locations and RECs – Map 1

Figure 3.18-3. Phase I ESA Locations and RECs – Map 2

Figure 3.18-4. Phase I ESA Locations and RECs – Map 3

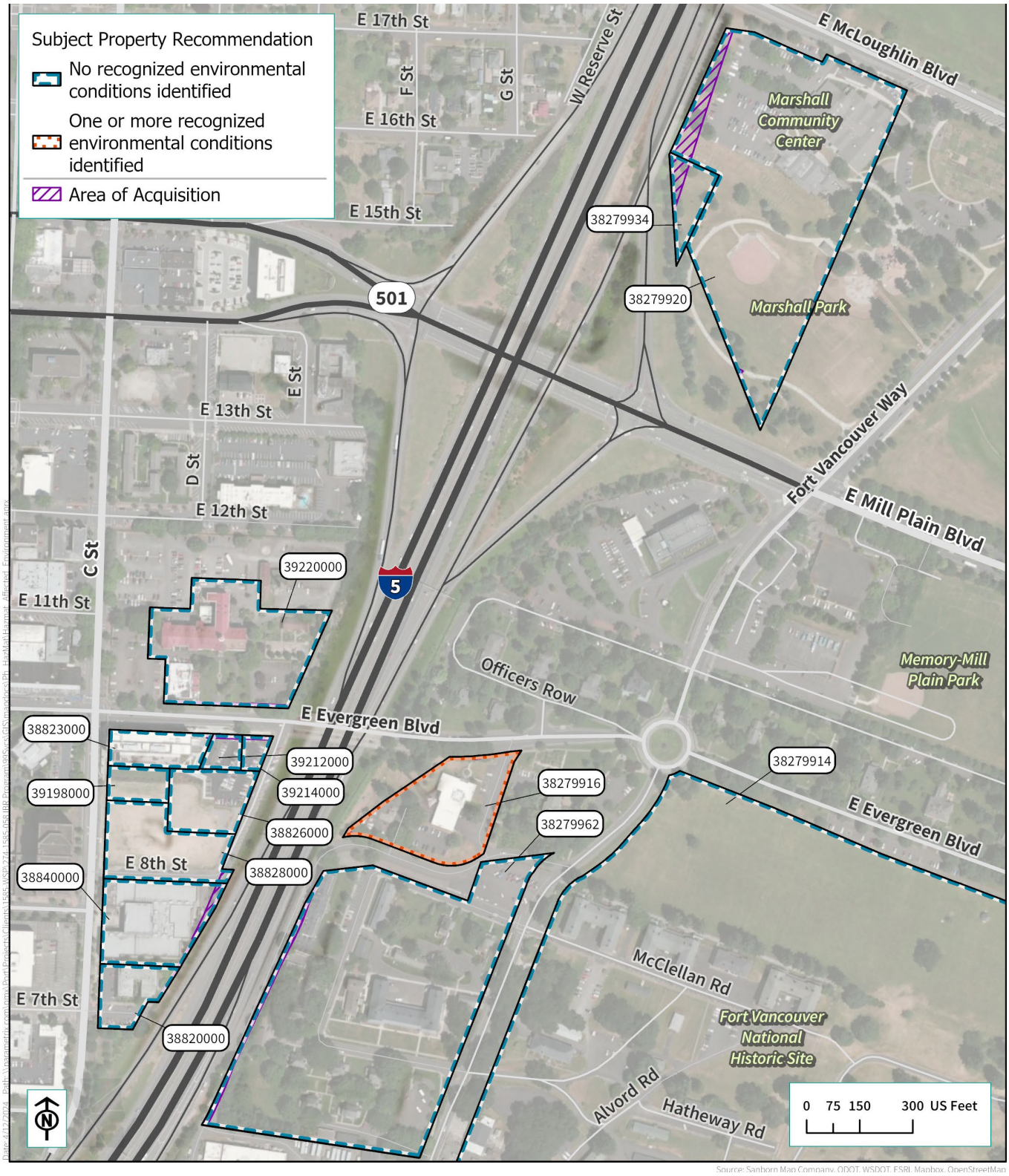


Figure 3.18-5. Phase I ESA Locations and RECs – Map 4

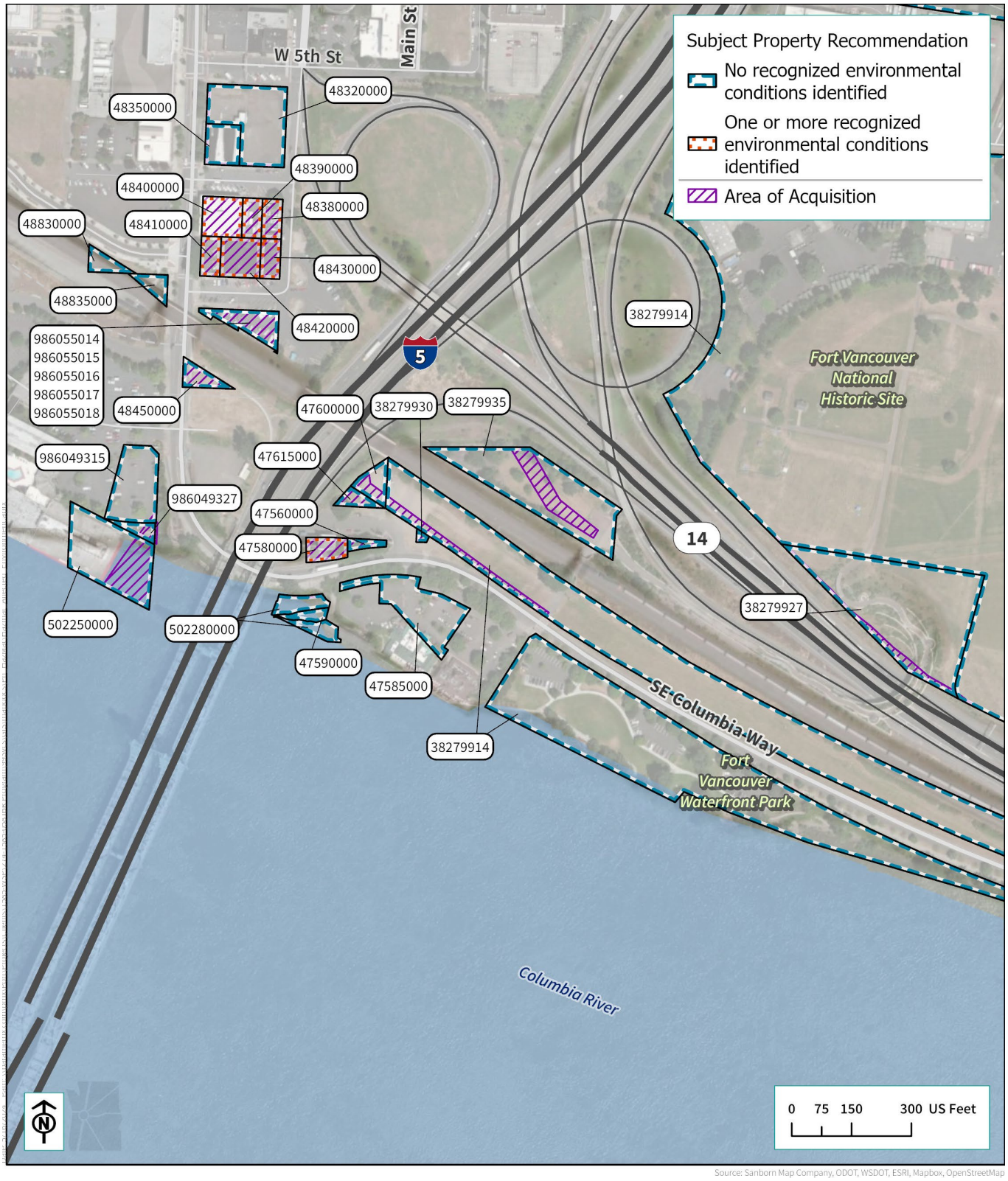


Figure 3.18-6. Phase I ESA Locations and RECs – Map 5

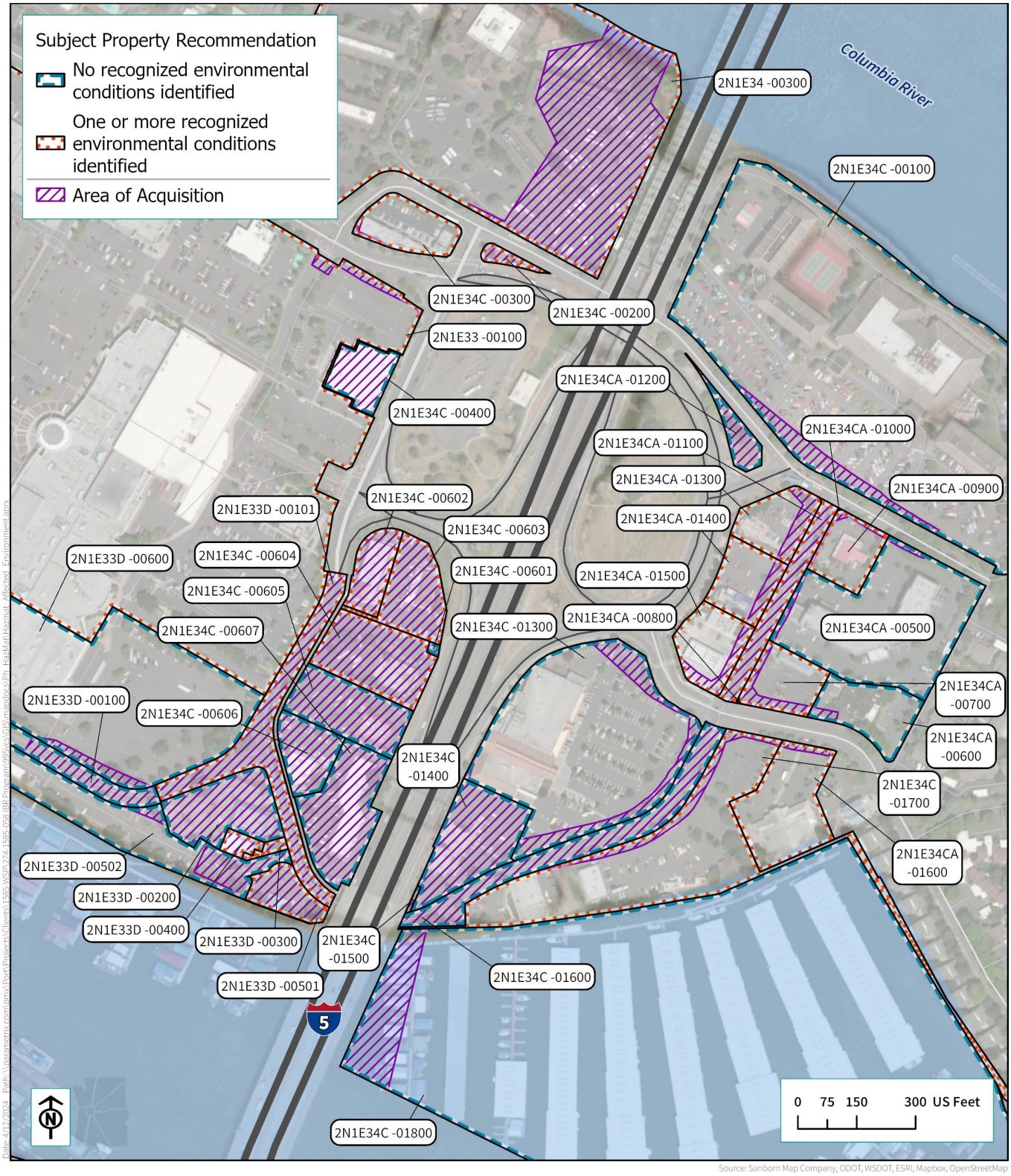


Figure 3.18-7. Phase I ESA Locations and RECs – Map 6

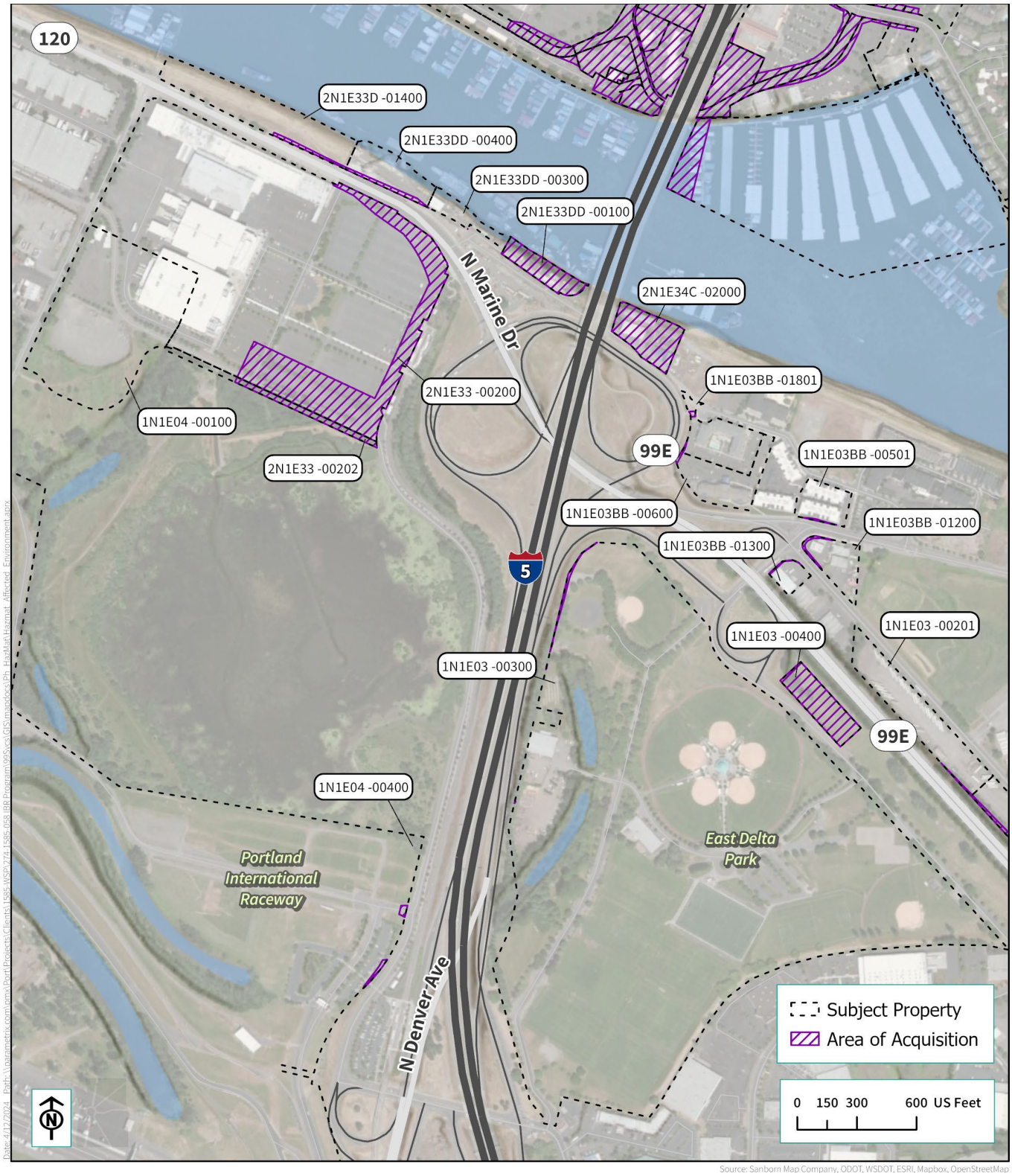


Figure 3.18-8. Phase I ESA Locations and RECs – Map 7

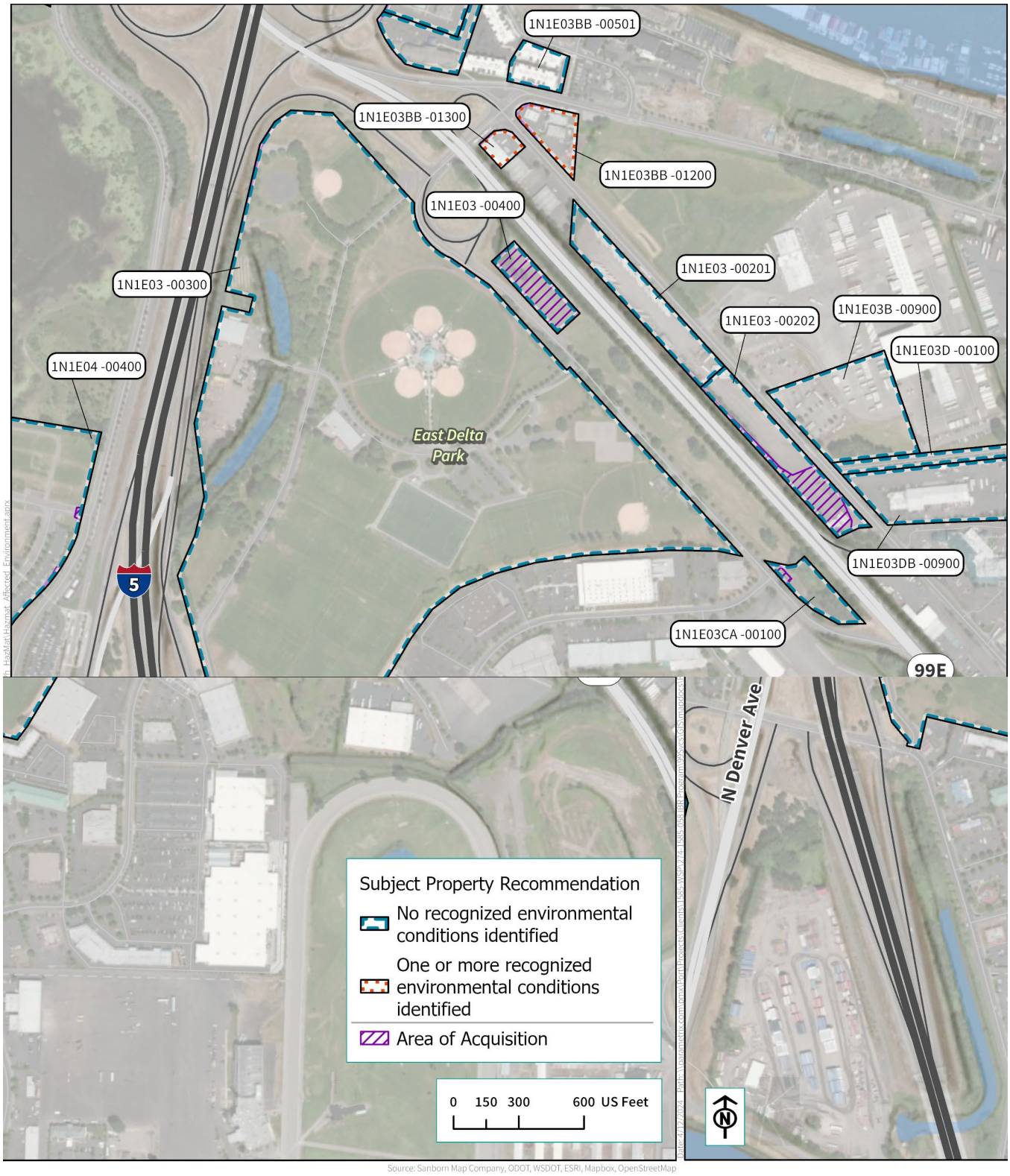
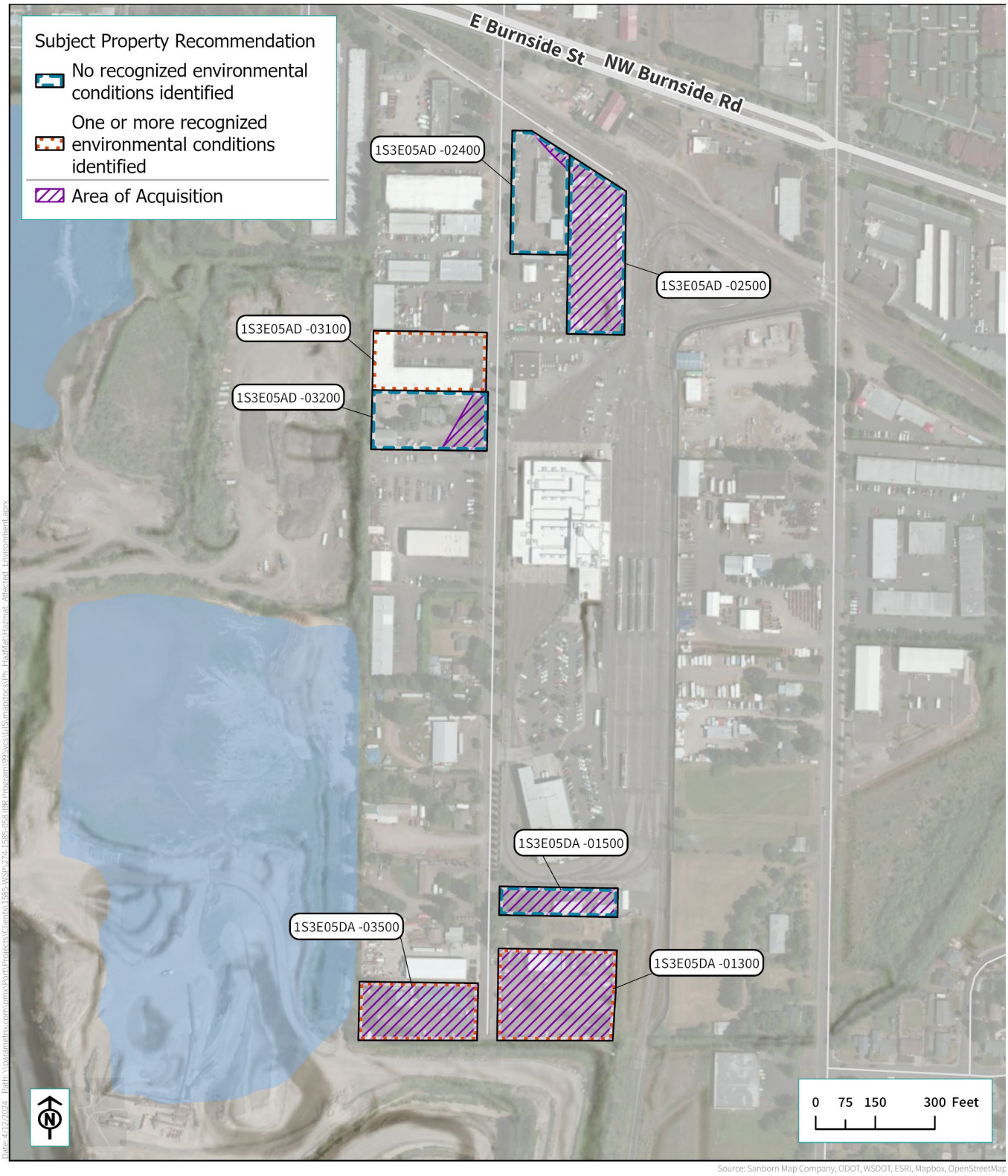


Figure 3.18-9. Phase I ESA Locations and RECs – Map 8



Of the 69 proposed acquisitions in Clark County, 59 received a recommendation of no further investigation (though five of those acquisitions have HBMS recommendations for impacted structures). Ten properties are recommended for further subsurface investigation (Phase II ESA) or contaminated media management plans; however, only 2 of these 10 properties are assumed to need more complex investigation.

Among 68 proposed acquisitions in Multnomah County, 35 received a recommendation of no further investigation (though 12 of those acquisitions have HBMS recommendations for impacted structures). Twenty-nine properties are recommended for further investigation, and 23 of the 29 are recommended for more complex investigation. In addition to these properties, some of these acquisitions are recommended for potential subsurface cleanup. The findings of the Phase II ESAs would inform mitigation and cleanup discussions in the Final SEIS.

Table 3.18-2 and Table 3.18-3 provide summaries of Phase I ESA recommendations for identified RECs in Washington and Oregon. Within Washington, the potential acquisitions requiring more complex investigation include the Clark Public Utilities property at 100 SE Columbia Way and a former industrial building at 215 W 4th Street. The potential acquisitions in Oregon that are likely to require more complex subsurface investigation and future cleanup are associated with the Pier 99 and Diversified Marine properties on North Portland Harbor, the Expo Center, the former Thunderbird Hotel and Hayden Island Landfill, and properties near former gas stations on Hayden Island east of I-5. Additional details on the conclusions of the Phase I ESAs, including those recommended for no further investigation, are provided in the Hazardous Materials Technical Report.

Stormwater Quality

The study area is located in the Columbia River watershed and the Burnt Bridge Creek watershed. These watersheds are highly urbanized within the study area. A substantial amount of the study area—including approximately 240 acres in the Columbia River watershed and 17 acres in the Burnt Bridge Creek watershed—is comprised of impervious surfaces that include highways, streets, parking lots, and alleys. Stormwater runoff from these surfaces—which contains pollutants such as automotive fluids, heavy metals, and small particles—flows into existing closed conveyance systems. These systems discharge runoff to either the Columbia River or Burnt Bridge Creek watersheds or to stormwater ponds and drywells that infiltrate into the subsurface soil.

In general, stormwater from the Columbia River watershed portion of the study area receives no water quality treatment prior to being released via several outfalls directly to the Columbia River. Runoff from the Interstate Bridge drains directly from the bridge decks through scuppers to the Columbia River or the ground below. In the smaller Burnt Bridge Creek watershed, most runoff is captured and treated by infiltration that removes pollutants as the stormwater percolates through the soil. Overall, approximately 21 acres within the study area receive some form of water quality treatment, while approximately 156 acres are untreated.

Additional discussion of stormwater quality and conveyance systems can be found in Section 3.14, Water Quality and Hydrology, and the Water Quality and Hydrology Technical Report.

Control Facilities for Spills and Releases

Roadway and transportation operations can result in the release of hazardous substances or petroleum products into the environment from accidental spills. These releases can migrate to surface water or groundwater and can affect properties outside of the right of way. Limited controls are currently in place within the study area to contain spills or releases of hazardous materials or petroleum products that could migrate to environmental media.

Table 3.18-2. Summary of Recommendations for Identified RECs – Washington

Tax Lot Number	Site Address	Owner	Total Area (acres)	Permanent Acquisition Impact (square feet)	Acquisition Extent	Phase I ESA Recognized Environmental Conditions Identified	Phase I ESA Recommendations
48380000	N/A	K2SM Investments LLC	0.115591	5,036	Full	One or more	CMMP
48390000	N/A	K2SM Investments LLC	0.113326	4,937	Full	One or more	CMMP
48400000	215 W 4th St	Columbia Fourth Building LLC	0.230046	10,022	Full	One or more	HBMS, Phase II complex
48410000	N/A	Columbia Fourth Building LLC	0.114527	4,989	Full	One or more	CMMP
48420000	210 W 3rd St	K2SM Investments LLC	0.345335	10,020	Full	One or more	HBMS; CMMP
48430000	210 W 3rd St	K2SM Investments LLC	N/A	N/A	Full	One or more	CMMP
47580000	100 SE Columbia Way	Clark Public Utilities	0.137723	6,000	Full	One or more	HBMS; Phase II complex
38279916	605 E Evergreen Blvd	City of Vancouver	2.05628	794	Partial	One or more	Phase II simple
14763000	3601 I St	Bob Snyder Real Estate LLC	0.114773	5,000	Full	None	HBMS
14765000	3605 I St	Davis Marcus A and Aiken Shareece	0.114773	5,000	Full	None	HBMS
14766000	3609 I St	Cheyney Aaron	0.114773	5,000	Full	None	HBMS
14768000	3615 I St	Dolbey John R	0.114774	5,000	Full	None	HBMS
15080000	904 E 35th St	Schaub Daniel and Schaub Elizabeth	0.11477	5,000	Full	One or more	HBMS; Phase II simple
15095000	N/A	Schaub Daniel and Schaub Elizabeth	0.057387	2,500	Full	One or more	HBMS; Phase II simple
15105000	3515 I St	Walters Aaron M	0.114773	5,000	Full	None	HBMS

ESA = environmental site assessment; HBMS = hazardous building materials survey; N/A = not applicable

Table 3.18-3. Summary of Recommendations for Identified RECs – Oregon

Tax Lot Number	Site Address	Owner	Total Area (acres)	Permanent Acquisition Impact (square feet)	Acquisition Extent	Phase I ESA Recognized Environmental Conditions Identified	Phase I ESA Recommendations
1S3E05DA-01300	1702 NW Eleven Mile Ave	Suran Rick P	1.560328	67967.90009	Full	One or more	Phase II simple
1S3E05DA-01500	1806 NW Eleven Mile Ave	VR Group LLC	0.496084	21609.41882	Full	None	HBMS
1S3E05DA-03500	1709 NW Eleven Mile Ave	Wagoner Properties LLC	1.003298	43703.67322	Full	One or more	Phase II simple
2N1E33DD-00100	1610 N Pier 99 St	Pier West LLC	1.017992	44343.72651	Full	One or more	HBMS; Phase II complex
2N1E34C-02000	1415 N Pier 99 St	Pier 99 LLC	1.592716	69378.72258	Full	One or more	HBMS; Phase II complex
1N1E04-00100	2060 WI/ N Marine Dr	Metro	10.81126158	0	Partial	One or more	Phase II complex
2N1E33-00200	2060 N Marine Dr	Metro	38.02263774	244768.0689	Partial	One or more	Phase II complex
2N1E33-00202	10799 WI/ N Expo Rd	The Port of Portland	0.728812658	21145.84096	Partial	One or more	Phase II complex
2N1E33D-01400	Levy Code 710	Metro	3.634831967	4953.610524	Partial	One or more	HBMS; Phase II complex
2N1E33DD-00300	1801-1809 N Pier 99 St	Whitecap Cove INC	0.783617393	13.269412	Partial	One or more	HBMS; Phase II complex
2N1E33DD-00400	1835 WI/ N Marine Dr	Redd Shores LLC	1.623943486	6493.692674	Partial	One or more	HBMS; Phase II complex

Tax Lot Number	Site Address	Owner	Total Area (acres)	Permanent Acquisition Impact (square feet)	Acquisition Extent	Phase I ESA Recognized Environmental Conditions Identified	Phase I ESA Recommendations
2N1E33D-00101	N Center Ave	Columbia Crossing LLC et al	1.30398	56801.37987	Full	One or more	HBMS, Phase II simple
2N1E33D-00200	11950 N Center Ave	N/A	0.968067	42169.01578	Full	None	HBMS
2N1E33D-00300	N Center Ave	Portland City of	0.064011	2788.303516	Full	One or more	HBMS; Phase II simple
2N1E33D-00400	N Center Ave	Portland City of	0.116175	5060.593671	Full	One or more	Phase II simple
2N1E33D-00501	11850 N Center Ave	1521/1523 N Jantzen Beach Property LLC	0.421582	18364.10501	Full	One or more	HBMS; Phase II simple
2N1E34C-00200	1401 WI/ N Hayden Is Dr	Thunderbird Hotel LLC	0.112638	4906.494663	Full	One or more	Phase II complex
2N1E34C-00601	N Center Ave	Buena-Hayden LLC	0.020297	884.156779	Full	None	Building survey
2N1E34C-00602	12229 N Center Ave	Buena-Hayden LLC	0.456181	19871.2569	Full	One or more	CMMP
2N1E34C-00603	12235 N Center Ave	Buena-Hayden North LLC	0.782624	34091.10826	Full	One or more	CMMP
2N1E34C-00604	12105 N Center Ave	Buena-Hayden LLC	1.099799	47907.24963	Full	One or more	HBMS; CMMP
2N1E34C-00605	12005 N Center Ave	Buena-Hayden LLC	0.934398	40702.39175	Full	None	HBMS
2N1E34C-00606	12055 N Center Ave	Buena-Hayden LLC	0.553	24088.6605	Full	None	HBMS

Tax Lot Number	Site Address	Owner	Total Area (acres)	Permanent Acquisition Impact (square feet)	Acquisition Extent	Phase I ESA Recognized Environmental Conditions Identified	Phase I ESA Recommendations
2N1E34C-00607	11915 N Center Ave	Buena-Hayden LLC	1.19962	52255.42742	Full	None	HBMS
1N1E03BB-01200	1014 N Marine Dr	The Webster Family LTD Prtnrshp	1.239179378	2614.209713	Partial	One or more	Phase II complex
1N1E03BB-01300	11051 N Vancouver Way	Georgia 01 LLC	0.487415053	649.893057	Partial	One or more	Phase II complex
2N1E33-00100	1555 N Tomahawk Is Dr	Jantzen Beach Center 1767 LLC	56.19442635	6075.455369	Partial	One or more	Phase II complex
2N1E34-00300	1401 N Hayden Is Dr	Thunderbird Hotel LLC	13.56992331	162170.4506	Partial	One or more	Phase II complex
2N1E34C-00300	1321-1337 N Hayden Is Dr	Hayden's Corner LLC	0.649744129	1273.422826	Partial	One or more	HBMS; Phase II complex
2N1E34C-01400	11875 N Jantzen Dr	DKoop Properties LLC	1.155933	50352.42424	Full	None	HBMS
2N1E34C-01500	N Jantzen Ave	DKoop Properties LLC	0.016344	711.964705	Full	None	HBMS
2N1E34C-01700	12050 N Jantzen Dr	Columbia Crossings LLC	3.825138306	13583.67998	Partial	One or more	HBMS; Phase II simple
2N1E34CA-01600	900 N Tomahawk Is Dr	(503) Real Estate LLC	1.249104441	2234.06147	Partial	One or more	HBMS; Phase II simple
2N1E34CA-01000	N Jantzen Ave	Taco Bell Corp et al	0.001055041	45.957604	Partial	One or more	Phase II complex
2N1E34CA-01100	N Jantzen Ave	Taco Bell Corp et al	0.58949556	25678.42658	Partial	One or more	Phase II complex

Tax Lot Number	Site Address	Owner	Total Area (acres)	Permanent Acquisition Impact (square feet)	Acquisition Extent	Phase I ESA Recognized Environmental Conditions Identified	Phase I ESA Recommendations
2N1E34CA-01300	12237 N Jantzen Dr	Weber Coastal Bells LP	0.629057238	8380.948765	Partial	One or more	Phase II complex
2N1E34CA-01400	12225 N Jantzen Dr	Jantzen/Angel LLC	0.63451554	5580.221826	Partial	One or more	Phase II complex
2N1E34CA-01500	12105 WI/ N Jantzen Dr	Chevron USA INC	0.697307599	7846.096472	Partial	One or more	Phase II complex
2N1E34CA-00700	12118 N Jantzen Dr	Sage Property Holdings LLC	0.630547303	7888.716493	Partial	One or more	Phase II complex
2N1E34CA-00900	12240 N Jantzen Dr	Umatilla INC	0.584856821	2745.984469	Partial	One or more	Phase II complex
1S3E05AD-02500	2410 NW Burnside Ct	2410 NW Burnside Ct LLC	1.347214	58684.62138	Full	None	HBMS
1S3E05AD-03100	2303-2363 NW Eleven Mile Ave	Nyhof Gordon L TR	0.981424272	97	Partial	One or more	Phase II complex
2N1E34C-00400	12300 North Parker Ave	PortArthur LLC	0.514988522	22432.9	Full	None	HBMS

Ave = avenue; CMMP = contaminated media management plan; Ct = court; Dr = drive; ESA = environmental site assessment; HBMS = hazardous building materials survey; Is = Island; N/A = not applicable

3.18.3 Long-Term Benefits and Effects

The long-term benefits and effects of the No-Build Alternative and the Modified LPA are summarized in Table 3.18-4 and detailed in the discussion below.

No-Build Alternative

Under the No-Build Alternative, I-5 and its interchanges and local street connections would remain as they are today. There would be no potential for encountering hazardous materials as a result of project development. The IBR Program would not assume liability for cleanup of contaminated sites. However, there would be no Program-related opportunities to improve existing contamination levels through the cleanup of acquired contaminated sites; existing contaminated sites would remain in their current conditions and pollutants may migrate off those sites.

The No-Build Alternative would include no improvements to roadways and bridges, which currently have limited controls in place to contain spills or releases that could migrate to environmental media. As such, the potential for adverse effects from spills or accidental releases is higher for the No-Build Alternative than it would be under the Modified LPA. Spills of hazardous materials from collisions as a result of traffic congestion would be assumed to continue at current levels or worsen as congestion increases over time. Stormwater would continue to be untreated on the existing Interstate Bridge and most other portions of I-5 within the study area; pollutants on roadways, such as oil from vehicles or heavy metals in brake dust, would continue to enter nearby surface water bodies and groundwater.

Modified LPA

The assessment of long-term effects from the construction, operation, and maintenance of the Modified LPA is based on information about the natural and built environments. The types of impacts evaluated include long-term liability from property acquisition, spills and releases of hazardous materials during project operation, contamination of groundwater and surface water by highway runoff, and the potential for legacy hazardous materials sites to affect operation and maintenance of Modified LPA facilities. Except where noted, effects would be similar for all Modified LPA design options.

Table 3.18-4. Comparison of Long-Term Benefits and Effects on and from Hazardous Materials

Type of Effect	No-Build Alternative	Modified LPA (all design options)
Property acquisition	Hazardous materials sites would not be acquired. No potential for adverse effects from acquisition of contaminated sites, such as increased liability and human health and safety if encountered during construction. No beneficial effects from the cleanup of contaminated sites.	• Moderate potential for increased liability for property owners (ODOT and WSDOT) from the acquisition of contaminated sites. • Beneficial effects on human health and safety and surface and groundwater quality from cleanup and remediation of contaminated areas on acquired sites and limiting the possible off-site migration of contamination. • If residual contamination remains on acquired hazardous materials sites after cleanup, moderate potential for adverse effects on human health and safety if encountered during construction or with the possible off-site migration of contamination.

Type of Effect	No-Build Alternative	Modified LPA (all design options)
Water quality	Stormwater that is untreated for the removal of pollutants would continue to enter surface waterbodies and groundwater.	Beneficial effects from improvements in stormwater conveyance and treatment, which would reduce pollutants in stormwater runoff and improve surface water and groundwater quality.
Hazardous materials spill potential	No improvement in existing spill risks from traffic congestion and collisions.	Reduction in spill risk due to reduced traffic congestion and collisions.
Legacy hazardous material sites	Future remediation activities at several sites have the potential to affect operation and maintenance of I-5.	Future remediation activities at several sites have the potential to affect operation and maintenance of the Modified LPA.

Source: Hazardous Materials Technical Report.
Note: The impacts for the Modified LPA are relative to No-Build and existing conditions.

Property Acquisition

Long-term liability can result when a project sponsor (in this case, ODOT or WSDOT) acquires a contaminated property. Liability can also result when a sponsor becomes legally or financially obligated to a property requiring investigation or remediation, or is subject to requirements associated with the long-term operation of a cleanup action. The Modified LPA would require the full or partial acquisition of properties that have been identified as hazardous materials sites, and therefore acquisition has the potential to result in long-term liability.

As an outcome of the Phase I ESAs described above, 36 of the properties identified for potential acquisition have been recommended for further subsurface investigation of potential or known contamination. Depending on the nature and extent of contamination encountered, long-term adverse effects from property acquisitions can be substantial. The need for cleanup can have the potential to affect the cost and schedule of project construction. For this reason, state and federal policies require due diligence (see sidebar) prior to property acquisition and construction.

To further assess the potential for liability related to cleanup requirements, following completion of the Draft SEIS, the IBR Program would prepare Phase II ESAs, consistent with ASTM E1527-21 or equivalent, for properties where identified RECs indicate that a subsurface investigation is needed to confirm the extent of contamination and to define specific measures and regulatory agency approvals needed to address the contamination. The findings of the Phase II ESA results would be incorporated into the Final SEIS to provide decision-makers with a more detailed understanding of cleanup obligations and costs associated with the Program. Properties with contamination in excess of regulatory standards would be subject to remediation and cleanup prior to construction. If residual contamination remained on acquired hazardous materials sites after cleanup, there would be moderate potential for adverse effects on human health and safety if contamination were encountered during construction or migrated off-site.

Due Diligence

Due diligence means taking appropriate precautions *before* a property is acquired to determine the presence, or potential presence, of environmental hazards. Due diligence provides the purchaser of a property with an understanding of the potential liability for environmental hazards and associated cleanup costs. The laws affecting legal liability for the purchasers of contaminated property differ between Oregon and Washington.

The two auxiliary lane design option and both of the single-level bridge configuration options would require the acquisition of a slightly larger area of property at the Fort Vancouver property (U.S. Army Vancouver Barracks) than the other design options. This site has a No Further Action determination for the possible presence of unexploded ordnance after a remedial investigation found no unexploded ordnance. Program activities on the site are therefore not expected to impact human health and safety. The site has been recommended for further hazardous materials investigations. Because ODOT and WSDOT would be required to clean up contaminated properties they acquired, the Modified LPA would result in long-term beneficial effects within the study area compared to the No-Build Alternative, which would not involve acquisition and cleanup of contaminated properties.

Stormwater Quality

Groundwater and surface water quality can be affected by pollutants contained in stormwater runoff from roadways and bridges and by erosion and runoff from contaminated soils exposed during excavation and grading activities. Compared to the No-Build Alternative, the Modified LPA would have a lower potential for adverse effects from contaminants in stormwater. The Modified LPA is anticipated to have substantial beneficial effects because it would treat all the stormwater runoff from existing, new, or reconstructed impervious surface area within the project footprint, including runoff from the Columbia River bridges. These improvements are anticipated to result in locally improved surface water, sediment, and groundwater quality. The Modified LPA stormwater conveyance system and treatment facilities would be monitored and maintained to ensure they perform as intended. Additional details regarding management and treatment of stormwater can be found in the Section 3.14 and the Water Quality and Hydrology Technical Report.

Spills and Releases

The Modified LPA also has the potential for adverse effects from spills or releases of hazardous substances or petroleum products during operation. However, these effects are anticipated to be less than under the No-Build Alternative. The Modified LPA would be constructed with updated road and bridge designs that would include controls within the stormwater system to contain or better manage releases on roadways and bridges. In addition, emergency response to such incidents would likely be quicker due to updates in roadway access and traffic safety. As such, the potential for adverse effects from spills or releases is lower for the Modified LPA compared to the No-Build Alternative.

The operation and maintenance of light-rail trains at the Ruby Junction Maintenance Facility requires the use of hazardous substances and the generation and disposal of hazardous waste. The facility currently has DEQ-approved plans and systems in place to control spills and manage hazardous materials. Operation of the expanded facility for light-rail maintenance would continue, and this existing use could create an incremental increase in existing risks; however, existing hazardous materials management plans and systems would be evaluated and adjusted as appropriate for the expanded scale of the facility. Therefore, expansion of the Ruby Junction Maintenance Facility would not be expected to result in substantial additional hazardous materials effects.

Legacy Hazardous Materials Sites

Legacy sites are hazardous materials sites that are or should be undergoing long-term cleanup actions by the owner, sites where additional investigation and cleanup may be required but where the responsible party has not yet complied, or orphan sites which are being managed by regulatory agencies. In special cases, site cleanup activities may coincide with the operation and maintenance of the Modified LPA. These activities could potentially interfere with the long-term operation and maintenance of components of the Modified LPA and result in financial liability or access restrictions.

The Modified LPA has a potential to experience adverse effects from legacy sites during operation. Hazardous materials sites of particular concern within the study area include former marine operations along North

Portland Harbor, the former Hayden Island Landfill (Thunderbird Hotel), and other former gas stations and industrial sites. These sites are identified above in Figure 3.18-1 through Figure 3.18-9 and listed in Table 3.18-2 and Table 3.18-3, and are discussed in further detail in the Hazardous Materials Technical Report.

A number of these sites have not been fully characterized, and cleanup actions have not been determined. Potential legacy issues associated with acquisitions along Marine Drive include cleanup actions for soil and sediment along the North Portland Harbor embankment or for in-water sediments. Potential future remedial activities that could affect the operation and maintenance of the Modified LPA include soil removal, sediment dredging, and capping. In addition, other potential legacy sites could be discovered during project construction activities. ODOT and WSDOT, as owners of the sites, would comply with all applicable federal, state, and local requirements for managing and mitigating contamination.

3.18.4 Temporary Effects

Temporary effects from hazardous materials include the risk of exacerbation of or exposure to existing contamination, accidental release of hazardous substances, and generation of hazardous waste during construction. The risk of these types of adverse effects has been evaluated for areas that would be disturbed during project construction and for staging and casting areas.

No-Build Alternative

Under the No-Build Alternative, there would be no Program-related construction or demolition, and therefore no construction-related disturbance of soils or sediments would occur that could potentially mobilize existing contamination into the environment. There would be no risk of accidental spills or releases of fuels, fluids, or other contaminants from construction vehicles, equipment, and materials.

Modified LPA

Property Acquisition (Temporary Construction Easements)

Some construction activities, such as construction of the new bridges and removal of the existing Interstate Bridge, would occur within temporary construction easements including subsurface and airspace easements. These would allow the state the right to use the property for short-term ground improvements or staging purposes. After fulfilling their intended purpose, temporary easements are typically returned to the landowner. Easements where RECs have been identified could result in potential liability. Liability issues can come in the form of incurred cleanup costs, schedule delays, and worker and public safety.

Prior to property acquisition and construction of the Modified LPA, the IBR Program would complete individual property evaluations and assessments (including the Phase I ESAs completed as part of this Draft SEIS and the recommended follow up actions from the Phase I ESAs). The nature and extent of soil, sediment, and groundwater contamination would be characterized, and specific measures and applicable regulatory agency approvals needed to address the contamination would be defined. Where contamination exists that may pose a risk to people or the environment if mobilized by construction activities, a remediation plan would be developed and executed for each property. The remediation or cleanup of hazardous material sites affected by the Modified LPA would occur prior to or during construction.

The properties requiring more complex investigation, as shown in Table 3.18-2 and Table 3.18-3, are mainly gas stations, automotive and marine repair and service facilities, landfills, and commercial or industrial operations with commercial LUSTs or other sources of hazardous releases. In accordance with FTA SOP 19 and applicable regulations for hazardous materials sites, actions to address this type of contamination would be defined in more detail at the individual property level. However, such sites would typically be addressed with soil excavation and disposal or the use of technologies such as in-situ chemical injection, bioremediation, or air sparge/soil vapor extraction. A period of groundwater monitoring during and after

remediation may also be required if groundwater is contaminated. Overall, the Modified LPA would include actions to identify and remediate contamination on temporary easements, resulting in long-term beneficial effects.

Accidental Release or Generation of Waste

Spills and Releases

Construction equipment can spill or release fuels or other vehicle fluids. Other pollutants such as paints, acids for cleaning masonry, solvents, and concrete-curing compounds are typically present at construction sites and have the potential to be released to the environment. Certain uses of construction materials, such as the subsurface pouring of wet cement, could also result in localized impacts to groundwater quality. Measures such as spill control and prevention plans, as described in Section 3.18.6, Potential Avoidance, Minimization, and Mitigation Measures, should render these risks negligible.

Lead- and Asbestos-Containing Materials

Buildings and structures that have lead or asbestos-containing materials (ACM) would require proper abatement procedures prior to demolition, renovation, or repair activities. At least 23 of the properties that would be acquired for the Modified LPA have structures built prior to 1980 that may contain asbestos and that are planned for demolition. Similarly, materials that contain lead (such as some types of paint) must be handled carefully during demolition and must be disposed of at an approved site.

Hazardous building material surveys would be conducted prior to demolition if properties are suspected of containing asbestos, lead, or PCBs.[2] Surveys would be consistent with OAR 248 and WAC 296-65, and would inventory lead-based paint, ACM, mercury and PCB-containing equipment, universal wastes, and/or abandoned waste. Based on survey results, abatement would be conducted prior to demolition, renovation and/or repair. The Washington State Department of Ecology or DEQ would be notified if unknown contamination is encountered during the assessments. Disposal of lead and ACM would be conducted at applicable Subtitle C or D solid waste facilities.

Asbestos

Asbestos was used extensively in building materials in the early and mid-twentieth century. Today, it is a known carcinogen, and is extremely *friable*; it crumbles easily. Demolition of buildings or other structures that contain asbestos can release small particles of asbestos into the air, and these particles can lodge in the lungs of people who breathe this air. Proper caution and *abatement procedures* can reduce or eliminate this hazard to human health.

Hazardous and Non-Hazardous Wastes

Hazardous and non-hazardous waste can be generated during construction activities. Waste can consist of contaminated soils; sediments; groundwater generated from excavation, drilling, and dewatering activities; and building materials containing lead or asbestos exposed by demolition activities. These wastes can be harmful to human health and the environment and would require management in accordance with applicable federal and state regulations if they are encountered during construction of the Modified LPA. The single-level movable-span bridge configuration would require an increased area of in-water work due to its larger bridge foundations, which could result in a comparatively greater potential risk of mobilizing hazardous materials in river sediments for this configuration as compared to others.

[2] polychlorinated biphenyls

Staging and Casting Areas

Potential off-site staging areas to support construction are currently being evaluated. Staging areas would be used for material laydown yards, equipment storage, and fabrication. The former Thunderbird Hotel site, identified as a potential staging area, is a REC. This location is the site of the former Hayden Island Landfill and a former automotive service station. Activities at this site may have resulted in contamination of subsurface soils and groundwater, which if disturbed during construction as a result of staging activities, could mobilize into the surrounding environment. However, most construction staging activities would occur on the ground surface, and excavation at this site is unlikely.

If the river crossing is built using precast concrete sections, an off-site casting yard would be required. One potentially available casting yard site has been identified to date: the former Thunderbird Hotel site on Hayden Island. Preliminary review of the site has identified existing RECs, as noted above.

3.18.5 Indirect Effects

In compliance with local land use plans, the Modified LPA could indirectly facilitate development and redevelopment of existing buildings and/or paved areas, as opposed to development in natural areas. As described in Section 3.4, local governments have adopted land use plans that support increased development densities in areas served by high-capacity transit, particularly in light-rail station areas. Redevelopment of properties in older urban areas, such as downtown Vancouver or Hayden Island, is more likely to encounter existing contamination. As a result, the Modified LPA, compared to the No-Build Alternative, has a somewhat greater potential for indirect adverse effects related to contaminated soils during construction. However, new development and redevelopment would be required to remediate known or discovered hazardous materials, including lead or ACM, in order to be in compliance with local land use plans; therefore, indirect land use changes resulting from the Modified LPA would be more likely to have long-term beneficial effects on hazardous materials than the No-Build Alternative.

Health effects have been documented from materials containing lead and asbestos. To the extent that land use changes involved the demolition, renovation, or repair of buildings and structures that have lead or ACM, proper abatement would be required. The risks are no greater for transit-oriented development than other residential and commercial construction, including potential release fuels or vehicle fluids from spills from construction equipment. Other pollutants such as paints, acids for cleaning masonry, solvents, and concrete curing compounds can be present at construction sites and have the potential to be released to the environment. These releases can migrate to soil, surface water, sediments, or groundwater. Developers would be required to comply with federal, state, and local requirements for managing hazardous materials and wastes, thereby minimizing the risks of releases to the environment.

3.18.6 Potential Avoidance, Minimization, and Mitigation Measures

Long-Term Effects

Regulatory Requirements

In accordance with FTA and FHWA standard procedures, the IBR Program has prepared Phase I ESAs to identify existing environmental issues on properties to be acquired. The results and recommendations of the Phase I ESAs have been incorporated into this Draft SEIS.

- Prepare Phase II ESAs for properties where identified RECs indicate that a subsurface investigation is necessary to confirm the nature and extent of contamination and define the specific measures and applicable regulatory agency approvals needed to address the contamination. Incorporate the Phase II

ESA results into the Final SEIS and ROD to provide decision-makers with a more detailed understanding of cleanup obligations and associated costs.

- Develop detailed hazardous materials management plans during final design and as part of the property acquisition process. Obtain necessary regulatory approvals to address areas where cleanup and remediation are needed. The remediation or cleanup of hazardous material sites affected by the Modified LPA would be required prior to construction.
- In accordance with Safety Standards for Construction Work: Lead (WAC 296-155) and General Occupational Health Standards: Asbestos (WAC 296-62 Part I-1), conduct HBMSs on structures proposed for demolition, prior to demolition, to identify ACM, lead-based paint, and other hazardous materials. Based on the survey results, conduct necessary abatement prior to demolition. Dispose lead-based paint, ACM, and other hazardous materials at facilities permitted to receive these materials in accordance with federal, state, and local agency regulations.
- Prepare a Program-wide construction health and safety plan, as required by federal Occupational Safety and Health Act regulations and state regulations, to minimize the potential for exposure of construction workers to hazardous materials and the risk to human health and the environment.
- Prepare a site-specific contaminated media management plan to ensure proper characterization, management, storage, disposal, and reporting of contaminated materials encountered during construction activities. The plan would outline the roles and responsibilities of personnel; health and safety requirements; methods and procedures for characterizing, managing, storing, and disposing of waste; and reporting requirements.

Program-Specific Mitigation

No Program-specific mitigation measures are proposed for long-term effects related to hazardous materials.

Temporary Effects

Regulatory Requirements

To minimize temporary effects related to hazardous materials during construction, standard mitigation measures such as best management practices would be implemented. Construction best management practices applicable to the Modified LPA are discussed in Section 3.14, Water Quality and Hydrology. Other required measures to reduce the risk of spills, leaks, or other releases during construction activities include:

- Conduct fueling, maintenance, and cleaning in areas that are contained by berms or other containment.
- Minimize the production or generation of hazardous materials, both upland and during demolition and replacement of overwater spans.
- Label and store hazardous waste according to federal regulations.
- Locate hazardous waste (including contaminated spoils) storage away from storm drains or surface water.
- Recycle materials such as used motor oil and water-based paint as appropriate.
- Handle potential spills of hazardous materials in conformance with applicable regulatory requirements and adhere to the Program spill prevention, control, and countermeasure plan.

Program-Specific Mitigation

No Program-specific mitigation measures are proposed for temporary effects related to hazardous materials.

3.19 Climate Change

According to the U.S. Environmental Protection Agency (EPA), multiple lines of evidence show changes in weather, oceans, and ecosystems (EPA 2022b) across the world. Examples include:

- Changing temperature and precipitation patterns.
- Increases in ocean temperatures, sea level, and acidity.
- Melting of glaciers and sea ice.
- Changes in the frequency, intensity, and duration of extreme weather events.
- Shifts in ecosystem characteristics, like the length of the growing season, timing of flower and algal blooms, water temperatures for fish, and migration of birds.

These changes to the earth's climate are due to a recent buildup of greenhouse gases (GHGs) in the atmosphere, which has resulted in dangerous effects on human health and welfare and to ecosystems (EPA 2022a). Climate change may result in localized effects in the study area.

The developed world's transportation systems are reducing reliance on fossil fuels and increasing use of electric and renewable fuels energy production and vehicles. Along the I-5 corridor, California, Oregon, and Washington have regulations to reduce fossil fuel use over time. These regulations are expected to reduce GHG emissions associated with transportation sources.

This section identifies the climate conditions in the region, highlights federal and state policy and regulation on climate, identifies the potential long-term climate impacts from the Modified LPA, and provides potential mitigation measures for unavoidable effects. In addition to considering climate effects from the Modified LPA, this section considers the potential effects or influence of changing climate conditions on the Modified LPA. The information presented in this section is based on the technical reports for climate, transportation, and energy.

The IBR Program aims to accelerate the local reduction of GHG emissions by developing alternatives to driving, managing transportation demand, and minimizing emissions associated with construction. Through design, the IBR Program also intends to minimize the expected GHG associated with the long-term maintenance of the proposed new infrastructure.

Actions to reduce or reverse impacts associated with transportation emissions require a holistic approach that considers patterns in land use and regional travel flows, in addition to major infrastructure. Both Oregon and Washington have among the strongest land use laws in the nation, and both have recently passed statewide legislation to end single-family zoning to increase housing supply and limit sprawl. These laws will enable more diverse housing development, supporting compact growth and multimodal transportation that will further reduce transportation emissions.

3.19.1 Changes or New Information Since 2013

Although there have been changes in design and operations between the Modified LPA and the CRC LPA, the general location and scale of many components are similar. Since 2013, there have been regional and local changes in the built environment, population and employment, transportation, climate modeling, demographics, human health, and other aspects of the existing conditions, which are reflected in this analysis.

The CRC project's Cumulative Effects Technical Report included a chapter on climate change that used the best available science to evaluate project-level GHG emissions and assess the project's resiliency to the effects of climate change. This analysis builds on that work and is consistent with Presidential Executive Order

14008: Tackling the Climate Crisis at Home and Abroad, as outlined by the interim Council on Environmental Quality (CEQ) guidance on consideration of greenhouse gas emissions and climate change (CEQ 2023).

Important changes related to climate since 2013 include major policy actions to reduce emissions from all sectors and specifically from the transportation sector. Both Oregon and Washington have an array of climate policies, strategies, and executive orders that guide state agencies' efforts to reduce emissions and increase the resilience of the transportation system. Executive actions and legislation in both Washington and Oregon are now in place to manage the transition to clean fuels for transportation and vehicle electrification, as well as a transition to 100% clean energy generation. These policies and other state-level changes are described later in this section. Highlights include:

- Washington has established statewide GHG reduction targets with benchmarks at 2030 (45% below 1990 levels), 2040 (70% below 1990 levels), and 2050 (95% below 1990 levels).
- State agencies in Washington, particularly WSDOT, are charged with leading by example and reducing transportation emissions when making investments and spending decisions.
- The ODOT Climate Action Plan (2021) guides ODOT to reduce emissions from the transportation system and improve resilience to extreme weather events.
- Oregon has established statewide GHG reduction targets with benchmarks at 2035 (45% below 1990 levels) and 2050 (80% below 1990 levels).
- Oregon's updated statewide planning rules require metropolitan communities to take steps to reduce emissions, including to plan for increased transit service to the key corridors and centers, prioritize investments that make it easier to travel without reliance on a personal vehicle, plan and manage parking to avoid oversupply, plan for electric vehicle (EV) charging, and increase monitoring.

At the city level, both Portland and Vancouver have strong political support for climate action and have established citywide policies to address the impacts of climate change for their communities. Highlights include:

- Portland's Climate Emergency Workplan (City of Portland 2022) establishes emission reductions targets with benchmarks at 2030 (50% below 1990 levels) and 2050 (reach net zero).
- Portland's Transportation System Plan (City of Portland 2020) aims to implement projects that shift travel behavior to increase trips to active and low-carbon modes of travel and projects that reduce vehicle miles traveled (VMT) to meet emissions-reduction targets.
- Portland's Pricing Options for Equitable Mobility Strategy (City of Portland n.d.) provides specific guidance for making mobility in the city more equitable using community engagement, pricing strategies, and reinvestment of revenues generated toward equity and climate goals.
- The City of Vancouver's Climate Action Framework (City of Vancouver 2022) supports a just and equitable transition to communitywide carbon neutrality by 2040, with support for low-income residents and communities of color. It establishes four near-term next steps: (1) ongoing engagement, (2) climate risk assessment, (3) continued focus on high-priority areas, and (4) increasing capacity for implementation and evaluation.

The IBR Program has tracked all partner agency climate plans and policies and their alignment with the Modified LPA. A summary of the Modified LPA's consistency with these plans and policies is included in Section 3.19.7, and detailed information can be found in Appendix B to the Climate Change Technical Report.

Table 3.19-1 compares the impacts and benefits of the CRC LPA with those of the IBR Modified LPA. There are no impacts from the Modified LPA that would differ substantially from those of the CRC LPA. Based on the

analysis described in this section, the climate effects of the Modified LPA, such as GHG reduction and improved resiliency, would be the same as or similar to those of the CRC LPA.

Table 3.19-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA [a] Effects Identified in this Section	Explanation of Differences
Consistency with federal, state, and Local Goals, Policies, and Plans	Consistent with applicable policies.	Same as for CRC LPA (see analysis of consistency in Section 3.19.7).	N/A
VMT	• Less than 1% reduction in regional VMT. [b]	Similar to CRC LPA for regional VMT • Less than 1% reduction in VMT for traffic subarea. [b]	Although methods for estimating VMT have changed since 2011, both analyses show a predicted reduction of less than approximately 1%.
Transit trips in Design Year (2030 for CRC, 2045 for IBR)	• Increase in transit trips over No-Build Alternative.	• Increase in transit trips by approximately 1.75% over No-Build Alternative.	Both CRC LPA and Modified LPA would lead to an increase in transit trips. The CRC Final EIS did not quantify the LPA's effects on transit trips.
Pedestrian and bicycle trips in Design Year (2030 for CRC, 2045 for IBR)	• Increase in pedestrian and bicycle trips over No-Build Alternative.	• Increase in daily active transportation trips across the bridge from 400 under No Build to between 740 and 1,600 by 2045. [c]	Both CRC LPA and Modified LPA would lead to an increase in active transportation trips. The CRC Final EIS did not quantify the LPA's effects on active transportation trips.
Operational GHG Emissions in Design Year (2030 for CRC, 2045 for IBR)	Reduction in GHG emissions: • Regional emissions (macroscale): approximately 1% reduction from No Build in CO_2e emissions (MT) in 2030. [d] • Local emissions (microscale): approximately 5% reduction from No Build in CO_2e emissions (MT) in 2030. [e]	Reduction in GHG emissions: • Less than 1% reduction from No Build in total CO_2e emissions (MT CO_2e/day) in 2045.	The differences in the reported reduction metrics are due to changes in methodology. It is anticipated that both the CRC LPA and Modified LPA would reduce GHG emission compared to the No Build Alternative.

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA [a] Effects Identified in this Section	Explanation of Differences
Construction Energy and GHG Emissions	• 11,477,104 MMBtu total energy consumption. • 871,265 MT CO_2e emissions.	• 2,601,017 MMBtu total energy consumption. • 469,444 MT CO_2e emissions (MT).	The reductions in the estimated consumption and emissions are due to changes in methodology and assumptions. It is anticipated that actual energy use and emissions during construction would be similar between the CRC LPA and Modified LPA. [f]
Resiliency	Improved resiliency to Columbia River sea-level rise, greater variation in high- and low-water flow due to changes in snowpack, severe weather events, and other changes in the environment.	Same as CRC LPA.	N/A

a In this context, "Modified LPA" refers collectively to all design options evaluated in this Draft SEIS. Differences among the IBR design options are discussed in Section 3.19.8.

b The CRC Final EIS VMT estimates are from the transportation analysis, as they were not included in the energy section or the climate section under cumulative effects.

e.

c Estimate of daily active transportation crossings of the Columbia River bridge in 2045 using methods and range of conservative, moderate, and optimistic growth; methods are described in the Transportation Technical Report.

d Includes interstates, highways, and principal arterials within Washington, Clackamas, Multnomah, and Clark Counties as well as light--rail related emissions. Emissions are reported as daily estimates.

e Includes a 12.2-mile segment of I-5 between Portland and Vancouver. Emissions are reported for a 4-hour AM peak period and 4-hour PM peak period.

f The IBR Program method used updated tools available from FHWA and supplemental calculations for the estimate reported in this document; these estimates vary substantially from the cost-based estimate produced for the CRC LPA.

CO_2e = carbon dioxide equivalent; CRC = Columbia River Crossing; EIS = Environmental Impact Statement; GHG = greenhouse gas; I-5 = Interstate 5; LPA = locally preferred alternative; MMBtu = million British thermal units; MT = metric tons; N/A = not applicable; VMT = vehicle miles traveled

3.19.2 Expected Future Conditions Resulting from Climate Change

Designing infrastructure intended to be part of the transportation system for 100 or more years requires consideration of climate change. The following describes a range of possible climate conditions based on global actions to curb emissions. For more information on potential future conditions, see Chapter 4 of the Climate Change Technical Report.

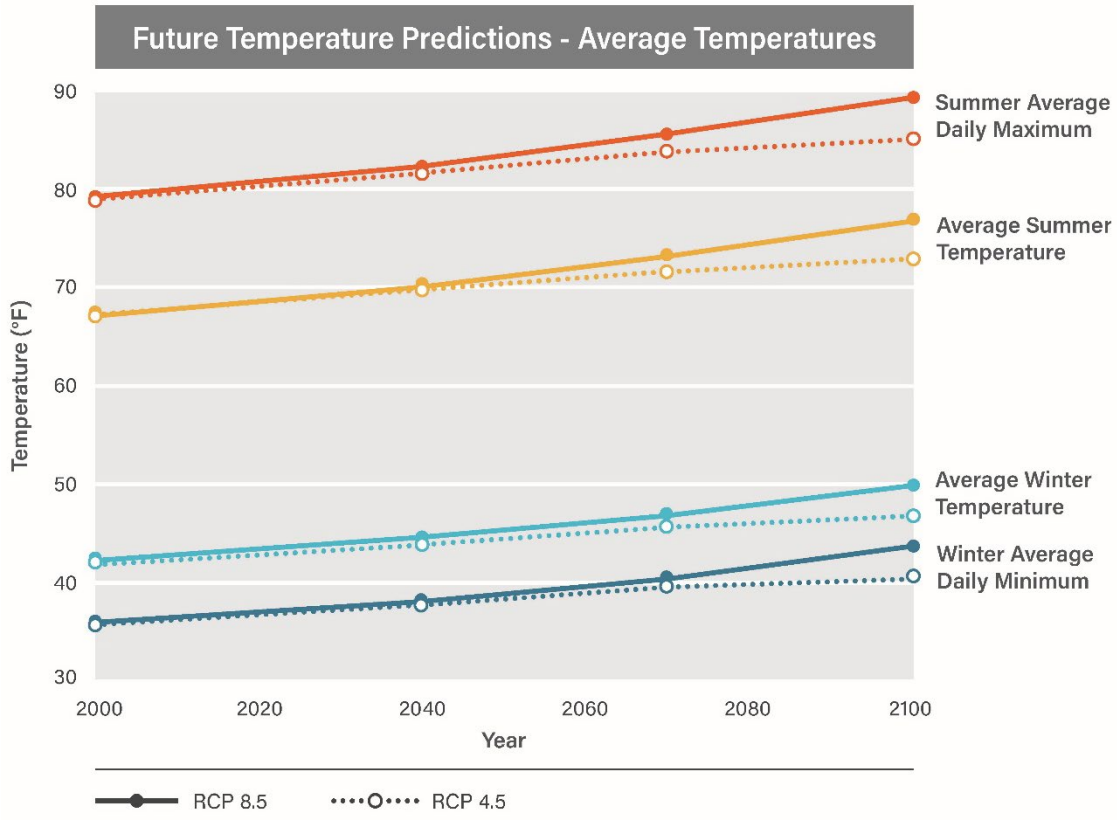
In the next century, the region is projected to experience an increase in average temperature (Figure 3.19-1) and in the number of extremely hot days. Additionally, changes to patterns of heavy precipitation are expected. While the region will experience roughly the same overall volume of rain, it is expected to come in more severe storm events (for example, atmospheric rivers). Increasing global temperatures may yield more precipitation falling as rain rather than snow, particularly in the Cascade Mountains and other areas of the lower Columbia River Basin. Rain falling on snow can further reduce accumulated snowpack, which would result in higher river flows during the rainy season and lower flows during the summer. Increased winter river flows and prevalence of severe storms result in a higher chance of flooding, which could impact low-lying land in the study area.

The expected future conditions in the study area were derived from two future scenarios representing a range of potential climate action between now and 2100. Climate change scenarios are often expressed as a Representative Concentration Pathway (RCP), which is a measure of the concentration of GHGs in the atmosphere, not the rate of emissions. Projections regarding precipitation and temperature are derived from the Climate Mapping for Resilience and Adaptation Assessment Tool, part of the U.S. Climate Resilience Toolkit (CMRA n.d.).

- **Strong Climate Action Scenario: RCP 4.5.** As shown in Figure 3.19-1, RCP 4.5 represents strong climate action to decrease atmospheric GHG concentrations, resulting in a leveling out of the warming effects by 2100 and a global average temperature increase of roughly 2 to 3 degrees Celsius (°C). This is commonly used as an optimistic scenario, although it still corresponds to significant climate disruption.
- **Weak Climate Action Scenario: RCP 8.5.** Also shown in Figure 3.19-1, RCP 8.5 represents the high end of plausible emissions through 2100 and a global average temperature increase of 4.3°C.

These expected future conditions have implications for design and operation of the Modified LPA.

Figure 3.19-1. Projected Average Temperature Changes over the Next 80 Years



Source: CMRA n.d.

3.19.3 Designing for Resilience in a Changing Climate

Temperature Changes

The average temperatures in the Program area are expected to increase between 5°F and 8°F by the end of the century. The increase in temperature is anticipated to be most evident in the summer months, where the average temperature is likely to climb between 5.5°F and 9.5°F, with an increase in average daily maximum temperatures between 6°F and 10°F. Extreme temperatures are expected to increase in the future. Currently,

the Portland-Vancouver metropolitan area experiences mild summer weather, where days with a heat index over 90°F happen only 5 to 6 days per year and where days with a heat index over 100 may happen once per year. In the future, the number of days over 90°F is predicted to occur between 30 and 60 days each year and days over 100°F are likely to become at least as common as days over 90°F are now. Finally, days with heat indices over 105°F are expected to occur from a once-in-a-decade phenomenon to up to 10 days every year (Merced n.d.).

To address long-term temperature increases, infrastructure designs should withstand regular air temperatures well over 100 degrees Fahrenheit during the summer months. Under excessive heat, the performance of light-rail transit rails and road surfaces are known to decrease. Active transportation commuters on the Columbia River bridges and users of public transit stations may need respite from the heat and sun in the summer.

Considerations for Climate Resilient Design

- Heat tolerance of materials
- Reflectivity and shading for active transportation and transit users
- Measures to minimize contribution to urban heat islands
- Designing stormwater systems with sensitivity to future storms
- Evaluating potential for sea level rise and saltwater intrusion at bridge site
- Worker safety during construction; air quality and heat effects

Precipitation Changes

Because the proportion of rain to snow precipitation is expected to increase, infrastructure design should plan for a wider range of water volumes and the possibility of higher and more frequent floods. Although the study area is not predicted to see a significant increase in overall precipitation, climate models predict an increase in the intensity of precipitation, specifically during the winter months. One-hour precipitation volumes are likely to increase, especially in the fall months.

Stormwater facilities should be sized to accommodate anticipated future storm frequencies and volumes. During construction, cut slopes should be protected from small landslides, especially during the winter months. Transit commuters may need additional shelter when waiting for trains, and active transportation commuters may need shelter on the bridge crossing. Infrastructure design should also consider the need for snow and ice removal, as increased winter storms may bring higher frequencies of freezing precipitation. Greater changes in river levels may also pose challenges to navigation, as there will likely be days when the Columbia River may be too high to accommodate vessels that might otherwise pass underneath fixed-span bridges; movable-span bridges may require more bridge openings if water levels are higher.

Other Climatic Factors

In addition to temperature and precipitation changes, climate change also has implications for wildfire risk and sea-level rise.

Wildfire Risk

While the wildfire risk is unlikely to damage infrastructure associated with the Modified LPA, because of its materials and location, landscape designs should consider the possibility of sparks from vehicles igniting plantings during dry, hot summer weather.

Exposure to wildfire smoke is a health threat, particularly to people directly exposed to the elements such as active transportation users, transit passengers, or construction workers (Grant and Runkle 2022).

Sea-Level Rise

Sea-level rise is a consideration on the coast, and the Columbia River is tidally influenced at the Interstate Bridge location. Sea-level rise at the mouth of the Columbia River is projected to range from 1.5 feet to 5 feet by 2150 (Miller 2018). The changes at the Interstate Bridge are expected to be much smaller and controlled by tides and precipitation. The resulting changes in water level are expected to be dwarfed by the seasonal changes from precipitation; the highest tidal swings are likely to occur when the Columbia River is relatively low (e.g., during the summer months) (USACE 2022). Saltwater intrusion is also not a cause for concern, as it is not expected to reach the Program area at river mile 106 according to the latest modeling from the Oregon Health and Science University Center for Coastal Margin Observation and Prediction, which estimates that saltwater will not be found upriver of approximately river mile 45 (Baptista 2018).

3.19.4 Federal Policy Context for Climate

Federal regulations and policies guide the development and evaluation of transportation projects and local communities' management of GHG emissions. The federal government has issued direction to address climate in NEPA documents. Consistent with Executive Order 13990, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis and in recognition of NEPA's important role in providing critical information to decision-makers and the public, CEQ issued interim guidance to agencies involved in federal actions in January 2023. The CEQ guidance directs federal agencies to do the following:

- Consider GHG emissions in the identification of proposed actions and alternatives.
- Quantify a proposed action's projected GHG emissions or reductions for the expected lifetime of the action.
- Place GHG emissions in context and disclose relevant GHG emissions and climate impacts.
- Identify alternatives and mitigation measures to avoid or reduce GHG emissions.
- Provide additional context for GHG emissions to allow decision-makers and the public to understand tradeoffs associated with an action, including through the use of the best available social cost of GHG estimates.
- Incorporate environmental justice considerations into their analysis of climate-related effects.
- Use the information developed during the NEPA review to consider reasonable alternatives that would make the actions and affected communities more resilient to the effects of changing climate.

The IBR Program has followed the CEQ guidance and outlined a strategy for addressing climate change in the planning, design, construction, and operation of the Modified LPA. Data used to support the greenhouse gas emissions estimates were derived from the analysis in the Transportation Technical Report (for VMT and mode shift estimates) and the Energy Technical Report for estimates of GHG emissions associated with construction and operation of the Modified LPA.

3.19.5 Washington and Oregon Policy Context for Climate

Washington and Oregon, along with their local agency partners, have policy directives to reduce GHG emissions from transportation and other activities and have developed energy transition plans. Reducing emissions to the targets established by these entities will require aggressive action at all levels of government and by private industry.

Washington and Oregon have policies intended to promote a shift away from GHG emissions in the transportation sector. These transportation-related transition policies are summarized in Table 3.19-2.

Table 3.19-2. Washington and Oregon Transportation Transition Policies

Policy	Policy Directives
WSDOT Strategic Plan: Resilience Goal (WSDOT n.d.)	WSDOT will plan and/or invest resources to improve the ability to mitigate, prepare for, and respond to emergencies; combat climate change; and build a transportation system that provides equitable services, improves multimodal access, and supports Washington's long-term resilience.
Washington Governor's Executive Order 20-01: State Efficiency and Environmental Performance (2020)	When making purchasing, construction, leasing, and other decisions that affect state government's emissions of GHGs or other toxic substances, agencies shall explicitly consider the benefits and costs (including the social costs of carbon) of available options to avoid those emissions.
Climate Commitment Act – Washington State Department of Ecology (Ecology n.d.)	Directed by Washington State Legislature to design and implement a cap-and-invest program to reduce statewide GHG emissions. This program works by setting an emissions limit, or cap, and then lowering that cap over time to ensure Washington meets the GHG reduction commitments set in state law (95% reduction of GHGs by 2050).
Washington Clean Vehicles Program (Chapter 173-423 WAC)	Adopt California's Heavy-Duty Engine and Vehicle Omnibus rules. 100% of sales of light-duty vehicles sold in Washington will be electric by 2035. Requires increasing the number of new ZEVs sold in Washington until all new vehicles meet the ZEV standard starting in 2035.
Washington Clean Fuels Program (RCW 70A.535)	Requires fuel suppliers to reduce the carbon intensity of transportation fuels to 20% below 2017 levels by 2038.
Washington Clean Energy Transition Act (UTC n.d.)	100% of electricity sold in Washington will be renewable by 2045.
Oregon Climate Protection Program (DEQ 2021a)	50% reduction by 2035 and 90% reduction by 2050 in emissions for covered fossil fuel suppliers (from 2017–2019 average emissions).
Oregon Clean Fuels Program (DEQ 2022)	10% reduction in average carbon intensity for transportation fuels by 2025; 20% reduction by 2030; 37% reduction by 2035. In March 2020, Governor Brown issued Executive Order 20-04 to amend low-carbon fuel standards and schedule to phase in implementation with the goal of 20% below 2015 levels by 2030, 25% below 2015 levels by 2035. (The Oregon Clean Fuels Program Expansion was adopted by the Environmental Quality Commission in October 2022 and is effective as of January 1, 2023.)
Oregon Clean Energy Targets (DEQ n.d. d)	Targets for reducing GHG emission from electricity in Oregon from baseline (average annual emissions for 2010, 2011, and 2012): • 80% below baseline emissions by 2030. • 90% below baseline emissions by 2035. • 100% below baseline emissions by 2040.
Oregon Zero-Emission Vehicle (ZEV) (Senate Bill 1044) (ODOE n.d.)	At least 250,000 registered motor vehicles will be ZEV by 2025. At least 25% of registered motor vehicles, and at least 50% of new motor vehicles sold annually, will be ZEV by 2030. At least 90% of new motor vehicles sold annually will be ZEV by 2035.

Policy	Policy Directives
Oregon Clean Car Standards (DEQ n.d. c) and Advanced Clean Cars II (DEQ n.d. a)	The Oregon Department of Environmental Quality is beginning a rulemaking process to adopt California's Advanced Clean Cars II rule, which would require all light-duty vehicle sales in Oregon to be zero emission by 2035.
Oregon Clean Truck Rules 2021 (DEQ n.d. b) and Advanced Clean Trucks (DEQ 2021b)	Requires manufacturers of medium- and heavy-duty vehicles to sell a certain percentage of ZEVs beginning with 2024 vehicle model year: • 75% zero-emission sales for Class 4-8 rigid trucks by 2035. • 55% zero-emission sales for Class 2b-3 pickup trucks and vans by 2035. • 40% zero-emission sales for Class 7-8 tractor trucks by 2035.

GHG = greenhouse gas; WSDOT = Washington State Department of Transportation; ZEV = zero emissions vehicle

3.19.6 Existing Emissions Sources

User Emissions

Emissions from vehicles using transportation facilities comprise the transportation sector's majority of GHG emissions. In a case study of six state departments of transportation, the National Cooperative Highway Research Program found that user emissions by passenger and freight vehicles make up approximately 94% of transportation-related emissions, while 6%comes from construction and maintenance of the system. The remaining fraction (approximately 0.2%) results from administrative functions (e.g., operation of office buildings). Thus, reducing user emissions provides the greatest potential to make large reductions in total transportation-related emissions.

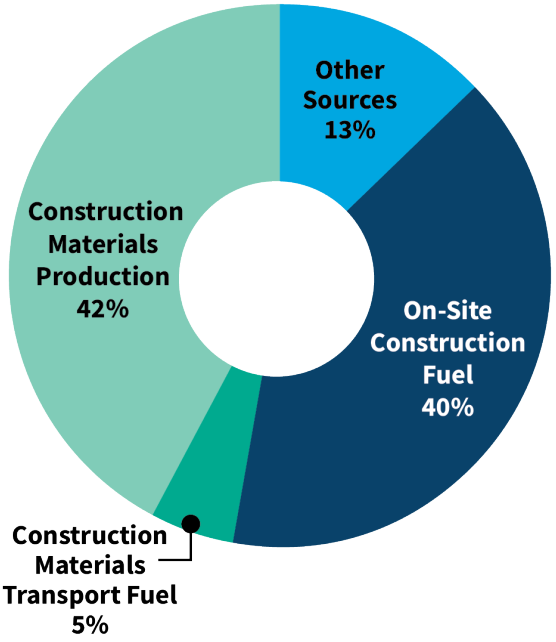
Across the U.S. transportation sector, roadway users account for over 80% of transportation emissions, with light-duty vehicles (passenger cars and trucks) producing the majority (57%) and medium- and heavy-duty trucks adding 26%. Of vehicle types, single-occupant light-duty trucks (which include the sport-utility vehicle class) are the least efficient mode, and they are a continuously growing share of the personal vehicle fleet.

Construction Emissions

Although construction emissions represent a smaller proportion of transportation sector GHG emissions, construction still produces substantial quantities. Figure 3.19-2 represents the average proportion of GHG emissions by category for the construction of transportation structures, highways, and streets per dollar spent.

The two largest categories of emissions are fuels used by construction equipment and production of construction materials (EPA 2023b). These categories provide the greatest opportunities for minimizing GHG emissions from construction activities. Construction material production includes concrete, asphalt, and steel products. The largest emissions in this category come from cement and concrete products and asphalt concrete pavement, including binders and aggregate. The remainder of construction-related GHG emissions come from fuel used in transporting materials and from other sources (e.g., engineering services, waste disposal).

Figure 3.19-2. Sources of Greenhouse Gas Emissions from Construction (EPA)



Source: NCHRP 2022. For data sources, see footnote. [1]

3.19.7 Summary of Climate Benefits

Modified LPA and GHG Emissions

The IBR Program proposes changes to the regional transportation system with the Modified LPA that would expand transit and institute tolling, which could encourage people to choose transportation modes other than driving alone (referred to as "mode shift"), and the Program would also reconfigure highway and local connections to improve the efficiency of the transportation network. Collectively, these changes could result in a decrease in regional GHG emissions. Compared to the No-Build Alternative, the Modified LPA is expected to reduce GHG emissions by affecting travel choices and traffic operations in the following ways:

- Encouraging mode shift to transit by providing an extension of TriMet's Metropolitan Area Express (MAX) light-rail between Portland and Vancouver and three new stations, expanded express bus service, and park and rides.
- Using demand management methods such as variable-rate tolling of the highway to reduce travel demand, promote mode shifts, and reduce travel during peak commuting periods.
- Improving traffic operations with ramp metering, auxiliary lanes, and roadway shoulders, which reduce idling by reducing congestion and disruptions due to vehicle crashes and other incidents.
- Encouraging mode shift from cars to active transportation (walking and bicycling) with facility

[1] Figure data notes: The values for this graphic are provided by the EPA U.S. Environmentally Extended Economic Input-Output Model. This model considers emissions for a wide variety of sectors in the U.S. economy, as categorized by the North American Industry Classification System (NAICS). The NAICS sector most closely aligned with Department of Transportation construction is 237310: Transportation Structures, Highways, and Streets. The model provides GHG emissions factors per U.S. dollar of purchase price (kilograms of CO_2e/$) and details about the largest sources of emissions for each industry.

improvements that provide a safe, comfortable, and direct path for walking, biking, and rolling.

IBR Program Climate Framework

The IBR Program has drafted a Climate Framework (see Appendix A of the Climate Change Technical Report) with two main objectives to guide processes and desired outcomes for climate: (1) reduce climate impacts and (2) improve climate adaptation and resilience through deliberate actions. The framework is intended to be applied during design, construction, and long-term operation and maintenance, with a goal of accounting for environmental impacts throughout the infrastructure life cycle. Evaluation of the IBR Program's performance related to climate objectives will be conducted at different stages. Table 3.19-3 provides an overview of the objectives for each stage.

Table 3.19-3. Climate-Related Objectives by IBR Program Phase

IBR Program Objective	Program Phase: Design/Refinement	Program Phase: Program Development and NEPA	Program Phase: Construction	Program Phase: Opening Day and Long-Term Operation
Design for resilience and adaptation	Avoid design choices that would restrict resilience to future climate conditions.	Assess future climate conditions, evaluate adaptability of design, develop climate-resilient design, and establish mitigation commitments.	Evaluate on-site needs regarding flooding, stormwater, heat tolerance, etc.; plan for and manage worker safety.	N/A; design and construction would be complete.
Reduce operational emissions	Design to support mode shift and VMT reduction. Develop high-capacity transit, improve active transportation, and implement roadway pricing.	Evaluate reasonable alternatives and design options in the NEPA process. Establish best management practices to reduce impacts.	N/A	Consider adaptive management and partner support. Consider air quality or temperature monitoring.
Reduce emissions during operations and maintenance activities	Design to support low or lower maintenance needs. Consider using on-site renewable energy for signage or other electricity needs.	Evaluate alternatives and design options in the NEPA process.	N/A	Consider adaptive management and requirements for lower GHG approaches to ongoing operations and maintenance. Optimize transit fuel use and equipment investments.
Minimize construction emissions and embodied carbon	Maintain options to use innovative approaches in construction	Evaluate and establish baseline.	Track equipment and materials.	N/A; construction would be complete.

IBR Program Objective	Program Phase: Design/Refinement	Program Phase: Program Development and NEPA	Program Phase: Construction	Program Phase: Opening Day and Long-Term Operation
	equipment and materials.			

N/A = not applicable; NEPA = National Environmental Policy Act; VMT = vehicle miles traveled.

Consistency with Goals, Policies, and Plans

ODOT, WSDOT, and the eight local agency partners have numerous climate-related goals, policies, and plans. Through an interagency working group, these agencies have been engaged with the IBR Program throughout the planning efforts to date. IBR Program staff and local agency partners developed a comprehensive database of local plans and climate initiatives, including specific climate commitments and emissions-reduction goals.

The IBR Program is consistently aligned with the climate aims of partner agencies. Important aspects of this alignment include:

- **Reducing emissions from the transportation system** – The Modified LPA would shift travel demand to lower GHG-emitting modes of travel and improve transportation efficiency. The Modified LPA would reduce vehicle-based GHG emissions by expanding transportation options for non-automobile trips, one of the most significant methods of reducing driving trips. New and improved transportation options include high-capacity transit and safe, comfortable bicycle and pedestrian infrastructure.
- **Reducing construction emissions and operations and maintenance emissions** – Construction goals for the IBR Program center on reducing construction-based emissions. The Program aims to reduce emissions associated with maintenance and operations by using an EV maintenance fleet.
- **Community resiliency** – The IBR Program includes climate resiliency goals such as designing for performance in a range of environmental conditions resulting from climate change. Equity in processes and outcomes for the community is prioritized by the IBR Program.

3.19.8 Long-Term Benefits and Effects

This section evaluates GHG emissions for the No-Build Alternative and the Modified LPA. Most of the Modified LPA design options would have similar emissions; those for which emissions may differ are discussed in the text. GHG emissions were estimated as a function of VMT, vehicle hours of travel (VHT), and vehicle hours of delay (VHD). Potential changes in travel behavior and VMT were estimated using the regional travel demand model that was jointly developed by Metro and Southwest Washington Regional Transportation Council (RTC) for use in the 2018 Regional Transportation Plan[2] (RTP), adopted by Metro in 2018 and RTC in 2019. The Transportation Technical Report, the Climate Change Technical Report, and the Energy Technical Report provide additional information on the modeling approach and the relationship between vehicle travel and GHG emissions.

[2] The transportation analysis for the No-Build Alternative and Modified LPA is based on the anticipated regional highway and transit networks and service levels for 2045 as informed by the regional transportation plans for both Metro (Metro 2018) and RTC (RTC 2019). The traffic model applied to this analysis reflects pre-COVID conditions. New surveys and model development efforts that include post-COVID travel behavior are planned to be incorporated in the 2028 RTP update.

Table 3.19-4 summarizes the effects of the No-Build Alternative, Modified LPA, and design options on climate. Detailed analysis of the effects is provided in the following sections.

No-Build Alternative

Daily travel and delay information for the No-Build Alternative is shown in Table 3.19-5, and daily trips by mode in the region and the traffic subarea are shown in Table 3.19-6. These figures are shown alongside the Modified LPA results for comparison.

Roadway Operations, Transit, and Multimodal Trips

Table 3.19-5 presents modeled weekday results of VMT, VHT, and VHD. Together with vehicle types and fuel sources, these traffic measures are used to estimate GHG emissions from travel behavior. Results are presented for the Modified LPA with one auxiliary lane and with two auxiliary lanes. None of the other Modified LPA design options would result in a measurable difference in VMT, VHT, or VHD.

Table 3.19-6 presents data on daily trips through the I-5 corridor in the study area as estimated by the regional travel demand model. These trip estimates, in combination with information on vehicle fuel sources, are used to calculate transportation emissions. The regional model assumes the same number of person-trips in the No--Build and Modified LPA alternatives; however, the distribution of these trips varies based on proposed system changes. A more detailed analysis of trip generation and distribution is presented in the Transportation Technical Report.

Table 3.19-6 shows that, although the number of regional person-trips is held constant between the Modified LPA and the No-Build Alternative, the models predict the Modified LPA would lead to shifts between modes and destinations. Modeling results indicate that there would be a mode shift to transit and a decrease in the number of total trips across the Columbia River with the Modified LPA. The regional transit mode share would increase slightly, with the Modified LPA generating 12,500 daily new transit trips as a result of variable-rate tolling on the Columbia River bridges, the extension of light-rail transit between the Expo Center and near Evergreen Boulevard, new park and rides, and improvements to the speed and frequency of express buses.

Table 3.19-7 shows that, on a regional basis, the Modified LPA would result in small but measurable reductions in energy consumption and GHG emissions. This is the result of reductions in VMT, VHT, and VHD and a mode shift to transit under the Modified LPA.

Active Transportation

In addition to shifting trips to transit, the Modified LPA would include bicycle and pedestrian improvements on the Columbia River bridges, as well as facilities to access these bridges, which are expected to increase bicycle and pedestrian trips. In 2022, approximately 410 daily bicycle and pedestrian trips were estimated to use the existing path to cross the Columbia River; the Modified LPA is expected to increase this total to between 740 and 1,600 trips per day in 2045 (see the Transportation Technical Report for more information).

Considering the increasingly hot conditions expected in the future, active transportation users could experience discomfort (and potentially health risks), which could discourage the use of the facilities. The different design options for the main bridge crossing could produce different user experiences. If the active transportation path were on the lower deck of the double-deck bridge, that would provide cover for users, which would be beneficial for shading during summer heat events and providing protection from the rain in other months. Opportunities to provide shade or rain protection would not be exclusive to a double-deck option, as measures to provide shade (e.g., canopies, shade panels) could be incorporated on single-deck options.

Table 3.19-4. Summary of No-Build Alternative and Modified LPA Effects on Climate

1	2	3	4	5	6
No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5 or I-5 Westward Shift, all Park-and-Ride Site Options	Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5, all Park-and-Ride Site Options	Modified LPA with Single-Level Fixed-Span Configuration,[a] One Auxiliary Lane, C Street Ramps, Centered I-5, all Park-and-Ride Site Options	Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, all Park-and-Ride Site Options	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Without C Street Ramps, Centered I-5, all Park-and-Ride Site Options
• Substantially lower energy consumption and greenhouse gas (GHG) emissions in 2045 due to increased electric vehicles in fleet and decarbonized electricity sources.	• Lower energy consumption and GHG emissions in 2045, similar to No-Build Alternative. • Increased mode share of low and no emissions modes (transit, active transportation). • Improvements in climate resilience with materials and design.	• Similar to effects listed in Column 2, but would slightly reduce emissions due to improved congestion.	• Similar to effects listed in Column 2, but would slightly reduce operational emissions due to the reduced profile grade of the new Columbia River bridges.	• Similar to effects listed in Column 2, but would increase GHG due to the longer construction duration, additional materials required for the larger bridge foundations, and electricity required to raise and lower the bridge and as a result of idling during bridge closures.	• Similar to effects listed in Column 2, but would increase GHG due to increased congestion and volumes on the Mill Plain/15th Street couplet. Additionally, VMT and GHG would increase for trips with an origin or destination in downtown Vancouver south of Mill Plain Boulevard.

a The effects associated with the single-level fixed-span configuration would be the same for all bridge type options, unless otherwise specified. Differences in user emissions between the design options and the Modified LPA were not quantified because they are too small to be measurable at the scale of the region or the analysis area.

Table 3.19-5. 2045 Weekday Daily Vehicle Miles of Travel, Vehicle Hours of Travel, and Vehicle Hours of Delay

Alternative	Area	Vehicle Miles of Travel	Vehicle Hours of Travel	Vehicle Hours of Delay
No-Build Alternative	Portland Metropolitan Region	59,042,000	1,803,600	65,500
	Traffic Subarea [a]	14,349,500	439,600	24,900
Modified LPA with one auxiliary lane	Portland Metropolitan Region	58,950,700	1,792,300	58,300
	Traffic Subarea	14,270,500	428,000	17,400
Modified LPA with two auxiliary lanes	Portland Metropolitan Region	58,960,800	1,791,900	58,000
	Traffic Subarea	14,279,300	427,400	17,000
Change between No Build and Modified LPA with one auxiliary lane	Regional Difference	-91,300(<-1%)	-12,100 (<-1%)	-7,300 (-11%)
	Subarea Difference	-79,000 (<-1%)	-11,600 (-3%)	-7,500 (-30%)
Change between No Build and Modified LPA with two auxiliary lanes	Regional Difference	-83,300(<-1%)	-12,600 (-1%)	-7,600 (-11%)
	Subarea Difference	-70,900 (<-1%)	-12,200 (-3%)	-7,900 (-32%)
Change between Modified LPA with one auxiliary lane and two auxiliary lanes	Regional Difference	10,100 (<-1%)	-400 (<-1%)	-300 (<-1%)
	Subarea Difference	8,800 (<-1%)	-600 (<-1%)	-400 (-2%)

Source: Metro/RTC Travel Demand Model

a The traffic subarea is a subset of the region used to capture potential impacts and diversion of trips related to the IBR Program. This subarea includes an extent between the I-5 and I-205 split in Vancouver, south of I-84 in Portland, west of I-5 and east of I-205 in both Portland and Vancouver. See the Transportation Technical Report for more information.

Table 3.19-6. 2045 Weekday Daily Corridor Trips and Systemwide Transit Trips

Measure	No-Build Alternative	Modified LPA (One aux. lane)	Modified LPA (Two aux. lanes)
Regional Person-Trips (all modes)	11,905,000	Same as No Build	Same as No Build
Work Trips (all modes)	2,165,500	Same as No Build	Same as No Build
Non-Work Trips (all modes)	9,739,500	Same as No Build	Same as No Build
Total Regional Transit Trips [a]	626,300	638,800	638,700
Regional Transit Mode Share	5.26%	5.37%	5.36%
Regional New Transit Trips	N/A	12,500	12,400
Percentage Change from No Build	N/A	+2.00%	+1.98%

Source: 2022 Metro, RTC, C-TRAN, TriMet, and IBR Analysis

a Transit trips count each passenger only once between the origin and destination of their trip. Transit trips include all trips on any transit mode.

aux = auxiliary; LPA = locally preferred alternative; N/A = not applicable

Operational GHG Emissions

GHG emissions by gas- and diesel-powered passenger and freight vehicles are directly related to VMT, the age and type of vehicle, and the time spent traveling (e.g., travel efficiency, or speed, and congestion). Other factors, such as the amount of time vehicles idle in traffic congestion, also influence their GHG emissions. When people switch to more efficient modes of transportation—such as transit, carpooling, walking, or biking—GHG emissions are reduced. Depending in part on the composition of the electricity grid, GHG reductions will also occur as people switch to EVs.

Section 3.12, Energy, describes potential GHG emissions associated with VMT, transit trips, and emissions from routine maintenance. As shown in Table 3.19-7, energy consumption and GHG emissions in 2045 under the No-Build Alternative are expected to be substantially lower than existing values for the region due to requirements in existing regulations and voluntary low-emission vehicle commitments made by private sector automobile manufacturers. This means that even as the regional population grows, and VMT increases an expected 40% in the study area compared to existing conditions, the additional miles driven will generate substantially fewer GHG emissions over that same time period because of new regulations and a shift toward EVs.

Table 3.19-7. Daily Regional Energy Consumption and CO_2e Emissions (with Electric Vehicle Assumptions)

Parameter	Existing (2015)	No-Build Alternative (2045) (with EV Assumptions)	Modified LPA (2045) (with EV Assumptions)	Modified LPA Difference from No-Build (with EV Assumptions)
Total Energy Consumption (MMBtu/day)	290,732	190,771	190,302	-0.25%
CO_2e Exhaust Emissions (MT CO_2e/day)	22,273	11,440	11,409	-31 MT/day -0.26%
CO_2e Fuel Cycle Emissions (MT CO_2e/day)	6,014	6,668	6,653	-15 MT/day -0.22%
Total CO_2e Emissions (MT CO_2e/day)	28,286	18,108	18,063	-45 MT/day -0.25%

Notes: Table sourced from the Energy Technical Report; Emissions estimates produced using EPA MOVES model. Fleet assumptions listed in the Energy Technical Report.
CO_2e = carbon dioxide equivalent; EPA = U.S. Environmental Protection Agency; EV = electric vehicle; LPA = locally preferred alternative; MMBtu = million British thermal units; MT = metric tons

Modified LPA

As shown in Table 3.19-5, the Modified LPA would reduce regional VMT, VHT, and VHD compared to the No-Build Alternative. Daily VMT in the region would decrease by nearly 100,000 miles with the Modified LPA, which is due either to mode shift or to people choosing to make shorter trips or otherwise adjusting their travel patterns. Although the decreases for VMT and VHT are quite small at the regional scale, local reductions in the traffic study subarea represent a more substantial decrease. Total reductions in VHD compared to the No-Build Alternative are more significant both regionally and in the study area at 11% and 29%, respectively. This highlights the improvement in congestion reduction resulting from the Modified LPA and the influence of I-5 on overall delay in the region.

Analysis of the long-term effects of the two auxiliary lane design option using the regional travel demand model shows no statistically significant difference in GHG emissions compared to the single auxiliary lane option in the traffic assignment subarea, as shown in Table 3.19-8. However, an additional analysis using operational model outputs (modeling that provides more sensitivity to changes in speed and congestion) in the traffic subarea shows that GHG emissions associated with the Modified LPA could be approximately 2.5% lower those emission under the No-Build Alternative. In addition, the Modified LPA option with two auxiliary lanes could have approximately 2.9% lower emissions compared to emissions under the No-Build Alternative. This analysis shows that improving traffic speeds (i.e., reducing congestion) through the addition of a second auxiliary lane would have an effect on I-5 that translates into lower GHG in the whole study area.

The single-level fixed-span configuration would have slightly lower operational emissions than the double-deck configuration due to the reduced profile grade of the new Columbia River bridges (approximately 29 feet lower than the Modified LPA's double-deck configuration). The reduced profile grade is also characteristic of the single-level movable-span configuration, except that this option would increase energy consumption due to additional materials required for the larger bridge foundations, and electricity required to raise and lower the bridge, and as a result of idling by queued vehicles on the freeway during bridge closures. These emission differences were not quantified because they are too small to be measurable at the scale of the region or the traffic sub area, and as such, are unlikely to be useful in differentiating between alternatives.

The elimination of C Street ramps at the SR 14 interchange would result in additional congestion on local streets, which in turn would result in failing operations at 19 intersections, compared to 10 intersections for the Modified LPA with C Street ramps. This additional congestion and idling would decrease vehicle efficiency, resulting in increased GHG emissions compared to the Modified LPA with C Street ramps. As with the bridge design options, these emission differences were not quantified because they are too small to be measurable at the scale of the region or the analysis area, and as such, are unlikely to be useful in differentiating between alternatives.

Table 3.19-8. Comparison of Energy Consumption and GHG Emissions, Traffic Assignment Subarea

Parameter	Existing (2015)	No Build (2045)	Modified LPA with One Auxiliary Lane (2045)	Modified LPA with Two Auxiliary Lanes (2045)	One Auxiliary Lane Difference from No-Build	Two Auxiliary Lanes Difference from No-Build
Daily Vehicle Miles Traveled	11,267,296	14,349,500	14,270,500	14,279,300	-0.55%	-0.49%
Total Energy Consumption (MMBtu/day)	76,557	47,863	47,380	47,371	-1.01%	-1.03%
CO_2e Exhaust Emissions (MT CO_2e/day)	5,864	2,886	2,854	2,853	-1.01%	-1.14%
CO_2e Fuel Cycle Emissions (MT CO_2e/day)	1,583	1,644	1,630	1,630	-0.85%	-0.84%

Parameter	Existing (2015)	No Build (2045)	Modified LPA with One Auxiliary Lane (2045)	Modified LPA with Two Auxiliary Lanes (2045)	One Auxiliary Lane Difference from No-Build	Two Auxiliary Lanes Difference from No-Build
Total CO_2e Emissions (MT CO_2e/day)	7,447	4,530	4,484	4,483	-1.01%	-1.03%

Note: Values in this table represent emissions and energy consumption within the traffic assignment area. CO_2e emissions are calculated assuming an EV adoption rate consistent with Oregon and Washington state goals. If the adoption rates are less than the rates assumed in this analysis (52% EVs by 2045), GHG from both No-Build and the Modified LPA would be proportionately higher.
CO_2e = carbon dioxide equivalent; EV = electric vehicle; LPA = locally preferred alternative; MMBtu = million British thermal units; MT = metric tons

Emissions from Operations and Maintenance

GHG emissions from operations and maintenance activities include the emissions from vehicles performing routine maintenance activities to roadways, transit vehicles, and light-rail tracks, activities such as sweeping, restriping, and landscaping. Table 3.19-9 summarizes the energy and GHG emissions from maintenance activities under the Modified LPA. These would be similar to or lower than the annual maintenance activities with the No-Build Alternative because the facilities built for the Modified LPA would be new. There would also be several years where only light to minimal maintenance activity would be needed after construction is complete. Maintenance needs for a lift span would be higher than for the other bridge configurations because of the need for regular inspections and maintenance of the lift mechanism and other moving parts.

Table 3.19-9 Modified LPA Annualized CO_2e Emissions from Maintenance Activities

Project Element	Energy Consumption (mmBtu/year)	CO_2e Emissions (MT/year)
Annualized Value [a]	11,078	1,088

Source: ICE model output (available in Appendix A of the Energy Technical Report).
a Annualized value assumes a 30-year project life.
CO_2e = carbon dioxide equivalent; LPA = Locally Preferred Alternative; mmBtu = million British thermal units; MT = metric tons

3.19.9 Construction Effects

Modified LPA Components

Construction of the Modified LPA would include construction of the new bridges and removal of the existing Interstate Bridge. GHG emissions would be produced from construction equipment and the emissions embodied in construction materials. Construction impacts to energy consumption and GHG emissions from the Modified LPA are presented in Table 3.19-10. FHWA's Infrastructure Carbon Estimator (ICE) spreadsheet tool (ICF 2020) provided the basis for the calculation, which incorporates project features and construction traffic delays to calculate energy consumption from construction equipment, materials, and routine maintenance. The ICE tool was used for all elements of the Modified LPA except the main Columbia River bridges structure, which was evaluated using a material-based approach and is presented separately in Table 3.19-10. The Climate Change and Energy Technical Reports present a range of potential emissions to reflect the uncertainty associated with final

bridge design and specific construction materials. The high range of estimates for the Columbia River bridges is presented below.

These values represent the sum of the total impacts over the construction period. Emissions generated from the construction of any of the Modified LPA design options would be similar.

For more information, including a description of the methods used to develop this estimate, see the Energy Technical Report.

Table 3.19-10. Modified LPA Energy Consumption and GHG Emissions from Construction Activities

Construction Element	Modified LPA, Excluding Columbia River Bridge Structure [a] ($MT CO_2e$)	Columbia River Bridge Structure [b] ($MT CO_2e$)	Modified LPA Construction, Total Emissions ($MT CO_2e$)
Materials (e.g., embodied emissions in construction materials)	299,518	121,373	420,891
Transportation (e.g., transport of materials to the project site)	10,045	4,070	14,115
Construction (e.g., operation of equipment on site)	18,423	16,015	34,438
Total	**327,986**	**141,459**	**469,444**

Source: ICE model output (available in Appendix A of the Energy Technical Report)

a Values calculated from the Federal Highway Administration's Infrastructure Carbon Estimator Model.

B Values calculated using a material quantity-based estimate for materials using environmental product declarations and scaled factors for transportation and construction fuel usage.

CO_2e = carbon dioxide equivalent; LPA = Locally Preferred Alternative; MT = metric tons

Design Options

While it is expected that certain design options would require a greater volume of materials, and that a greater volume of materials would contribute more GHG emissions, design data to determine those volumes will not be available until the final design process. GHG emissions from construction of the Modified LPA were estimated as a range to reflect the uncertainty associated with construction material quantities for a single-level fixed-span configuration. The high value of the range is presented in Table 3.19-10.[3] The double-deck fixed-span or single-level movable-span configuration and the two auxiliary lane option would require a slightly greater volume of materials, which would contribute more GHG emissions compared to the same type of bridge in the single-span configuration with one auxiliary lane.

Emissions and energy consumption were estimated for the Modified LPA using the ICE planning-level model, which does not have the granularity to differentiate between the design options associated with roadway configurations. Estimates could be refined by using material quantity data similar to the bridge construction analysis, which would not be available until final design.

[3] For more information on the methods used to create this range, see the Energy Technical Report.

Traffic Delay Due to Construction

Construction of the Modified LPA is anticipated to last 9 to 15 years, impacting all modes of transportation within the study area as well as adjacent corridors. The Modified LPA could require nighttime closure of regional roadways, interchanges, and local roads during construction. Construction-related truck traffic for delivery of materials, equipment and for removal of materials/debris from demolition could also increase congestion and delays, particularly during periods of major construction. Closures during construction of the Modified LPA could temporarily affect transit operations and/or access to transit within the study area, sidewalks, bicycle facilities, and/or shared-use paths. Increased congestion due to temporary closures of roadways, transit facilities, and active transportation facilities could result in elevated vehicle emissions of CO_2e. Closures would be limited to off-peak hours to minimize impacts to regional travel during peak travel periods.

3.19.10 Indirect Effects

In the context of climate change, indirect impacts include potential growth-inducing effects and other effects related to project-induced changes in patterns of land use, population density, or population growth rate. As documented in Section 3.4, Land Use and Economic Activity, the Modified LPA is likely to facilitate growth within portions of the study area currently designated for denser development; however, it is not expected to result in unplanned growth or urban sprawl. This is because the transit improvements in the Modified LPA, in conjunction with tolling, will encourage growth and development along the new transit line while disincentivizing automobile trips.

Indirect impacts could also occur on the federal navigational channel of the Columbia River; climate change induced sea-level rise could have effects to the channel in two circumstances:

- Below Water – Increased water depth due to sea-level rise within the federal navigation channel could impose a residual future benefit for the federal navigation channel future operations and maintenance and utility (less dredging required).
- Above Water – Increased river stage along the federal navigation channel could reduce the vertical clearance available for vessels to transit under the new Columbia River bridges.

However, evaluation of the latest climate change data indicate that sea-level rise at the mouth of the Columbia River would likely have little effect on water surface elevations around the new Columbia River bridges. Based on the most likely future scenario, the 50% probability projection for 2150, a water surface elevation change of less than 8 inches could occur at the bridges, but this would only occur during high tide events that coincide with atmospheric river storm events in November, December, and January. Therefore, the risk to federal navigation channel operations and maintenance and navigation clearance as a result of climate induced sea-level rise is expected to be very low.

3.19.11 Cumulative Greenhouse Gas Changes and the Social Cost of Carbon

This section evaluates how the reduction in GHG emissions due to the Modified LPA's reduced VMT and improved traffic performance would be balanced by unavoidable new GHG emissions from project construction, operations and maintenance, and transit operations. These estimates reflect the difference between the Modified LPA and the No-Build Alternative. Table 3.19-11 summarizes the inputs used in the estimate of the social cost of carbon from the beginning of construction through 11 years of operation.

Table 3.19-11. Cumulative Emissions Estimates

Parameter	Annual Difference Between the Modified LPA and No Build (MT CO_2e)	Years	Total Over Evaluation Period (MT CO_2e)	Note
Construction Emissions	+46,944	2025–2034	469,444	A range of emissions was estimated; this value is the "high" estimate is 469,444 MT CO_2e over a 10-year construction period. [a]
Operations and Maintenance Emissions	0	2040–2045	0	Annual emissions of 1,088 MT CO_2e would be lower or similar to No-Build.
Transit Operational Emissions	+2,653	2035–2045	26,530	Emissions reflect expanded transit system.
Roadway User Emissions [b]	-15,802	2035–2045	- 158,017	Estimate based on daily reduction of 45 MT CO_2e/day in the region.

a A range of emissions was estimated and presented in Section 3.19.9. The value presented in this table is the "high" value, which assumes higher carbon intensity bridge design and materials for the main river crossing under the single-level bridge configuration with one auxiliary lane.

b Roadway user emissions were assumed to be constant over each year between 2035 and 2045. Due to shifts in the share of electric vehicles in the fleet over time, the 2035–2045 benefits may be underestimated (i.e., those years have more gasoline vehicles than expected in 2045). Changes to travel demand based on population, employment and land use after 2045 are not forecast at this time. Benefits from the Modified LPA would extend well beyond 2045.

MT = metric tons

The climate damages from the combination of construction emissions, transit operations, and benefits accruing from the decrease in roadway use compared to the No-Build Alternative were monetized using the updated SC-GHG values published by the EPA in the *Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances.*[4] Table 3.19-12 shows the present value in 2024 of the monetized climate costs for the 2025-2045 period under each discount rate. The present value of the monetized damages of the GHG emissions from the IBR Program range from $41 to $116 million in 2020 dollars.[5] The equivalent annualized costs of the emissions over the 20-year period range from $2.56 million to $6.46 million. The estimates presented in Table 3.19-12 reflect emissions reductions through 2045, the end of the traffic

[4] U.S. Environmental Protection Agency. (2023, November) Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances. https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf. All files related to EPA's updated estimates are available on EPA's webpage (https://www.epa.gov/environmental-economics/scghg), including the final technical report, all replication instructions and computer code for the estimates, a link to the public comments received and EPA's responses to the comments within the Oil and Gas rule docket, and all files related to the peer review process, including EPA's response to the peer reviewer recommendations. It also includes a link to a Microsoft Excel "Workbook for Applying SC-GHG Estimates" spreadsheet to assist analysts in applying the updated SC-GHG estimates in policy analysis, such as to monetize project SC-GHG emissions in an EIS.

[5] The EPA's social cost of carbon tool provides values for CO_2, CH_4 and N_2O. However, the construction, maintenance, and user emissions are presented in the body of this SEIS in CO_2e. Estimates of CO_2e were disaggregated into specific speciation of constituent chemicals (e.g., CO_2, CH_4 and N_2O) for vehicle operations, fuel cycle emissions, and fuel used during construction and transportation of construction materials. Data were not available to disaggregate embodied CO_2e from construction materials or transit operations, and CO_2e was input as CO_2. Using CO_2e in place of CO_2, CH_4 and N_2O to estimate the social cost of carbon for transit operations and construction materials may result in an overestimate of the social cost of the construction-related emissions.

forecast period. However, benefits from the Modified LPA would extend well beyond 2045 because the transit, active transportation, and roadway improvements are expected to last for many years.

Table 3.19-12. Social Cost of All Greenhouse Gas Emission Changes Associated with IBR Program Cumulative Emissions (2025–2045)

Value	Discount Rate 2.5%	Discount Rate 2.0%	Discount Rate 1.5%
Present Value in 2024 (millions 2020$)	$41.47	$67.67	$115.63
Annualized Value (20 years; millions 2020$)	$2.56	$3.98	$6.46

Source: EPA 2024. Additional detail on the methods and annual estimates of benefits are provided in the Climate Change Technical Report.

3.19.12 Potential Avoidance, Minimization, and Mitigation Measures

Regulatory Requirements

State-level legislation and policy in Oregon and Washington support reducing emissions from transportation to minimize contributions to climate change. There are no specific requirements for mitigation actions in federal, state, or local regulations.

Program-Specific Mitigation

As noted above, there are no specific requirements for mitigation actions in federal, state, or local regulations. However, the IBR Program supports state, regional, and local goals to reduce GHG emissions. The Program is improving and adding multimodal transportation options (to facilitate mode shift), including the extension of light-rail, and the expansion of active transportation facilities; implementing demand management (e.g., variable-rate tolling); and implementing operation and maintenance efficiencies (e.g., using renewable energy for bridge operation needs, using zero-emission transit vehicles). Best management practices and mitigation measures will be considered in coordination with IBR Program partners, subject to developing regulations and standards for transportation projects.

Long-Term Effects

The IBR Program would reduce GHG emissions in support of local, regional, and state goals. This section outlines concepts to further reduce or minimize GHG emissions associated with the construction or operations and maintenance of the Modified LPA. In developing these concepts, the IBR Program collaborated with ODOT, WSDOT, and the eight local agency partners. The IBR Program team will continue to consider and incorporate mitigation and minimization measures during the development of the EIS and through final design and construction.

User Emissions and User Experience: Design and Implementation Considerations

The following concepts address future climate conditions:

- To increase resiliency, the design will consider future conditions, including more frequent and severe winter storms, lower low-water conditions in the dry season, and an increase in the number and intensity of hot days during summer months.
- In consideration of the effects of changing future climate conditions on users of the transportation system, the design considers the provision of shade and other treatments, with a focus on active

transportation and transit users.

Operation and Maintenance

The GHG emissions anticipated as a result of the long-term operation and maintenance of the Modified LPA (as opposed to user emissions) are relatively minor. However, they represent an additional opportunity to improve climate outcomes and progress toward shared GHG reduction goals. As Program design and planning continue, ODOT and WSDOT will work together to develop plans for long-term operation and maintenance of the infrastructure.

Options for reducing GHGs through infrastructure maintenance include:

- Minimizing energy use (e.g., LED lights) and using green energy sources.
- Providing energy storage on the bridges for operations if power is interrupted.
- Maximizing the renewable electricity supply for operations (lights, signs, transit, toll collection) toward 100% as soon as practical.
- Exploring potential for wind generation, solar panels for energy needs, or piezoelectric energy harvesters to generate energy from traffic vibration.
- Using an all-electric or hydrogen maintenance fleet (anticipated by 2045).
- Establishing guidelines for replacement equipment, alternative fuel use, and materials standards.

Measures outlined in the Energy Technical Report are as follows:

- Applying best management practices for maintenance of the toll gantries and supporting infrastructure.
- Using energy-efficient electrical systems for toll gantries and technical shelters.

Construction Effects

Strategies to reduce the GHG emissions associated with the construction of the Modified LPA would include a range of options. Oregon and Washington have standard specifications that would reduce GHG emissions during construction, including:

- ODOT Standard Specifications Section 290, which has requirements for environmental protection, and include air pollution control measures. These control measures include vehicle and equipment idling limitations, which would also reduce energy usage and GHG emissions.
- Many of WSDOT's standards specifications to minimize air quality impacts would also reduce energy use and GHG emissions, including:
  - Minimizing delays to traffic during peak travel times.
  - Minimizing unnecessary idling of on-site diesel construction equipment.
  - Educating vehicle operators to shut off equipment when not in active use to reduce emissions from idling.
  - Preparing a traffic control plan with detours and strategic construction timing (such as night work) to continue moving traffic through the area and reduce backups and delays to the traveling public, to the extent possible.

As construction packages and plans are developed, the IBR Program will evaluate the potential to further reduce GHGs associated with construction. This could be implemented through construction bid document specifications or performance requirements, and could include:

- Construction materials.
  - Design specifications for materials to reduce embodied emissions; use Environmental Product Declarations to evaluate various material choices and options.
  - Minimize lengthy supply chains for materials by using local sources where possible while still maintaining acceptable quality levels for materials.
  - Use cleaner production methods for cement and concrete (e.g., consider different mixes, fuel specifications for kiln and manufacture), and if found viable, incorporate into material specifications.
  - Maximize inclusion of recycled material to reduce virgin material production and inclusion. This would include recycling existing concrete and asphalt pavements within Program limits to be used as aggregate base, subbase, backfill materials, etc.
  - Consider prioritizing suppliers that document accountability to their sustainable practices, such as by participating and reporting to EPA's Energy StarChallenge for Industry.
- Fuel and energy use.
  - Specify emissions targets for contractors and encourage use of renewable fuels and electric equipment.
  - Specify improved diesel emissions standards for construction and vehicles.
  - Use renewable diesel, renewable propane, or other lower-carbon fuels in construction equipment and transport of materials.
  - Select specified electrical equipment (e.g., lighting) to maximize for energy efficiency, as long as the equipment meets safety and other project needs and requirements.
  - Seek to prioritize the use of battery-powered equipment and limit the use of diesel equipment operating under less stringent emissions standards than EPA's Tier 4.[6]
- Waste reduction.
  - Minimize construction waste.
  - Consider adopting or establishing a zero-waste demolition plan, including a recycling plan, to maximize the recycling or reuse of old bridge components.
- Traffic management during construction.[7]
- Support and encourage alternative modes during construction, such as transit subsidies or elimination of fares during construction period.
- Other approaches as suggested by interested parties, agencies, and the public.

[6] EPA has adopted a comprehensive national program to reduce emissions from nonroad (construction equipment) diesel engines by integrating engine and fuel controls as a system to gain the greatest emission reductions. To meet these Tier 4 emission standards, engine manufacturers will produce new engines with advanced emission control technologies.

[7] Measures for minimizing the effects of construction-related traffic congestion (and thus emissions) are described in the Transportation Technical Report.

3.20 Environmental Justice

Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (February 11, 1994) reinforces the National Environmental Policy Act of 1969 (NEPA) by requiring federal agencies to analyze the "disproportionately high and adverse" environmental effects resulting from federal actions on minority and low-income populations. EO 12898 also calls for the fair treatment and meaningful involvement of all people, which refers to proactive efforts to increase low-income and minority participation.

On April 21, 2023, the Biden Administration signed EO 14096, Revitalizing Our Nation's Commitment to Environmental Justice for All. EO 14096 directs the federal government to build upon and strengthen its commitment to deliver environmental justice (EJ) through an updated definition of EJ, a change in the standard for what constitutes an EJ effect, and an expansion of EJ communities. Although formal guidance on how to apply EO 14096 to NEPA projects has yet to be published, the IBR Program has sought to meet the intent of the rule through a robust EJ analysis, coordinated with an equity analysis completed as part of the Equity Technical Report and summarized in Section 3.5, Neighborhoods and Equity.

Per U.S. Department of Transportation (USDOT) Order 5610.2C (May 14, 2021), determination of a "disproportionately high and adverse effect" depends on whether that effect is (1) predominantly borne by an EJ population, or (2) will be suffered by the EJ population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-EJ population. It is important to note that determination of disproportionately high and adverse effects takes into consideration the mitigation and enhancement measures that are planned for the proposed action.

The information in this section is based on the Environmental Justice Technical Report, which contains greater detail and analysis.

3.20.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with environmental justice has been updated in this Draft SEIS to include the following:

Legal/Regulatory Changes

- On April 21, 2023, EO 14096, Revitalizing Our Nation's Commitment to Environmental Justice for All, was signed by the Biden Administration, providing updates to the definition of EJ, a change in standard for what constitutes an EJ effect, and an expansion of EJ communities.
- On May 14, 2021, USDOT Order 5610.2C was authorized, providing an update to the legal standard for "disproportionately high and adverse effects" on EJ populations.

Methods and Analysis Changes

- Updated EJ analysis methodology to identify "meaningfully greater" and high-priority EJ areas. This methodology is described in more detail in Section 3.20.2, below.
- Updated demographic information to assess low-income and minority populations within the study area.
- Changes in the project footprint necessitated by changed conditions resulted in shifting the light-rail transit alignment and stations.

- Design modifications that would reduce residential and commercial property acquisitions.
- Updated long-term, short-term, direct, indirect, and cumulative effects on low-income and minority populations resulting from the Modified LPA.
- Updated discussion of the effects on EJ populations that would result from a future IBR tolling program.

The IBR Program identified some impacts from the Modified LPA that would differ from those of the CRC LPA. Table 3.20-1 compares the key EJ-related impacts and benefits of the CRC LPA, as identified in the Final EIS (2011), and the IBR Modified LPA. Only the impact categories that would affect EJ populations are shown in the table. Key design changes that would affect EJ impacts include replacing the full interchange on Hayden Island that was part of the CRC LPA with a partial interchange and moving the proposed light-rail transit alignment closer to I-5 in downtown Vancouver. The changes proposed under the Modified LPA would require a smaller design footprint, reducing the number of residential and commercial displacements in meaningfully greater and high-priority EJ areas.

Table 3.20-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects

Type of Effect	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects Identified in This Section	Explanation of Differences
Residential Displacements	59 (approximately 18 in meaningfully greater and high-priority EJ areas)	43 for the Modified LPA, including all design options except the I-5 westward shift (none in meaningfully greater and high-priority EJ areas) The I-5 westward shift design option would shift I-5 west in downtown Vancouver, resulting in 33 residential units displaced in the Esther Short neighborhood (high-priority low-income neighborhood).	Modified LPA design changes would reduce residential property acquisition, including in meaningfully greater and high-priority EJ areas, for all design options except for the I-5 westward shift.
Business Displacements	69 (approximately 30 in meaningfully greater and high-priority EJ areas)	36 (13 in meaningfully greater and high-priority EJ areas) One design option would shift I-5 west in downtown Vancouver, resulting in 3 commercial displacements at the Regal City Center complex.	Commercial property acquisitions in meaningfully greater and high-priority EJ areas would also decrease due to the Modified LPA's smaller footprint.

Type of Effect	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects Identified in This Section	Explanation of Differences
Tolling	New toll would require a higher proportion of income for low-income drivers. Consideration of a variety of potential tolling schemes, including variable price tolls.	New toll would require a higher proportion of income for low-income drivers. Toll rates and policies, including a possible low-income toll program, would be jointly set by the OTC and WSTC. Both commissions have supported the study of a low-income toll program, including how such a program could be implemented in each state. They will work together to determine how to approach this for the IBR Program.	New analysis completed to understand the potential impacts of tolls on EJ populations under the Modified LPA.
High-Capacity Transit	The CRCLPA would bring new high-capacity transit to the I-5 corridor, including high-priority EJ neighborhoods such as Esther Short in Vancouver.	Same as CRC LPA.	None identified.
Social and Neighborhood Effects	Displacement of Hayden Island Safeway and bottle return.	None identified.	The Safeway grocery store (including a pharmacy and bottle return) closed after the CRC project was suspended. A new Target store, replacing some of these services, was constructed outside the Modified LPA footprint.

CRC = Columbia River Crossing; N/A = not applicable; OTC = Oregon Transportation Commission; WSTC = Washington State Transportation Commission

3.20.2 Affected Environment

Study Area

The IBR study area, also referred to as the primary study area, is a 5-mile segment of I-5 approximately between the SR 500 interchange in Washington and the I-5/Columbia Boulevard interchange in Oregon, as well as the Ruby Junction Maintenance Facility in Gresham, Oregon.

Impacts to EJ populations can extend beyond a project's limits. Therefore, the EJ analysis looked at a larger secondary study area, which extends over 15 miles from approximately 1 mile north of the I-5/I-205 interchange in Vancouver, south to the I-5/I-84 interchange, and 1 mile both east and west of I-5. The secondary study area captures the direct impacts as well as where the greatest potential for indirect impacts (e.g., traffic and development changes) could occur (Figure 3.20-1). The intent of using the secondary study area for the EJ analysis was to account for all EJ populations that could be directly and indirectly impacted by the Modified LPA. For the EJ analysis, references to the study area refer to this secondary study area unless noted otherwise.

Defining Environmental Justice Populations

EO 12898 instructs federal agencies and recipients of federal funds to integrate EJ into agency missions and to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on low-income and minority populations. Hence, the EJ analysis considers all potential impacts of the Modified LPA to determine whether the IBR Program would result in disproportionately high and adverse effects on low-income and minority populations, which are defined as EJ populations.

The first step of the EJ analysis was to identify all EJ populations within the study area using best practices and methods consistent with FHWA guidance (FHWA 2011) and guidance sourced from the publication *Promising Practices for EJ Methodologies in NEPA* (EJ IWG2016), a compilation of agency approaches for incorporating EJ into environmental reviews published by the Environmental Justice Interagency Working Group. Per this guidance, a "no-threshold" analysis was conducted to identify all minority and low-income populations within the study area regardless of concentration relative to the general population. This analysis used 2016–2020 American Community Survey (ACS) data published by the U.S. Census Bureau, analyzed at the U.S. Census block group level. For the Final SEIS, the analysis will be updated with the most recent ACS data available.

Building from the no-threshold analysis described above, a "meaningfully greater" analysis was used to identify concentrations of EJ populations relative to the average for the Portland-Vancouver region. As with the no-threshold technique, this methodology is sourced from *Promising Practices for EJ Methodologies in NEPA Reviews* (EJ IWG 2016).

For the purposes of this project, low-income and minority populations 1.5 times greater than the corresponding average for the Portland-Vancouver region are considered "meaningfully greater." Low-income and minority populations that are 2 times greater than the average for the Portland-Vancouver Region are considered "high-priority" EJ areas.[1] Block groups where minority or low-income populations made up 50% or more of the population were also considered high-priority EJ areas. The purpose of identifying meaningfully greater and high-priority EJ areas is to provide a baseline reference for the relative concentration of where minority and low-income populations are present, and where disproportionately high and adverse effects could occur. Determining meaningfully greater and high-priority EJ areas also provides a reference for where there could be a need for additional outreach and analysis as part of the IBR Program.

The IBR Program acknowledges that demographic data providing population and household information are a valuable sampling tool and support analyses such as the EJ analysis. There are some limitations to the use of census data, however, and demographic data for a particular U.S. Census unit should not be the only factor used to determine disproportionality in EJ analysis. Consideration of the type, magnitude, severity, and distance of impacts in conjunction with demographic data forms a more complete understanding of potential impacts, including whether impacts would be disproportionately high and adverse to EJ populations.

Minority Populations

Minority populations are defined consistent with USDOT Order 5610.2C and FHWA's Guidance on Environmental Justice and NEPA (FHWA 2011):

- Black: A person having origins in any of the black racial groups of Africa.

[1] The meaningfully greater thresholds of 1.5 and 2 times the corresponding county or regional average were selected given the regional significance of the IBR Program, such that the determination of meaningfully greater and high-priority EJ areas was relative to the broader region. These specific thresholds were also used in the Southwest Corridor Light Rail Environmental Impact Statement, another regionally significant program (FTA 2022).

- Hispanic or Latino: A person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.
- Asian American: A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent.
- American Indian and Alaskan Native: A person having origins in any of the original people of North America or South America (including Central America).[2]
- Native Hawaiian and other Pacific Islander: People having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

Tribal governments (federally recognized tribes) are sovereign nations as recognized by the U.S. Government, and consultation with federally recognized tribes occurs through a government-to-government consultation process separate and distinct from public and community outreach and comment.

Table 3.20-2 summarizes non-white, minority populations living in U.S. Census block groups within the study area for Portland and Vancouver (U.S. Census Bureau 2022). Minority populations account for 27.8% of this population, representing approximately 35,000 people, which is comparable to the percentage of minority populations in the Portland-Vancouver region (27.6%). Within the study area, block groups in Portland have a somewhat higher percentage of minority residents (31.0%) than in Vancouver (25.0%).

Table 3.20-2. Minority Populations in the Study Area (Portland and Vancouver)

Study Area	Minority Population	Percent Minority
Portland Block Groups	18,283	31.0%
Vancouver Block Groups	16,534	25.0%
Study Area Total	**34,817**	**27.8%**

Source: American Community Survey 5-Year Estimates, 2016–2020, Table B03002 (U.S. Census Bureau 2022).

Table 3.20-3 reports minority populations within the Rockwood neighborhood in Gresham. Demographics for Gresham are reported separately to account for its distance from the study area adjacent to the Interstate Bridge, distinct community characteristics, and separate but related set of improvements under the Modified LPA (Ruby Junction Operations and Maintenance Facility).

Table 3.20-3. Minority Populations in the Study Area (Gresham)

Study Area	Minority Population	Percent Minority
Gresham Block Groups (Rockwood)	8,227	60.0%
Study Area Total	**34,817**	**27.8%**

Source: ACS 5-Year Estimates, 2016–2020, Table B03002 (U.S. Census Bureau 2022).

[2] Not all American Indian and/or Native American populations are appropriately represented in U.S. Census data due to a history of termination, removal, and assimilation. Furthermore, tribal affiliation, citizenship, and/or sovereignty does not imply tribal ethnicity and cultural affiliation, and vice versa. The EJ analysis recognizes that the demographic analysis based on U.S. Census data is not fully representative of American Indian and/or Native American populations within the study area.

Figure 3.20-1. Environmental Justice Study Area

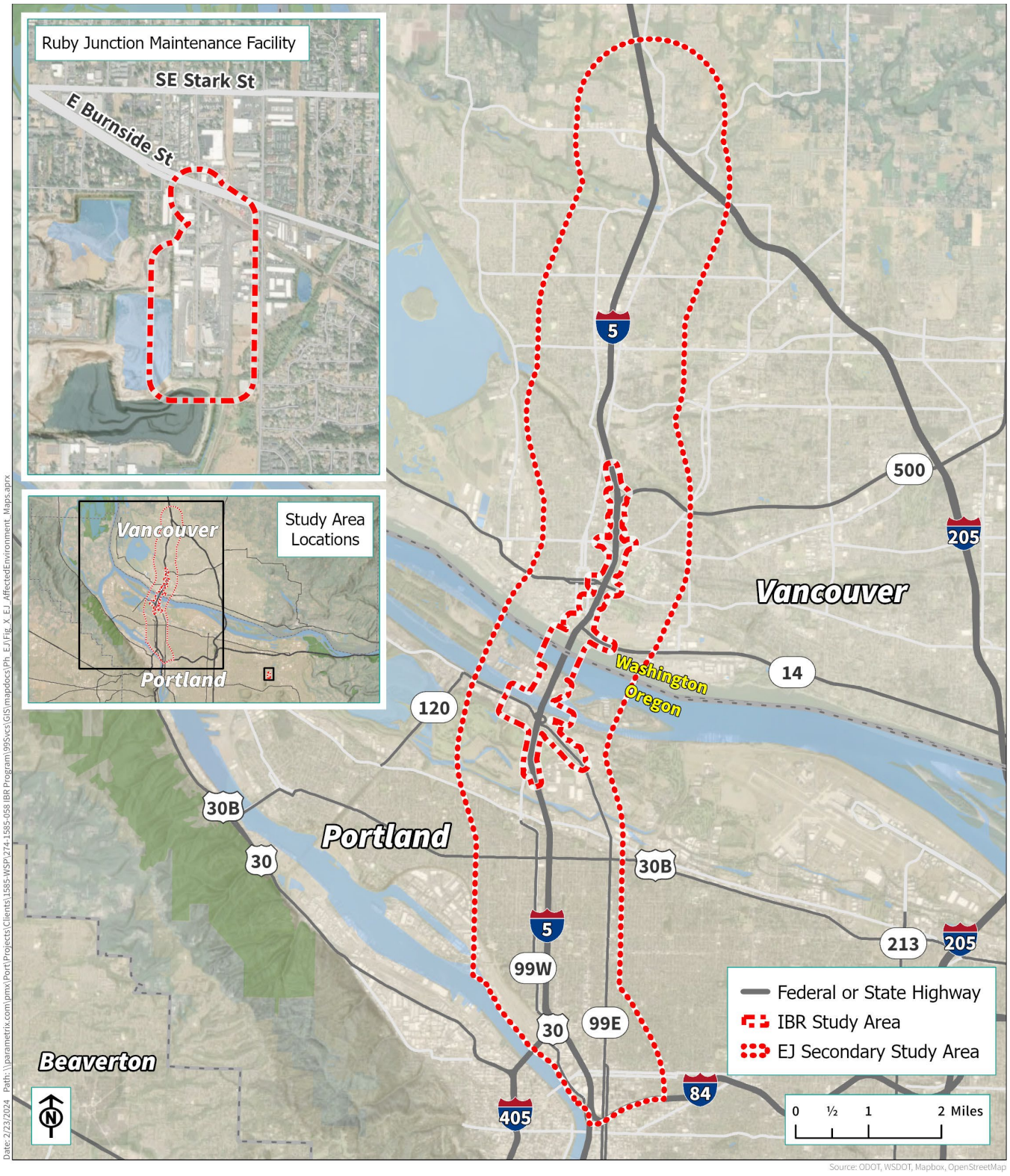


Table 3.20-4 summarizes minority populations in the study area by race and ethnicity (U.S. Census Bureau 2022). In the study area, white residents are the largest share of the total population (72.2%), followed by Hispanic or Latino (10.2%), Black or African American (6.7%), and two or more races (5.8%).

Within the study area, Portland's population is somewhat more racially diverse than Vancouver's. Compared to Vancouver, Portland study area block groups have a higher percentage of Black or African American, American Indian and Alaska Native, and Asian populations. However, Vancouver study area block groups have a higher percentage of Native Hawaiian and other Pacific Islander, two or more races, and Hispanic or Latino populations.

Table 3.20-4. Minority Populations in the Study Area by Race and Ethnicity (Portland and Vancouver)

Study Area	White Alone (Race)	Black or African American Alone (Race)	American Indian and Alaska Native Alone (Race)	Asian Alone (Race)	Native Hawaiian and Other Pacific Islander Alone (Race)	Some Other Race Alone (Race)	Two or More Races	Hispanic or Latino (Ethnicity)	Non-White Total
Portland Block Groups	69.0%	11.2%	0.8%	4.4%	0.3%	0.5%	5.7%	8.1%	31.0%
Vancouver Block Groups	75.0%	2.6%	0.5%	2.8%	0.6%	0.3%	5.9%	12.2%	25.0%
Study Area Total	**72.2%**	**6.7%**	**0.7%**	**3.6%**	**0.5%**	**0.4%**	**5.8%**	**10.2%**	**27.8%**

Source: American Community Survey 5-Year Estimates, 2016–2020, Table B03002 (U.S. Census Bureau 2022).

Table 3.20-5 reports minority populations by race and ethnicity within the Rockwood neighborhood in Gresham.

Figure 3.20-2 maps minority populations within the study area by U.S. Census block group.

Table 3.20-5. Minority Populations in the Study Area by Race and Ethnicity (Gresham)

Study Area	White Alone (Race)	Black or African American Alone (Race)	American Indian and Alaska Native Alone (Race)	Asian Alone (Race)	Native Hawaiian and Other Pacific Islander Alone (Race)	Some Other Race Alone (Race)	Two or More Races	Hispanic or Latino (Ethnicity)	Non-White Total
Gresham Block Groups (Rockwood)	40.0%	7.5%	1.6%	6.4%	2.1%	<0.1%	3.6%	38.7%	60.0%

Source: American Community Survey 5-Year Estimates, 2016–2020, Table B03002 (U.S. Census Bureau 2022).

Low-Income Populations

EJ analysis conducted for the IBR Program defines low-income populations consistent with FHWA EJ guidance and the definition established in USDOT Order 5610.2C, which states that a low-income person is an individual whose median household income is at or below the U.S. Department of Health and Human Services poverty guidelines (USDOT 2021). As of 2022, the poverty guideline for a household of four persons is $27,750. The guidelines set by the U.S. Department of Health and Human Services are national and do not reflect distinct state and local economic realities; therefore, special attention must be paid to state and local thresholds.

FHWA allows localities to adapt poverty thresholds to local standards per the FHWA Environmental Justice Reference Guide (FHWA 2015). Regional agencies, such as TriMet and Metro, accept the regional poverty threshold to be 200% of the federal poverty level to reflect regional living costs and standards (Metro 2015; TriMet 2019). Under these regionally accepted standards, a household of four persons making $55,500 or less would be considered low-income in 2022, as shown in Table 3.20-6. Therefore, a four-person household was selected as the basis for determining the low-income poverty threshold, consistent with regional best practices.

Table 3.20-6. Low-Income Populations as Defined for the IBR Program Environmental Justice Analysis

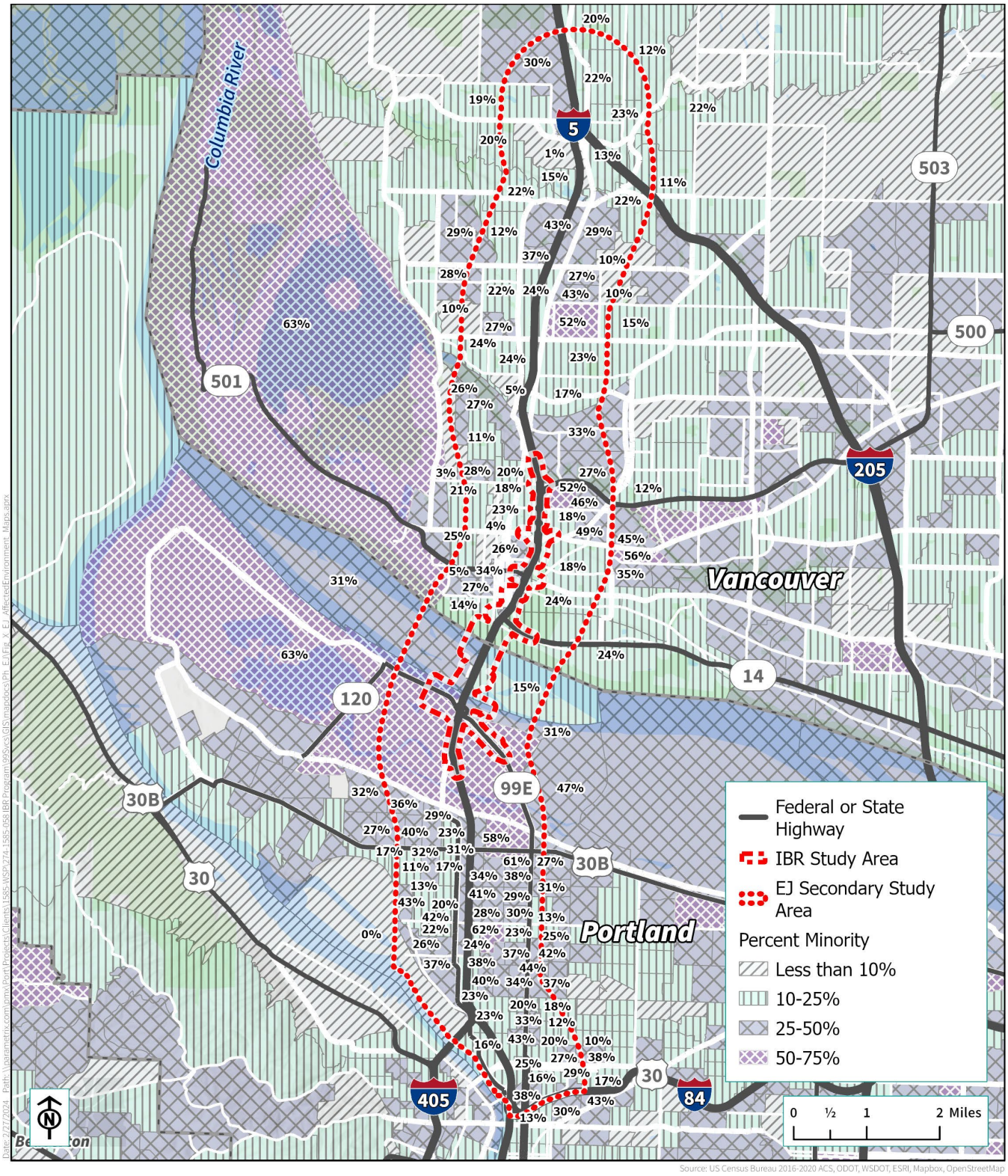
Low-Income Guideline	Household of Four	Individual
Federal Poverty Level	$27,750	$13,590
Low-Income (200% of Federal Poverty Level)	$55,500	$27,180

Source: U.S. Department of Health and Human Services Poverty Guidelines (HHS 2021).

Table 3.20-7 summarizes low-income populations in U.S. Census block groups within Portland and Vancouver (U.S. Census Bureau 2022). For the purposes of this EJ analysis, low-income populations also refer to an identifiable group of low-income persons, including houseless individuals and families in the study area.[3]

[3] The EJ analysis discusses low-income and minority populations and acknowledges that other communities, such as houseless populations or limited-English proficiency populations, may also belong to the EJ population. The equity analysis discusses populations not explicitly referenced in EO 12898; see Section 3.5 Neighborhoods and Equity, for additional analysis of equity populations.

Figure 3.20-2. Percent Minority by Block Group in the IBR Study Area



Within the study area, 25.8% of the population are low-income, approximately 32,000 people. Vancouver study area block groups have a higher percentage of low-income populations (27.1%) than Portland study area block groups (24.3%), which is comparable to the Portland-Vancouver region as a whole (23.7%).

Table 3.20-7. Low-Income Populations in the Study Area (Portland and Vancouver)

Study Area	Low-Income Population (200% of Federal Poverty Level)	Percent Low-Income
Portland Block Groups	14,269	24.3%
Vancouver Block Groups	17,592	27.1%
Study Area Total	**31,861**	**25.8%**

Source: ACS 5-Year Estimates, 2016–2020, Table C17002 (U.S. Census Bureau 2022).

Table 3.20-8 summarizes low-income populations in U.S. Census block groups within Gresham (U.S. Census Bureau 2022).

Table 3.20-8. Low-Income Populations in the Study Area (Gresham)

Study Area	Low-Income Population (200% of Federal Poverty Level)	Percent Low-Income
Gresham Block Groups (Rockwood)	14,269	49.6%

Source: American Community Survey 5-Year Estimates, 2016–2020, Table C17002(U.S. Census Bureau 2022).

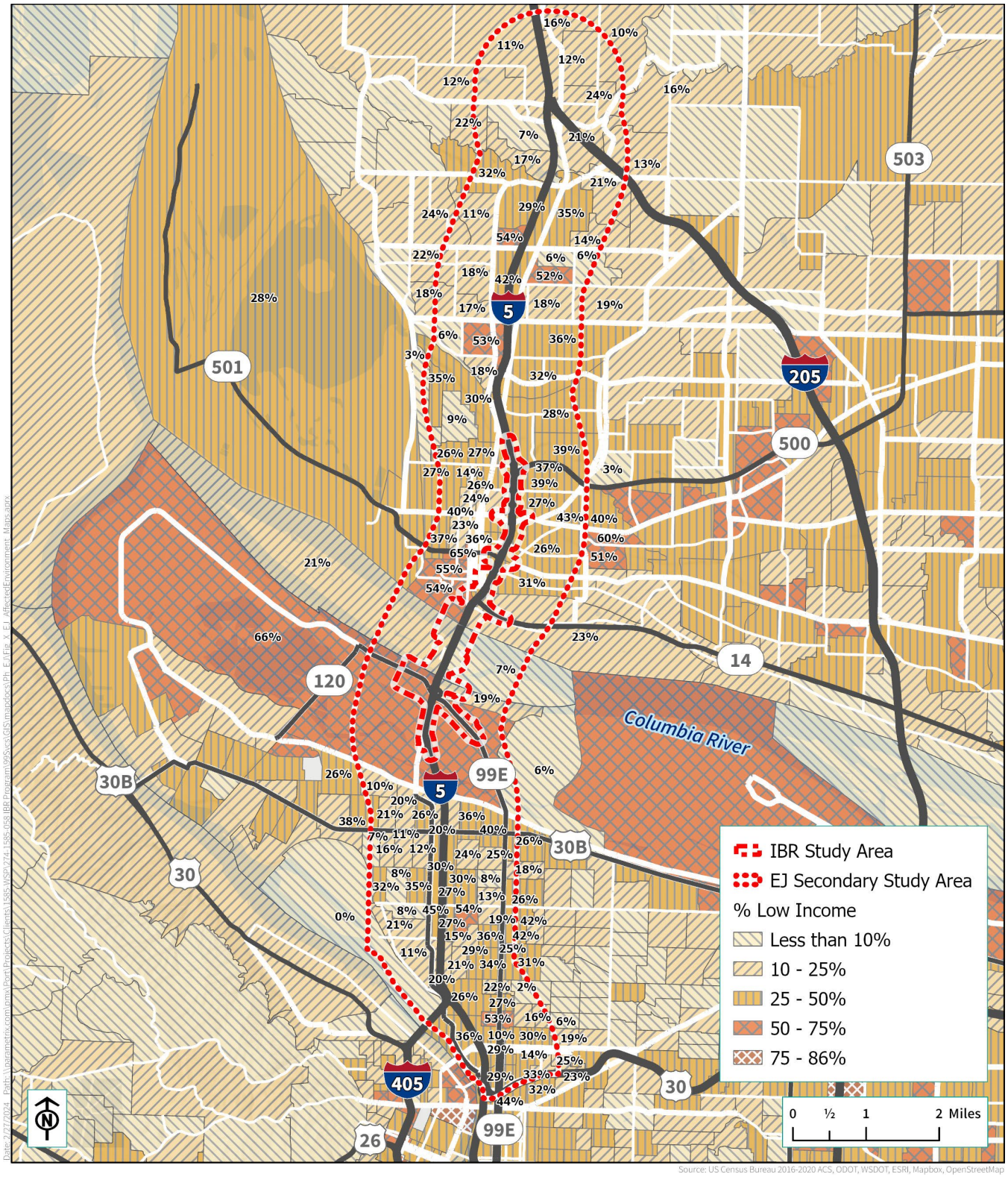
Figure 3.20-3 maps low-income populations within the study area by U.S. Census block group.

Meaningfully Greater and High-Priority EJ Areas

Building from the identification of all EJ populations based on the no-threshold analysis described above, additional analysis was conducted to identify concentrations of minority and low-income populations within the study area. Areas with higher concentrations of EJ populations provided a reference for where additional analysis and outreach may be needed as part of the IBR Program.

A "meaningfully greater" analysis methodology was used to identify higher concentrations of EJ populations relative to the general population. As with the no-threshold technique, this analysis technique is sourced from *Promising Practices for EJ Methodologies in NEPA Reviews* (EJ IWG 2016). The analysis considers EJ impacts in census block groups where levels of low-income or minority populations are meaningfully greater than corresponding county or regional averages—usually expressed in percentage ranges.

Figure 3.20-3. Percent Low-Income by Block Group in the IBR Study Area



Per the guidance set forth in the EJ methodology report, meaningfully greater analysis uses reasonable, subjective thresholds (e.g., 10% to 20% greater than the reference community) (EJ IWG 2016). For the purposes of this EJ analysis, low-income and minority populations 1.5 times greater than the corresponding average for the Portland-Vancouver region are considered meaningfully greater. Low-income and minority populations 2 times greater than the average for the Portland-Vancouver region are considered high-priority EJ areas[4] for the purposes of this project. Furthermore, block groups where minority or low-income populations made up 50% or more of the population were also considered high-priority EJ areas.[5]

Evaluating Effects on EJ Populations

It is important to note that, while meaningfully greater and high-priority EJ areas were used as tools to help identify higher concentrations of EJ populations relative to regional averages, these thresholds were not used as the analytical or legal basis for determining whether an environmental effect is disproportionately high and adverse. Per USDOT Order 5610.2c., determination of a "disproportionately high and adverse effect" depends on whether that effect is (1) predominantly borne by an EJ population, or (2) will be suffered by the EJ population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-EJ population.

EJ analysis conducted for the IBR Program defines low-income populations consistent with FHWA EJ guidance and the definition established in USDOT Order 5610.2C, which states that a low-income person is an individual whose median household income is at or below the U.S. Department of Health and Human Services (HHS) poverty guidelines (USDOT 2021). As of 2022, the poverty guideline for a household of four persons is $27,750. The guidelines set by HHS are national and do not reflect distinct state and local economic conditions; therefore, special attention must be paid to state and local thresholds.

The FHWA allows localities to adapt poverty thresholds to local standards per the FHWA Environmental Justice Reference Guide (FHWA 2015). Regional agencies, such as the Tri-County Metropolitan Transportation District (TriMet) and Metro, consider the regional poverty threshold to be 200% of the federal poverty level to reflect regional living costs and standards (Metro 2015; TriMet 2019). Under these regionally accepted standards, a household of four persons making $55,500 or less would be considered low-income in 2022, as shown in Table 3.20-6.[6]

The purpose of identifying meaningfully greater and high-priority EJ areas is to provide a baseline reference for the relative concentration of where minority and low-income populations exist, and where disproportionately high and adverse effects could exist. Determination of meaningfully greater and high-priority EJ areas also provides a reference for where there could be a need for additional outreach and

[4] The meaningfully greater thresholds of 1.5 and 2 times the corresponding county or regional average were selected given the regional significance of the IBR Program, such that the determination of meaningfully greater and high-priority EJ areas was relative to the broader region. These specific thresholds were also used in the Southwest Corridor Light Rail Environmental Impact Statement, another regionally significant program (FTA 2022).

[5] For the purposes of this project, the 1.5 and 2 times thresholds were developed based on an interpretation of the FHWA Environmental Justice Reference Guide that allows localities to adapt poverty thresholds to appropriate local standards (FHWA 2015). As described in the Defining Environmental Justice Populations section, TriMet and Metro accept the regional poverty threshold to be 200% of the federal poverty level to better reflect regional living costs and standards (Metro 2015; TriMet 2019). Meaningfully greater block groups indicate areas that are substantially impoverished relative to the Portland-Vancouver region—150%, or 1.5 times, below the "low-income" threshold established for the project. Block groups 200% or 2 times below are essentially the lowest-income block groups in the region. The same multipliers were applied to minority populations. Understanding these regional disparities served as one critical component for understanding the potential for disproportionately high and adverse impacts as part of the IBR Program.

[6] The average size of household in the Portland-Vancouver region is approximately 2.5 residents. Household sizes of one and four were reported based on other recently completed NEPA EJ analyses that have been performed in the region. For the purposes of this analysis, the federal poverty guideline for a four-person household is used.

analysis as part of the IBR Program. However, the determination of meaningfully greater and high-priority EJ areas was not used as the analytical or legal basis for determining disproportionately high and adverse effects on EJ populations (see *"Evaluating Effects on EJ Populations"* above).

As discussed above, low-income and minority populations 1.5 times greater than the corresponding regional average are considered meaningfully greater, and low-income and minority populations with 2 times the average are considered high-priority areas in the EJ analysis. Table 3.20-9 defines these values for the Portland-Vancouver-Hillsboro metropolitan area as defined by the U.S. Census.

Table 3.20-9. High-Priority and Meaningfully Greater Reference Values for EJ Areas

Reference Value	Low-Income (200% of Federal Poverty Level)	Minority
Portland-Vancouver-Hillsboro Metropolitan Average	23.7 %	27.6%
Meaningfully Greater (1.5 times)	41.4%	35.6%
High-Priority (2 times)	55.2%	47.4%

For the purposes of this discussion, meaningfully greater and high-priority EJ areas are described according to the neighborhoods within which they are located. The study area includes 43 neighborhoods, 19 of which are in Portland, 23 in Vancouver, and one in Gresham. Of these 43 neighborhoods, 10 contain meaningfully greater or high-priority percentages of EJ populations (either low-income or minority populations). Two of these neighborhoods are in Portland, one is in Gresham, and the remaining seven are in Vancouver.

The percentage of minority residents in the study area (27.8%) is higher than in the Portland-Vancouver region (23.7%). Both Portland and Vancouver neighborhoods in the study area have a higher percentage of low-income populations than the Portland-Vancouver region as a whole (23.7%).

Figure 3.20-4 displays neighborhood boundaries within the study area. Figure 3.20-5 shows meaningfully greater and high-priority low-income block groups in the context of neighborhood boundaries. Figure 3.20-6 shows meaningfully greater and high-priority minority block groups in the context of neighborhood boundaries.

3.20.3 Engagement Activities

23 CFR 771.111 requires the provision of public involvement opportunities and meaningful access to public information for minority populations and low-income households. Per FHWA and FTA guidance on Environmental Justice and NEPA, EJ documentation should include a discussion of major proactive efforts to ensure meaningful opportunities for public participation, including activities to increase low-income and minority participation. Public engagement information should also include affected populations' perception of the project and steps to resolve potential controversy. Additionally, EJ documentation should describe the degree to which affected minority and/or low-income populations have been involved in decision-making related to project alternatives, impacts, and mitigation.

The IBR Program team is engaged in an ongoing public outreach campaign that offers a wide range of opportunities for public involvement throughout the environmental review process. Meaningful public involvement in the IBR Program has included forming four advisory groups: the Community Advisory Group, Equity Advisory Group, Community Benefits Advisory Group, and Executive Steering Group. The advisory groups are composed of regional community members who were identified and appointed to represent a diverse range of perspectives, including EJ populations, as well as representatives from local agencies and

community-at-large members. The IBR Program has been engaging with partner agencies, tribal governments, and community-based organizations since late 2020 and has been conducting more formal intentional community engagement since January 2021. This process is documented in Section 2.5 of the Environmental Justice Technical Report, as well as in the IBR Community Engagement Report (IBR 2021) and Appendix B, Public Involvement, of this Draft SEIS.

The IBR Program is consulting with 10 federally recognized Indian tribes. Federally recognized tribes are sovereign nations as recognized by the U.S. Government, and consultation with federally recognized tribes occurs through a government-to-government consultation process separate and distinct from public and community outreach and comment. The government-to-government consultation goals and process are documented in Appendix A, Agency and Tribal Coordination. Additional discussion of federally recognized tribes is included in 3.5, Neighborhoods and Equity.

3.20.4 Long-Term Effects

In general, long-term impacts of the IBR Program were determined by evaluating the location and intensity of environmental impacts that would occur during operation of the Modified LPA in areas where EJ populations have been identified. In particular, the EJ analysis assessed whether impacts to EJ populations would be disproportionately high and adverse compared to the general population. The impact analysis included impacts derived from several IBR Program technical reports: Acquisitions and Displacements, Neighborhoods and Populations, Land Use, Economics, Visual Resources, Air Quality, Noise and Vibration, and Transportation.

All environmental resource topics were reviewed in coordination with subject matter experts to assess whether the effects identified for those resources under the Modified LPA had the potential to be predominantly borne by EJ populations or could be suffered by an EJ population in a manner appreciably more severe or greater in magnitude than the non-EJ population. Environmental resource topics with the potential to result in a disproportionately high and adverse effect on EJ populations under the Modified LPA became the focus of the EJ analysis and were studied further. Environmental resources that would not or were unlikely to result in disproportionately high and adverse effects under the Modified LPA were not studied further.

Table 3.20-10 summarizes all IBR environmental resource topics and indicates the relevant topics for the EJ analysis.

Figure 3.20-4. Neighborhoods in the IBR Study Area

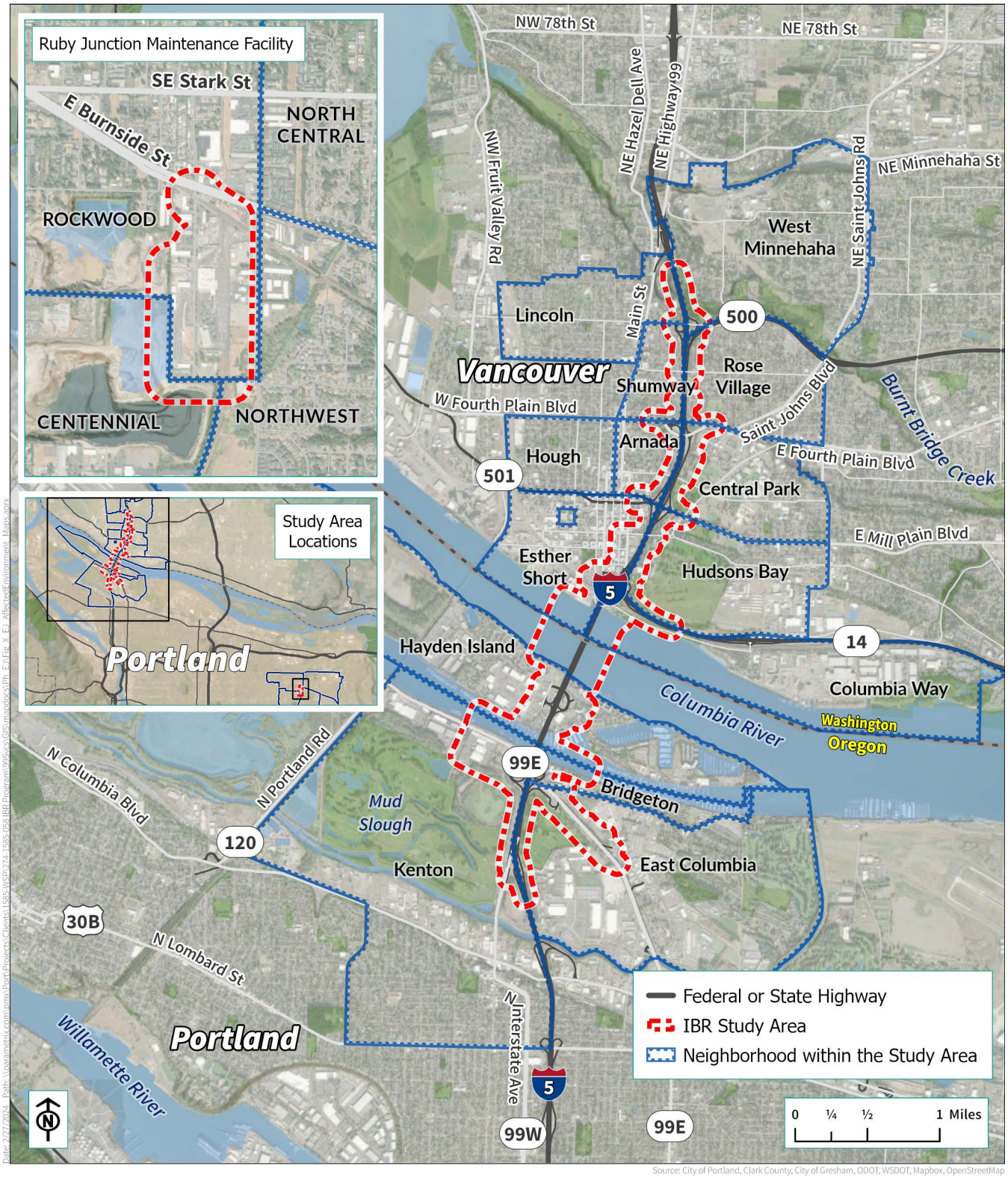


Figure 3.20-5. Meaningfully Greater and High-Priority Minority Block Groups and Study Area Neighborhoods

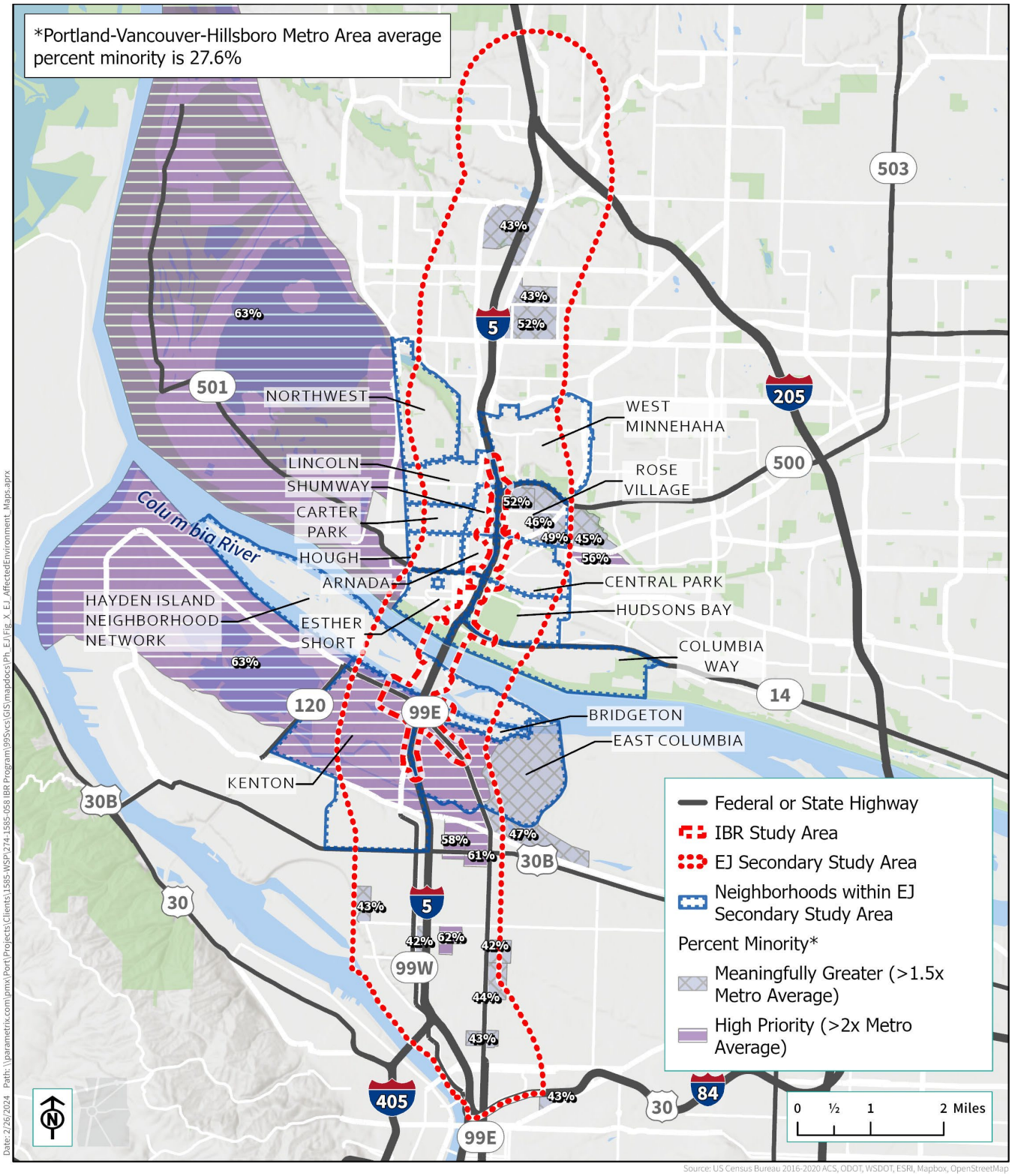


Figure 3.20-6. Meaningfully Greater and High-Priority Low-Income Block Groups and Study Area Neighborhoods

Table 3.20-10. IBR Environmental Resource Topics – Potential Impacts to Environmental Justice Populations

Environmental Resource Topic	IBR Reference	Potential Impact to EJ Populations?
Acquisitions, Displacements, and Relocations	Acquisitions Technical Report	Yes.
Air Quality	Air Quality Technical Report	Yes.
Archaeology	Archaeological Resources Technical Report	Yes.
Aviation	Aviation Technical Report	No; effects evaluated were limited to protected airspace and air navigation hazards.
Climate	Climate Technical Report	No; this is a larger-scale analysis of greenhouse gas emissions and climate resiliency that is not scalable to EJ population areas.
Economics	Economics Technical Report	Yes.
Ecosystems	Ecosystems Technical Report	No; this analysis evaluated effects to fish, wildlife and plants.
Energy	Energy Technical Report	No; this is a larger-scale analysis of energy usage that is not scalable to EJ population areas.
Electromagnetic Fields	Electromagnetic Fields Technical Report	No; this is a larger-scale analysis of EMF that is not scalable to EJ population areas.
Geologic Hazards	Geology and Groundwater Technical Report	No; this is a larger-scale analysis of geological hazards that is not scalable to EJ population areas.
Hazardous Materials	Hazardous Materials Technical Report	No; effects evaluated were site specific, whereas EJ population areas were evaluated at a neighborhood level.
Historic Resources	Historic Built Environment Technical Report	No; this analysis evaluated historic resources within the context of historical significance under the National Historic Preservation Act Section 106.
Land Use	Land Use Technical Report	Yes.
Noise and Vibration	Noise and Vibration Technical Report	Yes.
Social and Neighborhood Effects	Neighborhoods and Populations Technical Report	Yes.
Public Services	Public Services Technical Report	No; this analysis evaluated effects limited to public services without decreases in services to general and EJ populations.
Transportation	Transportation Technical Report	Yes.

Environmental Resource Topic	IBR Reference	Potential Impact to EJ Populations?
Tolling	Economics Technical Report	Yes.
Utilities	Utilities Technical Report	No; this analysis evaluated effects limited to utilities and potential utility relocations without impacts to service.
Visual Resources	Visual Quality Technical Report	Yes.
Water Quality and Hydrology	Water Quality and Hydrology Technical Report	No; this is a larger-scale analysis of water quality, and proposed changes would result in benefits to general and EJ populations.
Wetlands and Jurisdictional Waters	Wetlands and Other Waters Technical Report	No; this analysis evaluated wetlands and jurisdictional waters within the context of Clean Water Act Sections 401 and 404, as well as applicable state and local regulations.

EJ = environmental justice; EMF = electromagnetic field

The long-term impact assessment methods for each of the environmental topics relevant to the EJ analysis are summarized below.

- **Acquisitions and displacements.** The EJ analysis reviewed proposed property acquisitions and displacements within census block groups[7] and neighborhoods in the study area to determine impacts to EJ populations. The analysis reviewed the concentration of EJ populations compared with identified acquisitions and displacements to assess whether EJ populations within the study area would be disproportionately impacted by proposed acquisitions and displacements compared to the general population.
- **Air quality.** The EJ analysis reviewed changes to air quality resulting from the Modified LPA to determine whether EJ populations would be adversely and disproportionately impacted by airborne pollutants compared to the general population. The analysis was conducted for the study area and region and reviewed the six criteria pollutants regulated by the National Ambient Air Quality Standards, including carbon monoxide, lead (Pb), particulate matter (PM_{10} and $PM_{2.5}$), nitrogen dioxide (NO_2), ozone (O_3), and sulfur dioxide (SO_2).
- **Archaeology.** Investigations to determine the presence of archaeological resources within the study area are underway. If present, potential impacts to archaeological resources will be reviewed to determine if they would be culturally significant to EJ populations.
- **Land use and economics.** The EJ analysis evaluated the economic impact of the IBR Program to low-income and minority populations within the study area by reviewing several economic factors, such as the potential effects of business and employee displacements, changes to land uses in block groups with high concentrations of EJ populations, and the impact of tolling.
- **Noise and vibration.** Noise impacts were evaluated in block groups with high concentrations of EJ populations within the study area. The noise and vibration analysis used noise sample location data and noise modeling to compare existing and future noise and vibration levels. Adverse noise impacts were

[7] Block groups are statistical divisions of census tracts used by the U.S. Census Bureau, consisting of clusters of blocks within the same census tract. Block groups are generally defined to contain between 600 and 3,000 people and are used to present data and control block numbering.

evaluated to determine whether they would be predominantly borne by EJ populations within the study area as compared to the general population.

- **Social and neighborhood effects.** The EJ analysis evaluated community resource displacements and community cohesion impacts in block groups with high concentrations of EJ populations within the study area. The analysis evaluated whether adverse impacts to community resources or community cohesion caused by the IBR Program would be predominantly borne by EJ populations within the study area compared to the general population. The EJ analysis also considered potential impacts and access changes to facilities and services used by EJ populations, including healthcare centers, community facilities, and social service providers that serve low-income and minority populations.
- **Transportation.** The EJ analysis reviewed adverse transportation impacts resulting from implementation of the IBR Program. A range of impacts was considered, including construction-related and long-term changes to access, traffic impacts, public transportation impacts, and impacts to the nonmotorized transportation system. The analysis assessed whether these adverse transportation impacts would disproportionately burden block groups with high concentrations of EJ populations within the study area.
- **Tolling.** The EJ analysis assessed the potential impact of tolling on EJ populations. The analysis used two potential pricing scenarios currently being studied for the I-5 corridor—a typical commuter trip profile, and tolling prices as a percentage of median household income—to determine whether adverse tolling impacts would result in disproportionately high and adverse effects on EJ populations within the study area.
- **Visual resources**. The EJ analysis reviewed adverse impacts to views and visual resources to determine whether such impacts would disproportionately impact block groups with high concentrations of EJ populations.

The long-term impact assessment methods also accounted for potential benefits the IBR Program could bring to EJ communities, such as improved seismic resilience, multimodal access, and accessibility upgrades within the study area.

Table 3.20-11 summarizes the effects of the No-Build Alternative, Modified LPA, and design options on environmental justice. Detailed analysis of the effects is provided in the following sections.

No-Build Alternative

The No-Build Alternative would not displace residents, businesses, community resources, or jobs for any populations, including EJ populations. Travel times would increase by approximately 50% compared to existing times for drivers traveling within the I-5 corridor. This increase in travel times is not anticipated to impact EJ populations differently than the general population. The No-Build Alternative would not bring high-capacity transit to Hayden Island or downtown Vancouver, which would not be a benefit to EJ populations that may rely more on transit than the general population.

Modified LPA

Table 3.20-12 summarizes long-term impacts and benefits to EJ populations associated with the Modified LPA and all design options.

Table 3.20-11. Comparison of No-Build Alternative and Modified LPA Design Options

1 No-Build Alternative	2 Modified LPA With Double-Deck Fixed-Span Configuration, One or Two Auxiliary Lanes, with or without C Street Ramps, Centered I-5, all Park-and-Ride Site Options	3 Modified LPA Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Westward Shift, all Park-and-Ride Site Options	4 Modified LPA Single-Level Fixed-Span Configuration, [a] One Auxiliary Lane, C Street Ramps, Centered I-5, all Park-and-Ride Site Options	5 Modified LPA Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, all Park-and-Ride Site Options
• No displacement of residents, businesses, community resources, or jobs. • Travel times would increase by approximately 50% compared to existing times. Would not bring high-capacity transit to Hayden Island or downtown Vancouver. • Environmental conditions under the No-Build Alternative would affect EJ populations the same as the general population. Therefore, no disproportionately high and adverse effects have been identified.	• Increased access to high-capacity transit and active transportation, and reductions in vehicle travel time. Impacts to EJ populations would be the same as to the general public. • Increase in job access due to faster travel times. Because faster times would result from tolling, tolling would result in disproportionately high and adverse effects on EJ populations. • Residential and business displacements. Displacements in high-priority and meaningfully greater EJ areas such as the Esther Short neighborhood in Vancouver and the Rockwood neighborhood in Gresham would result in disproportionately high	• Similar to Column 2, but would increase residential and business displacements. Additional displacement of the Normandy Apartments in the Esther Short neighborhood as a result of the I-5 westward shift would result in disproportionately high and adverse effects on EJ populations.	• Similar to Column 2, except shared-use path users would have more exposure to noise, but would also have a shorter distance to climb and would be more visible and therefore feel safer. Noise and visual impacts to EJ populations would be the same as to the general population.	• Similar to Column 2, except bridge openings could delay transit and active transportation users. • Delays to transit and active transportation users as a result of bridge openings could also contribute to adverse effects on EJ populations. These effects would be the same for EJ populations as for the general population.

1	2	3	4	5
	and adverse effects on EJ populations. • Increased traffic and noise impacts from construction. Impacts to EJ populations would be the same as to the general public. • Improved air quality. Benefits to EJ populations would be the same as to the general public. • Some adverse impacts to community cohesion. Impacts to EJ populations would be the same as to the general public.			

a The long-term effects associated with the single-level fixed-span configuration would be the same for all bridge types, unless otherwise specified.

A preliminary determination has been made based on the current assessment of environmental impacts, benefits, and mitigation strategies under the No-Build Alternative, as described in Table 3.20-11, above. Given that increased travel times under the No-Build Alternative would affect EJ populations the same as the general population, and given that all other environmental conditions would remain the same as of this writing, the No-Build Alternative would not result in a disproportionately high and adverse effect on EJ populations within the IBR study area. The remainder of this analysis, therefore, focuses on the effects of the Modified LPA on EJ populations, with a preliminary determination for the Modified LPA presented in Section 3.20.8.

Table 3.20-12. Summary of Potential Long-Term Effects from the Modified LPA on Environmental Justice Populations [a,b]

Environmental Resource	Modified LPA Long-Term Impact Summary	Impact Specific to Minority and Low-Income Populations	Benefit Specific to Minority and Low-Income Populations
Acquisitions, Displacements, and Relocations	Full acquisition of 46 properties and partial acquisition of 132 properties, resulting in 43 residential displacements and 36 business displacements. **Oregon Neighborhoods**	The Modified LPA would acquire properties and displace residences and businesses in the identified high-priority and meaningfully greater EJ areas. **Oregon Neighborhoods** • East Columbia: 11 partial acquisitions of East Delta Park; no residential or business	None.

Environmental Resource	Modified LPA Long-Term Impact Summary	Impact Specific to Minority and Low-Income Populations	Benefit Specific to Minority and Low-Income Populations
	• 68 total acquisitions (25 full acquisitions, 43 partial acquisitions). • 36 residential displacements. • 26 business displacements. Residential displacements would occur in the Kenton and Hayden Island neighborhoods. Business displacements would occur in the Bridgeton, Kenton, Hayden Island, and Rockwood neighborhoods. Additional partial acquisitions from East Delta Park would occur in the East Columbia neighborhood. No residential or business displacements would occur in the East Columbia neighborhood. **Washington Neighborhoods** • 110 total acquisitions (21 full acquisitions, 89 partial acquisitions). • 7 residential displacements. • 10 business displacements. • I-5 westward shift design option: 33 additional residential displacements and 3 business displacements. Residential displacements would occur in the Esther Short and Shumway neighborhoods, and business displacements would occur in the Esther Short neighborhood, a high-priority EJ area. Additional acquisitions would occur at Marshall Park in the Central Park neighborhood (partial), Columbia Way (partial), Hudson's Bay (temporary), Lincoln (partial), and Rose Village (partial); none of these acquisitions would result in business or residential displacements. • **I-5 Westward Shift Design Option:** One design option would shift the I-5 mainline and ramps approximately 40 feet to the west between SR 14 and Mill Plain Boulevard. The impacts or	displacements; East Columbia is a meaningfully greater minority neighborhood. Partial acquisitions at East Delta Park within the East Columbia neighborhood would result in disproportionately high and adverse impacts to EJ populations. • Rockwood: 7 total acquisitions; 3 business displacements; Rockwood is a high-priority low-income and minority neighborhood. Rockwood acquisitions would result in disproportionately high and adverse impacts to EJ populations. **Washington Neighborhoods** • Esther Short: 27 total acquisitions; 10 business displacements; Esther Short is a high-priority low-income neighborhood. Esther Short acquisitions would result in disproportionately high and adverse impacts to EJ populations. • The design option that shifts I-5 westward would impact the Normandy Apartments, resulting in 33 additional residential displacements in Esther Short. Normandy Apartments displacements would result in disproportionately high and adverse impacts to EJ populations. • Rose Village: 8 total acquisitions; no displacements; Rose Village is a meaningfully greater low-income and minority neighborhood. Rose Village acquisitions would result in disproportionately high and adverse impacts to EJ populations. • **I-5 Westward Shift Design Option:** Although the Normandy Apartments are not identified by the U.S. Department of Housing and Urban Development as a low-income housing tax credit property (HUD n.d.), the 33 residential	

Environmental Resource	Modified LPA Long-Term Impact Summary	Impact Specific to Minority and Low-Income Populations	Benefit Specific to Minority and Low-Income Populations
	benefits to EJ populations associated with this design option would be similar to those described for the centered I-5 mainline, with two additional property acquisitions: – Normandy Apartments, where 33 residential units would be displaced. – Regal City Center complex, where 3 businesses would be displaced.	displacements would occur within the Esther Short neighborhood, a high-priority EJ area for low-income populations. As described above, Normandy Apartments and Esther Short acquisitions would result in disproportionately high and adverse impacts to EJ populations.	
Air Quality	Emissions for all Mobile Source Air Toxics and criteria pollutants are expected to be substantially lower than existing emissions, and the study area would remain in attainment for National Ambient Air Quality Standards.	No disproportionately high and adverse effects to EJ populations have been identified.	Improved air quality compared to existing conditions for all people, including EJ populations.
Land Use and Economics	• Permanent conversion of approximately 39 acres to transportation use (not inclusive of temporary construction staging). This land conversion would comprise a small portion of the total land in the Portland/Vancouver area and would not be substantial in a regional context. Converted land would be used for the extension of high-capacity transit, park-and-ride structures, and other transportation infrastructure, consistent with the goals and policies of adopted plans. • Business/employee displacements are anticipated to reduce tax revenues in Multnomah County and Clark County by approximately 0.2% and 0.3% to 0.4%, respectively. • The Modified LPA's direct impacts to Hayden Island, and, to a lesser extent, Vancouver, could have a substantial effect on wage earning opportunities for those seeking service industry employment. Some displaced businesses may	Although Hayden Island is not a meaningfully greater or high-priority EJ area, impacts to service industry workers and the conversion of property could impact low-income and minority workers in the study area. However, these land use and economic impacts would impact EJ populations the same as the general population, so no disproportionately high and adverse effects have been identified.	Increased jobs and economic development opportunities near the interstate and transit stations for all communities, including EJ populations.

Environmental Resource	Modified LPA Long-Term Impact Summary	Impact Specific to Minority and Low-Income Populations	Benefit Specific to Minority and Low-Income Populations
	choose to not relocate locally, and some employees would be displaced during construction.		
Noise and Vibration	**Oregon Neighborhoods** Increased noise levels (up to 10 dBA) at up to three sensitive receptors in Jantzen Beach RV Resort. This increase would remain below ODOT's Noise Abatement Criteria. No increase in vibration levels at Jantzen Beach RV Resort. **Washington Neighborhoods** Substantial noise impacts compared to No-Build are predicted to occur at up to six residences located between E 33rd Street and E 35th Street. No increase in vibration levels would occur at residences located between E 33rd Street and E 39th Street.	**Oregon Neighborhoods** None; Jantzen Beach RV Resort is not located in a meaningfully greater or high-priority EJ area, and impacts to EJ populations would be the same as to the general population. Therefore, no disproportionately high and adverse effects on EJ populations have been identified. **Washington Neighborhoods** The area between E 33rd Street and E 39th Street encompasses the Rose Village neighborhood—a meaningfully greater EJ area for both low-income and minority populations. The residences that would experience a substantial noise impact may include EJ populations. Therefore, noise impacts to the Rose Village neighborhood would result in a disproportionately high and adverse effect on EJ populations.	None.
Social and Neighborhood Effects	Impacts to cohesion could result from potential residential and business displacements and impacts to the visual landscape of neighborhoods. **Oregon Neighborhoods** • Displacements: Residential and/or business displacements would occur on Hayden Island, Bridgeton, Kenton, and Rockwood in Gresham. • No change to community resources. • Effects on cohesion: Adverse impacts to community cohesion have been identified on Hayden Island due to the high number of displacements within floating home communities.	**Oregon Neighborhoods** Social and neighborhood effects on EJ populations include displacements in the Rockwood neighborhood, a high-priority EJ area for both low-income and minority populations. These displacements would result in a disproportionately high and adverse effect on EJ populations. **Washington Neighborhoods** Social and neighborhood effects on EJ populations include displacements in the Esther Short neighborhood, a high-priority EJ area for low-income populations. These displacements would result in a disproportionately high and adverse effect on EJ populations.	Improved access, reliability, connectivity, and service frequency to transit for all communities, including EJ populations.

Environmental Resource	Modified LPA Long-Term Impact Summary	Impact Specific to Minority and Low-Income Populations	Benefit Specific to Minority and Low-Income Populations
	Washington Neighborhoods • Displacements: Residential and/or business displacements would occur in the Shumway and Esther Short neighborhoods. • Impacts to community resources: None identified. • Effects on cohesion: None identified.		
Tolling	Tolling on I-5, paired with other Program improvements such as increased transit and active transportation options, is expected to reduce travel times and improve travel reliability; however, tolls would result in higher transportation costs as a portion of household spending. Households in the region would expend an additional $1,600 per year on transportation, representing approximately 2% of median annual household income in the Portland-Vancouver metropolitan area. As described in this table under Transportation, the Modified LPA with all design options would not result in substantial diversion to I-205 as a result of tolling. Changes in vehicle volumes on I-205 on any of the studied screenline locations during the peak period range from -3% to +12% compared to the No-Build Alternative.	The cost of tolls on the Columbia River bridges would impact low-income populations disproportionately compared to the general population. Two of the toll price scenario schedules were used to study impacts to EJ populations, ranging from $2.15 to $3.55 (Scenario Schedule A) and $1.50 to $3.15 (Scenario Schedule B). For median-income households in Portland and Vancouver, the difference resulting from the new tolls would be relatively small for median-income households (a 2% increase from 14% to 16% of median annual household income in Portland and a 3% increase from 15% to 19% of annual household income in Vancouver). Four-member households at or below the federal poverty level would be the most significantly impacted by a future tolling program. Since these households already spend a relatively larger proportion of household income on transportation, the effect of tolling would increase household transportation costs from 29% of total household income under the No-Build Alternative to 35% under the Modified LPA. Tolling impacts to households at or below the federal poverty level constitute a disproportionately high and adverse effect on EJ populations.	Reduced travel times and improved travel reliability resulting, in part, from tolling would benefit all communities, including EJ populations.

Environmental Resource	Modified LPA Long-Term Impact Summary	Impact Specific to Minority and Low-Income Populations	Benefit Specific to Minority and Low-Income Populations
		Low-income households would be impacted similarly to the general population and would experience an increase in household transportation cost of approximately 3%. Several tribes have preemptions[8] from tolling per treaties with the U.S. Government. For members of tribes with those preemptions, there would be no adverse effect from tolling. Several tribes consulting on IBR have requested exemption from tolling on the existing Interstate Bridge and future Columbia River bridges. The bi-state transportation committee made up of representatives of the Washington State and Oregon Transportation Commissions determines tolling exemptions or discounts and is considering a low-income toll program. In conclusion, tolling on the proposed Columbia River bridges would result in a disproportionately high and adverse effect on EJ populations.	
Transportation	The Modified LPA would reduce regional vehicle-miles traveled and provide the following changes by mode and facility type: • I-5 Highway: Key bottlenecks would be reduced along segments of I-5. The Oregon segment of I-5 northbound would meet ODOT's mobility performance standards during the AM peak. The Washington segment of I-5 southbound would meet WSDOT's mobility standards during the PM peak. • Diversion Impacts: AM and PM peak-hour screenline volumes within the study area were	Changes to local traffic circulation resulting from the Evergreen Station would occur in the Esther Short neighborhood, a high-priority EJ area. **Single-Level Movable-Span Configuration:** Disturbances to transit and active transportation resulting from bridge opening delays can negatively affect EJ populations. However, a disproportionately high and adverse effect on EJ populations is not anticipated (per FHWA and USDOT guidance), given that the impacts would be the same for all populations traveling through the study area.	The following would benefit all travelers, including EJ populations: • Reduction in bottleneck conditions for some I-5 segments during the AM and PM peaks. • Faster total travel time on I-5 between I-205 north of Vancouver and the Marquam Bridge in Portland.

[8] A preemption is an inherent right retained, while an exemption is granting freedom from an obligation.

Environmental Resource	Modified LPA Long-Term Impact Summary	Impact Specific to Minority and Low-Income Populations	Benefit Specific to Minority and Low-Income Populations
	analyzed using the regional travel demand model to determine the relative differences in traffic volumes between the No-Build Alternative and the Modified LPA. Generally, the Modified LPA would result in increased traffic on adjacent facilities compared to the No-Build Alternative. However, the increases would be relatively minor, ranging from approximately +4% to +12%. In Vancouver, most volume increases would divert to I-5 rather than to surrounding north-south facilities, reflecting greater capacity on I-5 during the peak period with the Modified LPA compared to the No-Build Alternative. In Portland, traffic diversion under the Modified LPA during both peak and off-peak times have differences of less than 50 vehicles compared to the No-Build Alternative. Compared to the No-Build Alternative, the Modified LPA with all design options would not see substantial changes in vehicle volumes on I-205 on any screenline location in the peak period (-3% to + 12%). Therefore, diversion impacts to I-205 are not anticipated to be substantial based on the analysis. • Freight Mobility and Access: Improved conditions on I-5 would similarly benefit freight and trucks. • Arterials and Local Streets Impacts would include changes to traffic circulation, property access, and traffic control, primarily around station areas. • Transit Impacts: Impacts would include extension of high-capacity transit and express bus across the Columbia River. Stations would accommodate connections with C-TRAN Vine, C-	**Design Option without C Street Ramps:** The removal of the C Street ramps would eliminate an access and egress point for downtown Vancouver and would shift between 300 and 600 vehicles per hour to the Mill Plain Boulevard ramps and roadways during the peak hours. This could cause additional traffic in Arnada, a neighborhood with a meaningfully greater concentration of low-income populations. However, impacts to EJ populations under this design option would be the same as for the general population. Therefore, no disproportionately high and adverse effect has been identified.	• Transit, active transportation, and safety enhancements associated with the Evergreen high-capacity transit station, and the Community Connector pedestrian bridge over I-5 near Evergreen Boulevard, would benefit EJ populations in Esther Short neighborhood. • More reliable transit service benefitting EJ populations that use transit to travel through the study area. • Improved bicycle level of traffic stress (BLTS) in Vancouver would improve the local network quality across and around the I-5 corridor for all users, including identified EJ populations in the East Columbia and Esther Short neighborhoods. • In Portland, the BLTS scores of nearly all affected streets would improve to a low stress standing for all travelers, including EJ populations. • **Single-Level Movable-Span Configuration:** Fewer

Environmental Resource	Modified LPA Long-Term Impact Summary	Impact Specific to Minority and Low-Income Populations	Benefit Specific to Minority and Low-Income Populations
	TRAN and TriMet local bus, other TriMet MAX lines, nonmotorized, and park-and-ride trips. • Active Transportation Impacts: New shared-use path facilities that would enhance safety and comfort of walking, biking, and rolling access across the Columbia River, along the rebuilt segments of highway and interchanges, and new station areas. • Safety Impacts: Forecast reduction of crashes by 15% to 30% and changes in crash types, severities, and locations due to modifications involving the Columbia River bridges, I-5 mainline, ramps, and ramp terminals. In Vancouver, bike level of traffic stress (BLTS) scores of nearly all affected streets would improve. • **Single-Level Movable-Span Configuration:** The Modified LPA with a single-level movable-span configuration would continue to subject transit and active transportation users to delays during bridge openings, even though there would be fewer openings overall compared to the No-Build Alternative. • **Design Option without C Street Ramps:** Under this design option, I-5 would be accessed from downtown Vancouver through the Mill Plain interchange rather than C Street. The removal of the C Street ramps could cause additional congestion at the Mill Plain Boulevard ramps.		bridge openings compared to the No-Build Alternative. • Design Option without C Street Ramps: None.
Visual Resources	The scale, form, and materials of the Columbia River bridges and structures would not contrast with the existing visual character. New transit, bicycle, and pedestrian structures would be new visual elements similar in visual character to other proposed elements. An increase in ambient light	The downtown Vancouver and Ruby Junction landscape units include neighborhoods identified as high-priority EJ areas (Esther Short and Rose Village in Vancouver and Rockwood in Gresham). Changes to visual quality in these areas are expected to be neutral overall, given that there is an	None.

Environmental Resource	Modified LPA Long-Term Impact Summary	Impact Specific to Minority and Low-Income Populations	Benefit Specific to Minority and Low-Income Populations
	levels may be perceptible; however, replacement lights would be designed to limit light and glare. New landscape views crossing the Columbia River bridges.	existing bridge structure with similar visual characteristics. Changes in Ruby Junction are expected to be low because the added structures and uses would be consistent with existing character and uses. Therefore, no disproportionately high and adverse effect has been identified.	

a All data and findings are based on the IBR technical reports for each environmental resource.
b The long-term effects associated with the Modified LPA would be the same for all design options, unless otherwise specified.

3.20.5 Temporary Effects

No-Build Alternative

There would be no temporary effects on EJ populations under the No-Build Alternative.

Modified LPA

Construction of the Modified LPA, which includes construction of the new bridges and removal of the existing bridge, is expected to last up to 15 years, affecting all modes of transportation within the study area and adjacent corridors. Temporary transportation effects, including road closures, detours, and construction-related delays, would occur to varying degrees. Table 3.20-13 summarizes temporary impacts to EJ populations associated with the Modified LPA, including all design options. The analysis identified a potential for disproportionately high and adverse effects on EJ populations with regard to noise (specifically in the East Columbia and Esther Short neighborhoods) and transportation (as a result of transit disruptions and temporary closures of cross-river bicycle and pedestrian facilities). Disproportionately high and adverse effects on EJ populations are not anticipated for the other impact categories evaluated.

Table 3.20-13. Summary of Potential Temporary Effects on EJ Populations from the Modified LPA [a]

Type of Impact	Temporary Impact Summary for the Modified LPA	Temporary Impacts Specific to EJ Populations
Acquisitions, Displacements, and Relocations	Temporary construction easements and staging areas for each project subarea are: • Oregon Mainland: 12 parcels; 45 acres. • Hayden Island: 3 parcels; 13.2 acres. • Downtown Vancouver: 51 parcels; 6.7 acres. • Upper Vancouver: 20 parcels; 4.8 acres. • Ruby Junction Maintenance Facility Expansion: None. Two sites have been identified as possible major construction staging areas that could be temporarily acquired or leased: • Vacant Thunderbird Hotel site (Hayden Island): 3.5 acres. The hotel site, in addition to 13.2 acres on Hayden Island, would constitute the largest staging area for the IBR Program. • Former WSDOT rest area along I-5 in Vancouver: 5 acres.	Temporary construction easements would occur at two properties in downtown Vancouver identified as providing low-income housing: Evergreen Inn and Lewis and Clark Plaza. Downtown Vancouver includes the Esther Short neighborhood, a high-priority EJ area. No residential or business displacements would occur as a result of these temporary construction easements. Activities at the sites would consist of temporary staging for construction and equipment and other construction support activities. These temporary construction easements would result in a disproportionately high and adverse effect on EJ populations.
Air Quality	Short-term impacts to air quality from construction activities would occur during the construction period. Construction-related activities would result in increased particulate matter in the form of fugitive dust (from demolition, ground clearing and preparation, grading, stockpiling of materials, on-site movement of equipment, and transportation of construction materials). Dust emissions typically occur during dry weather, ground-disturbing construction activities, or high wind conditions. Air quality may also be affected by exhaust emissions from material delivery trucks, construction equipment, and workers' private vehicles.	The anticipated temporary air quality impacts within the study area are not expected to result in a disproportionately high and adverse effect on EJ populations because construction-related air quality impacts would be the same for EJ populations as for the general population.

Type of Impact	Temporary Impact Summary for the Modified LPA	Temporary Impacts Specific to EJ Populations
Land Use and Economics	Construction has the potential to cause negative economic effects by blocking visibility and access to businesses, resulting in patrons choosing other locations for goods and services. Construction can also cause traffic delays and detours that increase travel times, increase the cost of deliveries, and make access to some locations difficult. Construction activities and temporary detours could extend the peak period traffic congestion, negatively impacting businesses whose employees commute using the I-5 corridor. Likewise, the movement of freight, goods, and services could be negatively affected if construction activities make travel times longer and/or less predictable due to increased traffic and congestion.	Adverse land use and economic impacts (excluding acquisitions and displacements) would not be experienced disproportionately by meaningfully greater and high-priority EJ neighborhoods within the study area compared to the general population. Similarly, freight impacts would impact EJ populations the same as the general population. Therefore, no disproportionately high and adverse temporary land use and economic impacts to low-income and minority populations have been identified.
Noise and Vibration	All neighborhoods in the study area could experience temporary noise and vibration increases from construction equipment and activities, particularly in areas adjacent to I-5.	Although the entire study area would be impacted by increased noise and vibration, some areas with higher concentrations of EJ populations could be impacted disproportionately. Particularly high levels of noise and vibration from pile-driving activities are anticipated near the Interstate Bridge span. However, additional noise and vibration impacts are also anticipated within the East Columbia and Esther Short neighborhoods, which are high-priority and meaningfully greater areas. Therefore, noise and vibration impacts would result in disproportionately high and adverse effects to EJ populations in these neighborhoods.
Social and Neighborhood Effects	Neighborhood quality and cohesion could be negatively affected throughout the construction period. All neighborhoods in the study area could experience temporary congestion, traffic detours, noise, air quality impacts, and increases in truck traffic during construction, particularly in the areas immediately adjacent to I-5. The use of temporary construction staging would minimize some of these negative impacts. The net impact of air, traffic, noise, and construction impacts would constitute social and neighborhood effects within the study area.	Neighborhood quality and cohesion impacts would be experienced throughout the study area, and impacts to EJ populations are anticipated to be the same as to the general population. Furthermore, the negative impacts that have been identified would be reduced through the use of construction best management practices. Therefore, disproportionately high and adverse effects on EJ populations have not been identified.

Type of Impact	Temporary Impact Summary for the Modified LPA	Temporary Impacts Specific to EJ Populations
Tolling	Pre-completion tolling would be implemented on the Interstate Bridge when construction begins. This tolling is expected to occur between 5 a.m. and 11 p.m.; overnight hours would not be tolled, as construction activities may reduce the number of lanes travelers could use. Pre-completion tolling would have similar impacts as long-term tolling for travelers except during the overnight hours.	I-5 is currently not tolled, and there are currently no plans to toll the bridge independently of the IBR Program. Pre-completion tolling would have similar impacts on EJ populations as long-term tolling. It is anticipated that pre-completion tolling would result in a slightly lesser impact than long-term tolls given that pre-completion tolling would only occur between 5 a.m. and 11 p.m. EJ populations crossing the Interstate Bridge during the overnight hours would not be tolled. However, although the impacts resulting from pre-completion tolling would be reduced compared to long-term tolls, any tolling of I-5 would still impact low-income populations disproportionately compared to the general public. Furthermore, it is uncertain whether a low-income or equitable tolling program would be operational during construction or if it would not be launched until post-construction. In the absence of tolling mitigation, there is a potential for pre-completion tolling to result in a greater impact to EJ populations than a long-term toll and associated low-income tolling program. Therefore, pre-completion tolling is anticipated to result in a disproportionately high and adverse effect on EJ populations traveling across I-5 during the construction period.
Transportation	Construction would result in temporary bridge closures, highway lane closures, bus stop relocations, light-rail station closures, partial or full temporary closures of park-and-ride facilities, and rerouting of sidewalks and bicycle lanes. Traffic diversion during construction would lead to higher traffic volumes on detour streets, which could lead to a temporary increase in collision frequency. To minimize disruptions to peak period and daytime transportation travel on I-5, some construction activities could occur during nighttime hours and on weekends with approval by ODOT and/or WSDOT. Additional impacts to transportation include: • Bus Service Impacts. Bus service could experience delays from increased congestion due to potential roadway or	Interruptions to bus and light-rail transit service in the study area could affect EJ populations more than the general population, as low-income populations are more likely to rely on transit to get to work, school, or other essential destinations. Transit interruptions would be likely to result in detours and out-of-direction travel, particularly for cross-river trips. Short-term closures of cross-river bicycle and pedestrian facilities could result in an adverse and disproportionate effect on EJ populations that rely on cycling or walking to cross the river. Bicycle and pedestrian facility closures on I-5 leave few options for crossing the river on foot or by bike, as the only other option would be to cross using the facilities on I-205. The

Type of Impact	Temporary Impact Summary for the Modified LPA	Temporary Impacts Specific to EJ Populations
	interchange closures. Buses that travel through downtown Vancouver could encounter temporary closures and reroutes as the transit guideway is installed at the north end of the light-rail transit alignment. • TriMet MAX Impacts. Construction along Expo Road and the Marine Drive interchange may require temporary relocation or closure of the TriMet MAX Yellow Line terminus station near Expo Center. These temporary relocations, closures, or schedule adjustments could occur for 4 years. • Pedestrian and Bicycle Impacts. Construction could temporarily and intermittently close or reroute sidewalks, bicycle facilities, and/or shared-use paths or reduce facility widths within construction areas. Limited opportunities would be available for active transportation crossings of I-5 and would therefore be maintained to the extent practical.	distance between I-5 and I-205 may not be a practical distance to travel for some pedestrians and bicyclists, which may fully prevent cross-river trips during certain periods. Furthermore, low-income populations that rely on walking and cycling as their primary mode of transportation may have fewer resources and access to alternative transportation modes than the general population. Therefore, interruptions to bus service, light-rail service, and cross-river bicycle and pedestrian facilities would result in a disproportionately high and adverse effect on EJ populations.
Visual Resources	Construction is expected to last up to 15 years, during which views to and from the area of visual effects would be altered. Temporary effects on visual quality would result from visual distractions, high-visibility signage, and additional lighting during nighttime construction. Vegetation may be removed from some areas to accommodate the construction of the new bridge structures, new ramps, transit guideways, staging areas, and casting yards. Each area would be revegetated upon completion.	None. Changes in views and visual effects are anticipated to be the same for EJ populations as the general population.

a The temporary effects associated with the Modified LPA would be the same for all design options, unless otherwise specified.

3.20.6 Indirect Effects

No-Build Alternative

As described in Table 3.20-11 above, the No-Build Alternative would not displace residents, businesses, community resources, or jobs. Environmental conditions would generally remain the same as they are the time of this writing. However, the No-Build Alternative would maintain worsening traffic growth and congestion pattens on I-5, with travel times anticipated to increase by 50% in the future compared to existing travel times. Increasing travel times and congestion on I-5 could negatively affect freight movement and the local and regional economy; increase vehicle idling and associated air emissions; and reduce access to key destinations and community resources in Vancouver and Portland. Furthermore, the No-Build Alternative would not bring high-capacity transit to Hayden Island or downtown Vancouver, forgoing potential benefits to EJ populations that may depend more on transit and active transportation as their primary mode of transport compared to the general population. However, most of these indirect effects would impact EJ populations the same as, or similarly to, the general population. Therefore, the indirect effects of the No-Build Alternative are not anticipated to result in disproportionately high and adverse effects to EJ populations.

Modified LPA

The areas with the highest likelihood of indirect effects from the Modified LPA are Hayden Island and downtown Vancouver, as the addition of high-capacity transit stations in these neighborhoods would have the potential to support transit-oriented development. Hayden Island has not been identified as a meaningfully greater or high-priority EJ area. The Esther Short neighborhood within downtown Vancouver has been identified as a high-priority EJ neighborhood due to its high concentration of low-income populations. It is important to note that transit-oriented development would not be undertaken by the IBR Program; rather, the addition of light-rail transit as part of the Program would facilitate redevelopment that is already provided for in community plans in anticipation of the high-capacity transit stations (see Section 3.4, Land Use and Economic Activity, for further discussion of this topic). Other indirect effects could include increased noise and pollution in neighborhoods directly adjacent to the corridor, including Arnada and Rose Village, which have been identified as high-priority and meaningfully greater EJ areas, respectively. Indirect effects on Esther Short, Arnada, and Rose Village have the potential to result in disproportionately high and adverse effects on EJ populations residing within these neighborhoods.

The analysis of indirect effects also considered the potential for gentrification, which refers to the causal relationship between investment and redevelopment and demographic changes. As rents and property taxes increase, properties can become unaffordable for low-income property owners and tenants, who move out and are replaced by higher-income populations. Increased property values and rents in downtown Vancouver could result in the types of demographic changes that are frequently characterized as gentrification; this could be considered an indirect effect of the IBR Program on EJ populations. Though the Modified LPA would not on its own cause gentrification, it could help accelerate it relative to the No-Build Alternative by increasing the value of property directly or indirectly affected by investments resulting from the IBR Program. If low-income renters were forced to move because rents and associated costs of living increased downtown, this could result in adverse effects. However, low-income homeowners could benefit from the same rise in property values and rents.

The City of Vancouver has adopted goals and policies that support affordable housing and a mix of housing types, and the Vancouver Housing Authority works to maintain affordable units in the city through voucher programs and the development of new affordable housing units. Even if low-income renters faced adverse effects, it is not clear that such effects would be disproportionate, as rising rent levels can also displace middle-income earners. Renters as a group typically move with some regularity, and the vast majority of affordable rental properties in Vancouver would not experience direct or indirect effects from the Modified LPA.

3.20.7 Potential Avoidance, Minimization, and Mitigation Measures

Long-Term Effects

Mitigation for long-term effects on EJ populations includes measures that would be used to avoid, minimize, and/or mitigate impacts from each of the impact categories evaluated for this analysis (acquisitions and displacements, traffic, noise, etc.). Some of these measures are required by existing regulations or design and construction standards, while others are Program-specific. The sections below describe both regulatory and Program-specific mitigation measures for each impact category analyzed for EJ. The following is a discussion of proposed mitigation to address impacts resulting from the Modified LPA. The IBR Program will continue to engage with EJ populations to identify impacts and benefits and to gather meaningful input on avoidance, minimization, and mitigation measures to address adverse effects.

Regulatory Requirements

The applicable regulatory requirements are listed below:

- Title 42 USC Section 4601, the Uniform Relocation Assistance and Real Property Policies Act (1970).
- Title 23 CFR Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise.
- ORS 467.010, Chapter 340, Division 35, Noise Control Regulations.

The following subsections describe the effect of these regulatory requirements and related state policies in more detail as they relate to disproportionately high and adverse effects on EJ populations within the study area.

Acquisitions and Displacements

Title 42 USC Section 4601, the Uniform Relocation Assistance and Real Property Policies Act (1970), provides uniform and equitable treatment of persons displaced from their homes or businesses by federal and federally assisted programs and establishes uniform and equitable land acquisition policies for federal and federally assisted programs. These policies require that property be purchased at fair market value and that all residential displacements be provided with replacement housing and/or relocation assistance. Federal law requires replacement housing based on the characteristics of individual households. Relocation benefit packages for residents may include replacement housing for owners and renters, moving costs, and assistance in locating replacement housing. Relocation benefits for businesses can include moving costs, site search expenses, and business re-establishment expenses. Eligibility and terms of relocation assistance would be determined during future project planning. Discussion of the Uniform Relocation Assistance and Real Property Policies Act can also be found in Section 3.3, Property Acquisitions and Displacements.

For low-income populations or populations with special circumstances, a relocation program could include housing assistance. For example, the Washington State Department of Commerce participates in the U.S. Department of Housing and Urban Development's HOME Rental Development Program, a housing block grant program used to preserve and create affordable housing for low-income households. The extent to which similar housing programs could help offset displacement impacts resulting from the Modified LPA would depend on the availability of adequate housing stock to relocate EJ populations in the same general area.

Noise

FHWA requires consideration of noise abatement measures for highway projects where noise levels exceed certain thresholds. Long-term noise impacts to EJ populations were identified in the Rose Village neighborhood in Vancouver. After reviewing the locations of the predicted noise impacts, it was determined that noise walls are the only feasible form of noise abatement. The construction of noise walls is already considered a best management practice (BMP) for offsetting noise and vibration impacts.

The noise analysis completed for this Draft SEIS (see Section 3.11, Noise and Vibration) proposed 18 noise walls to mitigate traffic noise impacts predicted under the Modified LPA.[9] Noise impacts in the Rose Village neighborhood would be mitigated by Noise Wall 4, which would be located in the area east of I-5 between E 33rd Street and SR 500. Noise Wall 4 would replace an existing 4- to 8-foot-tall, approximately 200-foot-long wall located just north of the 33rd Street overcrossing and would continue along the WSDOT right of way until reaching the bridge over E 39th Street. The final decision and recommendation to include noise wall mitigation would be made during final design. As design advances, factors that affect the feasibility and cost-effectiveness of noise walls can change. In addition, should the noise-impacted residents oppose recommended noise mitigation, the mitigation measure may not be incorporated into the Modified LPA.

State requirements mandate noise and vibration monitoring. In addition to compliance with ODOT and WSDOT standard specifications for noise abatement that apply to highway construction activities, monitoring would include the following:

- Establish a complaint hotline to investigate noise complaints during construction. A construction monitoring and complaint program would help ensure that all equipment meets state, local, and manufacturer specifications for noise emissions. Equipment not meeting the standards would be removed from service until proper repairs were made and the equipment retested for compliance. This procedure would apply to all haul trucks, loaders, excavators, and other equipment that would be used extensively at the construction sites and that would contribute to potential noise effects.
- Conduct vibration monitoring of all activities that might produce vibration levels at or above 0.5 inches per second where structures are near the construction activity. This would include pile driving, vibratory sheet installation, soil compaction, and other construction activities with the potential to cause high levels of vibration. There is no effective method to completely eliminate vibration effects from construction; however, by restricting and monitoring vibration-producing activities, vibration effects from construction can be kept to a minimum.

Tolling

No regulations are currently in place to offset the impacts of IBR Program tolls on low-income populations, though such regulations may be implemented in the future in support of a low-income tolling program or equitable tolling policy that would reduce or offset the economic burden of tolling on low-income and minority populations. Toll rates and policies implemented on the existing Interstate Bridge (pre-completion tolling) and the replacement Columbia River bridges under the Modified LPA (long-term tolling) would be jointly set by the Oregon Transportation Commission (OTC) and the Washington State Transportation Commission (WSTC). The commissions would consider possible exemptions and discounts, which may include a low-income discount program. Both commissions would work together to determine how to apply such exemptions and discounts to the IBR Program.

Program-Specific Mitigation

Proposed Program-specific mitigation would include an attempt to minimize relocation impacts to residences, businesses, and public facilities as the project design is refined. The Modified LPA is currently at a conceptual level of design, and key features such as the number of auxiliary lanes, bridge type, and other design elements will not be determined until later stages of design. Furthermore, input from the IBR Executive Steering Group, Equity Advisory Group, Community Advisory Group, Community Benefits Advisory Group, and the public will support the refinement of the Modified LPA. The Program will attempt to minimize relocation impacts as these design and cost refinements occur.

[9] The final number of noise walls, considering feasibility and cost-effectiveness, will be determined as part of the Final SEIS.

Traffic Impacts

As described in Table 3.20-12, traffic impacts resulting from the Modified LPA are generally diffuse throughout the study area and would be experienced similarly by EJ populations and the general population. Under the Modified LPA, key bottlenecks would be reduced along segments of I-5 in both Oregon and Washington, high-capacity transit would be expanded in the region, new shared-use paths would be built, crashes would be reduced by 15% to 30%, and bicycle level of traffic stress (BLTS) would decrease to "low" stress, benefitting EJ populations and the general population alike.

Under the single-level movable-span configuration, the Modified LPA with a single-level movable-span configuration would continue to subject transit and active transportation users to delays during bridge openings, even though there would be fewer openings overall than under the No-Build Alternative. The single-level movable-span configuration would impact EJ populations the same as the general population, so no disproportionately high and adverse effects have been identified.

Under the design option without the C Street ramps, I-5 would be accessed from downtown Vancouver through the Mill Plain interchange rather than C Street. The removal of the C Street ramps could cause additional congestion at nearby collectors and ramps, shifting between 300 and 600 vehicles per hour to the Mill Plain Boulevard ramps during peak periods. However, the removal of the ramps would impact EJ populations the same as the general population, so no disproportionately high and adverse effects have been identified.

Because no disproportionately high and adverse effects have been identified, specific mitigation to offset, reduce, or minimize traffic impacts to EJ populations is not proposed. However, ODOT and WSDOT would monitor traffic operations and, as the need arises, pursue the following mitigation measures to benefit the general population, including EJ populations traveling through the study area.

- Monitor and adjust ramp meter rates to manage travel times, delay, and other operational performance measures consistent with ODOT and WSDOT highway procedures.
- Coordinate with local jurisdictions to adjust local street networks that could include the following actions:
  - Prohibit on-street parking during peak periods to improve vehicle flow and reduce travel delays associated with slowdowns to accommodate vehicles entering and exiting on-street parking spaces.
  - Add turn pockets at needed locations (e.g., a southbound right-turn lane at 15th and Columbia Streets in Vancouver) to improve vehicle flow and reduce travel delays associated with bottlenecking at intersections.
  - Alter traffic signal timing (e.g., for the Mill Plain Boulevard interchange signal) to maximize operational flow and reduce travel delays.

Air Quality

Air pollutant emissions are expected to be substantially lower in the future than under existing conditions. Regionally, future differences between the Modified LPA and the No-Build Alternative are small enough not to be meaningful within the accuracy of the estimation methods. Long-term air quality impacts are not expected to occur as a result of the IBR Program. Therefore, no disproportionately high and adverse air quality impacts would be expected on EJ populations as a result of the Modified LPA, and no specific mitigation is proposed.

Business Displacements and Loss of Service Industry Jobs

In addition to compliance with the Uniform Relocation Assistance and Real Property Policies Act, the IBR Program may provide mitigation for the loss of service industry jobs under a potential future workforce agreement and/or Project Labor Agreement. This agreement would be further defined as project design and planning progress, and would cover such topics as:

- Adopting goals for involvement of minority, women-owned, emerging, and disadvantaged businesses in Program construction contracting.
- Developing workforce practices to provide experience and business opportunities for disadvantaged workers and companies, such as requiring contractors to have apprentices perform a percentage of construction labor.
- Providing job training and establishing preferences in contracting for local services.
- Implementing a monitoring and evaluation program to track these measures through final project design, construction, and operation to help ensure that the benefits of promoting participation from minority-owned businesses are realized.

Tolling

Program-specific measures to minimize disproportionately high and adverse effects on EJ populations related to tolling are proposed as part of this SEIS. As described in Table 3.20-12 above, tolling new Columbia River bridges would result in higher transportation costs as a proportion of household spending for some EJ populations. Some of the project benefits—such as increased investments in the regional transit, walking, and bicycling network—may not be accessible or practical for EJ populations with fixed schedules and employment, school, and/or childcare commitments. Although the method of payment for a potential tolling program across the new Columbia River bridges has not been determined, a transponder model has the potential to present a burden to low-income and minority populations due to the up-front cost and technical requirements of purchasing and setting up a transponder.

Program-specific mitigation measures to address disproportionately high and adverse effects on EJ populations resulting from tolling may include:

- **A Low-Income and/or Equitable Tolling Program:** If the OTC and WSTC choose to implement a low-income toll program on the existing Interstate Bridge (pre-completion tolling) and the replacement Columbia River bridges under the Modified LPA (long-term tolling), it would play a role in mitigating disproportionately high and adverse effects of tolling on EJ populations. Additional mitigation may be needed if I-205 is tolled in the future or if a regional tolling system is implemented. Both transportation commissions are actively studying low-income tolling programs, including how such a program could be implemented in each state. The following key work has been done to date:
    - Oregon Tolling Program I-205 and I-5 Toll Projects' Equity Framework (2023). The OTC has advanced key elements of a low-income toll program—the first of its kind in the nation—that will serve low-income travelers who cannot change their travel schedules or who travel frequently on interstate facilities. The program will balance impacts to other travelers while still achieving overall program goals to reduce traffic congestion and raise revenue for transportation improvements. Key commitments include at least a 50% discount on tolls for customers in Oregon or Washington whose household income is up to 200% of the federal poverty level and exemptions for federally recognized tribes and tribal government vehicles.
    - WSDOT Low-Income Toll Program Study for I-405 & SR 167 Express Toll Lanes (2021). WSDOT has developed a range of program options and evaluation metrics to assess toll discount program options to benefit equity populations. Options include percentage-based and fixed-rate discounts per trip, time-based toll credits, free toll trips, and lowering the maximum toll rate. Although this study was for the I-405 and SR 167 Express Toll Lanes in Washington and would not directly apply to the IBR Program, the study and its findings may influence future discussions and coordination between the OTC and WSTC regarding the future of a regional toll program.

- **Equitable Access to Technology and Information**: ODOT, WSDOT, and regional partners will provide Program-specific information, such as how to obtain transponders and/or how to receive transportation assistance, particularly for low-income drivers.
    - Locate venues for acquiring transponders near lower-income neighborhoods. The IBR Program would partner with public agencies and public service providers to identify locations that are convenient for low- or lower-income neighborhoods and that are accessible by multiple modes of travel.
    - Enable populations without credit cards or checking accounts to obtain transponders by paying with cash or electronic bank transfer cards.
    - Share information with and through other public service providers, particularly those that provide direct service to EJ populations.
    - Share information about existing rideshare opportunities such as local carpool and vanpool providers or work with partners to develop new programs.
- **Early, Inclusive, and Equitable Public Engagement:** Public engagement and outreach is proposed as a critical step to ensure that transportation users can make informed travel choices when crossing the Columbia River. Public engagement should conduct specific outreach to potentially impacted EJ populations, connect these populations to assistance resources such as a future low-income and/or equitable tolling program and other travel options, and provide transparent information about the costs and impacts to their trips resulting from a future IBR tolling program.

Temporary Effects

Mitigation for temporary effects on some resources that would affect EJ populations would be provided through standard construction BMPs. BMPs applicable to the potential impacts described in Table 3.20-13 are discussed in Section 3.3, Property Acquisitions and Displacements; Section 3.10, Air Quality; and Section 3.9, Visual Quality. Mitigation for temporary effects on EJ populations is discussed below.

Acquisitions and Displacements

As described in Table 3.20-13, temporary construction easements would be acquired at two properties in downtown Vancouver identified as providing low-income housing: Evergreen Inn and Lewis and Clark Plaza. These properties are located in the Esther Short neighborhood, a high-priority EJ area. No residential or business displacements would occur as a result of these temporary construction easements. Activities at the sites would consist of temporary staging for construction and equipment and other construction support activities. Given their location within an identified EJ area and their provision of affordable housing, temporary construction easements at these two sites would result in a disproportionately high and adverse effect on EJ populations.

Temporary construction easements may also occur on Hayden Island to facilitate construction of both the transit and highway alignments. The census geography comprising Hayden Island is not a meaningfully greater or high-priority EJ area. However, the removal of the ramps would impact EJ populations the same as the general population, so no disproportionately high and adverse effects have been identified.

EJ-specific mitigation measures to offset temporary construction acquisitions and displacement impacts would be the same as those used to address impacts to the general population. These measures include increased coordination between the construction team and businesses, renters, and property owners who would be affected by temporary acquisitions to discuss details of the acquisition, such as the duration of the acquisition and the operating schedule for construction activities. The IBR Program would meet with property owners who would be affected by temporary acquisitions to discuss details of the acquisition, such as the

duration of the acquisition and the operating schedule for construction activities. Proposed mitigation measures are described in more detail in Section 3.3, Property Acquisitions and Displacements.

Transportation Impacts

As described in Table 3.20-13, construction activity for the highway and interchanges is anticipated to result in traffic delays on I-5 during construction. Depending on schedules and phasing, such delays could have greater impact to Hayden Island residents, as they have no other access to the island. The census geography comprising Hayden Island is not a meaningfully greater or high-priority EJ area. However, low-income and minority people living in the area may be affected and are considered as part of this analysis.

Temporary interruptions to bus and light-rail transit service in the study area could affect EJ populations more than the general population, as low-income populations are more likely to rely on transit to get to work, school, or other essential destinations. Transit interruptions would be likely to result in detours and out-of-direction travel, particularly for cross-river trips. These transit interruptions would result in a disproportionately high and adverse effect on EJ populations.

Short-term closures of cross-river bicycle and pedestrian facilities would also result in an adverse and disproportionate effect on EJ populations that rely on cycling or walking to cross the river. Bicycle and pedestrian facility closures on I-5 currently leave few options for crossing the river on foot or by bike, as the only other option would be to cross using the facilities on I-205. The distance between I-5 and I-205 (approximately 6 miles) is not practical for all pedestrians and bicyclists and may fully prevent cross-river trips during certain periods. Furthermore, low-income populations that rely on walking and cycling as their primary mode of transportation may have fewer resources and access to alternative transportation modes than the general population.

Therefore, interruptions to traffic, bus, light-rail service, and cross-river bicycle and pedestrian facilities would result in a disproportionately high and adverse effect on EJ populations.

Mitigation measures to address temporary transportation impacts to EJ populations would be similar to those used to address impacts to the general population. Disruptions to peak-period and daytime travel on I-5 are proposed to be mitigated through construction best practices, such as scheduling construction activities during nighttime hours and on weekends with approval by ODOT and/or WSDOT. Transit fare subsidies are proposed to offset impacts to transit riders, who may be more likely to belong to EJ populations; these subsidies would apply to all transit riders and not just to EJ populations. An emphasis would be placed on maintaining safe and accessible pathways during construction, especially near public housing, senior housing, and public services. The IBR Program would coordinate with TriMet to maintain paratransit service for qualifying mobility-impaired Hayden Island residents. Increased public outreach and construction-period communication are proposed to adequately inform travelers of delays and provide information about practicable detours throughout the construction period.

Mitigation measures for temporary transportation impacts are discussed in more detail in Section 3.1, Transportation.

Noise

As described in Table 3.20-13, the entire study area would be impacted by increased noise and vibration, though particularly high levels of noise and vibration from pile driving activities are anticipated near the Interstate Bridge span. Areas with higher concentrations of EJ populations could be impacted disproportionately compared to the general population. Temporary noise and vibration impacts have been identified within the East Columbia and Esther Short neighborhoods, which are high-priority and meaningfully greater areas. Therefore, noise and vibration impacts in these areas would result in disproportionately high and adverse effects on EJ populations.

Residents of Hayden Island are also likely to experience noise and vibration impacts due to construction equipment, vibratory compaction equipment, and pile driving during bridge construction. The census geography comprising Hayden Island is not a meaningfully greater or high-priority EJ area. However, low-income and minority people living in the area may be affected and are considered as part of this analysis. Residents living in floating homes may be particularly susceptible to noise and vibration impacts due to their close proximity to both the highway and transit alignments.

EJ-specific mitigation measures to address temporary noise and vibration impacts would be the same as the measures taken to address impacts to the general population. These measures would consist of compliance with existing federal and state noise abatement requirements[10] and monitoring, including the establishment of a complaint hotline to investigate noise complaints during construction, testing of construction equipment to ensure compliance with noise emission standards, and vibration monitoring of all activities that might produce vibration levels at or above 0.5 inches per second where structures are near the construction activity. There is no effective method to completely eliminate vibration effects from construction; however, by restricting and monitoring vibration-producing activities, vibration effects from construction can be kept to a minimum and reduce disproportionately high and adverse effects on EJ populations within the construction zone. Proposed mitigation measures for temporary noise and vibration impacts are described in more detail in Section 3.11, Noise and Vibration.

Air Quality

As described in Table 3.20-13, anticipated temporary air quality impacts within the study area are not expected to result in a disproportionately high and adverse impact to EJ populations because construction-related air quality impacts would be the same for EJ populations as for the general population. However, air quality may be affected on Hayden Island due to emissions from construction equipment. The census geography comprising Hayden Island is not a meaningfully greater or high-priority EJ area. However, low-income and minority people living in the area may be affected and are considered as part of this analysis. Residents living in floating homes and the mobile home park may be particularly susceptible to air quality impacts due to their close proximity to both the highway and transit alignments. Construction impacts to air quality could be minimized through measures discussed in more detail in Section 3.10, Air Quality.

3.20.8 Environmental Justice – Preliminary Determination Summary of Environmental Justice Impacts

EO 12898 directs federal agencies to make achieving EJ part of their respective missions by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. For the IBR EJ analysis, the Modified LPA's impact to EJ populations was compared to the impact to the general population; in instances where disproportionately high and adverse impacts to EJ populations were identified, mitigation measures have been proposed to minimize, reduce, or offset those impacts.

Disproportionately high and adverse effects on EJ populations were evaluated using five questions based on FHWA guidance to support a preliminary determination as to whether the IBR Program would result in disproportionately high and adverse effects on EJ populations (FHWA 2011). These questions, and the Program's responses, are provided below.

[10] Title 23 CFR Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise

ORS 467.010, Chapter 340, Division 35, Noise Control Regulations

Chapter 173-60 WAC, Maximum Environmental Noise Levels

Question 1: Would the Modified LPA result in disproportionately high and adverse impacts that would be predominantly borne by a minority or low-income population?

Yes.

- The Modified LPA would result in residential and business displacements in high-priority and meaningfully greater EJ areas such as the Esther Short neighborhood in Vancouver and the Rockwood neighborhood in Gresham. In Rockwood, EJ populations comprise more than 50% of the entire population, and displacement impacts would be disproportionately borne by minority and low-income populations.
- If the design option that shifts the I-5 mainline westward were chosen, the Modified LPA would also require full acquisition of the Normandy Apartments. This would result in an additional 33 residential displacements in the Esther Short neighborhood, a high-priority EJ area.
- As discussed in Table 3.20-11, the Modified LPA would result in temporary construction easements at the Evergreen Inn and the Lewis and Clark Plaza in Vancouver. These are two low-income apartment buildings that provide affordable housing within the Esther Short neighborhood. Given that these apartment buildings are located in an identified EJ area and that they specifically provide low-income housing to EJ populations within the study area, temporary construction easement impacts to these buildings would result in a disproportionately high and adverse effect. No residential displacements are anticipated from these temporary construction easements, so these impacts would be temporary in nature.
- The tolling program associated with the Modified LPA has the potential to result in adverse and disproportionate impacts to EJ populations. While tolls would be paid by all drivers using the new bridges, the tolls would represent a greater proportion of household income for low-income individuals than for higher-income individuals, resulting in a higher economic burden in some of the studied census block groups.

Question 2: Would the Modified LPA result in disproportionately high and adverse impacts on a minority or low-income population that would be appreciably more severe or greater in magnitude than the impact that would be suffered by the non-minority or non-low-income population?

Yes.

Residential displacements and implementation of the proposed tolling program have the potential to disproportionately burden EJ populations as compared to the general population, as described in the response to Question 1.

Question 3: Does the Modified LPA affect a resource that is especially important to a minority or low-income population? For instance, does the project affect a resource that serves an especially important social, religious, or cultural function for a minority or low-income population?

To be determined.

Adverse effects on culturally sensitive resources may be especially important to a minority population. In September 2020, FHWA and FTA contacted 21 tribes and Native Hawaiian organizations that were originally consulted regarding the CRC project and reinitiated government-to-government consultation. In February 2022, outreach was extended to an additional 17 tribes. Through that effort, 10 federally recognized tribes expressed an interest in consulting for the IBR program. Archaeological and ethnographic surveys are underway to determine the significance of resources present, make findings on level of effect from the Program, and identify possible strategies to avoid, minimize, or mitigate any adverse effects. If adverse effects on resources that serve especially important social, religious, or cultural functions for tribes are identified prior to completion of the Final SEIS, this analysis will be updated to reflect those effects. Any finding of adverse effect under Section 106 of the National Historic Preservation Act would be mitigated in accordance

with the terms of the Programmatic Agreement being developed for the IBR Program, as described in Section 3.8, Cultural Resources.

Question 4: Does the Modified LPA propose mitigation?

Yes.

Proposed mitigation is discussed in Section 3.20.8, Potential Avoidance, Minimization, and Mitigation Measures. Some of these mitigation strategies, such as those related to acquisition and displacement, noise and vibration, and transportation impacts are statutory requirements, BMPs, and obligations; others are Program-specific mitigation strategies to address disproportionately high and adverse effects on low-income and minority populations. Mitigation measures related to the future IBR tolling program, if advanced, will be important given the disproportionately high and adverse effect that tolling is anticipated to have on EJ populations, especially those for households living at or below the federal poverty level. A low-income toll program or equitable tolling policy would be an important mitigation strategy to offset disproportionately high and adverse effects on EJ populations resulting from future tolling on the new Columbia River bridges. Strategies to further reduce disproportionately high and adverse effects resulting from the potential use of tolling transponders could include public information campaigns to help EJ populations navigate and participate in the tolling system, the use of electronic benefits transfer cards, and financial assistance programs.

It is important to note that, although the IBR Program is committed to mitigation to address disproportionately high and adverse effects on EJ populations resulting from future tolling, tolling is still in a preliminary phase of planning and study. Once the structure of tolling has been determined, additional analysis, interagency coordination, and public involvement will be needed to define specific mitigation actions related to IBR Program tolling.

Question 5: Would EJ populations experience project benefits under the Modified LPA?

Yes.

- EJ populations would share benefits with the general population resulting from the construction of modern, seismically resilient, and multimodal bridges across the Columbia River.
- Under the Modified LPA, EJ populations would benefit from new and reliable high-capacity transit across the Columbia River. The decrease in transit travel time and increase in transit reliability would be a benefit for all populations but may benefit EJ populations differently to the extent that they ride transit at a higher rate than those with greater access to transportation options and/or higher incomes. [11]
- Under the Modified LPA, EJ populations would benefit from improved travel times and increased safety on I-5, as would the general population.
- Under the Modified LPA, EJ populations would benefit from improved bicycle and pedestrian travel across the Columbia River and from bicycle and pedestrian improvements to the local street system within the study area. Improved bicycle and pedestrian travel will benefit all populations but may benefit EJ populations differently to the extent that they rely on walking or bicycling as a primary mode of transportation at a higher rate than those with greater access to multiple transportation options and/or higher incomes.

[11] While it is important to note that many low-income populations would benefit greatly from a faster, more reliable trip, EJ principles hold that to offset a disproportionate adverse effect on low-income populations, the benefit also needs to disproportionately affect low-income populations. In this case, the benefits of a faster, more reliable trip apply to all populations and not just low-income populations.

Preliminary Determination

The FHWA Guidance on Environmental Justice and NEPA (FHWA 2011) provides the following direction for determining disproportionately high and adverse effects on EJ populations:

> *As per FHWA Order 6640.23A, a disproportionately high and adverse effect on a minority or low-income population means the adverse effect is predominantly borne by such population or is appreciably more severe or greater in magnitude on the minority or low-income population than the adverse effect suffered by the non-minority or non-low-income population.*
>
> *1) EJ considerations should be summarized in the appropriate section of the NEPA document; such as the social-economic section of the environmental consequences chapter. References to other sections in the NEPA document can be cited, as appropriate. The beneficial and adverse effects on the overall population and on minority and low-income populations, in particular, need to be addressed under the applicable topics such as: air, noise, water pollution, hazardous waste, aesthetic values, community cohesion, economic vitality, employment effects, displacement of persons or businesses, farms, accessibility, traffic congestion, relocation impacts, safety, and construction/temporary impacts, etc.*
>
> *2) Compare the impacts on the minority and/or low-income populations with respect to the impacts on the overall population within the project area. Fair distribution of the beneficial and adverse effects of the proposed action is the desired outcome. If the effects remain adverse after mitigation is considered, then a determination must be made whether those effects are disproportionately high and adverse with respect to minority and/or low-income populations. If the effects on minority and/or low-income populations are disproportionately high and adverse even with mitigation and benefits to those populations taken into account, the NEPA document must evaluate whether there is a further practicable mitigation measure or practicable alternative that would avoid or reduce the disproportionately high and adverse effect(s).*
>
> *3) Under NEPA, consideration must be given to mitigation (as defined in 40 CFR 1508.20) for all adverse effects regardless of the type of population affected. Discuss what measures are being considered for alternatives to avoid or mitigate the adverse effects. Follow the protocol of avoidance first, then minimization, and finally measures to offset or rectify the adverse effects. Using opportunities to enhance and increase sustainability in communities and neighborhoods is desirable. Any activity that demonstrates sensitivity to special needs should be highlighted, such as accommodations for transit dependency and/or addressing the need for translators.*
>
> *4) If the effects remain adverse after mitigation is considered, then a determination must be made whether those effects are disproportionately high and adverse with respect to minority and/or low-income populations. If the effects on minority and/or low-income populations are disproportionately high and adverse even with mitigation and benefits to those populations taken into account, the next section must be followed.*
>
> *5) If there are no disproportionately high and adverse effects on minority and/or low-income populations once mitigation and benefits are considered, that determination should be stated in the document and the EJ evaluation is complete. (An example of a statement of a determination of no disproportionately high and adverse effects: "Based on the above discussion and analysis, the XYZ alternative(s) will not cause disproportionately high and adverse effects on any minority or low-income populations in accordance with the provisions of E.O. 12898 and FHWA Order 6640.23A. No further EJ analysis is required.".)*

A preliminary determination has been made based on the current assessment of environmental impacts, benefits, and mitigation strategies under the Modified LPA as described in this section. A final determination will be made in the Final SEIS subject to future refinements to the Modified LPA design options, input obtained through public involvement, and refined mitigation measures.

The preliminary determination finds that minority or low-income populations have been identified that would experience disproportionately high and adverse effects from the Modified LPA, even after mitigation. Therefore, in accordance with the provisions of EO 12898 and FHWA Order 6640.23A, further EJ analysis is required, as well as additional public engagement to refine potential impacts and gather public input on mitigation measures, in order to evaluate whether there is a further practicable mitigation measure or practicable alternative that would avoid or reduce the disproportionately high and adverse effect. This determination is based on the following:

- As of this writing, a number of design options under the Modified LPA are still being actively studied. The selection of preferred design options may impact the extent and magnitude of impacts, benefits, and mitigation strategies related to low-income and minority populations.
- As noted in Question 4 above, tolling on the Interstate Bridge is currently in a preliminary planning stage, and more analysis is required to understand the extent of impacts to EJ populations under the Modified LPA. Therefore, mitigation to avoid, minimize, reduce, or offset disproportionately high and adverse effects on low-income and minority populations has not been fully developed. More analysis and public involvement is required to gain a more complete understanding of impacts to low-income and minority populations from potential future tolls. Updated findings related to tolling will be documented in the Final SEIS.
- Some transportation impacts, such as temporary diversion impacts during the construction period or longer-term diversion impacts resulting from the proposed future tolling on the Interstate Bridge and new Columbia River bridges, require further analysis to understand EJ-specific impacts. As of this writing, the AM and PM peak-hour screenline analysis indicates that diversion impacts under the Modified LPA would range between +4% to +11%, representing a relatively minor change compared to the No-Build Alternative. Furthermore, the analysis has not found that EJ high-priority or meaningfully greater areas would experience diversion impacts disproportionately or in a greater magnitude than the general population. However, this analysis will be updated as part of the Final SEIS process to continue to identify potential disproportionately high and adverse effects on EJ populations.
- The IBR Program will hold a public comment period after the Draft SEIS and associated IBR technical reports are published. This will be the first time the general public will have the opportunity to review the identified impacts, benefits, and proposed mitigation actions for EJ populations. This period will also include a robust process to engage EJ populations specifically, which will provide critical feedback on the Draft SEIS and Environmental Justice Technical Report. The IBR Equity Advisory Committee, Community Advisory Committee, and Community Benefits Advisory Group will also provide feedback on the Draft SEIS and the draft reports. All public and advisory committee feedback will be incorporated to develop the Final SEIS.

FHWA guidance provides steps on how to proceed when disproportionately high and adverse effects have been identified after project benefits and mitigation have been taken into account (FHWA 2011). Following the additional analysis and community input described in the bullets above, the Final SEIS must evaluate whether there are further practicable mitigation measures or practicable alternatives that would avoid or reduce the disproportionately high effect(s). FHWA and FTA will approve the proposed action only if it determines that no such practicable measures exist, and FHWA and FTA's determination must be stated in the document. The Final SEIS must also describe how the impacted populations were involved in the decision-making process.

The document also needs to identify what practicable mitigation commitments have been made at the time of Final SEIS completion.

In addition, if the affected population is a minority population protected under Title VI, FHWA will not approve the proposed action unless FHWA and FTA determine that:

1. There is a substantial need for the project, based on the overall public interest; and
2. Alternatives that would have less adverse effects on protected populations have either:
    a. Adverse social, economic, environmental, or human health impacts that are more severe; or
    b. Would involve increased costs of an extraordinary magnitude.

Where appropriate, the Final SEIS document must include both of these evaluations and contain the FHWA and FTA determination on the explicit issues required within these evaluations.

3.21 Section 6(f) and Federal Lands to Parks

Analyses of impacts to park and recreation resources protected under Section 6(f) of the federal Land and Water Conservation Fund (LWCF) Act of 1965 (Section 6(f)) (16 U.S. Code [USC] 4601-4 et seq. and Public Law 88-578, 78 Stat. 897) and the Federal Lands to Parks (FLP) program are included in this section.

3.21.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with Section 6(f) and FLP has been updated in this Draft SEIS to include:

- Updates to information on Section 6(f) and FLP resources.
- Changes in land uses such as development at the Vancouver Waterfront, planned uses on Hayden Island, and recently constructed, altered, or removed buildings.
- Changes in the project footprint necessitated by changed conditions resulted in shifting the LRT alignment and modifying interchange designs.
- Updates to long-term and temporary effects of the Modified LPA.
- Updates to mitigation, in consultation with the agencies with jurisdiction, for the long-term and temporary effects of the Modified LPA.

The Parks and Recreation Technical Report for the CRC Final EIS identified the following four resources in the study area that are protected by either Section 6(f) and/or the FLP program. The CRC Final EIS discussed potential FLP replacement property related to Marshall Park but did not conclude the FLP or 6(f) processes. The same four facilities are identified in this Draft SEIS.

- East Delta Park and Strasser Field (Oregon) – Section 6(f) (south of North Union Court) and FLP program (north of North Union Court)
- Burnt Bridge Creek Trail (Washington) – Section 6(f)
- Old Apple Tree Park (Washington) – FLP program
- Marshall Community Center and Park (Washington) – FLP program

What is Section 6(f)?

Section 6(f) of the Land and Water Conservation Fund Act protects parks and recreational facilities that have received funding through this act. Converting protected properties to non-recreational use requires replacement land of at least equal fair market value and reasonably equivalent recreational utility and location.

3.21.2 Relevant Laws and Regulations

The following provides a description of the Section 6(f) and FLP program regulations and requirements.

Section 6(f)

Section 6(f) of the LWCF Act requires that an area funded with LWCF assistance be "continually maintained in public outdoor recreation use" unless the Secretary of the Interior, via the National Park Service (NPS), approves substitution per the conversion requirements. Environmental review of affected properties must include the entire LWCF-assisted park proposed for conversion even if only a partial conversion is proposed (54 U.S.C. § 200305(f)(3)).

The purpose of the LWCF Act is to assist in preserving, developing, and ensuring accessibility to outdoor recreation resources and to strengthen the health and vitality of the citizens of the United States by providing funds, planning, acquisition, and development of recreational facilities.

A partial acquisition of Section 6(f) property cannot affect the recreational function of the parklands. A temporary use of the land for more than six months may be considered a permanent conversion and acquisition of replacement land may be required.

Section 6(f)(3) requires that conversion of these lands or facilities be coordinated with NPS via the appropriate state liaison officer(s), which, for the IBR Program, are the Oregon Parks and Recreation Department (OPRD) and the Washington State Recreation and Conservation Office (RCO), and that all practical alternatives to the conversion of a 6(f) property must be evaluated as a prerequisite for conversion approval. If conversion is approved, other recreation properties of at least equal fair market value and of reasonably equivalent usefulness and location must be substituted.

FLP Program

The FLP program, administered by NPS in compliance with Section 203 (k)(2) of Public Law 91-485, as amended (40 USC 484 (k)(2)), helps communities to acquire, reuse, and protect federal properties for local parks and recreation. States, counties, and communities may (at no cost) acquire federal land and buildings that are no longer needed by the federal government with the condition that they are protected as public parks and recreation. FLP program lands or facilities have similar restrictions as Section 6(f) properties in that their conversion requires replacing with land of comparable or greater value and recreational utility, with another federal public-benefit conveyance program (such as for education, public health, or law enforcement) or purchased at fair market value (NPS 2022). If property conveyed under this program is acquired for a nonpark or recreation use, this conversion must be approved by NPS, and replacement property of equal market value and reasonable equivalent recreational utility must be identified and acquired. Additionally, the General Services Administration (GSA) must concur on a conveyance and exchange of property rights.

What is Federal Lands to Parks?

The FLP program helps communities to acquire, reuse, and protect federal properties for local parks and recreation. Similar to Section 6(f), converting FLP properties to a non-recreational use requires replacement land of comparable or greater value and recreational utility.

3.21.3 Existing Conditions

As described in Section 3.7, Parks and Recreation, parks and recreation facilities were identified within the study area, which extends from approximately the SR 500 interchange in Washington and the I-5/Columbia Boulevard interchange in Oregon and includes the potential construction staging sites, identified in Chapter 2, and the Ruby Junction Maintenance Facility in Gresham, Oregon. Both East Delta Park and the Burnt Bridge Creek Trail have received LWCF grant funds (OPRD 2023; RCO 2023). Portions of Marshall Park, Old Apple Tree Park, the Burnt Bridge Creek Trail, and a portion of East Delta Park that is not currently in use are protected by the FLP program. Parks within the study area that are protected by Section 6(f) and the FLP program are shown on Figure 3.21-1.

Figure 3.21-1. Section 6(f) and FLP Program Resources in the Study Area

Note: This figure does not include resources protected under Section 4(f) of the U.S. Department of Transportation Act, which are described in Chapter 4 of this Draft SEIS.

East Delta Park (Oregon)

Protected by Section 6(f) of the LWCF Act and FLP Program

East Delta Park is an 87.5-acre neighborhood/regional park located adjacent to I-5 between NE Martin Luther King Jr. Boulevard and N Denver Avenue.

East Delta Park is open to the public from 6:00 a.m. to 10:00 p.m. and is managed by Portland Parks and Recreation (PP&R). Facilities at East Delta Park include a sports complex with seven lighted softball fields, four synthetic soccer fields, five grass soccer fields, six sand volleyball courts, a playground, picnic tables, restrooms, a parking lot, support buildings, and nature trails. An off-leash dog area was located in ODOT right of way across Union Court; the dog park is currently closed. East Delta Park is also home to the PP&R Urban Forestry Division Headquarters, located between I-5 and Walker Slough. The area of East Delta Park protected with LWCF federal assistance is only the area within the official Section 6(f) boundary identified by NPS and shown in OPRD's geographic information system (GIS) data layer. No official boundary determination has been requested at this point; however, a boundary determination would be requested before conclusion of the NEPA process.

The FLP program–protected land is limited to an approximately 1-acre area north of North Union Court. This portion of East Delta Park is separate from the land protected by Section 6(f).

Old Apple Tree Park (Washington)

Protected by FLP Program

Old Apple Tree Park is a 1.3-acre community park located north of the Columbia River and BNSF Railway and south of SR 14 in the Vancouver National Historic Reserve (VNHR). Old Apple Tree Park can be accessed from Waterfront Park via a pedestrian underpass beneath the railroad or from the VNHR using the Confluence Land Bridge over SR 14. It is owned and maintained by the City of Vancouver and is open to the public from 5:00 a.m. to 10:00 p.m. The Old Apple Tree died in 2020 at the age of 194. Its history lives on through saplings that share its genetic makeup. Interpretive signs, fencing, and the stump of the original tree remain. Old Apple Tree Park still provides passive recreational space, viewing, and bike parking for the Confluence Land Bridge.

Marshall Community Center, Luepke Senior Center, and Marshall Park (Washington)

Protected by FLP Program

The Marshall Community Center and Park is a 19-acre community park located on the east side of I-5 south of McLoughlin Boulevard. Marshall Park, which was renovated in 2006, is owned and maintained by the City of Vancouver and is open from 5:00 a.m. to 10:00 p.m. The site facilities include large fully accessible playground with multiple features, community gardens, a loop trail, picnic tables, horseshoe pits, ball fields, and the Marshall Community Center and Luepke Senior Center. The Marshall Community Center, open weekdays from 6:00 a.m. to 8:00 p.m., with shortened hours on Fridays and weekends, has a swimming pool, a fitness center, two basketball courts, a commercial kitchen, meeting rooms, administrative offices, an aerobics dance studio, and an arts and craft studio. In 2022, the City of Vancouver completed a playground renovation at Marshall Park. The parking lot contains 272 parking spaces, including 26 spaces that are accessible per requirements of the Americans with Disabilities Act. The Luepke Senior Center is a full-service senior center with a multi-purpose room and meeting rooms. In 2010, a large group picnic shelter was added to Marshall Park.

The property was originally transferred to the City of Vancouver in 1986 through the FLP program, as administered by NPS. The FLP parcel is described in the original Application for Federal Surplus Property as a grassy area that is used by the public. It is adjacent to a horseshoe pit area and is gently sloping from south to

north. The existing parcel also contains a few medium-sized trees and provides a partial vegetative buffer between Marshall Park and I-5.

Burnt Bridge Creek Trail (Washington)

Protected by Section 6(f) of the LWCF Act

The Burnt Bridge Creek Trail is an 8-mile paved multiuse trail that travels through the Burnt Bridge Creek Greenway located on the east and west sides of I-5, north of the I-5/SR 500 interchange. The trail is owned and maintained by Vancouver Parks, Recreation and Cultural Services and travels over I-5 on a pedestrian and bicycle-only overcrossing south of the I-5/Main Street interchange.

3.21.4 Long-Term Benefits and Effects

East Delta Park and Strasser Field (Oregon)

Protected by Section 6(f) of the LWCF Act and FLP Program

Under all current design options, the Modified LPA would require the permanent acquisition of a sliver of park land (approximately 0.1 acres) to construct a wall supporting the I-5 northbound to Marine Drive interchange ramp along the western edge of East Delta Park (see Figure 3.21-2). This acquisition is being evaluated as a potential conversion of a Section 6(f)-protected resource. The IBR Program is coordinating with the Portland Parks and Recreation Department and OPRD on how to avoid, minimize, and/or mitigate potential impacts to East Delta Park—most recently in October 2023. As the coordination proceeds, OPRD will coordinate with NPS. Final approvals would occur after completion of the Draft SEIS process as project design is further developed and right of way is acquired.

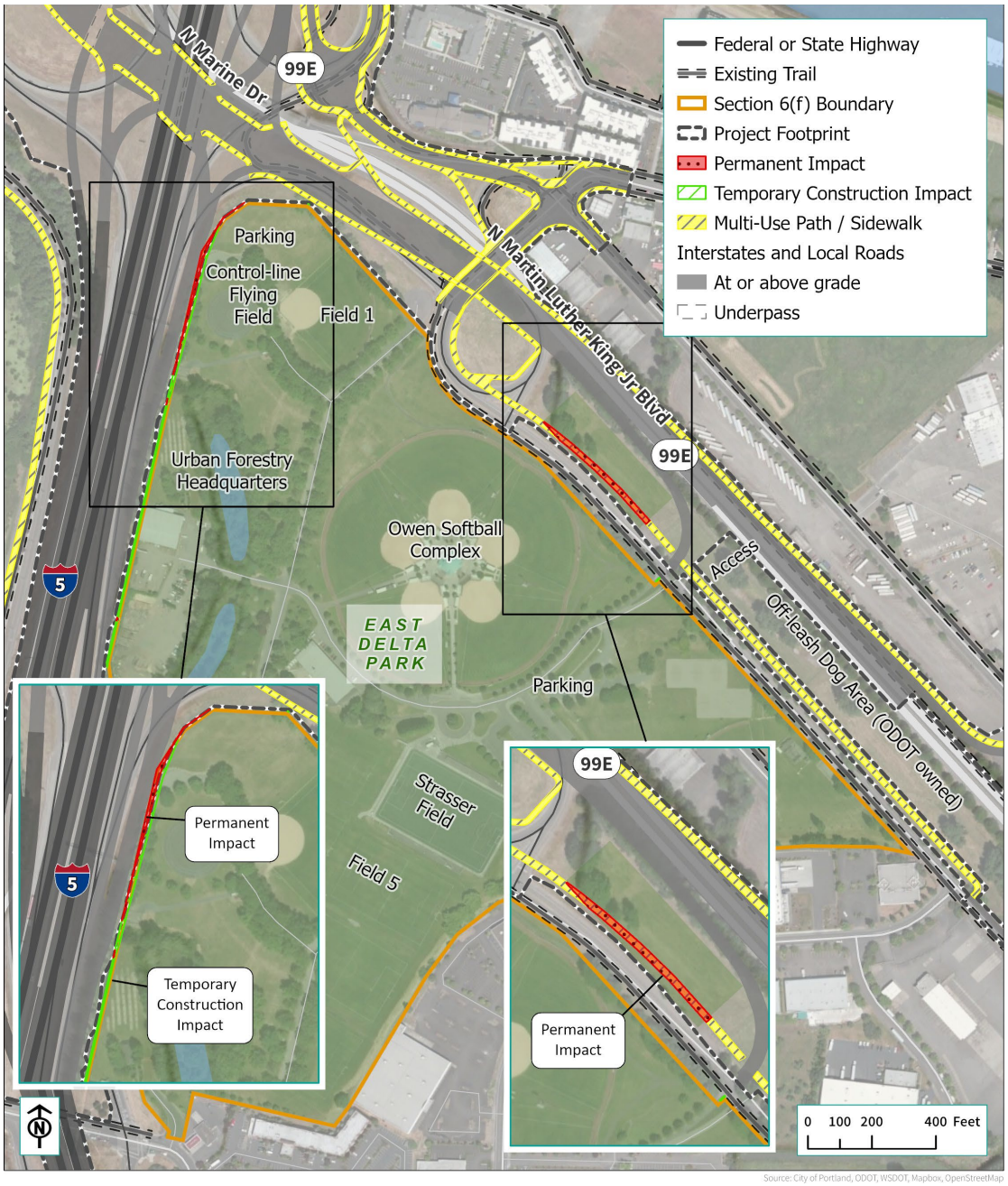
Approximately 0.1 acres of additional PP&R-owned park land would be acquired to construct the roadway connection between Martin Luther King Jr. Boulevard and N Union Court. This portion of East Delta Park is protected by the FLP program. This area is a small parcel located northeast of the main park and is not used by PP&R. Because the Modified LPA would affect FLP program–protected lands, it would require identifying replacement recreational land. Coordination and consultation will occur during the NEPA process, but final approvals of replacement land would occur after completion of the Draft SEIS process, as project design is further developed and right of way is acquired. These approvals by OPRD and NPS of the replacement land would be documented in a signed and executed LWCF conversion amendment.

Old Apple Tree Park (Washington)

Protected by the FLP Program

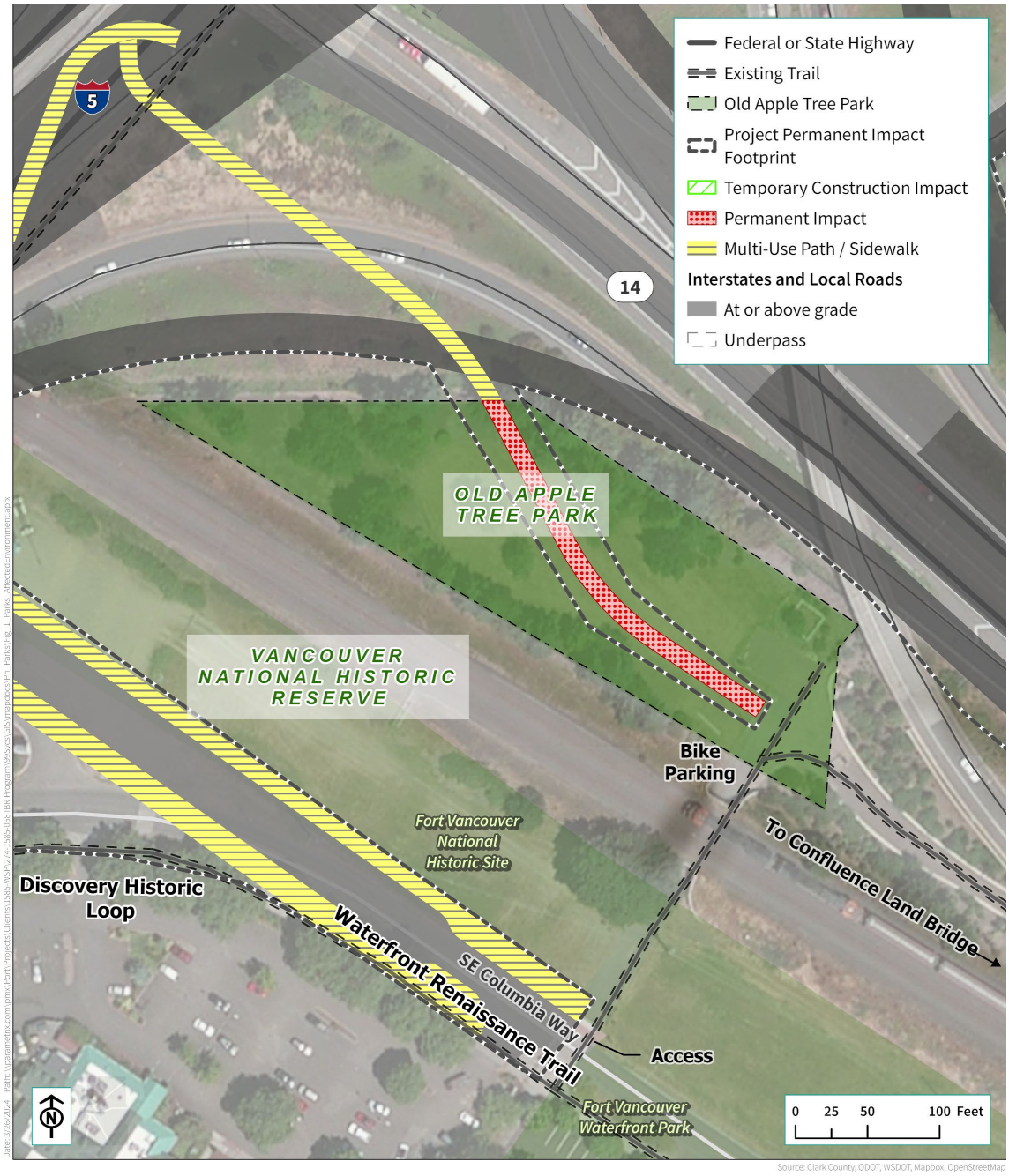
Under all design options, the Modified LPA would permanently acquire approximately 0.08 acres from Old Apple Tree Park for a new shared-use path that would link Main Street and downtown Vancouver (Figure 3.21-3). Users of the Confluence Land Bridge, which extends over SR 14 and connects the Vancouver waterfront with the VNHR, would benefit from this new path as they travel through Old Apple Tree Park. This acquisition may require providing replacement parkland, pending coordination among the IBR Program, RCO, and NPS. The IBR Program is coordinating with the City of Vancouver and NPS on how to avoid, minimize, and mitigate potential impacts to Old Apple Tree Park—most recently in October 2023.. Final approvals of replacement land would occur after completion of the Draft SEIS process, as the project design is further developed and right of way is acquired.

Figure 3.21-2. East Delta Park Section 6(f) and FLP Program Boundaries



All design options would also require a permanent airspace easement (less than 0.1 acres) over the northwest corner of Old Apple Tree Park for maintenance of the I-5 northbound to SR 14 elevated ramp. This easement would provide WSDOT with the right to enter Old Apple Tree Park with equipment to perform routine inspections of the ramp structure. This easement would not change the recreational use of the park, affect landscaping on the park property, or convert the land to a nonpark use.

Figure 3.21-3. Old Apple Tree Park FLP Program Boundaries



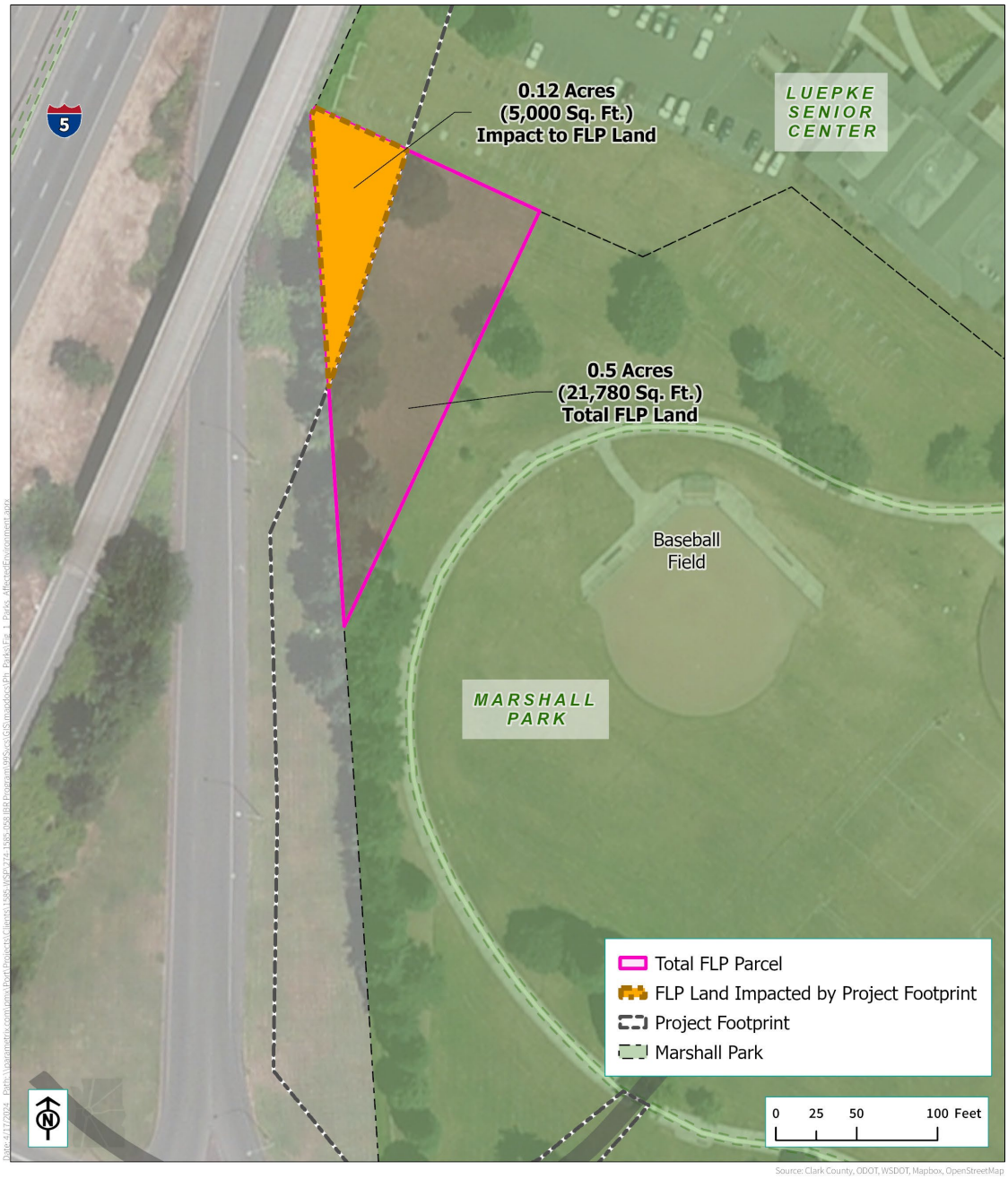
Marshall Community Center, Luepke Senior Center, and Marshall Park (Washington)

Protected by the FLP Program

The total area of FLP program–protected land at Marshall Park is approximately 0.5 acres. All design options for the Modified LPA would require approximately 5,096 square feet (0.12 acres) of the 0.5 acres of FLP program–protected land. Figure 3.21-4 shows this permanent property acquisition occurring along the western edge of the park parcel. These 5,096 square feet of land represent a small portion of the park's overall recreational utility and do not include recreational attributes that are unique to Marshall Park. The IBR Program is coordinating with the City of Vancouver and NPS on how to avoid, minimize, and mitigate potential impacts to Marshall Park—most recently in October 2023.. Final approvals of replacement land

would occur after completion of the Draft SEIS process as the project design is further developed and right of way is acquired.

Figure 3.21-4. Marshall Community Center, Luepke Senior Center, and Marshall Park FLP Program Boundaries

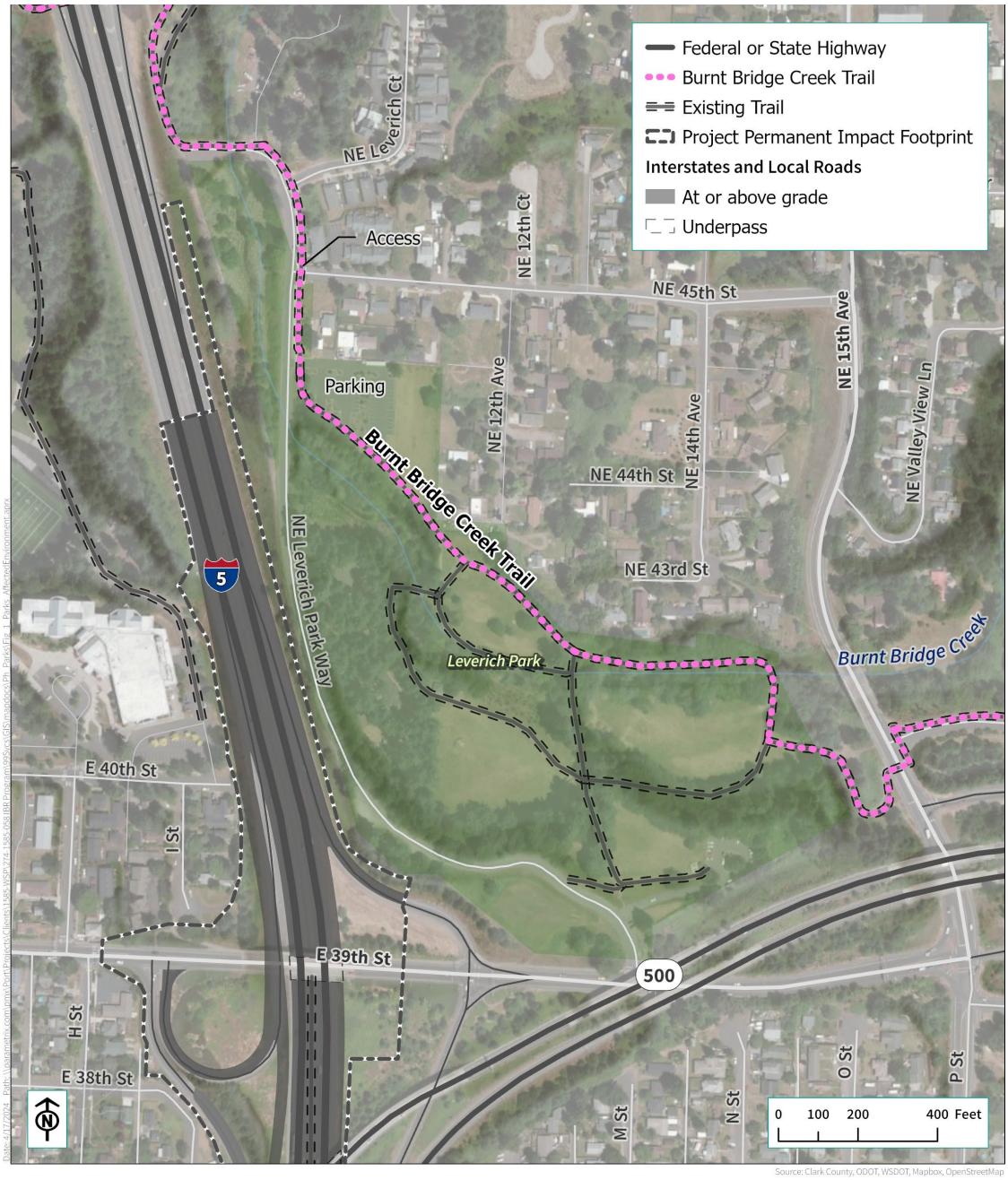


Burnt Bridge Creek Trail (Washington)

Protected by Section 6(f) of the LWCF Act

No design option under the Modified LPA would result in a conversion of the Burnt Bridge Creek Trail that is protected by Section 6(f) of the LWCF Act. The Burnt Bridge Creek Trail travels through Leverich Community Park (Figure 3.21-5) but would not be affected by the ramp from 39th Street to I-5 northbound that would tie into mainline I-5 south of the trail overpass. No adverse impacts to the trail are expected and no conversion would occur.

Figure 3.21-5. Burnt Bridge Creek Trail



3.21.5 Temporary Effects

No parklands protected by FLP would be subject to conversion during the construction of the Modified LPA, including construction of the new bridges and removal of the existing Interstate Bridge.

A temporary occupancy of approximately 0.2 acres and lasting less than 180 days at East Delta Park would be required during nearby construction activities. Because East Delta Park has been granted funds through the LWCF State Assistance Program, a request for the temporary non-conforming use within the LWCF boundary area must be submitted to OPRD, under the guidelines of the LWCF Federal Financial Assistance Manual. Later in the NEPA process, this would require state approval from OPRD and ultimately approval from NPS. Because the use would be temporary and would not exceed beyond 180 days, there would be no requirements for the provision of substitution property; however, mitigation will require bringing this area back to its original state,

including reseeding the lawn in this area and replanting any landscape that would require removal during construction. Criteria for OPRD and NPS approval of a temporary non-conforming use within an LWCF boundary area may include some or all of the following, depending on further consultation with and direction provided by OPRD and/or NPS:

- Size of the parkland area affected by the temporary non-recreation use, and its lack of significant impact to the other areas of the fund-assisted park.
- Temporary use does not result in permanent damage to the park and mitigation ensures there are no residual impacts on the site after the temporary use is concluded.
- No practical alternatives to the proposed temporary use exist.
- All applicable federal requirements for approval are met.

The application for approval from OPRD and NPS for temporary use requires the following documentation:

- OPRD recommendation.
- Complete description of the proposed temporary use, including the following:
  - Start and completion dates.
  - Identification of the portion of the site affected, including a map.
  - Justification of why the area needed is the minimum necessary for the proposed use.
  - Analysis of alternatives considered.
  - Description of impacts.
  - Mitigation and schedule.
- An acknowledgement from local agencies with jurisdiction over LWCF resources and OPRD stating that a full conversion will result if the temporary use extends beyond the maximum six-month (180-day) period.

3.21.6 Potential Avoidance, Minimization, and Mitigation Measures

Long-Term Effects

Regulatory Requirements

This Draft SEIS identifies potentially affected Section 6(f)- and FLP-protected parkland resources, potential avoidance alternatives, and agency process requirements, which are early steps in a much longer process required to convert Section 6(f)- and FLP-protected properties to nonpark uses. The IBR Program has initiated consultation with OPRD and the City of Portland to discuss potential 6(f) impacts at East Delta Park. The IBR Program has initiated consultation with NPS, the City of Vancouver, and the City of Portland to discuss potential FLP impacts at Marshall Park, Old Apple Tree Park, and East Delta Park.

Looking forward, the conversion process will generally include replacement property proposal and consultation.

This process will consider public comment on potential conversion of LWCF and FLP lands identified in the Draft SEIS. The IBR Program will continue to look for ways to first avoid and then minimize effects on LWCF and FLP resources. If all practical alternatives to conversion of LWCF and FLP resources have been ruled out, the IBR Program will coordinate with the local agencies with jurisdiction over the LWCF and FLP resources, as well as a broader coordination process with OPRD NPS, and the GSA.

Avoidance

Alternatives to avoid 6(f) properties including reducing the right-of-way width of I-5 or realigning the Modified LPA farther west were evaluated.

Reducing the Right-of-Way Width of I-5 under the Modified LPA and Design Options

Measures to reduce the right of way of I-5 near East Delta Park could include reducing project elements such as shoulders, travel lanes, or light-rail transit (LRT) tracks. The Modified LPA and design options must meet federal and state highway design requirements for safety, to avoid substandard roadway design, and maintain or improve traffic operations. The project could potentially reduce the number of through travel lanes or eliminate the wider shoulders or auxiliary lanes. These measures would not meet the Program's Purpose and Need. The purpose of the Modified LPA is "to improve I-5 corridor mobility by addressing present and future travel demand and mobility needs in the IBR study area." Specific objectives include: "a) improve travel safety and traffic operations on the Interstate Bridge and associated interchanges; b) improve connectivity, reliability, travel times, and operations of public transportation modal alternatives in the study area; c) improve highway freight mobility and address interstate travel and commerce needs in the study area; and d) improve the Interstate Bridge's structural integrity (seismic stability)." Eliminating project elements including travel lanes, auxiliary lanes, shoulders, or LRT tracks would not improve traffic operations; connectivity, reliability, travel times, and operations of public transportation modes; nor would it improve highway freight mobility.

Reducing the width of project elements such as shoulders, and travel lanes would not meet federal and state highway design requirements, could compromise safety and would not meet the Program's Purpose and Need. For these reasons, reducing the width of the project is not a practical alternative to conversion of land from Delta Park.

Realigning Program Elements West

IBR Program Modified LPA and design options were designed to minimize impacts to existing businesses, residences, and natural resources in North Portland by using the existing I-5 alignment and right of way to the maximum degree possible. Shifting the Modified LPA or design options alignments to the west would incur large-scale impacts to businesses and residents in North Portland and also to natural resources. For example, immediately to the west of the proposed alignment near East Delta Park are the Vanport Wetlands.

For this reason, a westward alignment shift is not a practical alternative.

Program-Specific Mitigation

Program-specific mitigation measures for long-term effects related to LWCF resources will be developed in coordination with mitigation proposed for parks and recreation (see Section 3.7), and will be based on further consultations with the local, state, and national parks agencies throughout and beyond the NEPA process.

Temporary Effects

Mitigation measures for temporary effects related to LWCF resources will be developed in coordination with mitigation proposed for parks and recreation (see Section 3.7) and will be based on further consultations with the local, state, and national parks agencies throughout and beyond the NEPA process.

3.22 Aviation

An important goal of the IBR Program is to avoid or minimize hazards to aircraft navigation at nearby airports and associated airspaces. This section discusses existing aircraft navigation conditions and evaluates the associated beneficial and adverse effects of the Modified LPA and the No-Build Alternative.

There are two airports near the study area: Pearson Field in Washington and Portland International Airport (PDX) in Oregon. Each of these airports has federally protected airspace regulated by the Federal Aviation Administration (FAA). Long-term effects to aviation were evaluated using federal aviation regulations, which are the FAA rules that govern all U.S. aviation activities. Federal aviation regulations relevant to the IBR Program include regulating air navigation systems, lights or glare that may affect visibility, and management of wildlife hazards that may increase the probability of aircraft strikes.

The information presented in this section is based on analyses found in the Aviation Technical Report.

3.22.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with aviation has been updated in this Draft SEIS to include:

- Changes to aviation conditions and needs.
- Changes to federal, state, and local aviation regulations.
- New bridge configurations added for evaluation due to changed conditions that would each have varying heights with respect to proximity to protected airspace.

The main IBR Program component relevant to aviation is the replacement bridges over the Columbia River. The CRC LPA and IBR Modified LPA would both include a pair of double-deck fixed-span bridge configurations with 193 feet maximum height of the bridge with signage and luminaires. The Modified LPA also includes two additional configuration options: a single-level fixed-span configuration and a single-level movable-span configuration.

Table 3.22-1 compares the impacts and benefits between the CRC LPA and the IBR Modified LPA from the changes listed above. Based on this analysis, the Modified LPA would have the same or similar effects as the CRC LPA on aviation. A detailed description of impacts and benefits to aviation from the Modified LPA and associated design options follows.

Table 3.22-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects to Aviation

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects as Identified in the Draft SEIS	Explanation of Differences
Aviation Safety	Less intrusion into Pearson Field protected airspace compared to the existing Interstate Bridge. Reduced potential for bird nesting or roosting.	Same as CRC for all configuration options.	N/A

Note: The CRC LPA and Modified LPA effects are as compared to a No-Build Alternative, unless otherwise noted.
CRC = Columbia River Crossing; LPA = Locally Preferred Alternative; N/A = not applicable; SEIS = Supplemental Environmental Impact Statement

3.22.2 Existing Conditions

Protected airspace is regulated by FAA per 14 Code of Federal Regulations (CFR) Part 77, including several imaginary[1] surfaces, in space and on the ground, established in relation to an airport and its runways. Figure 3.22-1 illustrates the following protected surfaces for civil (commercial) airports, such as Pearson Field and PDX, as defined in 14 CFR § 77.19:

Approach, departure, and other protected air navigation surfaces represent imaginary lines extending upward and outward from the center of the runway that define the area for evaluation of potential obstructions to safe takeoffs and landings.

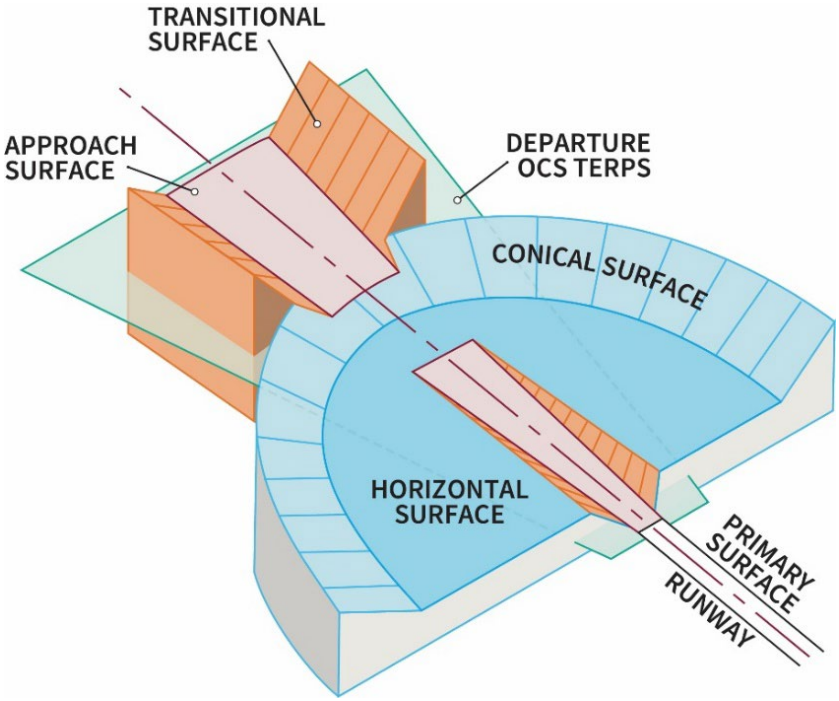
- **Horizontal surface**. A horizontal plane 150 feet above the established airport elevation.
- **Conical surface**. A surface extending outward and upward from the periphery of the horizontal surface at a slope of 20 feet of run to 1 foot of rise for a horizontal distance of 4,000 feet.
- **Primary surface**. A surface longitudinally centered on a runway.
- **Approach surface**. A surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. The approach surface protects the airspace for aircraft on approach to land, ensuring that there are no obstacles or structures that could pose a hazard to aircraft during their approach and landing phases.

Transitional surfaces. These surfaces extend outward and upward at right angles to the runway centerline and the runway centerline extended at a slope of 7 to 1 from the sides of the primary surface and from the sides of the approach surfaces. Transitional surfaces ensure obstacle clearance for aircraft during the initial phases of their approach and departure.

In addition, aircraft departures from airports are managed by procedures developed under FAA Order 8260.3E U.S. Standard for Terminal Instrument Procedures (TERPS) as established in 14 CFR Part 95 and Part 97. Departure procedures must evaluate obstacles that penetrate a 40 feet of run to 1 foot of rise slope beginning at the end of a runway, which is called the "obstacle clearance surface" (OCS). If obstacles penetrate the OCS, then the airport is required to establish obstacle departure procedures for aircraft pilots.

[1] Surfaces are called imaginary because a person cannot see them; however, they define volumes of airspace to protect air navigation.

Figure 3.22-1. Typical Civil Airport Protected Airspaces



Portland International Airport

PDX is located about 3 miles southeast of the Interstate Bridge on the Oregon side of the Columbia River. It is the Portland area's major regional and international airport and serves large commercial passenger and freight service, private aircraft, and the Oregon Air National Guard. Potential future expansions include runway extensions and the addition of a new runway; however, the most recent Airport Master Plan update determined that these facilities would not be required through the 2035 planning horizon (Portland Bureau of Planning and Port of Portland 2008). Protected Part 77 airspace for PDX in the vicinity of the Interstate Bridge is approximately 130 feet above the top of the lift-span towers, and the Interstate Bridge is outside the OCS for PDX. As a result, the existing Interstate Bridge creates no intrusion or hazard for aircraft navigation at PDX.

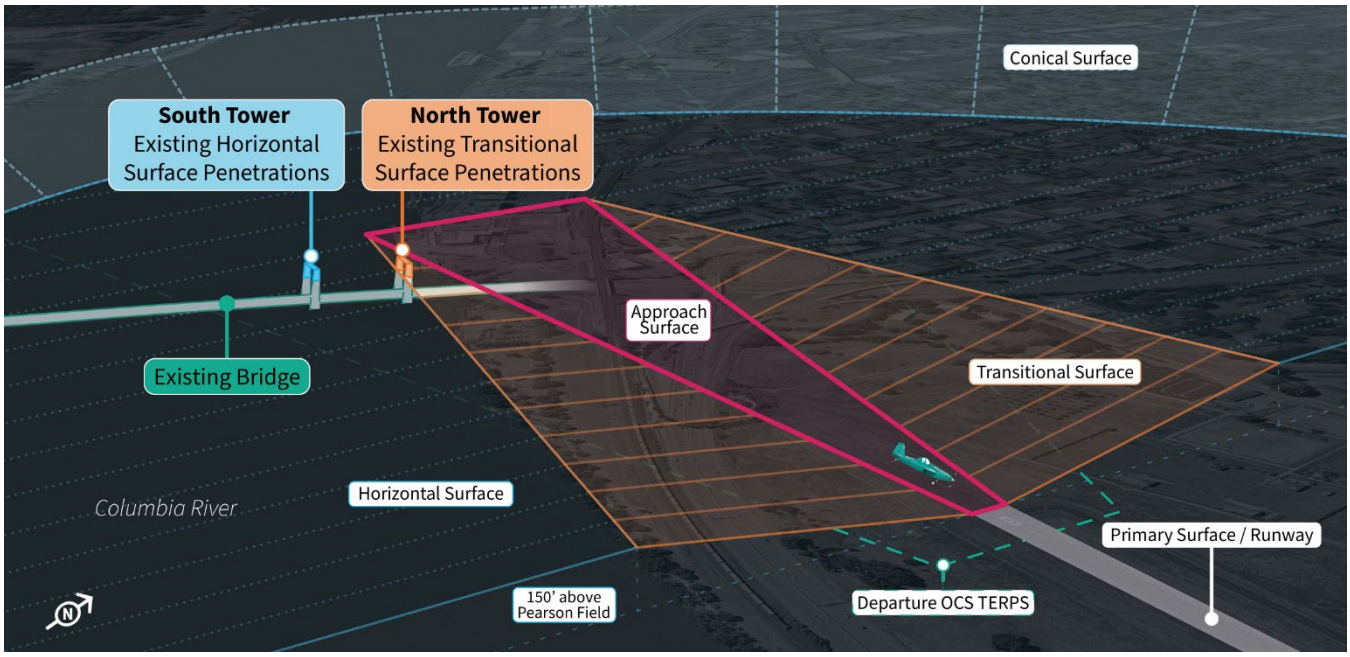
Pearson Field

Pearson Field, on the Washington side of the Columbia River, serves primarily small, piston-engine aircraft weighing 10,000 pounds or less. Because it is surrounded by developed urban uses and the Vancouver National Historic Reserve, there are no plans to expand facilities or operations at this airfield.

The existing Interstate Bridge and Pearson Field both predate current 14 CFR Part 77, Part 95, and Part 97 regulations. Currently, the Interstate Bridge lift-span towers intrude into Part 77–protected airspace (70 feet into the horizontal surface and 98 feet into the transitional surface) and the OCS for Pearson Field (see Figure 3.22-2). To mitigate these conditions, the existing lift-span towers are marked with lights, and the FAA issues obstacle departure procedures to avoid the Interstate Bridge lift towers.

Furthermore, the existing Interstate Bridge's open-truss framing unintentionally provides bird roosting and nesting areas, which in turn can contribute to potential wildlife strike hazards for aircraft. Wildlife strikes can cause damage to aircraft and potential loss of life; thus, birds and their habitat are an important concern at Pearson Field. To date, ODOT has used deterrents such as sound cannons to discourage birds from using the existing bridges.

Figure 3.22-2. Pearson Field Protected Airspace – Existing Bridge Penetrations



3.22.3 Long-Term Effects

No-Build Alternative

Under the No-Build Alternative, the Interstate Bridge lift-span towers would continue to intrude on Pearson Field's protected airspace. Existing obstacle departure procedures would remain in place for pilots. The open-truss structure of the existing bridge would continue to provide bird roosting and nesting habitat, functioning as a potential source of aircraft wildlife strike hazards. Hazards to aviation would remain because the Interstate Bridge lift-span towers have historically been an aviation hazard, and aircraft wildlife strike hazards from birds using the structure are documented and subject to mitigation measures.

Modified LPA

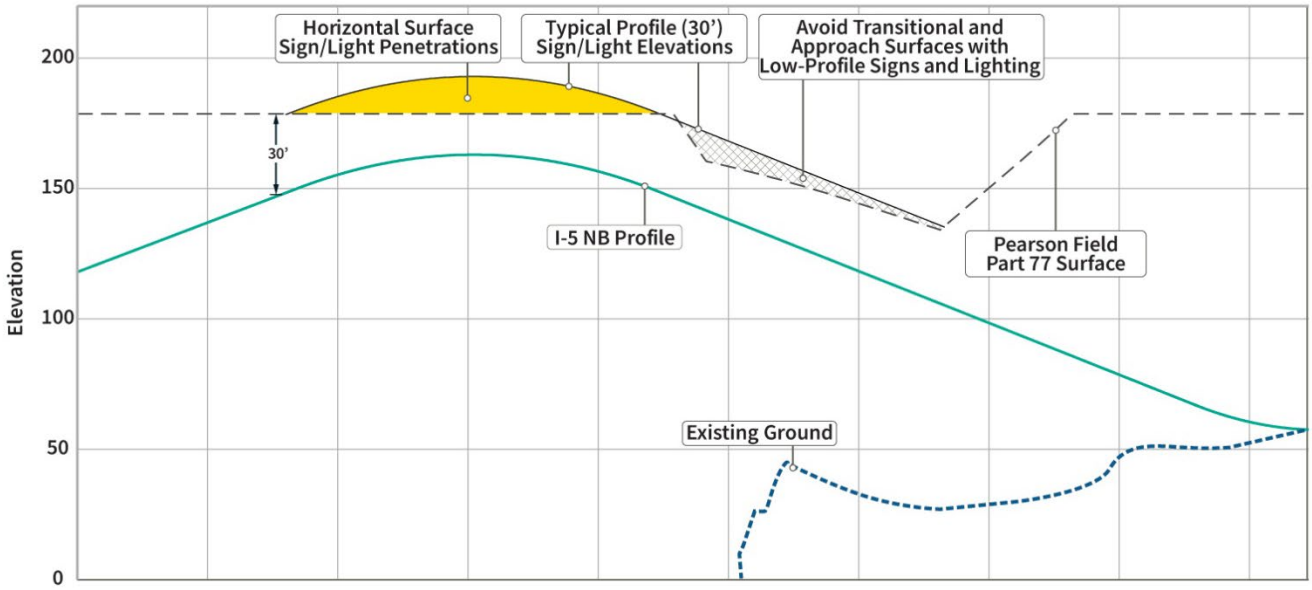
The Modified LPA, including all design options, would benefit aviation safety and efficiency. The new Columbia River bridges would be located slightly farther downstream and thus slightly farther from Pearson Field compared to the existing Interstate Bridge. The IBR Program has assumed a 17-foot vertical clearance envelope above the roadway surface to account for the height of vehicles operating on the highway. Above this envelope, the IBR Program assumes an additional 13-foot envelope to accommodate signs and lighting. The FAA provided feedback on potential penetrations, noting penetrations in the horizontal and transitional surfaces could be mitigated with low-profile signs and lighting, but penetrations in the approach surface could not be mitigated. Therefore, as bridge design progresses, the IBR Program will pursue designs that avoid penetrating the approach surface at Pearson Field. Effects to protected airspaces by bridge configuration include the following, summarized in Table 3.22-2:

- The roadway deck for the Modified LPA with a double-deck fixed-span configuration would have an approximate maximum height of 160 feet and would be outside protected airspace for Pearson Field. The 17-foot envelope above the deck for vehicle traffic would also avoid penetration of all protected airspace. The current design assumes a 13-foot envelope for signs and lighting above the vehicle envelope. If designed to the extent of this envelope, some signs and lighting would penetrate the horizontal surface to a maximum depth of

12.5 feet. Where needed, low-profile signs and lighting would be used to avoid intrusions into the approach and transitional surfaces (Figure 3.22-3 and Figure 3.22-4).

- The single-level fixed-span configuration (with the girder, extradosed, and finback bridge types)[2] would avoid intrusions to protected airspace.
- The lift-span towers for the Modified LPA with the single-level movable span configuration would penetrate the Pearson Field protected airspace, specifically the horizontal surface. The penetration would be located south of the existing tower locations, such that the new obstructions would not penetrate the Pearson Field transitional or approach surfaces (Figure 3.22-5). Therefore, although the single-level movable-span configuration would penetrate Pearson Field horizontal surface, it would not likely be a hazard to aviation.

Figure 3.22-3. Locations for Low-Profile Signs and Lights on Modified LPA with Double-Deck Fixed-Span Configuration (Profile View)



[2] See Chapter 2, Description of Alternatives, for more information on the girder, extradosed, and finback bridge types.

Figure 3.22-4. Locations for Low-Profile Signs and Lights on Modified LPA with Double-Deck Fixed-Span Configuration (Plan View)

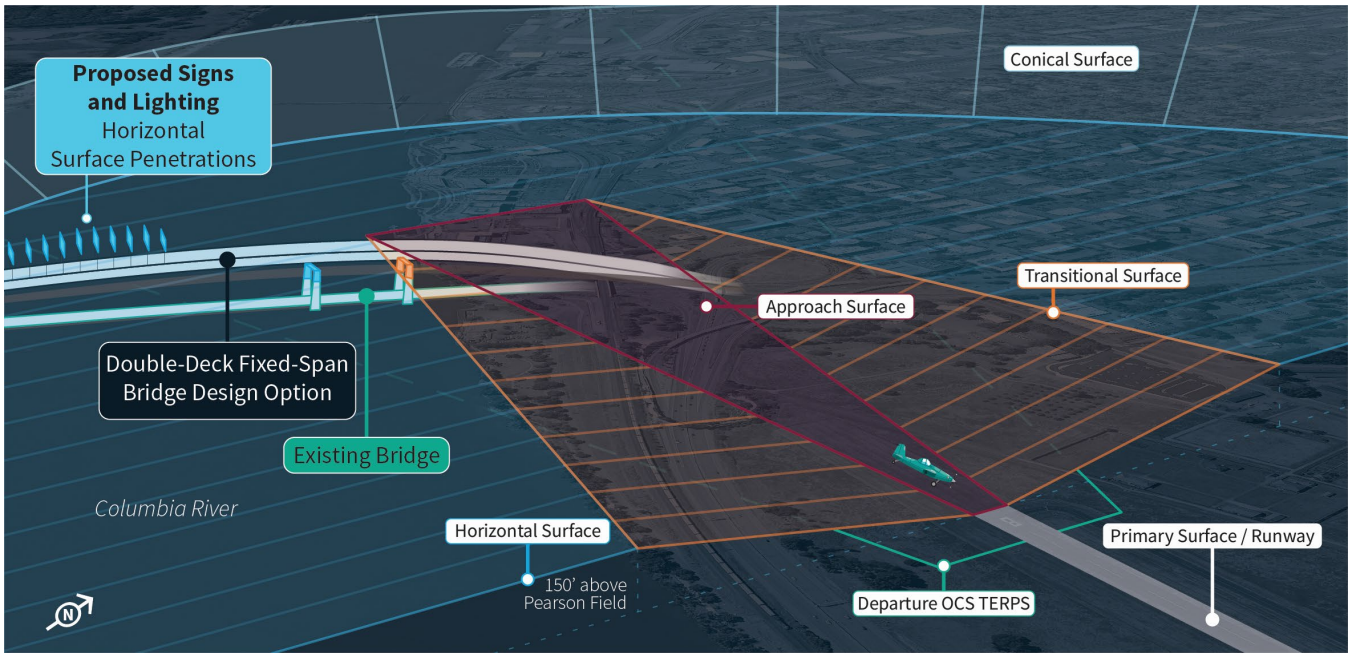
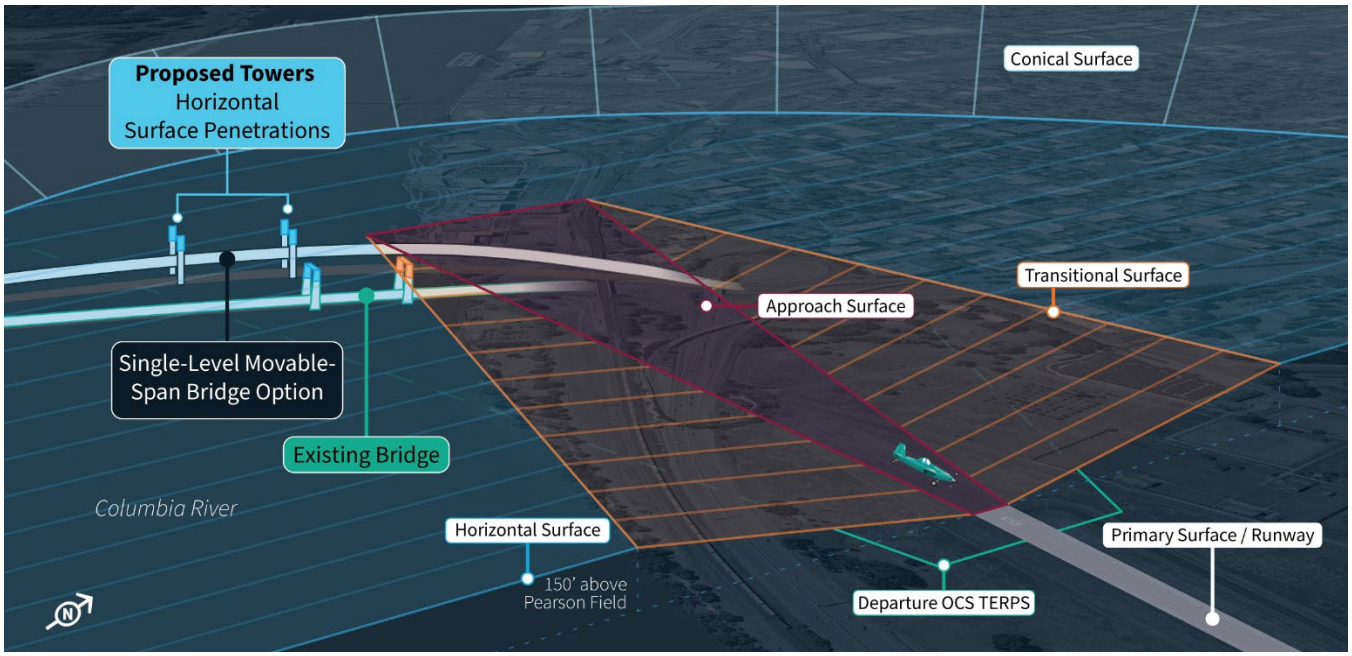


Figure 3.22-5. Pearson Field Protected Airspace – Modified LPA with Single-Level Movable-Span Configuration Intrusion



The goal of the new Columbia River bridges configuration and alignment is to minimize effects on both Columbia River marine navigation and Pearson Field air navigation. However, the vertical navigation clearance for marine vessels/cargo and the westbound departure OCS for Pearson Field overlap. Therefore, obstruction of the westbound departure OCS is unavoidable by any configuration or alignment. Under all the design options and configurations for the Modified LPA, westbound departure procedures would be required,

though these departure procedures would be to a lesser degree than the No-Build Alternative (Table 3.22-2). The effects of the Modified LPA on westbound departure procedures include:

- The Modified LPA with either the double-deck fixed-span configuration or the single-level fixed-span configuration (all bridge type options), including with the C Street ramps design option, would decrease the No-Build Alternative westbound departure procedures climb gradient from 650 feet per nautical mile (ft/NM) to approximately 427 ft/NM (double-deck) and 474 ft/NM (single-level), as the existing lift towers would no longer be an obstacle.
- The single-level fixed-span configuration (all bridge type options) without the C Street ramps at the SR 14 interchange would further reduce the westbound departure procedures climb gradient to approximately 401 ft/NM (double-deck) and 357 ft/NM (single-level).
- The Modified LPA with the single-level movable-span configuration would decrease the westbound departure procedures climb gradient from 650 feet per nautical mile (ft/NM) to approximately 544 ft/NM and 612 ft/NM respectively. There is no difference associated with or without C Street ramps, as the movable-span configuration would constrain the climb gradient.

The Modified LPA would be designed with consolidated structural elements that reduce the areas on which birds can land, roost, and potentially nest. Fewer birds would be attracted to the new Columbia River bridges as a result, and continued incorporation of bird deterrent measures into the bridge maintenance program would further reduce the potential for wildlife strike hazards at Pearson Field. Stormwater ponds constructed as part of the Modified LPA would include deterrent features commonly used at other airports, such as nets, to discourage birds from using the ponds.

No long-term effects on aviation activities at PDX would result from the Modified LPA because the new Columbia River bridges would remain outside its protected airspace. Protected airspace for PDX in the vicinity of the Interstate Bridge lift-span towers is approximately 130 feet above the top of the existing lift-span towers. Because the current preliminary movable-span configuration design proposes new lift towers at an elevation similar to the existing lift towers, the single-level movable-span configuration would not penetrate or create a hazard for aircraft navigation at PDX.

Table 3.22-2. Long-Term Effects on Pearson Field Aviation Surfaces and Departure Procedures

Aviation Component	No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration	Modified LPA with Single-Level Fixed-Span Configuration [a]	Modified LPA with Single-Level Movable-Span Configuration
Horizontal Surface	98 vertical feet penetration by south lift tower, illuminated to increase visibility.	Up to 12.5 vertical feet penetration by signs and lighting, illuminated to increase visibility.	No penetration.	64 vertical feet penetration by lift towers; illuminate to increase visibility
Approach Surface	No penetration.	Use low-profile signs and lighting on north ends of upper decks to avoid penetration.	No penetration.	No penetration.
Transitional Surfaces	Penetration by existing Interstate Bridge north lift tower; illuminated.	Use low-profile signs and lighting on north ends of upper decks to avoid penetration.	No penetration.	No penetration.

Aviation Component	No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration	Modified LPA with Single-Level Fixed-Span Configuration [a]	Modified LPA with Single-Level Movable-Span Configuration
Westbound Departure OCS	Obstacle departure procedures required to avoid existing Interstate Bridge lift towers; climb gradient is 650 ft/NM.	Obstacle departure procedures required to avoid new bridges; climb gradient reduced to 427 ft/NM. Without C Street ramps, climb gradient further reduced to 401 ft/NM.	Obstacle departure procedures required to avoid new bridges; climb gradient reduced to 474 ft/NM. [b] Without C Street ramps, climb gradient further reduced to 357 ft/NM.	Obstacle departure procedures required to avoid new bridges; climb gradient reduced to 544ft/NM for vertical lift span, with and without C Street ramps.
Wildlife strike risk	Existing open-truss framing continues to provide bird roosting and nesting areas, existing ODOT deterrence measures continue; aircraft wildlife strike risk continues at existing level.	Design bridge features to reduce potential for bird nesting and roosting combined with continued deterrence measures would reduce potential for aircraft wildlife strikes from existing level.	Design bridge features to reduce potential for bird nesting and roosting combined with continued deterrence measures would reduce potential for aircraft wildlife strikes from existing level.	Design bridge features to reduce potential for bird nesting and roosting combined with continued deterrence measures would reduce potential for aircraft wildlife strikes from existing level.

a The long-term effects associated with the single-level fixed-span configuration would be the same for all bridge type options, unless otherwise specified.

b The climb gradient is steeper for the single-level fixed-span configuration with C Street ramps compared to the double-deck fixed-span configuration because of the single-level fixed-span configuration's increased width and the reduced distance between the C Street off-ramp and the Pearson Field runway.

ft/NM = feet per nautical mile; LPA = Locally Preferred Alternative; NB = northbound; OCS = Obstacle Clearance Surface; ODOT = Oregon Department of Transportation; Part 77 = CFR Part 77; TERPS = Terminal Instrument Procedures

3.22.4 Temporary Effects

No-Build Alternative

No Program-related construction activities would take place under the No-Build Alternative that would have temporary benefits or effects to aviation.

Modified LPA

Tall cranes used during construction of the Columbia River bridges and the SR 14 interchange and demolition of the Interstate Bridge may be hazards to aviation at Pearson Field. Equipment used to remove the existing lift-span towers would likely be the tallest construction equipment on site and therefore the most likely to present a hazard to aviation. The degree to which aviation would be affected depends on the construction methods employed. FAA would review construction plans to determine potential effects and associated mitigation before construction could begin.

Construction activities are not anticipated to affect aircraft navigation to and from PDX because construction equipment is not anticipated to exceed a height of 375 feet, the point at which it would begin to penetrate the PDX protected airspace.

Construction of the SR 14 interchange would penetrate the restricted airspace for Pearson Field. Temporary storage of fill, cranes, or other construction-related materials and equipment could also temporarily intrude into the aviation surfaces. As with the construction of the Columbia River bridges, the actual intensity of effects would depend on the equipment and construction methods proposed by the contractor. Following FAA's review of the equipment locations and heights proposed by the contractor, the FAA may issue temporary flight procedures during construction to aircraft operating at Pearson Field.

Construction dust or emissions from construction equipment in the SR 14 area could pose a short-term hazard to aviation from Pearson Field by reducing visibility. Wind could cause dust by disturbing uncovered fill or open excavations. Trucks and equipment traveling on unimproved construction roads could also stir up dust, impairing visibility.

Activities at the staging and casting yards would not be expected to have temporary effects on aviation.

Temporary aviation effects under the single-level movable-span configuration would be similar in character to those described above but would be longer in duration than for fixed-span configurations—potentially up to an additional two years. Effects would be prolonged because tall cranes would be required to construct the new lift towers associated with the movable-span configuration.

3.22.5 Indirect Effects

No anticipated indirect effects to aviation have been identified for the Modified LPA, including all design options.

3.22.6 Potential Avoidance, Minimization, and Mitigation Measures

Long-Term Effects

Regulatory Requirements

Standards and regulatory measures to avoid or minimize long-term effects on aviation have been evaluated and screened. These measures have been incorporated during the development of the Modified LPA to the extent possible and will continue to be refined as the design progresses.

During final design, the IBR Program would comply with the FAA's findings in response to the Program's Form 7460-1. The FAA would issue a finding of "hazard to aviation" or "no hazard to aviation" upon completion of the aeronautical review. In addition, the FAA would have requirements for marking obstacles; this would likely include marking according to FAA AC 70/7460-1M "Obstruction Marking and Lighting" using equipment specified in AC 150/5345-43J "Specification for Obstruction Lighting Equipment."

Program-Specific Mitigation

In addition to regulatory requirements, potential Program-specific mitigation measures have been identified and will be developed with the Modified LPA design.

Specific mitigation for aviation includes:

- Provide obstruction marking and lighting to make the river crossing structures visible to aircraft. Design roadway or accent lighting on the bridges and surrounding interchanges to limit light or glare that could affect aviation at Pearson Field or PDX.
- Place wire mesh or other deterrents over the top of stormwater detention ponds to conceal open water when they are full to prevent birds from landing or using selective plantings within ponds.

- Incorporate designs of proposed structures and features of the Program that minimize locations for birds to roost or nest.

Temporary Effects

Regulatory Requirements

To protect and minimize temporary effects on aviation during construction, standard and regulatory mitigation measures such as best management practices (BMPs) would be implemented. Construction BMPs applicable to the Modified LPA are discussed in Section 3.14, Water Quality and Hydrology.

Standard and regulatory mitigation measures for aviation include:

- In the area of demolition of the Interstate Bridge and construction activities for the Columbia River bridges and the SR 14 interchange, FAA would review and approve the location and height of tall construction equipment proposed by the contractor. Equipment would be marked following the FAA's Obstruction Marking and Lighting Standards described in Advisory Circular 70/460-1M.
- Apply dust control measures, such as watering exposed soil and using gravel surfacing on temporary construction roads, to mitigate potential reduction in visibility to aviation from construction activities in the SR 14 area. Section 3.10.6, Air Quality, lists dust control requirements in both Oregon and Washington. Manage construction materials and activities to minimize glare and smoke.

Program-Specific Mitigation

- Construction specifications for contractors working near Pearson Field would include a condition that any electronic devices used for communication or other purposes cannot interfere with equipment required for air navigation and communication.
- Place wire mesh or other deterrents over the top of temporary stormwater ponds to prevent birds from landing on open water.
- Provide public involvement throughout construction to provide information to pilots and the public.

3.23 Cumulative Effects

Cumulative effects result from the incremental effect of a proposed action when added to those of other past, present, and reasonably foreseeable future actions, regardless of the agency (federal or nonfederal) or person that undertakes such other actions. Cumulative effects can result from individually minor but collectively substantial actions that take place over a period of time (definition paraphrased from 40 CFR 1508.7).

The cumulative effects timeframes considered in this analysis are as follows:

- "Past" actions vary by component of the environment.
  - Natural environment analysis considers broad changes beginning in the 1800s.
  - Cultural environment analysis begins 15,000 years before present.
  - Built environment analysis starts in the early 1950s, with the construction of I-5. Additional historical context prior to the 1950s is described given the lifespan of the Interstate Bridge.
- "Present" actions are those ongoing in nature, such as maintenance of the existing transportation system.
- "Future" actions are those that will occur between the present (2024) and 2045, the design year of the IBR Program.

This analysis considers past major actions; planned transportation projects; population, employment, and land use forecasts; comprehensive land use plans; and other major public and private projects that are under development or reasonably expected to occur. Because the geographic scale of analysis varies by discipline, the cumulative effects analysis uses the study area identified in each technical report when evaluating cumulative effects on a particular resource.

The information presented in this section is based on the Cumulative Effects Technical Report, which contains greater detail and additional analysis.

3.23.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with cumulative effects has been updated in this Draft SEIS to include:

- Updates to past, present, and reasonably foreseeable future actions, or projects, in the study areas that have affected or could affect environmental and community resources.
- Changes in land uses such as development at the Vancouver waterfront, planned uses on Hayden Island, and recently constructed, altered, or removed buildings.
- Changes in the project footprint necessitated by changed conditions resulting in shifting the light-rail transit alignment, modifying interchange designs, and adding bridge configuration options.
- Change in transportation modeling and analysis.
- Changes in the direct and indirect effects on specific resources (as documented in each resource section).

Based on the analysis described in sections of Chapter 3, the effects of the Modified LPA would be similar to the CRC LPA. As such, the Modified LPA would have a similar contribution to effects caused by past, present, and reasonably foreseeable future actions and would have cumulative effects similar to those of the CRC LPA.

3.23.2 Past, Present, and Reasonably Foreseeable Future Actions

Past Actions

Past transportation projects, urbanization, housing, and other developments have influenced the social, economic, and natural environment reflected in the existing conditions of the region and study area. Past projects were not always planned and implemented with meaningful public input and communication.

Native Americans have occupied and traveled through the study area for thousands of years. Traces of their past activities are no longer easily identifiable in the study area's current natural and built environment; however, there are numerous cultural resources in the study area associated with these activities. In the 1800s, Euro-American settlement began and expanded with the Hudson Bay Company's post in Vancouver, and the Portland and Vancouver area population began to dramatically increase.

In the 1890s early urbanization in Portland and Vancouver was greatly influenced by the trolley line system, followed by the introduction of the automobile in the early 1900s. Construction of the Interstate Bridge occurred in two stages: the original bridge was built in 1917, followed in 1958 by construction of a parallel bridge and conversion of the 1917 bridge to northbound traffic only. Prior to 1917, unlimited vertical navigation (VNC) clearance at the Interstate Bridge location was available; however, the bridge limited this clearance to 178 feet when the bridge lift was fully opened. At that time, it was not expected that any navigation would have been reduced as larger vessels and cargo shipments began to transit the Columbia River in the 1930s to support building hydroelectric dams and the 1940s to support World War II shipbuilding activities.

Other past actions that influenced the built, social, and natural environment in the study area, include the removal of Indigenous peoples to reservations; authorization and maintenance of the federal navigation system on the lower Columbia River; airplane manufacturing at Pearson Field during World War I and shipyard manufacturing during World War II; urban renewal and large-scale transportation projects such as the construction of I-5; and greater concentration of development in urban centers under growth-management policies in Oregon and Washington.

Recently Completed Transportation Projects

Recent projects in or near the study area that give a sense of current development trends include:

- Port of Vancouver's West Vancouver Freight Access Project (Vancouver, west of I-5).
- Waterfront Renaissance Trail (Vancouver, east of I-5).
- Interstate Bridge northbound trunnion replacement (Vancouver/Portland).
- Interstate Bridge northbound active traffic management (Vancouver).
- Clark County Public Transit Benefit Area Authority (C-TRAN) bus-on-shoulder service (Vancouver, I-5, and Interstate 205 [I-205]).
- New metering on southbound I-5 at the 39th Street/SR 500 off-ramp (Vancouver).
- The C-TRAN The Vine on Mill Plain and Fourth Plain (bus rapid transit) (Vancouver).

Recently Constructed Development

- Multifamily residential buildings along N Marine Drive and N Anchor Way (Portland, east of I-5).
- Vanport wetlands restoration (Portland, west of I-5).
- Jantzen Beach Center redevelopment (outdoor mall) (Portland, Hayden Island, west of I-5).

- Floor and Décor (commercial store) (Portland, Hayden Island, east of I-5).
- Vancouver Waterfront (mixed-use development) (Vancouver, west of I-5).
- Hurley Building condominiums (Vancouver, west of I-5).
- New Seasons (grocery store) (Vancouver, west of I-5).
- West Barracks renovation (commercial properties) (Vancouver, east of I-5).
- Vancouver Community Library (Vancouver, west of I-5).
- Aegis/Providence Academy redevelopment (mixed-use development) (Vancouver, west of I-5).
- Block 10 (mixed-use development) (Vancouver, west of I-5).
- Office buildings at 210 W 4th Street and 1010 E 6th Street (Vancouver, west of I-5).
- Vancouver Center Condos (Vancouver, west of I-5).
- Vancouver Innovation, Technology and Arts Elementary School (Vancouver, east of I-5).

Present Actions

Present actions are those that are ongoing in nature, such as regional population growth and maintenance of the existing transportation system and ongoing transportation safety improvements. These include maintenance of the Interstate Bridge, the City of Vancouver's Pavement Management program, and the City of Portland's Fixing Our Streets program.

Reasonably Foreseeable Future Actions

For many resources, anticipated changes in conditions over time are linked to future changes in population, employment, traveler behavior, and transportation system performance, and land use patterns. Regional transportation forecast modeling is built upon the best available projections of 2045 population, employment, and land use changes and includes the transportation improvements that are reasonably expected to occur by 2045. Therefore, the analyses based on regional traffic forecast modeling are already cumulative. This includes the analysis of air quality, climate, energy (fuel and greenhouse gas [GHG] emissions), noise and vibration, and transportation.

The list of reasonably foreseeable future actions included in the cumulative effects analysis has been organized into three categories:

1. Future transportation projects.
2. Other future projects (non-transportation).
3. Future growth and regional changes identified in adopted state, regional, and local plans.

Future Transportation Projects

The list of reasonably foreseeable future transportation projects is based primarily on the transportation modeling conducted for the IBR Program, which is detailed in Appendix A of the Transportation Technical Report.[1] The list includes a variety of projects that are assumed to be built and in operation before 2045.

[1] ODOT's Regional Mobility Pricing Project was not included in the modeling or cumulative effects analysis as that project was not included in the 2018 RTP. Additionally, all work on the Regional Mobility Pricing Project was halted in March 2024 at the direction of the Oregon governor, and the project is not anticipated to be reinitiated at this time.

Sources for this future transportation project list include the financially constrained project list in the 2018 Regional Transportation Plan (RTP) . [2]

The list of future transportation projects considered for the No-Build Alternative cumulative effects analysis includes the projects noted above but does not include the improvements proposed under the Modified LPA and assumes that the Interstate Bridge would not be tolled. The Modified LPA assumes the same future transportation projects as the No-Build Alternative, with the addition of the Program components, including additional auxiliary lanes on I-5, light-rail transit extension from the Expo Center Station in Portland to Evergreen Boulevard in Vancouver, active transportation improvements, and variable-rate tolling on the Columbia River bridges.

The RTP transit projects and the service levels they include reflect regional growth priorities and policies emphasizing lower reliance on driving and more transit and active transportation to meet future regional mobility needs. The Transportation Technical Report provides further detail on the other transportation projects included in the 2018 RTP, but the primary transit projects in the 2018 RTP to improve regional transit and meet the demands of future growth are listed below.

- Five high-capacity transit projects: Division Transit, Southwest Corridor, Red Line extension, the Central City Capacity Analysis, and Steel Bridge Improvements.
- Nineteen enhanced transit projects and two streetcar extensions, involving capacity, speed and reliability improvements throughout the region.
- Investments in the vehicle fleet, maintenance facility expansions, and technology to improve operations.

Other Reasonably Foreseeable Future Projects

Other reasonably foreseeable future projects considered in the cumulative effects analysis were identified based on proximity to the area where most physical changes associated with the Program would occur (see Figure 2-1 in the Cumulative Effects Technical Report). This list of projects, described below, was confirmed with local and regional partner agencies.

- **Vancouver Waterfront.** This ongoing project is a large-scale mixed-use development led by a public/ private collaborative partnership between the City of Vancouver and private development interests. A master plan was approved for the 20-block, 32-acre site, which included new office and residential space in addition to a public park and multiuse trail. While the improvements are largely complete, private properties at the waterfront continue to be developed. No timeline is currently available for when the remaining blocks would be developed, but construction could overlap with construction of the Modified LPA.
- **Terminal 1.** The Port of Vancouver USA is developing a 10-acre property known as Terminal 1, which is located between the Vancouver waterfront (described above) and the existing Interstate Bridge. Terminal 1 would be a mixed-use development with a hotel, office and retail space, outdoor gathering areas, and a public marketplace. Terminal 1 would also complete a missing segment of the Vancouver Waterfront Renaissance Trail, connecting the existing trail at the Vancouver waterfront to the existing Columbia River Renaissance Trail east of Terminal 1. Some elements have been constructed, including an outdoor amphitheater. Construction of other features is underway, with an anticipated completion date of 2027.

[2] Federal regulations require that an RTP be financially constrained. This means that total transportation expenditure levels identified within the RTP must not exceed the total revenue level reasonably expected to be available for the metropolitan region over the life of the plan; this includes existing revenues and new revenues that may be reasonably anticipated. Transportation modeling typically includes only projects in the fiscally constrained RTP. However, one transportation project, the Fourth Plain Safety and Mobility project, is not listed on the financially constrained list in the RTC's regional transportation plan (RTP) but was incorporated into the modeling at the request of partner agencies.

- **Renaissance Boardwalk.** The Renaissance Boardwalk project is a public-private partnership between Kirkland Development and the City of Vancouver to develop a 2.3-acre plot of land directly to the east of the Interstate Bridge. The development plans include two new buildings and underground parking, with 230 apartments and retail space for 30 tenants. A public walkway along the water's edge would be included in the development and would connect to existing trails. Construction is planned to begin in spring 2024; an anticipated end date has not been published.
- **Waterfront Gateway.** This project, run by the Vancouver City Center Redevelopment Authority, would redevelop a 6.4-acre site in downtown Vancouver near City Hall. The City Center Redevelopment Authority has selected a development team to move forward with efforts to turn the site into a mixed-use destination space that includes office, retail, and residential uses. The City has identified this project as a major opportunity for housing and economic growth, given the site's position between the waterfront and downtown Vancouver. While some project details are available (including a high-level site plan and potential residential units), environmental studies are not currently available for the project. The project is currently in the design phase, with construction projected to begin in early 2025 and end in 2027.
- **Levee System Improvements.** There are two concurrent efforts underway to improve the existing levee system along the Columbia River near the Interstate Bridge: the U.S. Army Corps of Engineers (USACE) and Urban Flood Safety & Water Quality District (UFSWQD) Portland Metro Levee System project and Flood Safe Columbia River. Proposed improvements include raising the elevation of the levees. Anticipated environmental impacts for this project are documented in the Final Integrated Feasibility Report and Environmental Assessment (USACE and CCDD 2021), with a Finding of No Significant Impact signed in April 2022. The IBR Program is coordinating with the agencies involved to ensure the design efforts consider the timing and scope of the proposed modifications to the levees.
- **Restoration and Habitat Projects.** There are several planned restoration projects within and near the Program footprint and along habitat corridors or waterways that pass through the footprint. Restoration activities are planned along Burnt Bridge Creek in Vancouver and the Columbia Slough in Portland (Ecology n.d.; Lee and Stamberger 2018, respectively). These projects are led by various agencies and organizations including the Cities of Vancouver and Portland and the Columbia Slough Watershed Council. Restoration actions are likely to occur as funding becomes available, and no specific timeline is available.
- **Portland Expo Center Redevelopment (Expo Future).** Metro owns the Portland Expo Center, which is a 53-acre employment and exhibition site located west of I-5. Following a development opportunity study, Metro recommended redevelopment of the Expo Center into a sports and cultural complex. While a general future use has been recommended, project details are still to be determined, and therefore many potential effects (and contribution to cumulative effects) cannot be described quantitatively at this time. No schedule or timeline is currently available for this project. The IBR Program will continue to coordinate with Metro as the Expo Center project progresses.
- **Cascade Renewable Transmission Project.** Installation of a new high-voltage transmission cable buried in the bed of the Columbia River through the study area will transfer energy from utility-scale wind, solar, and other renewables to help meet renewable energy demand in Oregon and Washington. The transmission cable will extend from The Dalles to Portland, traveling approximately 100 miles beneath the Columbia River. Some general environmental information is available about the project and the proposed technology; however, no detailed studies are available and it is anticipated this project will require an EIS. No schedule or timeline is currently available for this project. The IBR Program will coordinate with the utilities involved to consider the timing and location of the proposed facility.

Future Growth and Regional Changes Identified in Adopted State, Regional, and Local Plans

Adopted state, regional, and local plans include visions of growth or change in the region over the next 20 years. These visions are reflected in this analysis, as the plans' assumptions regarding growth were inputs into the regional modeling conducted for air quality (including GHG emissions), energy, noise and vibration, and transportation. Details on how projected changes in population, land use, employment, and other factors are reflected in the regional modeling are provided in Appendix A of the Transportation Technical Report.

3.23.3 Cumulative Effects

Please see the resource technical reports for additional information on anticipated Modified LPA effects on a particular resource (e.g., air quality, wetlands). Although there are some differences in direct and indirect impacts and benefits associated with the various design options, these differences generally do not change the conclusions regarding the Program's contribution to cumulative effects for each resource.

Transportation

Effects from Past, Present, and Reasonably Foreseeable Future Actions

Past and present actions affecting transportation in the study area (and region) include population growth and accompanying development, which subsequently led to an increase in single-occupancy and freight vehicles on roads, and the expansion of public transit and active transportation networks. Past actions that have supported the growth and reliance on single-occupancy vehicles include the construction of I-5 and the Interstate Bridge. Past public transportation improvements in the area include expansion and increase in service of the Tri-County Metropolitan Transportation District of Oregon (TriMet) bus and light-rail system (including the extension of light-rail to the Expo Center in 2004), as well as the C-TRAN bus service (including the recent introduction of bus rapid transit along Fourth Plain Boulevard and Mill Plain Boulevard in 2017 and 2023).

Many of the reasonably foreseeable future actions, primarily those identified in the 2018 RTP, are transportation projects that address the anticipated needs of the community for travel by vehicles, freight, public transit, and active transportation. The non-transportation future actions reflect the ongoing growth and development in the region that will rely on the existing and planned transportation networks, including new commercial and residential units at Waterfront Gateway, Renaissance Boardwalk, and Terminal 1.

Primary transportation trends in the study area include the growing number of vehicles on the roads (with increasing congestion and crash rates) and a growing demand for more public transit and active transportation options.

No-Build Alternative

Under the No-Build Alternative, congestion would continue to increase and the active transportation and transit improvements proposed under the Modified LPA would not be constructed. Congestion at the bridge would continue to be caused by overall high traffic volumes, the structure's limited capacity, limited sight distance, substandard shoulders, short merge and diverge locations north and south of the bridge, high-volume on- and off-ramp flows north of the river, and high truck volumes.

Other reasonably foreseeable future actions in the study area that could contribute to cumulative effects on transportation (identified above) would continue under the No-Build Alternative. Future growth and development would continue to increase transportation demand. Although other transit projects may be implemented in the region, their benefits would be reduced if the Modified LPA is not included as anticipated in adopted regional plans. Active transportation systems would be expanded but not between Portland and Vancouver. Tolling of I-205 (Abernethy Bridge), which is currently on hold, but if advanced in Oregon would

likely contribute to the beneficial cumulative effects of several future projects that would reduce regional congestion and increase the use of public transit and active transportation.

Modified LPA

The Modified LPA would reduce freight and vehicle congestion, improve safety, and improve the connectivity, capacity and reliability of active transportation and transit networks. Future travel demand would be more efficiently served by the multimodal transportation improvements included in the Modified LPA as well as other improvements in the region, consistent with adopted regional transportation plans. The region's goals for higher levels of transit and active transportation use would be better supported by the completed transit and trail connections between Portland and Vancouver, in combination with other regional projects. The key drivers of transportation demand—other future population growth and accompanying developments—will continue to affect conditions for all transportation modes and facilities in the study area and region.

Cumulative Effects Conclusion – Transportation

Past actions affecting transportation in the study area include the construction of I-5 and the Interstate Bridge, construction of state and local transportation networks, implementation of public transit service, and the establishment of local transit agencies (TriMet, C-TRAN) and regional metropolitan planning organizations (Metro, RTC). These actions, taken in response to rapid regional growth, have had a cumulative effect of providing additional transportation capacity, safety improvements, transportation demand management and transportation systems management enhancements on highways, public transit systems, and active transportation networks. Some areas continue to experience congestion where the demand for transportation exceeds capacity, and safety challenges are still present. Recent projects, such as development in downtown Vancouver, along with population growth have continued the trend of more vehicles on the road and exacerbated congestion, while other projects, such as The Vine, have improved access to alternative transportation options. Planned reasonably foreseeable future actions included in the 2018 RTP will contribute to managing congestion, improving safety, and expanding the transit and active transportation networks; however, under the No-Build Alternative (including the effects of past, present, and future actions), congestion would continue to grow and safety would continue to worsen. As compared to the No-Build Alternative with past, present, and reasonably foreseeable future actions, the cumulative effect of the Modified LPA (including the effects of past, present, and reasonably foreseeable future actions) would be an improvement to congestion and safety (see Table 3.1-10 and 3.1-12).

When combined with past, present, and reasonably foreseeable future actions, the No-Build Alternative would have adverse cumulative effects because of growing congestion and crashes. The cumulative effects on transportation from the Modified LPA combined with past, present, and reasonably foreseeable future actions, when compared to the No-Build Alternative, would be beneficial with fewer vehicle hours of delay and lower crash frequency on I-5.

Navigation

Effects from Past, Present, and Reasonably Foreseeable Future Actions

Past actions affecting river navigation include authorization and construction of the Columbia River federal navigation channel, construction of upstream dams and navigation locks, construction of the existing Interstate Bridge and North Portland Harbor bridge, and other bridges constructed downriver and upriver of the study area, such as the BNSF Railway Bridge (which has 79 feet of vertical clearance when in the closed position and unlimited vertical clearance when in the open position) and the I-205 Glenn L. Jackson Memorial Bridge (which has a fixed vertical clearance of 136 feet). The location of the existing navigation channels in the river requires vessels to make an S-curve maneuver between the Interstate Bridge and the BNSF Railway Bridge opening when transiting the barge or alternate barge channels.

The federal navigation channel at and upstream of the Interstate Bridge was established as a deep-draft (27 feet) channel to accommodate ocean-going ships upstream to The Dalles. This shipping traffic never materialized, and the USACE currently maintains the channel to a depth of 17 feet, reflecting current river traffic. If the USACE were to deepen the channel from Vancouver to The Dalles to 27 feet as authorized, it would allow deeper-draft vessels to traverse the study area, which could contribute to a change in waterway use. Few properties exist within this reach of the river (BNSF Railway Bridge in Vancouver to Celilo Falls BNSF bridge) that have current commercial/industrial facilities using waterborne shipping or the potential for future such facilities. The primary factors affecting commercial/industrial development along the Columbia River are political and geographic constraints, including the Columbia River Gorge National Scenic Area, transportation routes paralleling the river, steep topography, and existing recreational and open space uses. Industrial uses generating marine vessel traffic are typically located within industrial parks in urban areas.

Several ongoing and planned navigation maintenance projects downriver and upriver of the Interstate Bridge could contribute to long-term beneficial cumulative effects on navigation in the study area. The USACE maintains the federal navigation channels to the authorized and/or maintained depths by conducting maintenance dredging on a yearly basis for the federal navigation channel along the Columbia River. The USACE is developing an updated Channel Maintenance Plan with lower Columbia River ports to ensure that the federal navigation channel downstream is maintained and operational for another 20 years. Dredging is also conducted by ports and private entities in the area to maintain adequate waterway depth at marinas and marine terminals.

No reasonably foreseeable future actions were identified that would contribute to a long-term adverse cumulative effect by restricting reasonable navigation. Upriver navigation and marine commerce development would continue to be restricted by existing political and geographic constraints, such as the National Scenic Area and the navigation clearance under the I-205 bridge and other upriver governing structures (e.g., bridges, utility lines).

Temporary cumulative effects on navigation would occur during construction of other reasonably foreseeable future actions, as addressed in Section 3.23.4.

No-Build Alternative

Columbia River navigation conditions would not be changed by the No-Build Alternative; navigation would continue to be affected by the existing piers and bridge opening restrictions. Under the No-Build Alternative, the primary navigation channel under the Interstate Bridge would remain in its current position, which generally lines up with the opening in the BNSF Railway Bridge. The alternate channels under the Interstate Bridge are located toward the center and south bank of the river, thus requiring vessels to make an S-curve maneuver between the Interstate Bridge and the BNSF Railway Bridge opening.

Routine maintenance dredging performed by the USACE's dredge *Yaquina* would continue to maintain the federal navigation channel to an adequate depth to support current navigation needs. Without seismic upgrades to the Interstate Bridge, a major earthquake could collapse or seriously damage one or both bridges, temporarily restricting or preventing navigation.

Modified LPA

Under the Modified LPA (including all bridge configurations), river navigation safety in the main channel of the Columbia River would be improved by (1) reducing the need for an "S" curve maneuver (to align with the BNSF Railway Bridge opening) for many vessels that currently use the barge and alternate barge channels and could use the northern channel under the Modified LPA, which would provide a straighter route between the two bridges, (2) increasing horizontal navigation clearance by reducing the number of piers, and (3) improving

seismic resiliency.[3] In addition to the main channel, the Modified LPA would improve navigation safety on North Portland Harbor through improved seismic resiliency and wider pier spacing, which would allow more room for smaller vessels to pass under the new bridges.

There would be some differences in impacts to navigation from a fixed-span configuration (either double-deck or single-level) compared to a single-level movable-span configuration, specifically associated with the VNC. The movable-span configuration would provide a VNC of 178 feet in the open position for a vertical lift span bridge and be consistent with the U.S. Coast Guard's Preliminary Navigation Clearance Determination (issued in May 2022). The two fixed-span configurations would provide 116 feet VNC, which would prohibit some existing vessels from transiting unless modifications or other accommodations were made to those vessels or cargo. A fixed-span configuration would permanently prevent vessels with VNC requirements of greater than 116 feet (and unable to modify the vessel) to transit under the bridge for its 100+ year service life.

Under a movable-span configuration, vessels requiring a bridge opening would be restricted to specified time periods to transit the new Columbia River bridges; timing restrictions would be updated and formalized during a federal rulemaking process. Under the single-level or double-deck fixed-span configuration, all vessels would pass under the bridges without timing restrictions.

Dredging activities performed by the USACE's dredge *Yaquina* would not be affected by the Modified LPA; however, during construction of the Modified LPA, there would be occasions when the dredge *Yaquina* would not be able to transit the bridge unless the dredge was modified, or alternate measures of dredging would be implemented.

Cumulative Effects Conclusion – Navigation

Past actions have both improved and limited navigation conditions in the study area. The establishment of federal navigation channels and associated dredging improved navigation and allowed for deeper draft vessels to transit the Columbia River from the Pacific Ocean to the BNSF Railway bridge in Vancouver, while the construction of bridges, dams, and overhead utilities across the river, as well as land use restrictions, have limited navigation along the full length of the Columbia River. Past, present, and reasonably foreseeable future actions along with the No-Build Alternative would retain the existing Interstate Bridge with nine in-water pier sets and narrow horizontal navigation clearances. Vessels that do not require a bridge opening, including most tugboats with barges, would continue to use the barge and alternate barge channels requiring S-curve maneuvers, which can be hazardous to navigation in inclement weather and high-water conditions, to align with the nearby BNSF Railway bridge. Ongoing and planned maintenance of the navigation channels by USACE and others would continue under the No-Build Alternative.

Along with maintenance of the navigation channels, the Modified LPA would improve navigation by providing a straighter route for many vessels to transit through the new Columbia River bridges and the BNSF Railway Bridge via the relocated barge channel (north) and a reduction in the number of in-water piers, as well as improved seismic resiliency. Vessels using the primary navigation channel (center) and alternate barge channel (south) would need to make an S-curve maneuver; however, the wider horizontal navigation clearance would enable vessels to begin this maneuver earlier in downbound transits and providing greater distance before needing to transit the BNSF Railway Bridge resulting in improved navigation safety. Under the Modified LPA with a fixed-span configuration, navigation for some vessels would be prohibited.

It is difficult to predict Maritime Transportation System demands and associated need for bridge openings for the 100+ year service life of the bridge since vessel traffic and river-level conditions vary from year to year and

[3] All vessels that can transit with 100-feet of vertical clearance (for fixed-span configurations) or 89-feet of vertical clearance (for movable-span configuration) could use the relocated north barge channel, which would provide the straightest route between the new Columbia River Bridges and the BNSF Railway Bridge. Only those vessels or cargo requiring a higher vertical clearance would need to use the relocated primary navigation channel and make an "S" curve maneuver.

economic trends for maritime commerce may change over time. If a fixed-span configuration is selected, the Modified LPA would contribute to a cumulative adverse effect on navigation by further limiting navigation upstream on the Columbia River, which has been limited by past and present actions, such as construction of roads and rail lines, creation of the National Scenic Area, and construction of bridges with less than 178 feet of vertical clearance.

Under the No-Build Alternative, the cumulative effects on navigation from past, present, and reasonably foreseeable future actions would remain unchanged. Compared to the No-Build Alternative, the cumulative effects on navigation from the Modified LPA with a double-deck or single-level fixed-span configuration would be adverse for some vessels or fabricators shipping large cargo due to the reduction in VNC. Cumulative effects on navigation from the Modified LPA with a single-level movable span would retain the existing VNC so all vessels and cargo that currently transit the bridge would continue. Beneficial cumulative effects on navigation from the Modified LPA, under all bridge configurations, would occur as a result of increased horizonal navigation clearance and increased use of the northern channel for many vessels, thereby, improving navigation safety as vessels transit through both the new Columbia River Bridges and the BNSF Railway Bridge.

Property Acquisitions and Displacements

Effects from Past, Present, and Reasonably Foreseeable Future Actions

The original construction of I-5 during the late 1950s and early 1960s required substantial property acquisitions and displacements in the study area. According to historic aerial photos, the floating home moorages were developed following the original construction of I-5, and therefore no floating homes were displaced by I-5. Most of the area (approximately 84%) that would be directly affected by the Modified LPA is already public right of way from previous transportation projects or other infrastructure projects.

No known reasonably foreseeable future projects would require displacements on the Hayden Island floating home community along North Portland Harbor. Existing state and federal regulations have made it difficult to permit new moorages for floating homes, making it unlikely that new slips would be available in the future. In addition to the existing floating home sites along North Portland Harbor, there are slips along the Multnomah Channel in northwest Portland, St. Helens, and Scappoose and in Washington near Caterpillar Island on the Columbia River. In June 2023, 76 floating homes were available for purchase in the Portland metro area, with 30 located on owned slips (versus rented from the moorage) (Portland Floating Homes 2023). A review of publicly available information did not identify any information suggesting that moorages have been declining.

Most of the reasonably foreseeable future projects would not result in the displacement of existing residential or commercial properties, although one (Renaissance Boardwalk) may require one business displacement. Based on recent and proposed developments in Vancouver, ongoing infill development may displace additional businesses (see the Land Use Technical Report for additional details).

While redevelopment of the Expo Center would change the underlying use of the site to a sports and cultural complex, the property would remain under the control of Oregon Metro and does not constitute a displacement.

No-Build Alternative

Under the No-Build Alternative, no Program-related acquisitions would occur. Other reasonably foreseeable future actions in the study area would continue under the No-Build Alternative; however, most reasonably foreseeable future actions are not currently anticipated to result in acquisitions or displacements.

Modified LPA

In Oregon, most of the acquisitions and displacements resulting from the Modified LPA would be commercial properties and floating homes on Hayden Island. As noted above, current regulations and a lack of other moorage spaces limits opportunities for relocating displaced floating homes.

In Washington, most acquisitions and displacements would be commercial properties and multifamily dwellings in downtown Vancouver. Some single-family residences would be acquired and displaced along I Street in Vancouver's Shumway neighborhood. The Modified LPA would displace up to 13 businesses in downtown Vancouver.

Cumulative Effects Conclusion – Property Acquisitions and Displacements

Past actions, including the construction of I-5 and other major roadways, have required substantial acquisitions and displacements in the study area. Most of the present and reasonably foreseeable future actions are not anticipated to acquire or displace businesses or residences (with the exception of one potential business displacement). Reasonably foreseeable future transportation actions would follow federal and state guidelines, such as the Uniform Relocation and Real Property Acquisitions Policies Act of 1970, as amended, to provide replacement housing and relocation benefit packages.

The No-Build Alternative, combined with past, present, and reasonably foreseeable future actions, would not contribute to cumulative acquisitions and displacements. The acquisition of property for the Modified LPA would be substantially smaller than the acquisitions associated with the original construction of I-5 in the corridor but would make a small cumulative contribution to the conversion of residential and commercial land to transportation use, and to the total number of acquisitions and displacements that have occurred within the study area.

Under the No-Build Alternative, the cumulative effects on acquisition from past, present, and reasonably foreseeable future actions, would continue to be adverse through conversion of private property to public infrastructure. The cumulative effects on acquisition from the Modified LPA would have an incremental adverse effect with additional property acquired for public right-of-way.

Land Use and Economic Activity

Land Use

Effects from Past, Present, and Reasonably Foreseeable Future Actions

Past development in the Portland-Vancouver region transformed land use over time from wilderness to urbanization. Since the 1950s, actions affecting land use have included the construction of I-5 and other transportation projects, increased urbanization, and new growth-management regulations. Land use on Hayden Island has changed from recreational to residential and commercial development, including the Jantzen Beach Center (a regional large-format retail shopping center) and surrounding retailers. Residential uses in the area include manufactured homes and floating homes associated with small marinas, as well as other low- to medium-density developments.

Vancouver's downtown has changed greatly over the past decade, broadening from mainly professional offices to tourism and recreation, retail shopping, meeting and convention activities, housing, and entertainment. Revitalization of the retail core and central waterfront has included new office, mixed-use, and residential development including projects such as the Vancouver Waterfront. New and growing land uses include retail, office/commercial, and multifamily residential.

Identified reasonably foreseeable future actions in the study area that could contribute to cumulative effects on land use include:

- Improvements to public transit, state highways, local road networks, and active transportation facilities, as identified in the 2018 RTP. Land use cumulative effects from reasonably foreseeable future transportation-related improvements have been evaluated by using results of the transportation analysis.
- Metro's future redevelopment of the Expo Center could replace or expand the exhibition hall use that currently occurs at this location. Future plans may include a sports and cultural complex.
- The redevelopment of Hayden Island's commercial core from the current large-scale retail land use pattern to a more urban form with more mixed uses, pedestrian-scale design, and transit orientation. The City of Portland's 2009 plan also identifies a replacement bridge over the Columbia River and the addition of high-capacity transit—both of which the IBR Program would provide—as important elements of future development on the island.
- Several developments for the Vancouver Waterfront. These redevelopments include (1) the Port of Vancouver's Terminal 1 mixed use (i.e., hotel, office and retail space, outdoor gathering areas, and a public marketplace) project, which also includes trail connection to the Vancouver Waterfront Renaissance Trail; (2) Renaissance Boardwalk, which is public-private partnership for a mix of apartments, retail and underground parking: and, (3) the Waterfront Gateway Project, run by the Vancouver City Center Redevelopment Authority, to redevelop an area between the waterfront and downtown Vancouver with mixed-use office, retail, and residential uses. These future Vancouver Waterfront developments would continue to expand the present and recent past developments to create more commercial-residential uses compared to past industrial uses along the waterfront.
- Adopted state, regional, and local agency and port plans that identify future visions for growth and land use planning to accommodate that growth. Population is projected to increase and result in needs to expand employment opportunities, which also necessitate adequate levels of housing, utilities, recreation facilities, schools, and other services.

No-Build Alternative

The No-Build Alternative would not address current deficiencies in the Interstate Bridge structure, design, or capacity. Other reasonably foreseeable future actions would be expected to proceed and would address some elements of state, regional, and local agency visions; however, without improvements associated with the Modified LPA, the existing and future land uses that rely on I-5 to travel within the region could be affected by high levels of congestion, unsafe conditions, and potential earthquake-induced failure. There would also be no high-capacity transit service to connect the regional centers of downtown Vancouver and downtown Portland, which would be inconsistent with the stated policies and goals of applicable regional transportation and land use plans. In addition, the No-Build Alternative would not meet certain goals in the Hayden Island Neighborhood Plan or the Vancouver City Center Vision & Subarea Plan, such as providing light-rail transit service or improving connectivity within the neighborhoods.

Other reasonably foreseeable future actions would contribute to cumulative impacts to land use as new development and redevelopment would continue to change the landscape of existing and future land use.

Modified LPA

The Modified LPA is consistent with and would support land use policies, transportation system plans, and development trends in Oregon and Washington, which encourage investment in urban infrastructure, multimodal transportation, freight mobility, economic development, and compact urban development. It would also support statewide policies and goals directing high-density growth to urbanized locations and integrating planned transportation facilities. These anticipated land use changes could accelerate development (e.g., residential, commercial, office) focused near new light-rail facilities, but land use would remain consistent with adopted plans. Land use and development in Oregon and Washington is governed by

state and growth-management laws, local land use plans, zoning regulations, and other controls. These land use controls require all development to be consistent with existing zoning and comprehensive planning in order to be permitted.

The Modified LPA would convert approximately 47 acres of land, currently zoned as commercial, industrial, residential, mixed-use, and open space, into transportation use (see Section 3.3, Acquisitions). The Community Connector near Evergreen Boulevard in downtown Vancouver would address existing gaps in active transportation connectivity between residential and commercial land uses created by the past construction and presence of I-5.

Variable-rate tolling as part of the Modified LPA would support regional and local policies for managing traffic congestion. Tolling is not expected to change land use patterns because land use and development in the study area are governed by state land use and growth-management laws, local land use plans, zoning regulations, and other controls. However, the combination of improved transit service and the introduction of tolling would shift some trips from vehicle to transit and reduce overall vehicle travel miles traveled across the Columbia River on an average weekday by approximately 1% compared to the No-Build Alternative.

Cumulative Effects Conclusion – Land Use

Past actions have changed land use throughout the study area, typically increasing the density of development and converting undeveloped or residential areas to commercial or transportation uses. None of the present actions are anticipated to convert land uses or alter land use patterns. Reasonably foreseeable future actions include planned transportation projects, which would include the conversion of land currently in non-transportation uses to transportation use, and development and redevelopment that would create additional residential, commercial, industrial and recreational land uses in the study area. All present and reasonably foreseeable future actions would be required to comply with the applicable adopted land use plans.

The No-Build Alternative, combined with past, present, and reasonably foreseeable future actions, would not convert existing land uses to a transportation use; however, it would be inconsistent with adopted land use plans, such as the Hayden Island Neighborhood Plan and the Vancouver City Center Vision & Subarea Plan that included goals of providing light-rail transit service. Although the Modified LPA would include right of way acquisitions that would convert existing land uses to a transportation use, it would be consistent with the goals of local land use plans to provide light-rail transit service and providing transit stations near planned land use development.

Under the No-Build Alternative, the cumulative effects on land use from past, present, and reasonably foreseeable future actions would be negligible because land use from reasonably foreseeable future actions would continue to comply with local land use plans. Compared to the No-Build Alternative, the cumulative effects on land use from the Modified LPA would be beneficial as it would provide light-rail transit service to Hayden Island and downtown Vancouver and may facilitate planned growth and development in station areas consistent with local land use plans.

Economic Activity

Effects from Past, Present, and Reasonably Foreseeable Future Actions

I-5 runs continuously from Mexico, through the United States, and into Canada and is used for freight, business, and personal travel. In the Portland-Vancouver region I-5 is the central component of the transportation infrastructure. Freight needs are a major driver for future improvements along the I-5 corridor.

The Columbia River is the regional backbone of marine commerce. Commercial vessels on the Columbia River include cruise vessels, tugs, tows, barges, and marine contractors' vessels. Commercial tugs and barges have

the highest share of river usage and transit year-round and accounted for approximately 54% of the bridge opening events across a 35-year study period.

The Ports of Portland and Vancouver are critical to the region's economic growth and prosperity. The total annual tonnage moving through the two ports is expected to double from approximately 300 million tons in 2007 to almost 600 million tons in 2040 (Cambridge Systematics 2015). Both ports connect to the surface transportation network within the study area, as well as the Columbia River, to move products to, from, and within the region. To remain competitive with other West Coast ports, efficient and cost-effective multimodal transportation systems must be available. Increases in regional traffic congestion could severely hinder the ports' ability to move goods and impact their competitiveness. Similarly, economic growth in the region would increase demands along the I-5 corridor, as Metro forecasts that the number of jobs in the Portland-Vancouver Standard Metropolitan Statistical Area would increase by approximately 1.6% per year. This is slightly higher than the Oregon-area growth rate of 1.1% per year and the Washington-area growth rate of 1.0% per year.

Identified reasonably foreseeable future actions in the study area that could contribute to cumulative effects on economic activity include:

- Continued development of Terminal 1 by the Port of Vancouver, which will expand the mixed-use Vancouver Waterfront area nearer to the I-5 corridor and is anticipated to enhance the waterfront as a regional attraction for commercial and retail jobs.
- A stated goal of the Waterfront Gateway development is to strengthen the economy by creating a "bustling center with high-quality jobs." While no job estimate is available at this time, the development will include new office and retail uses, which will support job creation in the study area.
- Portland Expo Center is a 53-acre redevelopment site that has been recommended by Metro to be redeveloped into a sports and cultural complex. The redevelopment could be a local and regional attraction drawing visitors to the I-5 corridor and surrounding businesses and lodging. This project is still in the early stages but would likely contribute commercial and retail jobs to the study area.
- The 2018 RTP includes short- and long-term strategies and transportation projects. These strategies and projects are integral to the local and regional economy, addressing economic growth, environmental health, and equitable mobility.
- The Cascade Renewable Transmission Project is estimated to support 300 to 400 jobs and apprenticeship programs during construction and generate revenues that will strengthen local tax bases. The cables will also add east-to-west energy transfer capability in the region and assist in the distribution of increased power flows, especially during extreme heat events, which would help maintain power supply for commercial activities.

No-Build Alternative

Under the No-Build Alternative, increasing congestion and unreliable travel times on I-5 could result in negative economic effects, as planned economic development may occur more slowly with business owners reluctant to locate in an area with poor access and mobility for employees and customers. Freight reliability would decrease as congestion continues to spread throughout the day and customers could elect to shop in areas with better access and mobility. Other reasonably foreseeable future actions in the study area that could contribute to cumulative effects with an increase in jobs and commerce (identified above) would continue under the No-Build Alternative.

Modified LPA

The Modified LPA would have both adverse and beneficial impacts on economic activity, with the overall long-term economic effects after construction expected to be positive (short-term cumulative effects during

construction are addressed in Section 3.23.4). The Modified LPA's highway, transit, and active transportation components would move people and commerce more effectively and efficiently through the I-5 corridor. The Modified LPA, along with other projects aimed at reducing congestion and enhancing freight mobility, would support an improvement in economic activity. Congestion relief in the study area would benefit freight traffic generated by Swan Island, the Rivergate area, the Port of Portland, and the Port of Vancouver. Incremental benefits would include decreased travel times, increased mobility, and increased reliability for freight vehicles. The Modified LPA would provide a slight improvement to marine commerce for many vessels as most vessels would be able to pass under the bridges without timing restrictions, providing more flexibility in operating schedules and reducing wait times. With the fixed-span configurations, some larger vessels and future freight shipments would not be able to pass under the bridges; the IBR Program is coordinating with these river users to develop measures to avoid economic impacts through vessel or cargo modifications and other accommodations.

The Modified LPA would acquire additional rights of way from taxable property with the potential for decreasing property tax revenues. However, the reduction in sales tax is not anticipated to have a substantial economic impact, given that most of the affected businesses would be commercial offices.

Cumulative Effects Conclusion – Economic Activity

The Portland-Vancouver region and economy is largely dependent on its role as a gateway and distribution center for domestic and international markets. The development of corridors along the Columbia and Willamette rivers, the BNSF Railway and Union Pacific Railroad transcontinental rail lines, Portland International Airport, and marine terminals of Portland and Vancouver are all integral components to the region's ability to transport goods, with the I-5 corridor serving as the backbone of the region's transportation network. Many past projects have worked to solidify I-5 as the central component of regional infrastructure (including construction of the Interstate Bridge and development of the ports). Freight needs are an important driver for future improvements along the I-5 corridor, and economic growth in the region would increase demands along the I-5 corridor.

Several reasonably foreseeable future projects will support job creation and improve freight mobility and connectivity in the area, thereby benefiting economic activity. The 2018 RTP includes several capacity and safety projects west of I-5 that are designed to improve safety and flow for commercial trucks traveling between I-5 and industrial areas to the west. Additionally, plans for the area would generally improve travel conditions for commercial trucks, but those improvements could be offset by congestion resulting from projected growth in population and employment.

Increased congestion, decreased freight reliability, and unreliable travel times on I-5 associated with the No-Build Alternative, as well as past, present, and reasonably foreseeable future actions, would contribute to adverse cumulative effects on economic activity by slowing planned economic development. Economic activity requires reliable transportation; therefore, the improvements in capacity, safety, and reliability provided by the Modified LPA, in combination with past, present, and reasonably foreseeable future actions, would cumulatively benefit economic activity by allowing commercial and industrial activity that is constrained by existing transportation conditions to improve.

With the No-Build Alternative, reasonably foreseeable future economic activity could be limited by increased congestion and decreased freight reliability that would occur as future travel demand would not be met by the available transportation infrastructure provided by past, present, and reasonably foreseeable future actions. The Modified LPA, in combination with these other actions, would cumulatively benefit employers, businesses, marine commerce, and economic activity through job creation, reduced congestion, enhanced marine operating schedules, freight mobility, transit access, and vehicular circulation when compared to the No Build Alternative.

Neighborhoods and Equity

Effects from Past, Present, and Reasonably Foreseeable Future Actions

Past projects adversely affected neighborhoods in the I-5 corridor, while more recent transportation projects have generally provided net benefits through improved access, pedestrian-oriented development, mitigation, and other amenities. Past highway development had significant effects on neighborhoods and communities along the I-5 corridor, including equity priority communities.[4] The development of I-5 required the acquisition of right of way and the relocation of many businesses and homes and contributed to a loss of community cohesion. Local planning efforts serve to strategically place and design current and future transportation to maximize benefits and minimize negative impacts. Neighborhoods within Portland and Vancouver formally adopt neighborhood plans as part of their respective comprehensive plans and typically include goals, objectives, proposed comprehensive plan and zoning changes, and an implementation strategy. Neighborhood plans and comprehensive plans for each respective city will contribute to the current trend of improving neighborhood access and mobility.

Reasonably foreseeable future actions in the study area that could contribute to cumulative effects on neighborhoods and equity include transportation and development projects with the potential for displacement or relocation of businesses and homes or actions that affect connectivity and cohesion. Many of the reasonably foreseeable future projects have yet to complete environmental assessments, but at this time none have been identified that would require the displacement or relocation of homes. Renaissance Boardwalk may result in one business displacement, although it would also improve connectivity along the waterfront. There are no known encampments of houseless populations at the sites of the reasonably foreseeable future actions; however, encampments are typically transient and the potential for displacement would need to be evaluated for each project prior to construction.

The Main Street Promise project will improve safety and connectivity in downtown Vancouver through improvements to vehicle and active transportation infrastructure. Other transportation improvements in the adopted RTPs would contribute to the cumulative effect of improving connectivity in neighborhoods in the study area.

No-Build Alternative

The No-Build Alternative would not displace residences or businesses and would not directly change community cohesion. Neighborhoods in the study area would continue to develop according to local and regional plans, though their development might not be fully consistent with goals that assume improved mobility in the I-5 corridor and expanded transit access. Neighborhoods and equity priority communities would experience increased traffic congestion, decreased safety, and no benefits from increased mobility and accessibility from construction highway improvements, light-rail, and active transportation facilities. Other reasonably foreseeable future actions in the study area that could contribute to cumulative effects on neighborhoods and equity would continue under the No-Build Alternative.

Modified LPA

The Modified LPA would have both beneficial and adverse effects on neighborhoods and equity. The Modified LPA is not anticipated to adversely affect community cohesion in most neighborhoods, except for Hayden Island. Benefits from the Modified LPA to equity priority communities include increased access to high-

[4] The IBR Program has made a commitment to the community to place equity at the center of the Program, beyond legal and statutory requirements. A foundational component of this commitment was the formation of an Equity Advisory Group, which developed a Program-specific definition of equity and identified "equity priority communities" as those who experience and/or have experienced discrimination and exclusion based on identity or status. The communities include Black, Indigenous, and People of Color (BIPOC); people with disabilities; communities with limited English proficiency; persons with lower incomes; houseless individuals and families; immigrants and refugees; young people; and older adults.

capacity transit, increased availability of active transportation, and highway and driving travel time reductions. Burdens to equity priority communities include potential displacement of encampments of houseless populations, residential displacements, and the additional transportation cost from tolling. See Section 3.05, Neighborhoods and Equity, for additional details on direct and indirect impacts to neighborhoods and equity priority communities.

The Modified LPA is expected to continue the positive trend in the corridor of improving neighborhood access and mobility. The provision of a light-rail station, the connection of N Tomahawk Island Drive under I-5, and the improved access and capacity of the Hayden Island interchange may contribute to the viability and success of redevelopment plans for the island (see Section 3.4, Land Use and Economic Activity). However, the Modified LPA would displace sufficient commercial and residential activities to constitute an adverse impact. One major difference between the Modified LPA and past actions is that past actions were not always planned and implemented with meaningful input from and communication with the public, including equity priority communities. Involving communities and understanding impacts is an essential part of the IBR Program.

Cumulative Effects Conclusion – Neighborhoods and Equity

Past transportation projects, such as the original construction of I-5, had significant effects on neighborhoods and communities in the I-5 corridor, including equity priority communities, leading to a loss of community cohesion and displacement of businesses and homes. Recent, present, and reasonably foreseeable future actions typically seek to avoid, minimize and mitigate impacts to communities through closer analysis of how a project could affect neighborhoods and specific populations. Most of the reasonably foreseeable future actions are anticipated to improve connectivity and cohesion, either as their intended purpose (e.g., Waterfront Gateway) or through required mitigation (e.g., the I-5 Rose Quarter Improvement Project). Local land use plans, including neighborhood plans in Portland and Vancouver, will continue the trend of improving neighborhood access and mobility.

The No-Build Alternative would not contribute to adverse or beneficial cumulative effects on neighborhoods and equity created by past, present, and reasonably foreseeable future actions. The Modified LPA would contribute to adverse cumulative effects from past and reasonably foreseeable future actions that have displaced commercial and residential uses. Reasonably foreseeable future actions that would affect neighborhoods and equity would be required to follow federal and state guidelines for potential displacement and other adverse impacts. The Modified LPA and other reasonably foreseeable future actions would also contribute to the positive trends of improving neighborhood access and mobility, and providing public engagement opportunities for neighborhoods and equity priority communities

Under the No-Build Alternative, the cumulative effects on neighborhoods and equity from past, present, and reasonably foreseeable future actions, would continue to be adverse due to displaced commercial and residential uses. Compared to the No-Build Alternative, the cumulative effects on neighborhoods and equity from the Modified LPA would be beneficial due to improved access, pedestrian-oriented development, and other amenities and slightly more adverse due to potential displacement.

Public Services and Utilities

Effects from Past, Present, and Reasonably Foreseeable Future Actions

Past population growth has incrementally increased demand on public services and utilities. Effects from most of the reasonably foreseeable future projects would include changes to traffic patterns and increased demand on public services and utilities. Adopted land use plans and projected population growth are expected to create an increased demand for public services and utilities. However, since those increases are planned, it is reasonable to assume that the public service sector and utility providers would have adequate time to plan and adjust for future conditions.

Forecast population and development patterns reflected in the long-range comprehensive plans of the jurisdictions served by each public service and utility provider will affect public services and utilities. Service providers evaluate future population growth and calculate provider needs such as increased numbers of police officers, expanded treatment plants, new equipment, or new station locations. Anticipated density increases in downtown Vancouver and on Hayden Island are consistent with current long-range plans and growth assumptions, and increased services for new development would occur in urbanized areas that already have public services and utilities. This anticipated development would not require the extension of service to a new geographic area.

Current emergency response time trends are increasing. Annual performance reports by the City of Portland Fire and Rescue show that from 2017 to 2022, fire and medical emergency response times at the 90th percentile increased. The City of Vancouver Fire Department reports an increase in standard response times from 2022 to-2023. Similarly for law enforcement, the Portland Police Bureau's Dispatched Calls Dashboard indicates that the average emergency response times within the study area increased between 2017 and 2022. Forecasted changes in response times are not available, although service providers are anticipated to plan for future needs based on forecast population and development patterns found in long-range comprehensive plans.

No-Build Alternative

The No-Build Alternative would not change existing utility connections and would, therefore, not have a cumulative effect on utilities. While the No-Build Alternative would not change the types of public services provided, increased congestion could slow response times for emergency vehicles, and ongoing bridge openings would continue to disrupt traffic and cause potential delays for emergency vehicles, which would have an adverse effect on public services. I-5 is an important north-south access route through the study area, and it is the only emergency access route to and from Hayden Island. Increased congestion under the No-Build Alternative would decrease the ability of the public, particularly Hayden Island residents, to reliably reach or receive public services due to increased travel times and lower travel speeds.

Other reasonably foreseeable future actions in the study area that could contribute to cumulative effects on public services and utilities (identified above) would continue under the No-Build Alternative. Impacts from those actions would be included in long-range plans and growth assumptions.

Modified LPA

The Modified LPA would enhance transit service that provides access to public service facilities such as medical facilities, police and fire facilities, or schools. The Modified LPA would provide transportation reliability improvements through changes in roadway and traffic operations to critical access routes that would generally improve emergency response times to serve the planned growth. The direct physical impacts to public services from the Modified LPA would be minor. The IBR Program would work with affected communities to ensure that Program-related changes do not impair existing overall levels of public service. Utilities would be protected in place or relocated during construction; following completion of construction, utilities are expected to operate as well as or better than they do currently.

Cumulative Effects Conclusion – Public Services and Utilities

Past actions, including population growth, have incrementally increased the demand on public services and utilities. Current trends in emergency response times show an increase in response times, and, consistent with current practices, public service providers will continue to evaluate reasonably foreseeable future population growth to meet demand. Reasonably foreseeable future actions in the study area that could affect public services and utilities include increased service and associated new or improved facilities as well as an increase in utility services based on forecast population and development patterns found in comprehensive

long-range plans. The Cascade Renewable Transmission Project would provide renewable energy and additional energy capacity to the Oregon and Washington electrical grid.

The No-Build Alternative, combined with past, present, and reasonably foreseeable future actions, would not contribute to cumulative effects on utilities but would contribute to cumulative effects on public services (Table 3.6-5). Under the No-Build Alternative, increased congestion in the study area would continue to slow response times for emergency vehicles, ongoing bridge openings would continue to disrupt traffic and cause potential delays for emergency vehicles, and the public would have a decreased ability to reliably receive or reach public services. The Modified LPA and other reasonably foreseeable future actions would support planned growth in the study area by providing new light-rail service, improving the reliability of bus transit, and facilitating the types and densities of development envisioned in local and regional land use plans, especially in Hayden Island and downtown Vancouver.

The No-Build Alternative, including past, present, and reasonably foreseeable future actions, would have cumulative adverse effects on public service as a result of increases in emergency response times. The Modified LPA would provide beneficial improvements in transportation reliability serving emergency access routes and expanded access to high-capacity transit. There would be little to no cumulative effects on utilities from either alternative.

Parks and Recreation

Effects from Past, Present, and Reasonably Foreseeable Future Actions

Park and trail development efforts in the region have been ongoing and will continue consistent with current plans and programs. Some of the parks and recreation facilities are regulated and protected by Section 4(f) of the U.S. Department of Transportation Act, Section 6(f) of the Land and Water Conservation Fund Act, and/or the Federal Lands to Parks (FLP) program. These protections, along with state and local goals to increase access to recreation facilities, have led to an increase in acreages of parks and recreation facilities in both Vancouver and Portland over the past decade (City of Vancouver 2021; City of Portland 2022).

Recent projects that have added or expanded facilities include public open space at the Vancouver waterfront and a new amphitheater at Terminal 1, both of which are connected by new segments of the Renaissance Trail. Planned expansions of park and recreation facilities in adopted plans include park and trail development at the North Portland Harbor waterfront, Hayden Island, the Vancouver National Historic Reserve, and Kiggins Bowl. None of the identified reasonably foreseeable future projects are anticipated to reduce the number or size of park or recreation facilities in the study area (including those protected under Section 4(f), Section 6(f), or the FLP program). Several of the reasonably foreseeable future projects would create new parks and recreation facilities, including a new sports and cultural complex at Expo Center, 2 acres of public space at Waterfront Gateway, and public spaces and trails proposed as part of Terminal 1 and Renaissance Boardwalk. Planned extensions or improvements to the trail systems in Portland and Vancouver will connect many of the new recreation facilities.

No-Build Alternative

The No-Build Alternative would not require the conversion of parks and recreation resources to transportation use. Access to parks and recreation resources would remain as is, with limited public transit service and active transportation facilities. Other reasonably foreseeable future actions in the study area that could contribute to cumulative effects on parks and recreation (identified above) would continue under the No-Build Alternative.

Modified LPA

The Modified LPA would require the acquisition of approximately 1.3 acres of parkland for a transportation use. Permanent acquisitions would be required from East Delta Park, the Fort Vancouver National Historic Site, Old Apple Tree Park, Marshall Community Center and Park, and Kiggins Bowl. Some acquisitions would affect lands protected by Section 4(f) and/or Section 6(f) (see Chapter 4 for the draft Section 4(f) evaluation and Section 3.21, Section 6(f) and Federal Lands to Parks). These acquisitions would be used for transportation uses, including improved connections across the active transportation network in the study area.

The Modified LPA would improve access to regional recreational resources including the Portland International Raceway, East Delta Park, and the Vancouver National Historic Reserve. Notably, it would improve access and connections to the Portland Expo Center, which would support Metro's plans to redevelop the site into a sports and cultural complex. The Modified LPA would also improve access to the Vancouver waterfront and connect parks on both the east and west sides of the bridges, which would essentially restore the once-connected waterfront that was bifurcated by the existing bridge.

Cumulative Effects Conclusion – Parks and Recreation

While some past actions reduced recreational areas due to conversion to other uses, recent projects have typically increased the number of recreation and park resources. Present actions include routine maintenance of parks and recreational facilities. Current trends suggest that parks and recreation sites in the study area will continue to be expanded and improved by reasonably foreseeable future actions.

The No-Build Alternative would not contribute to cumulative effects as access to parks and recreation resources would remain as is and there would be no change to existing resources. However, other actions would continue to result in net expansions, and improve access to, parks and recreation facilities. The Modified LPA would contribute to current trends by improving connectivity between existing and planned facilities through new and improved active transportation facilities.

Under the No-Build Alternative, the cumulative effects on parks and recreation from past, present, and reasonably foreseeable future actions, would continue to be beneficial through increased number and size of parks and recreation facilities. The cumulative effects on parks and recreation from the Modified LPA would have a net incremental beneficial effect through additional access and connections.

Cultural Resources

Archaeological Sites

Effects from Past, Present, and Reasonably Foreseeable Future Actions

The Archaeology Technical Report identifies and assesses effects on archaeological sites protected under Section 106 of the National Historic Preservation Act. While there is archaeological evidence that Native Americans inhabited the Pacific Northwest more than 10,000 years ago, the archaeological record for Native American land use in the lower Columbia River begins around 3,500 years ago. The Native American groups inhabiting the cultural resource area of potential effects (APE)[5] were part of an extensive network of villages, trade, and harvesting, fishing, and resource sites. Villages consisted of multifamily houses and other structures such as fish-drying sheds or scaffolds, sweat and menstrual lodges, and temporary dwelling houses. Starting in the late 18th century, maritime expeditions by Europeans and European Americans began

[5] The APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alteration in the character or use of historic properties, if any such properties exist." (936 CFR 800.16(d)) APE is analogous to "study area," which is the term commonly used for other resources.

to interact with Native Americans along the Oregon coast and the mouth of the Columbia River. European American settlement along the Columbia River's southern bank remained sparse in the mid-1800s and the area remained sparsely developed throughout the 19th century. More extensive development began in the 20th century, including rapid development associated with World War II and construction of I-5 in the 1950s.

Past construction activities have involved earthmoving on a massive scale, which impacted the presence and preservation of archaeological sites in the APE. Many archaeological sites have been lost or altered by construction projects, though some have been preserved underground and, recently, some have been recovered, studied, and archived. Additional studies are in progress to verify known archaeological resource presence and dimensions, and to identify unrecorded terrestrial and marine archaeological sites. Further studies will be performed through phased identification as allowed under Section 106 of the National Historic Preservation Act (36 CFR 800.4 (b)(2)) and would be stipulated in the Section 106 Programmatic Agreement (PA).

While none of the identified reasonably foreseeable future actions are known to affect a documented archaeological site, it is likely that reasonably foreseeable future actions in the APE could encounter additional sites, which could be preserved, recovered, disturbed, or destroyed. The environmental assessment for the USACE levee system improvements acknowledges that these improvements could disturb or destroy known or presently unknown archaeological resources (USACE and CCDD 2021). Ground disturbance associated with any of the reasonably foreseeable future actions, as well as ongoing development in the area consistent with adopted land use plans, may affect archaeological sites. Current local, state, and federal cultural resources laws and regulations that protect archaeological sites reduce the likelihood of destruction, but cannot completely prevent it.

No-Build Alternative

The No-Build Alternative would not affect archaeological sites in the APE and would therefore not contribute to a cumulative effect. Other reasonably foreseeable future actions in the study area that could contribute to cumulative effects on archaeological sites would continue under the No-Build Alternative, though any impacts from those actions would be subject to regulatory requirements for the protection of archaeological sites.

Modified LPA

Construction-related physical ground disturbance is anticipated to be the primary source of potential permanent and temporary direct effects on archaeological sites. As discussed in Section 3.8, 15 archaeological sites are located within the Washington portion of the APE; of these 15 sites, 12 are within the Modified LPA footprint and have the potential to be impacted by construction-related physical ground disturbance based on the anticipated nature and extent of ground disturbance associated with the Modified LPA. The remaining three resources are located within the APE but are outside of the Modified LPA footprint. FHWA and FTA are consulting to complete the Section 106 process and resolve adverse effects on historic properties through the development of a PA, pursuant to 36 CFR 800.14(b).

Cumulative Effects Conclusion – Archaeological Sites

The archaeological record for Native American land use in the lower Columbia River begins around 3,500 years ago. European and European American settlement in the area began in the late 18th century and remained sparsely developed throughout the 18th and 19th centuries. More extensive development began in the 20th century, including rapid development associated with World War II and construction of I-5 in the 1950s. Past construction activities have impacted the presence and preservation of archaeological sites in the APE and ground disturbance from ongoing development could disturb or destroy known or unknown archaeological resources in the area. Recent studies have recovered, studied, and archived archaeological sites and

additional studies are in progress to verify known archaeological resource presence and dimensions, and to identify unrecorded terrestrial and marine archaeological sites.

The No-Build Alternative would not contribute to cumulative effects on archaeological sites, as no known archaeological sites in the APE would be affected; however, it would not change the overall trends in disturbance to archaeological sites from other past, present, and future actions. Although local, state, and federal regulations are in place to protect archaeological sites, ground disturbance during construction of the Modified LPA and other reasonably foreseeable future projects may result in adverse effects on known or unknown sites.

Under both the No-Build Alternative and the Modified LPA, cumulative effects on archaeological sites from past, present, and reasonably foreseeable future actions would be adverse due to a pattern of large-scale ground disturbance in the study area.

Historic Built Environment

Effects from Past, Present, and Reasonably Foreseeable Future Actions

The historic built environment (HBE) includes built resources protected under Section 106 of the National Historic Preservation Act. Some of the historic sites are also regulated and protected by Section 4(f) of the U.S. Department of Transportation Act. There is a wide variety of HBE resources in the APE in Oregon and Washington, reflective of the area's historic development. The land now known as Vancouver became an important post in the Hudson's Bay Company's inland trade routes, succeeded thereafter by a U.S. military installation, and was the center of life and commerce in the region. The region became an important area for trading in the 18th and 19th centuries, with ample resources provided by the rivers and adjacent valleys. Further growth and development in the region in the 20th century was driven by the introduction of wartime industries, such as the Kaiser shipyards, and the completion of major infrastructure projects, including railroad bridges and the Interstate Bridge. The 1917 Interstate Bridge span is listed on the National Register of Historic Places in both Oregon and Washington, and the 1958 span has been determined eligible for listing.

Past activities of settlement and development both created the existing HBE and have dramatically affected the preservation of HBE resources in the APE. Many resources were demolished or their historic contexts largely altered. The original construction of I-5 divided Vancouver's downtown from the Vancouver National Historic Reserve and separated the major commercial and civic center from the historic resources and context of the fort and barracks. Recent development, including the Vancouver Community Library and the Aegis/Providence Academy redevelopment, has affected the HBE through changes in the historic setting of downtown Vancouver.

Several of the identified reasonably foreseeable future actions are anticipated to affect known historic resources, namely redevelopment of the Expo Center, which is recommended as eligible for listing on the National Register of Historic Places, and the USACE levee system improvements, which would affect contributing resources in the Columbia Slough Drainage Districts Historic District (note that the Modified LPA would have no adverse effect on this district). It is also likely that reasonably foreseeable future actions could alter the context and setting of historic resources, and ongoing development in the area consistent with adopted land use plans may affect historic resources, ranging from demolition, preservation and restoration, to changes in the historic setting.

No-Build Alternative

The No-Build Alternative would retain the existing infrastructure, including the existing historic Interstate Bridge, which would continue to operate. There would be no direct impacts on the character-defining features or integrity of the HBE properties and, therefore, no contribution to cumulative effects. A seismic event could adversely affect the two historic bridge spans. Other reasonably foreseeable future actions in the

study area that could contribute to cumulative effects on the HBE (identified above) would continue under the No-Build Alternative, though any impacts from those actions would be subject to regulatory requirements for the protection of historic sites and features.

Modified LPA

The Modified LPA is being designed to avoid direct effects on HBE resources and minimize impacts that cannot be avoided. However, activities proposed for the Modified LPA would result in adverse effects, as defined under 36 CFR 800.5, on 12 HBE properties, including demolition of the northbound and southbound Interstate Bridge (and the Normandy Apartments under the I-5 shifted west design option). Other changes include affecting the historic features or settings of various resources. There are some differences in effects on historic properties across the design options, but no design option would completely avoid adverse impacts, and therefore all would contribute to adverse cumulative effects.

Cumulative Effects Conclusion – Historic Built Environment

HBE resources in the APE in Oregon and Washington are reflective of the growth and development in the region, particularly trading in the 18th and 19th centuries and the introduction of wartime industries during the 20th century. Despite substantial development over the past decade, many historic resources and districts remain in the study area. Ongoing development has led to an incremental loss of the area's historic fabric, and this will continue into the future as more development and redevelopment occur. The No-Build Alternative would not directly contribute to cumulative effects on the HBE; however, it would not change the overall past, present, and reasonably foreseeable future trends of HBE properties being affected by other transportation and land redevelopment actions. While reasonably foreseeable future actions, including the Modified LPA, will be required to meet regulatory requirements, the Modified LPA will contribute to changes in the context and setting of the study area over time.

Under both the No-Build Alternative and the Modified LPA, the cumulative effects on the HBE from past, present, and reasonably foreseeable future actions would be adverse due to specific impacts to HBE resources and changes in the surrounding historic setting.

Visual Quality

Effects from Past, Present, and Reasonably Foreseeable Future Actions

Visual quality impacts occur when the visual character of a place changes (for example, from an agricultural landscape to a residential development) as perceived by viewers. In the Portland and Vancouver areas, visual character has steadily evolved from a primarily natural environment to rural and agricultural, and then to suburban and urban. The I-5 corridor has steadily grown in development intensity and in use as a major transportation route. Reasonably foreseeable future development projects will continue the study area's visual transformation. Identified reasonably foreseeable future actions that would alter the existing and cumulative visual character in the study area include development and redevelopment projects in downtown Vancouver and north Portland. Reasonably foreseeable future projects such as Terminal 1, Waterfront Gateway, Renaissance Boardwalk, and Portland Expo Center Redevelopment would add new buildings or redevelop existing buildings adding to the development intensity along the I-5 corridor and existing visual character of the project environment in downtown Vancouver, along the Vancouver waterfront, and in north Portland. Reasonably foreseeable future transportation projects within the study area would contribute to changes in the visual character of the physical and project environment through visual changes from traffic congestion and constructed elements within the road, public transit, and active transportation network.

All of the identified reasonably foreseeable future projects would alter the existing and cumulative visual character in the study area to some degree; however, projects would be required to be consistent with

existing zoning and design standards, which would maintain visual consistency with existing development and minimize additional adverse effects to visual quality.

No-Build Alternative

While the existing bridges, ramps, interchanges, roadways, and other structures would remain in place, the visual environment would not be static or unchanging with the No-Build Alternative. Ongoing and upcoming development within the Area of Visual Effect (AVE) would continue to impact the visual character. Furthermore, the No-Build Alternative would lead to heightened traffic congestion within the AVE, potentially diminishing the overall visual cohesiveness of the project environment. However, the No-Build Alternative would not significantly influence the existing visual character and would not contribute to cumulative adverse effects on visual quality.

Other reasonably foreseeable future actions in the study area could contribute to cumulative effects on visual quality as identified above, although impacts from those actions would be subject to applicable regulatory requirements within existing zoning and design standards.

Modified LPA

The primary elements of the Modified LPA that would affect visual character and quality are new highway bridges across North Portland Harbor and the Columbia River; revised I-5 interchanges; and light-rail transit guideway, stations, and park-and-ride facilities. The visual quality of the entire length of the study area and all landscape units would be affected.

In general, the Modified LPA is expected to have a range of visual quality impacts from neutral to beneficial for most viewers in the Columbia Slough, Columbia River, Vancouver Downtown, Burnt Bridge Creek, and Ruby Junction landscape units. With the Modified LPA, the higher Columbia River bridges' decks and the more visually complex SR 14 interchange represent an increase in the scale of visual elements of the project environment. These new elements are likely to be notably more visible to adjacent recreational viewers in the Greater Central Park landscape unit. As a result, impacts to visual quality are expected to be adverse for these sensitive viewers.

Cumulative Effects Conclusion – Visual Quality

Past actions transitioned the visual character of the study area from a natural environment to an urban environment as Portland and Vancouver developed and as rail routes and the I-5 corridor were constructed. The current trend of urban development will continue, and present and reasonably foreseeable future projects would continue to change visual character as the area continues to develop and transition to a denser urban environment.

The No-Build Alternative would not change the overall trends in visual quality with reasonably foreseeable future actions continuing the trend of urban development in the study area. The Modified LPA and reasonably foreseeable future actions would add to beneficial and adverse cumulative effects on visual character through ongoing and upcoming urban development creating new visual elements. To the extent that projects would be consistent with existing zoning and design standards to maintain visual consistency with existing development, their visual character would be consistent with the long-standing trend of an increasingly urban landscape.

Under both the No-Build Alternative and the Modified LPA, the cumulative effects on visual quality from past, present, and reasonably foreseeable future actions, would be either beneficial or adverse, depending on the viewers' location, activity, and visual sensitivity.

Air Quality

Effects from Past, Present, and Reasonably Foreseeable Future Actions

In the 1800s, there were limited air pollutant emissions as the study area and region was characterized by natural wilderness landscapes and human settlements were significantly smaller than they are in the present day. Since the 1950s, actions including the construction of I-5 and increased urbanization have resulted in the incremental introduction of air pollutants from vehicles and development. Starting in the early 1970s, regulatory controls on air pollutant emissions have substantially reduced emissions, including industrial and vehicle emissions. Long-term monitoring has shown that air quality has improved over the years. The Oregon Department of Environmental Quality (DEQ) measures air pollutant levels with a network of air monitoring and sampling equipment at more than 40 sites throughout the state, including the study area. The Washington State Department of Ecology (Ecology) does not operate many monitors in the Vancouver area because the monitors operated by DEQ fulfill the federal monitoring requirements for the metropolitan area. Over the last 10 years, pollutant concentrations have been trending mostly downward for most locations, with most exceptions corresponding to wildfire smoke events.

The implementation of current regulations will continue to reduce pollutant emissions from mobile sources and other sources into the future and, along with vehicle electrification, are expected to yield additional vehicle emission reductions over the next 25 to 30 years (DEQ 2021; FHWA 2016).

The air quality analysis is based on projected land use and employment information, expected overall growth in the region and the study area, and the effect of the transportation projects identified as reasonably foreseeable future actions. Non-transportation projects may increase emissions, such as general commercial and residential development in the area. Tolling of I-205 (Abernethy Bridge), if advanced in Oregon, may reduce overall emissions through a mode shift away from single-occupancy vehicles to carpooling, public transit, and active transportation, as well as a reduction in emissions associated with congestion.

No-Build Alternative and Modified LPA

Under both the No-Build Alternative and the Modified LPA, air pollutant emissions are expected to be substantially lower in the future than under existing conditions for most mobile source air toxics and criteria pollutants. For all pollutants analyzed, future (2045) emissions are projected to be lower than existing conditions under both the Modified LPA and No-Build Alternative.

The Modified LPA would result in lower pollutant emissions than the No-Build Alternative. Reductions in vehicle miles traveled (VMT) and improved traffic flow under the Modified LPA would result in lower emissions of mobile source air toxics and criteria pollutants in the region, with decreases ranging from 1% to 16%, varying by pollutant. The Modified LPA may also contribute to beneficial cumulative effects through the expansion of public transit and active transportation networks or other projects, resulting in changes to emissions and beneficial effects on air quality. However, traffic volumes on some roadway links would increase with the Modified LPA, which could increase localized air pollutant concentrations.

Regional improvements, such as increased transit capacity and extension of active transportation networks, would further reduce additional future emissions and have a positive effect on air quality. Other reasonably foreseeable future actions in the study area that could contribute to cumulative effects on air quality (identified in the air quality analysis) would continue under the No-Build Alternative, though any impacts from those actions would be subject to applicable regulatory requirements for air pollutant emissions from mobile sources or other sources.

Cumulative Effects Conclusion – Air Quality

Past actions affecting air quality in the study area and region include population growth and accompanying development leading to an increase in the number of emission sources, including single-occupancy and

freight vehicles, industrial sites, and the expansion of and demand for utilities. Recent actions have started to reverse course and reduce air pollutants, primarily due to the implementation of programs and regulations to control pollutant emissions. In addition, recent and reasonably foreseeable future regional improvements to transportation supply through increased roadway and transit capacity, active transportation networks, and measures such as regulations on other source types would reduce additional future emissions and have a positive effect on air quality. Long-term monitoring of air quality over the last 10 years is showing a downward trend in pollutant concentrations. Reasonably foreseeable future actions in the study area that affect air quality would be required to meet applicable regulations that control air pollutant emissions.

Due to long-term air quality trends and other actions, future air pollutant emissions under the No-Build Alternative are expected to be reduced for most mobile source air toxics and criteria pollutants. The Modified LPA would further reduce emissions compared to the No-Build Alternative, through reductions in VMT, improved traffic flow, and expansion of public transit and active transportation networks.

Under the No-Build Alternative, the cumulative effects on air quality from past, present, and reasonably foreseeable future actions would be beneficial due to an anticipated reduction in pollutant emissions. Compared to the No-Build Alternative, the cumulative effects on air quality from the Modified LPA would be incrementally more beneficial due to reduced VMT, improved traffic flow, and a mode shift to public transportation and active transportation.

Noise and Vibration

Effects from Past, Present, and Reasonably Foreseeable Future Actions

Past actions include urban development in the region that led to the introduction of urban noise sources in the study area. In addition to existing urban noise sources, residential and commercial construction activities in the study area could be a substantial, intermittent source of noise and vibration into the future.

Noise in the study area is typical of urban noise sources and noise levels. Sources include traffic on I-5, SR 14, SR 500, Martin Luther King Jr. Boulevard, N Marine Drive, and various arterials and other roadways. Air traffic associated with Portland International Airport (PDX) and Pearson Field is also a substantial source of noise that has increased over time. Marine vessels on the river, trains on two rail lines, industrial uses, and the Portland International Raceway further add to the cumulative noise environment. Many residences and other uses in the study area, including those adjacent to I-5 and the proposed light-rail transit line, have experienced increasing noise levels over time, resulting from steady growth in vehicle traffic, air traffic, and other urban noise sources. If the land use plans for the City of Vancouver and Hayden Island are realized, then residential and commercial construction activities could be a substantial, intermittent source of noise and vibration into the future.

Present and reasonably foreseeable future transportation and transit projects are required to evaluate noise and vibration impacts resulting from permanent facility improvements and from construction activities. If cumulative transportation noise levels exceed thresholds established by ODOT, WSDOT, FHWA, and FTA, then mitigation analysis must be conducted. Past projects were not always subject to these requirements; thus, present and reasonably foreseeable future projects, through required mitigation analysis and implementation, are often able to reduce overall transportation noise, as the applied mitigation would also reduce noise produced by existing transportation sources.

Identified reasonably foreseeable future actions in the study area that could contribute to cumulative effects on noise and vibration include the following:

- Transportation improvements to public transit, state highways, local road networks, and active transportation facilities as identified in the2018 RTP. These projects are included into the transportation analysis of the Modified LPA and No-Build Alternative.

- Metro's future redevelopment of the Expo Center, which may include a sports and cultural complex, could replace or expand the exhibition hall use that currently occurs at this location.
- Two concurrent efforts are underway to improve the existing levee system along the Columbia River near the Interstate Bridge: the USACE and UFSWQD Portland Metro Levee System project and Flood Safe Columbia River. Proposed improvements include raising the elevation of the levees.
- The City of Portland's 2009 planning for Hayden Island calls for redevelopment of the commercial core from the current large-scale retail land use pattern to a more urban form with more mixed uses, pedestrian-scale design, and transit orientation. The plan identifies a replacement bridge over the Columbia River and the addition of high-capacity transit, both of which the IBR Program would provide, as important elements of future development on the island.
- Several developments are planned for the Vancouver waterfront, including (1) the Port of Vancouver's Terminal 1 mixed-use (i.e., hotel, office and retail space, outdoor gathering areas, and a public marketplace) project, which also includes a trail connection to the Vancouver Waterfront Renaissance Trail; (2) the Renaissance Boardwalk, which is public-private partnership for a mix of apartments, retail, and underground parking: and (3) the Waterfront Gateway Project run by the Vancouver City Center Redevelopment Authority to redevelop an area between the waterfront and downtown Vancouver with mixed-use office, retail, and residential uses. These future Vancouver waterfront developments would continue to expand the present and recent past developments to create more commercial-residential uses compared to past industrial uses along the waterfront.

No-Build Alternative

Under the No-Build Alternative, increased noise and vibration levels in the future would be expected to increase as population, employment, highway traffic, public transit service, air traffic, and freight rail traffic continue to grow and planned development and redevelopment are implemented. The No-Build Alternative would result in highway noise impacts to 215 sensitive receptors (e.g., residences, parks, schools, and hotels) where noise levels approach or exceed noise abatement criteria thresholds established by ODOT, WSDOT, and FHWA. No new transit-related noise and vibration impacts would occur under the No-Build Alternative. Other reasonably foreseeable future actions in the study area that could contribute to cumulative effects related to noise and vibration would continue under the No-Build Alternative. There would be permanent noise and vibration effects associated with highway traffic, and temporary effects associated with construction of transportation facilities.

Modified LPA

The noise analysis described in Section 3.11 incorporated regional growth and foreseeable transportation projects; therefore, the noise modeling results include transportation-related cumulative effects associated with noise and vibration from the Modified LPA in combination with other transportation projects in the study area. Noise and vibration impacts under the Modified LPA would include permanent impacts such as increased noise to sensitive receptors along I-5, existing and new transit facilities, and along local streets that would be modified in the study area. Approximately 198 sensitive receptors would experience highway-related noise levels that approach or exceed noise criteria thresholds established by ODOT, WSDOT, and FHWA. Transit-related noise would have moderate-level impacts to approximately 12 sensitive receptors (this would be reduced to 0 with mitigation) and vibration impacts to 13 sensitive receptors along the extended light-rail transit facilities. Construction activities would result in increased noise and vibration due to construction equipment, drilling or pile driving, and other related construction activities. Construction-related noise impacts are regulated by local jurisdictions through permits or variance requests.

Noise abatement proposed for the Modified LPA, such as noise walls, would reduce traffic noise to below the noise abatement criteria levels at 77 of the 198 noise-impacted sensitive receptors. Mitigation measures

would be developed in accordance with the FHWA highway noise mitigation regulations and the FTA transit noise and vibration impact assessment manual (see Section 3.11.7).

Cumulative Effects Conclusion – Noise and Vibration

Past actions include urban development in the region that led to the introduction of urban noise sources in the study area. Many residences and other uses in the study area have experienced increased noise levels over time, driven by the growth in urban noise sources. Under the No-Build Alternative, no new transit-related noise and vibration impacts would occur, although continued population, employment, highway traffic, public transit service, air traffic, and freight rail traffic growth and planned development and redevelopment would contribute to increased noise and vibration levels in the future. The No-Build Alternative would result in highway noise impacts to 215 sensitive receptors in the study area.

While the Modified LPA would increase transportation noise in and introduce transit vibration to the study area, it would also provide mitigation that would reduce noise levels at sensitive receptors affected by cumulative transportation noise from past, present, and reasonably foreseeable future actions. Including mitigation benefits, the Modified LPA would result in cumulative highway noise impacts to 121 sensitive receptors as compared to 160 existing impacts and 215 with the No-Build Alternative (Table 3.11-8).

Past, present, and reasonably foreseeable future actions have introduced transportation noise creating adverse effects in the study area, which would continue with the No-Build Alternative. The Modified LPA would have both adverse and beneficial cumulative effects. It would increase existing noise and vibration generated by highway and transit sources, but it also would provide noise abatement measures that would reduce the number of sensitive receptors affected by cumulative highway noise levels.

Energy

Effects from Past, Present, and Reasonably Foreseeable Future Actions

Regional energy demand and use in the study area have grown as a result of general development patterns, including suburban residential growth, increases in the VMT of single-occupancy vehicles, and increase in renewable energy sources used. However, even though cumulative energy demand and use in the study area has increased, the expansion of C-TRAN's bus service in Vancouver (including the introduction of bus rapid transit and electric express buses) and improvements in TriMet's bus and light-rail system (including the extension of light-rail to the Expo Center and the use of wind-generated electricity for the Metropolitan Area Express [MAX]), contribute to a small incremental benefit for cumulative energy demand and use due to the use of alternative energy sources, and supporting a mode shift from personal vehicles to public transit. These strategies are consistent with and reflective of action items in the City of Vancouver's 2022 Climate Action Plan and climate emergency priorities in the City of Portland's Climate Emergency Workplan 2022–2025.

Tolling of I-205 (Abernethy Bridge), if advanced in Oregon, may reduce energy use through a reduction in the number of single-occupancy vehicles on the road caused by a mode shift to carpooling, public transit, and active transportation.

The Cascade Renewable Transmission Project will help achieve Oregon and Washington's clean energy goals by adding 1,100 megawatts (MW) of east-to-west energy transfer capability in the region and assisting in the distribution of increased power flows on the networked transmission system, especially during extreme heat events.

The future demand for energy will depend on trends in population, economic activity, energy prices, and adoption and implementation of technology. The U.S. Energy Information Administration projects that energy consumption in the transportation sector will remain lower than 2019 levels through 2050 due to

improvements in fuel economy. As a result, energy consumption by light-duty and heavy-duty vehicles is projected to remain lower than 2019 levels through 2045.

No-Build Alternative and Modified LPA

The energy analysis in Section 3.12 incorporates projected increases in traffic, regional growth, and reasonably foreseeable future transportation projects. The analysis showed that under both the No-Build Alternative and the Modified LPA, energy consumption and GHG emissions in 2045 are expected to be substantially lower than existing values for the region, which is consistent with national trends. Although the annual VMT in the study area would increase, GHG emissions would decrease substantially compared to baseline conditions (2015) due to the implementation of fuel and engine efficiency regulations. On a regional basis, future emissions would be similar under the No-Build Alternative and Modified LPA.

Operation of the Modified LPA would lower the transportation demand for petroleum relative to the No-Build Alternative because of the mode shift to public transportation and active transportation options. Energy required to power light-rail transit operations is more than offset by the reduction in petroleum demand from roadway users. Daily regional VMT would decrease by approximately 0.16%, and total regional transportation energy consumption would decrease by approximately 0.28% in 2045 under the Modified LPA compared to the No-Build Alternative.

Construction of the Modified LPA would require up to 2.6 million British thermal units to power construction equipment and transport materials to and from project locations. This increased demand for petroleum during construction would be offset by the benefits achieved from roadway user energy demand after 15 years of operations.

Cumulative Effects Conclusion – Energy

Past actions have increased regional energy demand and use in the study area, largely as a result of general development patterns, which have been increasingly dense and urban. Current trends from present and reasonably foreseeable future actions include the adoption of renewable energy sources and public transit improvements, which are increasing the use of alternative energy sources and supporting a mode shift from personal vehicles to public transit. Reasonably foreseeable future actions will continue to incrementally decrease energy demand and GHG emissions.

Energy consumption and GHG emissions under the No-Build Alternative would continue to decline due to other past, present, and reasonably foreseeable future actions. The Modified LPA would further reduce energy consumption and GHG emissions compared to the No-Build Alternative, through reductions in VMT and a mode shift to public transit and active transportation.

The Modified LPA and other actions would contribute to adverse cumulative effects on energy through the energy demand required to construct the projects, as well as beneficial cumulative effects on energy by contributing to other projects that lower the transportation demand for petroleum due to mode shift.

Under the No-Build Alternative, the cumulative effects on energy from past, present, and reasonably foreseeable future actions would be beneficial due to reduced energy consumption and GHG emissions from the implementation of fuel and efficiency regulations. Compared to the No-Build Alternative, the cumulative effects on energy from the Modified LPA would be incrementally more beneficial due to reduced VMT and a lower transportation demand for petroleum due to mode shift to public transportation and active transportation options.

Electric and Magnetic Fields

Effects from Past, Present, and Reasonably Foreseeable Future Actions

Federal regulations addressing electromagnetic fields (EMF) were introduced in response to incremental increases in the presence of EMF sources such as AM and FM radio, television, and wireless sources. Sensitive receptors to EMF include hospitals and research facilities. The existing EMF environment in the study area varies depending on location, as EMF levels are site- and time-specific. Sensitive receptors to EMF, such as hospitals and research facilities, are not known to be located within the study area. The main transportation sources of EMF within the study area are the traction power system and traction power substations associated with the TriMet MAX light-rail transit system.

Present and reasonably foreseeable future actions that could contribute to cumulative effects on EMF would be new sources of high-voltage power or high-frequency transmission, or the introduction of new EMF-sensitive receptors. None of the reasonably foreseeable future actions are anticipated to create new sensitive receptors, and only the Cascade Renewable Transmission Project would create potential new sources of EMF, as the project would install an underwater and underground cable bundle through the study area. However, the cables will be shielded so that they produce no external electric fields (Cascade Renewable Transmission n.d.).

No-Build Alternative

The No-Build Alternative would not change EMF sources as a result of Program activities. Other reasonably foreseeable future actions in the study area that could contribute to a cumulative effect on EMF would continue under the No-Build Alternative, but no proposed significant sources or sensitive facilities have been identified.

Modified LPA

The extension of the light-rail line under the Modified LPA would result in the generation of additional EMF within the study area. EMF levels from Portland's light-rail system are well below the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and American Conference of Governmental Industrial Hygienists exposure standards. There is no evidence to indicate that light-rail-generated EMF would change the human health risk associated with cumulative EMF exposure. Therefore, as with the existing light-rail system, the Modified LPA would not have adverse effects associated with EMF emissions.

Cumulative Effects Conclusion – Electric and Magnetic Fields

Past actions, primarily electrification in the twentieth century and the introduction of light-rail transit, led to an increase in EMF exposure in the environment. None of the present or reasonably foreseeable future actions in the study area are anticipated to contribute to EMF levels in the study area. Sensitive receptors to EMF, such as hospitals and research facilities, do not exist in the study area and none are currently proposed.

The No-Build Alternative would not contribute to cumulative effects on EMF exposure, and it would not change the overall trends in EMF exposure from other actions. The Modified LPA would introduce a new source of EMF variation.

The cumulative effects from EMF exposure created by past, present, and reasonably foreseeable future actions, including the Modified LPA, are negligible because of the lack of evidence indicating a change in human health risk associated with cumulative EMF exposure and the absence of existing or proposed EMF-sensitive facilities in the study area.

Water Quality and Hydrology

Effects from Past, Present, and Reasonably Foreseeable Future Actions

Historic land use changes and increasing urbanization have decreased the number of natural areas and the natural flow of water bodies in the study area. Over the past 150 years, historic off-channel areas have been filled, rechanneled, diverted, and otherwise developed for agricultural and urban use. Flood-control measures have been implemented that affect the entire lower Columbia River area. Levees and river embankments were constructed in the early 1900s on both sides of the Columbia River, which isolated most of the floodplain from all but the highest flows. Development of the hydropower system on the Columbia River has also significantly influenced peak seasonal flows in the river, as well as their velocity and timing. The channelization of the watershed, combined with the development of the hydropower system, dramatically altered the historic hydrologic regime.

The enactment of environmental laws beginning in the 1960s (such as the Clean Water Act), combined with decreases in upstream heavy industrial activities, has reduced contamination sources and improved water quality in study area water bodies. However, most of the water bodies within the study area are "303(d)-listed," meaning they fail to meet the water quality standards for one or more pollutants under the Clean Water Act. There are approximately 180 acres of existing contributing impervious area (CIA) in the study area; stormwater runoff from over 80% of the CIA (approximately 150 acres) is untreated.

Most present and reasonably foreseeable future projects would improve water quality and hydrology in the study area as new development is held to stricter standards for stormwater management and treatment than past actions. The redevelopment of the Expo Center and Waterfront Gateway properties, for example, would likely improve runoff from these sites, which are mostly impervious surfaces at present. While individual actions are required to mitigate and treat their stormwater runoff, increased development could still lead to an increase in pollutant discharges to local water bodies as a result of increased congestion and traffic on existing roads that lack sufficient treatment.

Anticipated projects that would improve water quality in the study area include restoration activities along Burnt Bridge Creek in Vancouver and the Columbia Slough in Portland (Ecology 2021; Lee and Stamberger 2018). For Burnt Bridge Creek, Ecology recommends sampling and monitoring of water quality, implementing best management practices for stormwater management in the watershed, completing watershed evaluations, conducting windshield surveys and desktop analysis, achieving system potential riparian vegetation of 85% tree canopy, and completing additional studies to identify priority areas for streamflow restoration activities.

Future projects from the Columbia Slough Watershed Council may include slough cleanup and stormwater management projects such as the Expand for a Bigger Great Slough Clean Up program, Portland Water Bureau's Main Pump Station riparian restoration, and a volunteer trash monitoring program. In addition, cleanup of the Portland Harbor Superfund Site will improve water quality in the Willamette River, which flows into the Columbia River downstream of the Interstate Bridge.

Future hydrologic projects in the study area include maintenance of the existing drainage system as well as the levee system improvements proposed by the USACE and UFSWQD. These projects would maintain and improve the flood-control systems in the study area.

No-Build Alternative

The No-Build Alternative would continue to degrade water quality through untreated stormwater runoff from existing impervious roadway surfaces within the study area. However, it is assumed that the No-Build Alternative would maintain existing water quality conditions and would not result in long-term changes (either increased or decreased impacts) as there is not a reliable method to quantify future emissions or other pollutants, such as 6PPD-quinone. Other reasonably foreseeable future actions in the study area that could

contribute to cumulative effects on water quality and hydrology (identified above) would continue under the No-Build Alternative, though impacts from those actions would be subject to applicable regulatory requirements.

Modified LPA

The Modified LPA would increase impervious roadway surfaces within the study area to approximately 200 acres, which could result in increased stormwater runoff rates and volumes. However, the Modified LPA includes stormwater treatment facilities for new and resurfaced existing roadways, including the new Columbia River bridges, which would remove pollutants from stormwater runoff and improve water quality in the Columbia Slough, Columbia River, North Portland Harbor, Burnt Bridge Creek, and Fairview Creek. With the Modified LPA, all stormwater runoff from the CIA would be treated to remove pollutants before being discharged into water bodies, reducing the area of untreated CIA by 150 acres. With new stormwater treatment and infiltration, the Modified LPA would improve surface water quality, increase groundwater recharge, and help restore natural flow to water bodies, thus reducing impacts of past actions.

Based on a preliminary hydraulic assessment, there may be a small net rise to the base flood elevation of the Columbia River and North Portland Harbor, which would be confirmed with a Location Hydraulic Study prior to the Final SEIS. If the hydraulic analysis showed a resulting rise in the base flood elevation, mitigation would be explored, such as improving hydraulic efficiency and compensate for flood storage capacity.

Cumulative Effects Conclusion – Water Quality and Hydrology

Hydrological function in the study area has been heavily influenced by past development, hydropower projects, and flood-control projects. Past development has also increased impervious surfaces and the number of pollutant sources in the study area, including industrial sites and vehicles, leading to many of the water bodies failing to meet water quality standards under the Clean Water Act. Because recent, present, and reasonably foreseeable future projects are subject to stricter regulatory standards for pollutants and hydrological effects, it is anticipated that water quality will continue to improve in the study area and hydrological effects will continue to be managed by existing and planned hydropower and flood-control projects. Due to the lack of a reliable method to quantify future emissions or other pollutants, it is assumed that existing water quality conditions would be maintained under the No-Build Alternative (see Section 3.14).

The No-Build Alternative would contribute to adverse cumulative effects on water quality and hydrology through the continued release of pollutants and untreated runoff from past development, and would not contribute beneficial cumulative effects created by present and reasonably foreseeable future actions, which are held to stricter regulations.

Under the No-Build Alternative, the cumulative effects on water quality and hydrology from past, present, and reasonably foreseeable future actions would be beneficial due to reasonably foreseeable future actions that would provide more stringent treatment of stormwater runoff. Compared to the No-Build Alternative, the cumulative effects on water quality and hydrology from the Modified LPA would be incrementally more beneficial due to improved stormwater treatment within the CIA.

Wetlands and Other Waters

Effects from Past, Present, and Reasonably Foreseeable Future Actions

Urbanization and land use changes have reduced the acreage of wetlands in the study area since the 1800s (Morlan et al. 2010). Between the 1780s and 1980s, Oregon and Washington lost an estimated 38% and 31% of their wetlands, respectively (Dahl 1990). In the 1970s through the 1990s, stricter federal and state protections reduced the annual wetland loss in the Willamette Valley but did not stop the loss of wetlands (Morlan et al. 2010). Since 1958 (the base year of I-5 construction), some wetland restoration has occurred near the

southern portion of the study area. The Port of Portland completed a wetland restoration project at the 90-acre Vanport wetlands parcel, located immediately west of the existing highway and light-rail line. Other historic wetlands east of the highway, in the Delta Park area and on Hayden Island, have experienced increased development, draining, or filling since 1964.

Identified reasonably foreseeable future actions in the study area that could contribute to cumulative effects on wetlands and other waters include:

- Planned restoration activities near the Columbia Slough and the Smith and Bybee Wetlands Natural Area, which would improve wetland functions.
- The Portland Metro Levee System project is estimated to result in the loss of approximately 0.5 acres of wetlands that would be mitigated through compensatory mitigation (e.g., the purchase of credits from a wetland mitigation bank) (USACE and CCDD 2021). Mitigation would be required to completely offset any loss of functions or value, and USACE issued a Finding of No Significant Impact in 2022.
- The Renaissance Boardwalk mixed-use development has been proposed near the Columbia River in Vancouver; it is close to wetlands. While more detailed information is not yet available for this project, impacts to wetlands or waters would have to meet Washington state requirements for no net loss of functions or value.
- Future dredging projects, such as the potential deepening of the navigation channel by USACE, that would disturb sediment in the Columbia River waterway. USACE and affected ports are conducting environmental reviews for a Dredged Material Management Plan for the Lower Columbia River, which would document effects to wetlands and waters as well as proposed mitigation. However, these environmental reviews are not yet complete, so specific information regarding the potential impacts from the dredging project are not known at this time.
- The Cascade Renewable Transmission Project would install an underwater cable at the bottom of the Columbia River. This project has not gone through environmental review yet, and more specific impacts are not known at this time; however, this proposed project would likely involve disturbing the river bottom sediment to create an approximately 18-inch trench for the cable (Cascade Renewable Transmission n.d.).

The Oregon Department of State Lands recorded a net loss of wetlands over the past decade in Oregon (approximately 45 acres), although there has been a net gain in the last 5 years (approximately 47 acres). Based on the data, statewide wetland gains and losses are highly variable year to year (ranging from a net loss of 42 acres to a net gain of 60 acres). While all recorded wetland losses are compensated, this is often achieved through the purchase of credits from mitigation banks or in-lieu fee programs, and wetland enhancement and preservation are not counted as wetland gains as they do not result in gains in wetland acres (Pelton 2024). Similar data for Washington State were not located; however, the state's regulatory agencies are charged with ensuring no net loss of wetland value or function. USACE, Ecology, and some Washington jurisdictions (including the City of Vancouver) encourage the use of mitigation banks and in-lieu fee programs over on-site mitigation because they can offer greater assurance for mitigation (Hruby et al. 2009; USACE and EPA 2008). Therefore, a loss of wetlands can be reliably offset in another location within the watershed without a loss of overall value and function.

No-Build Alternative

The No-Build Alternative would not result in further filling of wetlands or the fill or reduction of wetland buffers within the study area due to Program activities. Untreated stormwater from over 150 acres of CIA within the study area would continue to be discharged into wetlands and other waters. Increased development, traffic volumes, and congestion could increase pollutant discharge to wetlands and waters, including 6PPD-quinone (a byproduct of tire dust that is toxic to salmonids). Other reasonably foreseeable

future actions in the study area that could contribute to cumulative effects on wetlands and other waters (identified above) would continue under the No-Build Alternative, although impacts from those actions would be required to meet applicable regulatory requirements for no net loss of functions or value.

Modified LPA

The Modified LPA would require the fill of relatively small areas of wetlands and wetland buffers (approximately 0.58 acres and 7.39 acres, respectively), which would adversely affect wetland functions. In addition, the Modified LPA would increase the impervious surface area in the vicinity of wetlands and decrease the distance between wetlands and roadway traffic, which could increase stormwater flow and pollutants. However, the Modified LPA would also provide stormwater facilities that would treat stormwater runoff for both new and existing impervious surfaces created by the original construction of I-5 in the study area, which would improve water quality flowing into wetlands. In addition, the double-deck fixed-span configuration would result in a net restoration of approximately 0.13 acres of waterway in the Columbia River and North Portland Harbor due to the smaller footprint of the replacement structures compared to the existing Interstate Bridge. The single-level fixed-span and single-level movable-span configurations would both result in a small net loss (less than 0.1 acres).

Mitigation for wetland fill is regulated by federal, state, and local jurisdictions and would typically require purchasing credits from an agency-approved mitigation site or completing on-site or off-site mitigation to compensate for lost or degraded functions. Fill of the Vanport wetland would require increased mitigation ratios because it is an existing wetland mitigation site. Unavoidable impacts to wetlands and other waters would be offset through one or more compensatory mitigation projects, which are currently being developed in coordination with federal, state, and local regulatory agencies, tribes, and community members. With mitigation, it is anticipated that the Modified LPA would result in a net beneficial effect on quality and ecological function of wetlands and waters.

The net reduction of fill in the Columbia River and improved stormwater treatment would improve the current functions of wetlands and waters, helping to mitigate some past actions.

Cumulative Effects Conclusion – Wetlands and Other Waters

Past actions, including construction of I-5 and the existing Interstate Bridge, led to a decline in the amount and function of wetlands and other waters. Present actions are required to adhere to more stringent regulations, with the current requirements being no net loss in wetland function and value and treating stormwater runoff from roadways. Reasonably foreseeable future actions in the study area that affect wetlands and other waters would also be required to comply with regulations to achieve no net loss of wetland function or value and treat stormwater.

While the No-Build Alternative would not result in filling of wetlands or other waters, it would not improve wetland functions, and untreated stormwater would continue to be discharged into wetlands and other waters. The Modified LPA would result in the fill of some wetlands, and would provide mitigation to improve the current value and functions of wetlands, and would improve stormwater treatment.

Under the No-Build Alternative, the cumulative effects on wetlands and other waters from past, present, and reasonably foreseeable future actions would be beneficial due to reasonably foreseeable future actions that would provide more stringent stormwater treatment for water that flows into wetlands and other waters. Compared to the No-Build Alternative, the cumulative effects on wetlands and other waters from the Modified LPA would be incrementally more beneficial due to improved stormwater treatment within the CIA and mitigation to replace lost functions and values of fill placed in wetlands and waters.

Ecosystems

Fish, Wildlife, and Vegetation

Effects from Past, Present, and Reasonably Foreseeable Future Actions

Ecosystem resources include fish, wildlife, plants, and their habitats. Ecosystem resources within the study area include habitat for a variety of plants, terrestrial wildlife, birds, fish, marine mammals, rare plants, and noxious weeds. This discussion of ecosystem resources includes aquatic and terrestrial species.

Native Americans lived in the study area for more than 10,000 years before the arrival of Euro-American settlers. Since the Euro-American settlement in the mid-1800s, human population growth and land development have gradually displaced and reduced the quality and quantity of wildlife habitat. Historically, many activities, including deforestation, urbanization, dams for hydroelectricity, irrigation and flood control, hatchery operations, and overfishing have contributed to the loss of habitat and reduction in fish and wildlife species. These past actions have made significant changes to the region's ecosystems. Compared to their historic conditions, natural habitats in the area are generally small and fragmented.

General growth and development in the region will continue to affect species and habitats in the study area. Current and reasonably foreseeable future projects, such as the Portland Metro Levee System project, Flood Safe Columbia River, Port of Vancouver Terminal 1, Cascade Renewable Transmission Project, dredging, and maintenance of existing waterfront structures could include activities that would affect aquatic or terrestrial species and their habitats. For example, additional impervious surface area could increase the quantity of stormwater runoff, affecting aquatic habitat function. Of the reasonably foreseeable future actions, only the Portland Metro Levee System project is identified as increasing impervious surfaces (by less than 1 acre); the remaining projects (including the Renaissance Boardwalk, Waterfront Gateway, and Expo Center) are located in areas that currently consist primarily of impervious surfaces and redevelopment may ultimately improve runoff if it includes stormwater detention and treatment.

Substantive legislation to protect natural resources began in the 1960s and has since expanded. Projects that are subject to federal, state, and/or local permits require a mitigation sequencing process consisting of avoidance, minimization, and mitigation to reduce effects on species and their habitats. Reasonably foreseeable future projects would be required to provide stormwater quality treatment consistent with applicable stormwater regulations, which would reduce pollutants being discharged into water bodies and improve water quality and aquatic habitat for aquatic species. Because requirements typically include treatment for existing untreated impervious surfaces, reasonably foreseeable future projects may lead to a net beneficial effect on water quality and aquatic habitat for aquatic species. Reasonably foreseeable future projects constructed over time would also be legally required to avoid, minimize, and mitigate impacts to fish and wildlife to achieve no net loss in habitat function. Planned restoration in the study area includes cleanup at the Portland Harbor Superfund Site and smaller projects along Burnt Bridge Creek in Vancouver and the Columbia River Slough in Portland (EPA n.d.; Ecology 2021; Lee and Stamberger 2018).

No-Build Alternative

The No-Build would continue to contribute to an adverse cumulative effect on ecosystem resources, particularly aquatic habitat and aquatic species, from untreated stormwater runoff from I-5 and disturbance of fish and wildlife during intermittent bridge and highway maintenance activities. Other reasonably foreseeable future actions in the study area that could contribute to cumulative effects on fish, wildlife, and vegetation (identified above) would continue under the No-Build Alternative, though any impacts from those actions would be subject to applicable regulatory requirements. Untreated stormwater from over 150 acres of CIA within the study area would continue to be discharged into wetlands and waters, negatively affecting these natural habitats and species within them. Increased development, traffic volumes, and congestion

could increase pollutant discharge to wetlands and waters, including 6PPD-quinone (a byproduct of tire dust that is toxic to salmonids).

Modified LPA

Construction of the Modified LPA would result in temporary impacts (e.g., increased noise, turbidity, overwater shading) to aquatic and terrestrial species and their habitats. The Modified LPA would result in both permanent and short-term disturbance to sensitive terrestrial habitats, including riparian buffers, trees, wetlands, and wetland buffers. To minimize the impacts to fish and wildlife species and their habitats during construction, as described in the Ecosystems Technical Report and required in the permits that would be issued, best management practices would be followed.

Long-term effects on aquatic ecosystem resources would include displacement of benthic habitat from the new bridge piers and new overwater shading from the bridges' shaft caps and bridge decks. The Modified LPA would create new impervious surfaces, which would generate stormwater runoff but would also provide water quality treatment for new and existing impervious surfaces, including those created by the original construction of I-5 that did not include stormwater treatment. The Modified LPA would reduce pollutants (including dissolved copper) associated with highway runoff, improving aquatic habitat. Impacts to fish and wildlife species and their habitats would be avoided, minimized, and offset through compensatory mitigation, as required by compliance with federal, state, and local regulatory requirements. These mitigation measures would result in no net loss of habitat function. A compensatory mitigation approach is currently in development with federal, state, and local regulatory agencies; tribes; and community members.

Mitigation measures required for the Modified LPA would reduce harmful effects and even improve parts of the local ecosystem relative to existing conditions. The Modified LPA would have a net beneficial effect on fish and wildlife species and habitat, considering the proposed improvements treating stormwater entering the Columbia River and North Portland Harbor.

Cumulative Effects Conclusion – Fish, Wildlife, and Vegetation

Past actions, such as deforestation, urbanization, and construction of dams for hydroelectricity, have resulted in loss of habitat and reduction in fish and wildlife species. Although regulations have been implemented to protect species and their habitat, present actions include development that would continue to affect species and their habitat. Reasonably foreseeable future actions, such as the Portland Metro Levee System Project and the Cascade Renewable Transmission Project, which both involve extensive over-, near-, and in-water work, would also affect species and their habitat.

The No-Build Alternative would contribute to adverse cumulative effects on ecosystem resources, particularly aquatic habitat and aquatic species, from continued untreated stormwater runoff from I-5 and disturbance of fish and wildlife during intermittent bridge and highway maintenance activities. The Modified LPA would not impact sensitive terrestrial habitats and species. The Modified LPA would displace some benthic habitat for aquatic species, and result in new overwater shading from shaft caps, in the Columbia River; however, the Modified LPA would also provide water quality treatment that would improve aquatic habitat.

Under the No-Build Alternative, the cumulative effects on fish, wildlife, and vegetation from past, present, and reasonably foreseeable future actions would be adverse, due to actions that remove or disrupt habitat, but also beneficial, due to new development being held to stricter stormwater management and treatment standards. Compared to the No-Build Alternative, the cumulative effects on fish, wildlife, and vegetation from the Modified LPA would be incrementally more beneficial due to the additional treatment of stormwater from roadways within the CIA.

Aquatic and Terrestrial Species of Interest

Species of Interest (SOI) is not a specific category of governmental or nongovernmental organization-designated species, but refers to native species identified through tribal, local, state, and federal coordination as having particular importance because of their regulatory status, rarity, and/or special habitat considerations. Examples of aquatic and terrestrial SOI species include those species listed under the federal Endangered Species Act, species with other federal regulatory protections (such as marine mammals, bald eagles, and migratory birds), species with special state regulatory status in Oregon or Washington, and other species that consulting tribes have identified as warranting particular focus.

Effects from Past, Present, and Reasonably Foreseeable Future Actions

The effects from past, present, and reasonably foreseeable future actions on fish, wildlife, and vegetation (described above) are anticipated to have similar effects on SOI. Many SOI are subject to additional legal protections (e.g., the Endangered Species Act) and require additional evaluation and mitigation for impacts caused by present and reasonably foreseeable future actions. Compliance with the relevant laws, regulations, policies, and codes in force would help minimize or mitigate the effects of other actions on SOI and their habitats. However, even if a project has a net beneficial impact on these species, many of them would continue to face threats to their continued long-term survival.

No-Build Alternative

The No-Build Alternative would continue to contribute to an adverse cumulative effect on aquatic and terrestrial SOI from untreated stormwater runoff from I-5 and direct disturbance of aquatic and terrestrial SOI during intermittent bridge and highway maintenance activities. As noted above for non-SOI species, reasonably foreseeable future actions in the study area that are identified above and could contribute to cumulative effects on ecosystems would continue under the No-Build Alternative, though any impacts from those actions would be subject to applicable regulatory requirements. Within the study area, untreated stormwater with various pollutants would continue to be discharged into aquatic habitats, including 6PPD-quinone.

Modified LPA

Construction of the Modified LPA would result in temporary impacts (e.g., increased noise, turbidity, and overwater shading) to aquatic and terrestrial SOI. Long-term effects on aquatic and terrestrial SOI species and their habitats would include displacement of benthic habitat from the bridge piers and new overwater shading. The Modified LPA would reduce pollutants associated with highway runoff (including dissolved copper), improving water quality and habitat function for aquatic SOI.

Mitigation measures under the Modified LPA would reduce harmful effects and even improve parts of the local ecosystem relative to existing conditions. The Modified LPA would have a net beneficial effect on habitat function for aquatic SOI, considering improved treatment of stormwater entering the Columbia River and North Portland Harbor.

Cumulative Effects Conclusion - Aquatic and Terrestrial Species of Interest

Past actions on aquatic and terrestrial SOI have resulted in the same effects as non-SOI fish, wildlife, and vegetation, including deforestation, urbanization, and construction of dams for hydroelectricity, that have resulted in loss of habitat and reduction in the populations of SOI. Although regulations have been implemented to protect SOI, present actions include development that would continue to affect SOI and their habitat. Reasonably foreseeable future actions would affect SOI ecosystem resources, particularly the Portland Metro Levee System Project and the Cascade Renewable Transmission Project, which both involve extensive in-water work in the Columbia River.

The No-Build Alternative would contribute to adverse cumulative effects on aquatic and terrestrial SOI from continued untreated stormwater runoff from I-5 and direct disturbance of fish and wildlife during intermittent bridge and highway maintenance activities. The Modified LPA would not impact sensitive terrestrial habitats and terrestrial SOI. The Modified LPA would displace some benthic habitat, and result in new overwater shading from shaft caps, in the Columbia River that would affect aquatic SOI; however, the Modified LPA would also provide water quality treatment that would improve aquatic habitat.

Under the No-Build Alternative, the cumulative effects on aquatic and terrestrial SOI from past, present, and reasonably foreseeable future actions would be adverse, due to actions that remove or disrupt habitat, but also beneficial, due to new development being held to stricter stormwater management and treatment standards. Compared to the No-Build Alternative, the cumulative effects on aquatic and terrestrial SOI from the Modified LPA would be incrementally more adverse due to in-water habitat loss and incrementally more beneficial from additional stormwater treatment.

Geology and Groundwater

Effects from Past, Present, and Foreseeable Future Actions

Past activities in the study area that have affected geological conditions and groundwater include settlement and development of the region, filling of lowland areas, grading of slopes, and construction in earthquake-prone areas. The study area consists of soils with high relative earthquake hazard rating that are susceptible to severe ground shaking and liquefaction during a major seismic event. The steep slopes and soils susceptible to erosion in the Burnt Bridge Creek area have been disturbed in the past from the construction of I-5 and SR 500. Current infrastructure, including roads, bridges, and buildings, was constructed under seismic codes applicable at the time of construction. The existing bridges and other I-5 structures, such as overpasses and retaining walls, were built before design standards addressed the impacts associated with subduction zone earthquakes, including severe liquefaction. More recent development, such as the mixed-use buildings along the Vancouver waterfront, was constructed to current design standards and should withstand a major seismic event.

Past actions such as the Vanport Flood, the siting of the Hayden Island Landfill, and industrial activities along the Columbia River resulted in contamination of groundwater through the spillage or leakage of gasoline and other petroleum products stored at commercial sites or industrial facilities. Contaminants from historical commercial and industrial activities in both Vancouver and Portland have diminished groundwater quality. Reasonably foreseeable future actions, such as the Waterfront Gateway, levee system improvements, and the Renaissance Boardwalk, may include development and regrading that could lead to soil erosion, even with erosion control best practices in place. These actions may also continue to sustain existing impacts to degradation of the groundwater quality from stormwater runoff in the study area. These and other reasonably foreseeable future actions would also be constructed to current seismic standards and would contribute to the beneficial cumulative effect of improved resiliency throughout the study area.

No-Build Alternative

The No-Build Alternative would not include the construction of new Columbia River bridges and other structures built to current seismic safety standards. Therefore, the No-Build Alternative would leave I-5 vulnerable to earthquakes and other geologic hazards that would have an adverse cumulative effect. In addition, the No-Build Alternative would continue to leave stormwater runoff untreated, which would continue contributing to an adverse cumulative effect on groundwater. The identified reasonably foreseeable future actions in the study area that could contribute to cumulative effects on geological and hydrogeologic conditions would continue under the No-Build Alternative, subject to applicable regulatory requirements for water quality and current seismic design standards.

Modified LPA

The Modified LPA would construct new Columbia River bridges and other I-5 structures to current seismic design standards that would substantially improve the region's seismic resiliency to withstand a major seismic event. The design of the Modified LPA would address potential non-seismic settlement to avoid impacts to levees. The Modified LPA would expose approximately 415 acres of near-surface soils to potential erosion from excavation, fill, clearing, and grading during construction. Impacts to geology and geologic hazards (such as steep slopes, soil erosion, and landslides) would be mitigated and avoided to the extent feasible by the Modified LPA. Construction on steep slopes would be minimized and the roadway design would include retaining walls or other stabilization techniques to reduce the potential for soil erosion and slope failure hazards. Landslides are not known to occur within the study, area and the Modified LPA would address the risks of increased scour that could result from potential landslides upstream caused by a major Cascadia Subduction Zone event. No long-term effects on geologic hazards are anticipated in the Ruby Junction Maintenance Facility expansion area.

The Modified LPA would have beneficial effects on groundwater quality, including for the Troutdale Sole Source Aquifer, through stormwater facilities that would manage stormwater volume and flow rates and treat stormwater runoff to reduce pollutants. The Modified LPA could also improve groundwater quality by remediating some existing contamination.

Cumulative Effects Conclusion – Geology and Groundwater

Past actions that have affected geological and groundwater conditions include regional development that has graded slopes and occurred in earthquake-prone areas and commercial and industrial activities that have resulted in groundwater contamination. Present actions in the study area are required to meet current, stricter standards for water quality, erosion control, and seismic safety. Reasonably foreseeable future actions, including new construction and redevelopment of existing sites, would continue to bring buildings and infrastructure throughout the study area up to current seismic design standards and comply with regulatory requirements related to discharges into groundwater.

The No-Build Alternative would not include the construction of new Columbia River bridges or other structures, leaving I-5 vulnerable to earthquakes and other geologic hazards and stormwater runoff that enters into groundwater would remain untreated. The Modified LPA would improve the seismic resilience of the Columbia River bridges and other I-5 structures and would treat stormwater runoff within the CIA that enters into groundwater.

Under the No-Build Alternative, the cumulative effects on geology and groundwater from past, present, and reasonably foreseeable future actions would be adverse because I-5 infrastructure would continue to age and be increasingly vulnerable to damage in an earthquake and untreated stormwater would enter into groundwater. Compared to the No-Build Alternative, the cumulative effects on geology and groundwater from the Modified LPA would be beneficial due to improved seismic resiliency of structures in the I-5 corridor and the treatment of stormwater that enters into groundwater.

Hazardous Materials

Effects from Past, Present, Reasonably Foreseeable Future Actions

Past actions in the study area, including spills and releases of hazardous materials from commercial and industrial land uses, have caused soil and groundwater contamination and pose a risk to human health. There are 579 sites that could contain hazardous materials within the study area, and the Ruby Junction Maintenance Facility is a small-quantity generator for hazardous wastes, including solvents, batteries, and paints. High-priority hazardous materials sites include the U.S. Army Vancouver Barracks, Hayden Island landfill, and Jantzen Beach car wash, among others. Many of these contaminated areas have been

documented, and in some cases cleanup actions have been initiated or completed. There may also be unknown contamination caused by past land uses and actions in the study area that poses additional risks. Reports of spills and releases of hazardous materials within the study area vary by location and year, averaging approximately zero to three incidents annually. Reported incidents of hazardous substances are managed by the Oregon State Fire Marshal's Hazardous Substance Incident database and reported spill incidents are managed by Ecology's Reported Spills to Water database.

Identified reasonably foreseeable future actions in the study area that could contribute to cumulative effects on hazardous materials include development and redevelopment of existing buildings and paved areas, particularly on sites with a history of industrial use. Properties in older urban areas, such as downtown Vancouver or Hayden Island, would be more likely to contain existing contamination. However, new development and redevelopment would be required to remediate known or discovered hazardous materials, including lead or asbestos-containing materials, to comply with local land use plans.

Development in the study area may involve the management of legacy sites, which are hazardous materials sites where the owner is or should be undertaking long-term cleanup actions. Sites for which the responsible party has not yet complied may require additional investigation and cleanup. These sites may also be considered "orphan" sites, which are being managed by regulatory agencies. Reasonably foreseeable future development in the study area could add exposure risks but also provide cleanup and remediation benefits. The discovery of new legacy sites would be the responsibility of the property owners, including ODOT and WSDOT, who would need to comply with all applicable federal, state, and local requirements for managing and mitigating contamination. In addition, population and employment growth could cause increased traffic that may result in slightly more incidents of hazardous material spills from vehicle collisions as congestion remains at current levels or worsens over time.

No-Build Alternative

Under the No-Build Alternative, there would be no acquisitions or displacements, no potential for hazardous materials liability resulting from property acquisition, and no cleanup of previously contaminated locations. Other reasonably foreseeable future actions in the study area that could contribute to cumulative effects on hazardous materials would continue under the No-Build Alternative, though any activities on contaminated sites would be subject to applicable regulatory requirements for managing and mitigating contamination.

Modified LPA

The Modified LPA would require ODOT and WSDOT to acquire properties or portions of properties that have been identified as contaminated sites. Contamination may also exist within portions of WSDOT's existing right of way. Properties to be disturbed or acquired that have contamination above levels defined in regulatory standards would be subject to remediation and cleanup prior to construction. The discovery of contamination within new or existing right of way would be the responsibility of the property owners, including ODOT and WSDOT, who would be subject to applicable remediation and cleanup requirements. The Modified LPA would have beneficial effects due to the cleanup and remediation of previously contaminated areas on disturbed or acquired sites (consistent with state requirements). This cleanup would reduce the risk of future contamination and risks to human health.

Construction of the Modified LPA, or other reasonably foreseeable future construction actions, creates a potential for the release of hazardous substances or petroleum products into the environment from the improper transfer of fuel or spills from construction equipment. Other pollutants, such as paints, acids for cleaning masonry, solvents, raw concrete, paving, striping products, and concrete-curing compounds, are often present at construction sites and may enter the environment if not managed correctly.

The Modified LPA would improve safety and operations on I-5, which could reduce hazardous material spills as a result of highway crashes.

Cumulative Effects Conclusion – Hazardous Materials

Past actions include spills and releases of hazardous materials from commercial and industrial land uses, which have resulted in contaminated sites in the study area. Present actions include continued spills and releases of hazardous materials (reported incidents of hazardous substances and spills vary by location and year) and also efforts to clean up contaminated sites in the study area. Reasonably foreseeable future actions in the study area that would affect hazardous materials would include the continued potential for spills and cleanup efforts to meet applicable regulatory requirements for managing and mitigating contamination.

The No-Build Alternative would not result in the potential disruption of contaminants on properties within the study area and would not cleanup previously contaminated property. The Modified LPA would cleanup and remediate previously contaminated areas on disturbed or acquired sites and would improve safety and operations on I-5, which would potentially reduce spills as a result of highway crashes.

Under the No-Build Alternative, the cumulative effects on hazardous materials from past, present, and reasonably foreseeable future actions would be beneficial for the environment and human health through the reduction and cleanup of hazardous materials as a result of redevelopment. Compared to the No-Build Alternative, the cumulative effects on hazardous materials from the Modified LPA would be incrementally more beneficial because acquired sites that are contaminated within the study area would be cleaned up.

Climate Change

Effects from Past, Present, and Reasonably Foreseeable Future Actions

Substantially rising GHG concentrations from human activities have been a primary driver of global warming. Both Ecology and the Oregon Global Warming Commission publish reports every 2 years measuring their states' GHG emissions and progress toward state and federal goals to reduce these emissions. Transportation (including highway, rail, and air transport) is the greatest contributor to GHG emissions nationally and in Oregon and Washington; other major contributors include electric power generation, industrial uses, residential and commercial energy consumption, and agriculture. Multiple federal, state, regional, and local regulations and policies have been enacted to guide the development and evaluation of transportation projects and local communities' management of GHG emissions. NEPA and many state environmental policy regulations now require project sponsors to quantify the GHG emissions of their projects. Policy efforts aimed at reducing transportation GHG emissions include incentives for purchasing electric vehicles, funding of electric vehicle charging infrastructure, and funding to increase less-polluting travel modes like transit, walking, and biking.

Reasonably foreseeable future actions related to the policies and plans of state, regional, and local jurisdictions have the potential to influence the decrease in GHG emissions in the transportation and land use sectors. Policies that directly regulate the emissions of vehicles, such as a clean fuels standard, have the greatest potential to reduce GHG emissions. Additional ancillary benefits may also come from transitions to renewable energy sources in the energy sector. For example, the Cascade Renewable Transmission Project will transfer approximately 1,100 MW of large-scale wind, solar, and other renewable energy sources to help meet renewable energy goals in Washington and Oregon. Renewable energy sources emit fewer upstream GHGs than energy generated from fossil fuels. Other actions currently being legislated or encouraged to reduce GHG emissions include limits on industrial emissions, strategies to reduce home and commercial energy use or switch to green sources, and efforts to curb methane production by the agricultural industry. Collectively, these efforts have reduced emissions in the U.S. by approximately 3% since 1990 (EPA 2024). This trend is expected to continue as a result of stronger regulation of emissions.

Compared to existing conditions, GHG emissions associated with the transportation sector are expected to decline in future years due to improvements in vehicle fuel technologies and the transition away from using

gasoline and diesel fuels to power vehicles. As more of the vehicle fleet is composed of electric cars, the decarbonization of the electric grid in Washington and Oregon will further decrease GHG emissions associated with vehicle travel.

Because the effects of regional growth and reasonably foreseeable future actions are incorporated into the transportation modeling, the results of the GHG emissions modeling for both the No-Build Alternative and the Modified LPA reflect cumulative effects on annual GHG emissions in the study area that include projected vehicle volumes in 2045.

No-Build Alternative

Although VMT would increase in the study area by 2045 under the No-Build Alternative, GHG emissions are expected to decline substantially over this period due to the implementation of fuel and engine regulations. However, the No-Build Alternative would not contribute to this cumulative reduction in GHG emissions. Other reasonably foreseeable future actions in the study area that could contribute to cumulative effects on climate change (identified above) would continue under the No-Build Alternative, though any impacts from those actions would be subject to regulatory requirements to reduce emissions and improve resiliency.

Modified LPA

The Modified LPA would result in fewer user GHG emissions than the No-Build Alternative because of a mode shift to public transit and active transportation, as well as decreases in VMT, congestion, and vehicle idling. While the sources of GHG emissions during construction would be temporary, the GHG emissions would remain in the atmosphere. GHG emissions from construction would include exhaust from construction equipment and vehicles used to transport materials to and from the study area. There would also be GHG emissions associated with the embodied carbon of construction materials, which refers to emissions due to material production. GHG exhaust during construction would be mitigated and reduced by following current standard specifications and regulatory guidance from ODOT and WSDOT to conserve the use of construction materials and fuels and by implementing best management practices.

The Modified LPA includes features that would improve local and regional resiliency to the anticipated effects of climate change. These features would help to avoid fragmentation and degradation of floodplain hydrology by sensitively locating new and modified transportation and utility project components; maximizing management of stormwater by restoring existing unused impervious paved areas to natural, permeable, and vegetated conditions during the design phase; and ensuring that the bridge design would accommodate potential effects of climate change, such as larger water volumes from winter storms and more frequent snow and ice storms.

Cumulative Effects Conclusion – Climate Change

Past actions, primarily transportation projects and population growth and development, have led to an increase in GHG emissions and climate hazards. Present actions include additional transportation projects which could increase GHG along with efforts, such as the Cascade Renewable Transmission Project, that seek to lower GHG emissions and/or improve climate resiliency. Reasonably foreseeable future actions are expected to generate GHG emissions as well as seek to reduce VMT and GHG emissions as roadways users shift to transit and active transportation modes and a reduction in roadway congestion

The No Build Alternative would not contribute to a reduction in GHG emissions; it would continue past trends of car-centric transportation networks. While construction of the Modified LPA would generate GHG emissions from construction equipment and materials, in the long-term the Modified LPA would provide transit and active transportation options to lower VMT and GHG emissions and improve climate resiliency.

Under the No-Build Alternative, the cumulative effects on climate change from past, present, and reasonably foreseeable future actions would be beneficial as a result of other actions that would reduce

GHG emissions. Compared to the No-Build Alternative, the cumulative effects on climate change from the Modified LPA would be incrementally more beneficial due to reduced VMT and GHG emissions in the I-5 corridor and improvements in climate resiliency.

Environmental Justice

Effects from Past, Present, and Reasonably Foreseeable Future Actions

The original construction of I-5 and I-205 through Portland had significant effects on the populations in and adjacent to the highway's path, including environmental justice (EJ) populations.[6] ODOT cleared entire blocks for development of the roadway, dividing neighborhoods, displacing residences, and affecting businesses in the historic center of Portland's Black community. The construction of I-5 through Vancouver changed the city by closing 5th Street (the route heading east) and encouraging development of housing to the north of downtown. Fewer displacements occurred in Vancouver than Portland because the area was less densely developed than Portland at that time.

One socioeconomic impact attributed to the cumulative effect of population growth and development is an increase in the cost of living. Between 2000 and 2021, median gross rent increased 52% in Portland, 48% in Multnomah County, 40% in Vancouver, and 41% in Clark County (adjusted for inflation) (U.S. Census Bureau 2000, 2021). In the same period, median household income increased by only 15% in Portland and 11% in Multnomah County, while median household income decreased by 4% in Vancouver and 7% in Clark County (U.S. Census Bureau 2021). As the cost of living increases, low-income households often move farther from jobs and services to find affordable housing. This can result in longer commute times and higher transportation costs for low-income households.

Tolling of I-205 (Abernethy Bridge), if advanced in Oregon, could increase transportation costs for EJ populations. The tolling project may implement low-income or equitable tolling policies to subsidize or offset the economic burden of tolling on low-income and minority populations. There are no other known reasonably foreseeable future projects within the study area that would contribute to a cumulative effect on EJ populations, such as displacement or increasing the cost of living. Reasonably foreseeable future transportation actions would follow federal and state guidelines, such as the Uniform Relocation Act, to provide replacement housing and relocation benefit packages.

Reasonably foreseeable future development and redevelopment projects include projects in downtown Vancouver and north Portland. Future projects such as Terminal 1, Waterfront Gateway, Renaissance Boardwalk, and Portland Expo Center Redevelopment would add new buildings or redevelop existing buildings. There is not enough information at this time to determine the exact impacts; however, reasonably foreseeable future development projects may lead to the displacement of encampments of houseless populations and the Renaissance Boardwalk could displace an existing commercial property.

No-Build Alternative

The No-Build Alternative would not change the existing conditions that affect EJ populations. It would not acquire or displace residences or businesses or provide an extension of light-rail, improvements to active transportation facilities, and improved bus service in the corridor. Therefore, the No-Build Alternative would not contribute to beneficial or adverse cumulative effects on EJ populations. Other reasonably foreseeable future actions in the study area that could contribute to cumulative effects on EJ populations would continue under the No-Build Alternative, although impacts from actions subject to review would follow federal and state guidelines to provide mitigation for displacement or other adverse impacts.

[6] Environmental justice populations include low-income and minority groups.

Modified LPA

The Modified LPA would have both beneficial and adverse effects on EJ populations. Some populations, including minority and low-income individuals, would be adversely affected by displacement of businesses and residents and by noise, dust, and traffic during construction. However, in general, the Modified LPA would likely improve conditions (such as air pollution, poor access to affordable housing and transportation, and poor transit service) for populations and neighborhoods that have historically been adversely affected by other past actions.

For low-income populations, among which Black, Indigenous, and people of color (BIPOC) communities are overrepresented, the impacts of tolling associated with the Modified LPA, such as the share of total household income spent on transportation costs, may be a disproportionate and adverse impact. The IBR Program is considering a low-income toll program to address these impacts.

EJ populations would benefit from the Modified LPA through the construction of light-rail transit; increased transit frequencies; improved travel times on I-5; improved bicycle and pedestrian facilities; and safer vehicle, bicycle, and pedestrian travel.

Cumulative Effects Conclusion – Environmental Justice

Past actions, such as the original construction of I-5 and I-205 led to the displacement of residences, affected businesses, and influenced development patterns and growth in Portland and Vancouver. Present actions include population growth and continued development that include residential and/or business displacements and increases in the cost of living. Reasonably foreseeable actions include continued development and population growth that could impact low-income households and their access to affordable housing, and result in longer commute times and higher transportation costs. Present and reasonably foreseeable future actions in the study area that affect EJ populations would be required to follow state and federal guidelines to provide mitigation for displacement and other adverse impacts.

The No-Build Alternative would not result in displacements that would affect EJ populations or improvements to the transportation system, including active transportation facilities and transit, that would improve mobility for EJ populations. The Modified LPA would effect EJ populations, including minority and low-income individuals, through the displacement of businesses and residents by noise, dust, and traffic during construction. For low-income populations, tolling of the Columbia River bridges would affect transportation costs. The IBR Program is considering a low-income toll program to address these impacts. The Modified LPA would improve conditions (such as air pollution, poor access, and poor transit service) for EJ populations and neighborhoods. The Modified LPA would provide beneficial cumulative effects to EJ populations through a variety of transportation improvements to public transportation, traffic congestion, active transportation, and traffic safety.

Under the No-Build Alternative, the cumulative effects on EJ populations from past, present, and reasonably foreseeable future actions would be adverse due to the potential for displacements that could affect EJ individuals and businesses and rising transportation costs. Compared to the No-Build Alternative, the cumulative effects on EJ populations from the Modified LPA would be adverse due to the potential displacement of EJ individuals and businesses and beneficial through improvements in access, traffic safety, transit service, air quality, and noise.

Aviation

Effects from Past, Present, and Reasonably Foreseeable Future Actions

Two airports are located near the study area: Pearson Field and Portland International Airport (PDX). Both airports were in operation prior to construction of I-5 in the early 1950s (though improvements at both airports have occurred since then), and both the airports and the existing Interstate Bridge pre-date federal

aviation regulations. Past actions affecting aviation in the study area include development that penetrates the airspace of aircraft landing or departing at Pearson Field. The towers of the existing Interstate Bridge and several buildings in downtown Vancouver currently penetrate Pearson Field Part 77 airspace. There are no known planned reasonably foreseeable future projects in the area that would contribute to cumulative effects on airspace.

No-Build Alternative

The No-Build Alternative would not alter existing aviation conditions. The towers of the Interstate Bridge would continue to penetrate into Pearson Field Part 77 airspace, which requires special departure procedures to help aircraft avoid the towers. The Interstate Bridge creates no intrusion or hazard for aircraft navigation at PDX. There are no other known reasonably foreseeable future actions in the study area that could contribute to cumulative effects on airspace; however, any impacts from reasonably foreseeable future actions would be subject to federal aviation regulations, in addition to local airport overlay zoning regulations and Pearson Field departure procedures.

Modified LPA

The Modified LPA would have no effect on aviation at PDX. The Modified LPA with a single-level or double-deck fixed-span configuration would contribute to beneficial cumulative effects on operations at Pearson Field by removing the lift towers that were introduced when the existing Interstate Bridge was constructed. The Modified LPA with the movable-span configuration would also remove the existing lift towers but would introduce new penetrations into the Pearson Field airspace and would contribute to existing cumulative effects on aviation. The lift towers for the vertical lift span, based on the preliminary design, would be similar in elevation to the existing lift towers and permanently penetrate the Pearson Field airspace. The Modified LPA would reduce wildlife strike risk at Pearson Field by including bridge design features to reduce the potential for bird nesting and roosting combined with continued deterrence measures.

Cumulative Effects Conclusion – Aviation

Past actions, including development in downtown Vancouver and construction of I-5, led to airspace penetrations for aircraft landing or departing at Pearson Field. Present actions would comply with Federal Aviation Administration requirements to ensure compliance with airspace regulations. There are no reasonably foreseeable future actions in the study area that would affect aviation airspace.

The No-Build Alternative would not change existing airspace conditions; several buildings in downtown Vancouver and the existing Interstate Bridge would continue to penetrate the Pearson Field Part 77 airspace and require specific departure procedures to help aircraft avoid the bridge towers. The Modified LPA could reduce bird nesting and bird strike risk at Pearson Field. The Modified LPA would have no effect on aviation at PDX but, depending on the bridge configuration, could result in new airspace penetrations for Pearson Field airspace.

Under the No-Build Alternative, the cumulative effects on aviation from past, present, and reasonably foreseeable future actions would be negligible as other actions would continue to comply with Federal Aviation Administration requirements. Compared to the No-Build Alternative, the cumulative effects on aviation from the Modified LPA would be minor and beneficial due to reduced potential for bird nesting and, if a movable-span configuration is selected, adverse through continued penetration into protected airspace.

3.23.4 Temporary Cumulative Effects

Cumulative effects during construction may result when simultaneous or sequential construction projects have an additive effect on the temporary effects of constructing the Modified LPA. Construction of the

Modified LPA, which includes construction of the new bridges and removal of the existing bridges, is anticipated to overlap with the construction of several of the reasonably foreseeable future projects listed in Section 3.23.2. These include Vancouver Waterfront, Terminal 1, Renaissance Boardwalk, Waterfront Gateway, the various levee system improvements, Portland Expo Center, and the Cascade Renewable Transmission Project. In addition, numerous transportation projects in the 2018 RTP are scheduled for construction in the same timeframe.

Simultaneous or sequential construction projects can increase congestion, cause temporary delays and disruptions to local residents and businesses, create more temporary employment opportunities, impact community and natural resources, and require additional public and private spending. Temporary cumulative effects on the community may result from local traffic congestion and rerouting, as well as noise and air quality impacts, when construction of the Modified LPA overlaps with the construction of other projects in the area. Other projects would have their own traffic control plans, but some may influence the travel routes of commuters and freight and could place more traffic in the study area. Likewise, some projects are on planned haul routes and could influence the delivery of supplies and materials to the job sites for the Modified LPA.

As more detailed plans are developed, traffic control plans would need to be coordinated with these projects and their timelines. Mitigation plans, including coordinated traffic control plans and business assistance, would reduce the temporary negative consequences of construction, while the employment demands would result in positive economic outcomes for the region.

Construction of the Modified LPA could also result in increased employment and spending in the study area during construction. The extent of these effects depends on the funding sources and the makeup of work crews used during construction. This could affect the ability of other projects to obtain skilled workers.

Construction of the Modified LPA is likely to affect marine commerce, including disruptions and delays for vessels during the in-water work (projected to be periodic over 4 years). Several other projects will require in-water work that may occur at the same time, including the Renaissance Boardwalk, the levee system improvements, and the Cascade Renewable Transmission Project.

In addition to marine commerce, overlapping in-water work can also create temporary cumulative effects on fish and wildlife. For each project, most construction-related natural environment impacts would be localized in extent and magnitude such that cumulative effects from other projects would be minimal. Other projects in the area, such as the two levee improvement projects and the Cascade Renewable Transmission Project, could directly impact the same waters or wetlands or regulated habitats that the Modified LPA would affect. Cumulative effects related to construction activities would only occur if such activities were being conducted simultaneously and near construction being conducted for the Modified LPA. Temporary cumulative effects to aquatic habitats may include underwater noise from pile driving, physical benthic impacts, and shading from temporary in-water and overwater structures.

Any project that requires substantial in-water construction work would require federal approvals for work within the river and would therefore undergo Endangered Species Act consultation. To minimize impacts to aquatic species and their habitats, certain work below the ordinary high water mark of the Columbia River and North Portland Harbor would be restricted to defined timing restrictions, referred to here as the in-water work window. The USACE, NOAA Fisheries, USFWS, ODFW, and WDFW all can recommend and/or require restrictions on the timing of in-water work during their regulatory review processes.

Upland ground-disturbing activities (including clearing, grubbing, and excavation) have the potential to cause erosion, which in turn may introduce sediment into adjacent water bodies. However, reasonably foreseeable future projects would require project-specific erosion and sediment control plans, which would reduce the potential for upland construction to cause turbidity in the Columbia River.

If construction of reasonably foreseeable future projects does occur simultaneously with IBR Program-related construction, adverse cumulative effects would be temporary and minimized through construction coordination between ODOT, WSDOT, and other agencies.

3.23.5 Irreversible and Irretrievable Commitments of Resources

NEPA regulations from the Council on Environmental Quality require the environmental analysis to identify "…any irreversible and irretrievable commitments of resources that would be involved in the proposed action should it be implemented" (CFR 1502.16). Irreversible and irretrievable resource commitments include the use of nonrenewable resources throughout a project that may be irreversible if removal of the resources occurs and cannot be replaced within a reasonable timeframe (for example, extinction of a threatened or endangered species) or if obstruction of the use of resources occurs after construction. Implementing the Modified LPA would involve committing natural, physical, human, and fiscal resources.

The proposed improvements would involve a long-term conversion of approximately 47 acres of land to provide right of way for the Modified LPA. Although these transportation facilities could revert to urban land and open space, that is unlikely and would require resources to make happen. Fossil fuels used to power construction, operate vehicles, and manufacture materials are the major nonrenewable resources that would be consumed by construction of the Modified LPA and the resulting daily vehicle operations.

Considerable amounts of labor and material, including cement, aggregate, asphalt, sand, fill materials, lime, and steel, would be used for construction. For demolition of the existing infrastructure, reuse options are relatively limited, but many materials can be recycled. As construction packages and plans are developed, construction bid document specifications or performance requirements could include measures such as maximizing the inclusion of recycled material to reduce new material production, such as recycling existing concrete and asphalt pavements to be used as aggregate base, subbase, backfill materials, etc. The use of these construction materials would not have an adverse impact upon continued availability of these resources. Construction would also require a substantial one-time expenditure of both state and federal funds that may not be retrievable. Retrievability is possible if the improved transportation facilities spur economic growth and toll revenues are bonded to provide capital funding for bridge construction.

4. DRAFT SECTION 4(F) EVALUATION

This chapter provides analysis and information to comply with Section 4(f) of the U.S. Department of Transportation Act (49 U.S. Code [USC] 303 and 23 USC 138).

4.1 Introduction

Chapter Contents

4.1 Introduction
4.2 Summary of 2011 Final Section 4(f) Findings
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4.6 Measures to Minimize Harm
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4.8 Coordination
4.9 Preliminary Section 4(f) Findings

Section 4(f) of the Department of Transportation Act (49 USC 303 and 23 USC 138) and its implementing regulations at 23 Code of Federal Regulations (CFR) Part 774 require U.S. Department of Transportation (USDOT) agencies, such as the Federal Transportation Administration (FTA) and Federal Highway Administration (FHWA), to avoid any use of Section 4(f) property unless there is no feasible and prudent alternative to using the land, or unless the impact will be *de minimis*. Where there is no feasible and prudent alternative to the use of Section 4(f) property, USDOT may approve only the alternative that causes the least overall harm, which is determined by balancing various factors as described in 23 CFR § 774.3(c).

A Section 4(f) property is one that includes any publicly owned parks, recreation areas, and wildlife and waterfowl refuges of national, state, or local significance, as determined by the federal, state, or local officials having jurisdiction, or any land from a historic site of national, state, or local significance, as determined by the State Historic Preservation Officer. The latter include historic properties or archaeological sites listed or eligible for listing in the National Register of Historic Places (NRHP), though archaeological sites must warrant preservation in place to be subject to Section 4(f) requirements.

Once Section 4(f) properties have been identified in the study area, it is necessary to determine whether any of them would be used by the Program activities. A Section 4(f) use is defined and addressed in the FHWA/FTA regulations in 23 CFR 774.17 and the term has a very specific meaning. A "use" of Section 4(f) property occurs when one of the following occurs:

- Land is **permanently incorporated** into a transportation facility.
- There is a **temporary occupancy** of land that is adverse in terms of the Section 4(f) statute's preservationist purposes (23 CFR 774.13(d)).
- There is a **constructive use** of land as determined by criteria in 23 CFR 774.15.
- Permanent incorporation, temporary occupancy, and constructive use are further described in FHWA's *Section 4(f) Policy Paper* (FHWA 2012) and FTA's Standard Operating Procedure No. 18 (FTA 2016).

USDOT agencies may not approve the use of Section 4(f) property with greater than *de minimis* impact unless the agency determines that (1) there is no prudent or feasible alternative, and (2) the project includes all possible planning to minimize harm to these resources resulting from such use (23 CFR 774.3).

If a project will use Section 4(f) property, the first consideration is whether the use of a Section 4(f) property would be so negligible as to constitute a *de minimis* impact or qualify as a temporary occupancy.

A Section 4(f) evaluation must be completed when a project requires the use of Section 4(f) property that will result in a greater than *de minimis* impact. This evaluation considers whether a feasible and prudent avoidance alternative exists and identifies a reasonable range of project alternatives, including those that avoid using Section 4(f) property. For each potential avoidance alternative identified, this chapter evaluates whether avoiding the Section 4(f) property is feasible and prudent. See 23 CFR 774.17.

If there are no prudent and feasible alternatives that can avoid all Section 4(f) properties, then the Section 4(f) analysis must determine which alternative, after measures to minimize harm, results in the least overall harm to Section 4(f) properties. Assessment of least overall harm must consider seven factors—ability to mitigate adverse impact (including any measures that result in benefits to the property); relative severity of the remaining harm, after mitigation, to the protected activities, attributes or features of each Section 4(f) property; relative significance of each Section 4(f) property; views of the officials with jurisdiction over each Section 4(f) property; degree to which the alternative meets the Purpose and Need of the Program; impacts on other important non-Section 4(f) properties after reasonable mitigation; and whether there are substantial differences in cost between the alternatives. See 23 CFR 774.3(c)(1).

Project effects on a Section 4(f) property may be so negligible as to constitute a *de minimis* impact or qualify as a temporary occupancy. Temporary occupancy exceptions are defined under 23 CFR 774.13(d) as occupancies of land that are so minimal as to not constitute a use within the meaning of Section 4(f) given that five conditions detailed in 5.1.3 are satisfied.

Permanent incorporation, temporary occupancy, and constructive use are further described in FHWA's *Section 4(f) Policy Paper* (FHWA 2012) and FTA's Standard Operating Procedure No. 18 (FTA 2016).

4.1.1 Permanent Incorporation

Land is permanently incorporated into a transportation project when it has been purchased as right of way or when sufficient property interests have been otherwise acquired for the purpose of project implementation. An example would be a permanent easement that is required for project construction or that grants a future right of access onto Section 4(f) property, such as for the purpose of routine maintenance by the transportation agency.

4.1.2 *De Minimis* Impact

Title 23 USC Section 138 and Title 49 USC Section 303 allow for a simplified process and approval for projects that have only *de minimis* impacts on lands subject to protection under Section 4(f). *De minimis* impacts are of such a minor extent they do not require a full Section 4(f) evaluation. Section 4(f) use is assessed in terms of the magnitude of impact to determine whether the use is "*de minimis*" or not "*de minimis.*" For historic sites, a *de minimis* impact means that the Administration has determined, in accordance with 36 CFR part 800 (a.k.a. Section 106) that no historic property is affected by the project or that the project will have "No Adverse Effect" on the historic property question. For parks, recreation areas, and wildlife and waterfowl refuges, a *de minimis* impact is defined under 23 CFR 774.17 as "one that will not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f)." Avoidance, minimization, mitigation, and enhancement measures must be considered in assessing the net impact to the Section 4(f) property to make a *de minimis* determination. FHWA/FTA is required to consider the net impact after measures to minimize harm are applied.

A finding of *de minimis* impact must include concurrence by the officials with jurisdiction. After providing an opportunity for public comment, the official(s) with jurisdiction issues their concurrence in writing for the proposed *de minimis* impact determination. *De minimis* impact determinations can be made for permanent incorporations or temporary occupancies.

The requirements of Section 4(f) are satisfied if it is determined that a transportation project would have only a *de minimis* impact. Therefore, if a project would have only a *de minimis* impact on a Section 4(f) property, there is no obligation to analyze feasible and prudent avoidance alternatives or all possible planning to minimize harm to the property because, by definition in 23 CFR 774.17, impacts on the Section 4(f) property are reduced to a *de minimis* level.

4.1.3 Temporary Occupancy

Temporary occupancy occurs when a property is required for a limited amount of time for project construction-related activities. There is no permanent acquisition of property, but the temporary use of the property is adverse to the preservation purpose under Section 4(f). In some situations, temporary occupancy may not constitute a use under Section 4(f) if it meets the following five conditions of the temporary occupancy exception criteria in 23 CFR 774.13(d):

1. Duration must be temporary, i.e., less than the time needed for construction of the project, and there should be no change in ownership of the land;
2. Scope of the work must be minor, i.e., both the nature and the magnitude of the changes to the Section 4(f) property are minimal;
3. There are no anticipated permanent adverse physical impacts, nor will there be interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis;
4. The land being used must be fully restored, i.e., the property must be returned to a condition which is at least as good as that which existed prior to the project; and
5. There must be documented agreement of the official(s) with jurisdiction over the Section 4(f) property regarding the above conditions.

In cases where the five conditions of the temporary occupancy exception criteria are met, there is no use of Section 4(f) properties. If one or more of the conditions for the exception cannot be met, then the temporary occupancy becomes a use of the Section 4(f) property even though the duration is temporary. Documented concurrence of the official(s) with jurisdiction is necessary to demonstrate that the temporary occupancy exception criteria are met and must be kept on file as part of the project. Concurrence documentation is typically included in the Final Section 4(f) evaluation.

4.1.4 Constructive Use

Constructive use occurs when there is no physical use of a Section 4(f) property, as would be the case when there is a permanent incorporation or temporary occupancy, but there are proximity impacts on an adjacent or nearby Section 4(f) property, after incorporation of impact mitigation, that are so severe that they result in a substantial impairment of the property's activities, features, or attributes that qualify it for protection under Section 4(f). Constructive use includes proximity impacts such as noise, access restrictions, vibration, ecological intrusions, and visual impacts. Not all proximity impacts result in a constructive use—only those that will "substantially diminish" the activities, features, and attributes of a Section 4(f) property. For instance, a park whose central features include views and quiet where a transportation project would block views and devalue the serenity of the park due to noise could be a proximity impact, whereas merely a change in views or incremental increases in noise likely would not be a proximity impact.

For historic sites, a constructive use does not occur when compliance with the requirements of 36 CFR 800.5 (Assessment of adverse effects) for proximity impacts of the proposed action, on a site listed in or eligible for the NRHP, results in an agreement of "No Effect" or "No Adverse Effect" (23 CFR Section 774.15). Therefore, where permanent incorporation or nonexempt temporary occupancy occurs for a given Section 4(f) property and/or there is "No Effect" or "No Adverse Effect," this evaluation does not further discuss constructive use. Constructive use is an extremely rare occurrence.

The evaluation to determine whether there is a constructive use is subject to the criteria in 23 CFR 774.15(e). These criteria are provided below and are referenced for constructive use evaluations in Section 4.3 of this evaluation. These criteria focus on noise, aesthetics, access, vibration, and ecological intrusion.

> *(e) The Administration has reviewed the following situations and determined that a constructive use occurs when:*
>
> > *(1) The projected noise level increase attributable to the project substantially interferes with the use and enjoyment of a noise-sensitive facility of a property protected by Section 4(f), such as:*
> >
> > *(i) Hearing the performances at an outdoor amphitheater;*
> >
> > *(ii) Sleeping in the sleeping area of a campground;*
> >
> > *(iii) Enjoyment of a historic site where a quiet setting is a generally recognized feature or attribute of the site's significance;*
> >
> > *(iv) Enjoyment of an urban park where serenity and quiet are significant attributes; or*
> >
> > *(v) Viewing wildlife in an area of a wildlife and waterfowl refuge intended for such viewing.*
> >
> > *(2) The proximity of the proposed project substantially impairs esthetic features or attributes of a property protected by Section 4(f), where such features or attributes are considered important contributing elements to the value of the property. Examples of substantial impairment to visual or esthetic qualities would be the location of a proposed transportation facility in such proximity that it obstructs or eliminates the primary views of an architecturally significant historical building, or substantially detracts from the setting of a Section 4(f) property which derives its value in substantial part due to its setting;*
> >
> > *(3) The project results in a restriction of access which substantially diminishes the utility of a significant publicly owned park, recreation area, or a historic site;*
> >
> > *(4) The vibration impact from construction or operation of the project substantially impairs the use of a Section 4(f) property, such as projected vibration levels that are great enough to physically damage a historic building or substantially diminish the utility of the building, unless the damage is repaired*
> >
> > *and fully restored consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties, i.e., the integrity of the contributing features must be returned to a condition which is substantially similar to that which existed prior to the project; or*
> >
> > *(5) The ecological intrusion of the project substantially diminishes the value of wildlife habitat in a wildlife and waterfowl refuge adjacent to the project, substantially interferes with the access to a wildlife and waterfowl refuge when such access is necessary for established wildlife migration or critical life cycle processes, or substantially reduces the wildlife use of a wildlife and waterfowl refuge.*

4.1.5 Summary of 2011 Final Section 4(f) Findings

Where details of the CRC Final Section 4(f) Evaluation for a given property are still relevant and accurate, they have been included to support the Draft Section 4(f) Evaluation for the IBR Program.

The CRC project's Final Section 4(f) evaluation identified 11 park and recreation facilities and 36 historic sites.

- The CRC evaluation analyzed the use of Section 4(f) properties for five different alternatives: The CRC LPA: Included a new river crossing over the Columbia River and the I-5 highway improvements, including improvements to seven interchanges, north and south of the river and enhancements to the local street network, as well as light-rail extension from the Expo Center to Clark College, bicycle and pedestrian improvements throughout the corridor, tolling for the river crossing, and transportation demand management measures.
  - LPA Option A included local vehicular access between Marine Drive and Hayden Island on a multimodal bridge.
  - LPA Option B did not have traffic lanes on the light-rail bridge, but would provide direct auto access between Marine Drive and Hayden Island with collector-distributed lanes on two new bridges adjacent to I-5.
- Alternative 2: Included a full replacement crossing downstream (west) of the current I-5 alignment. The new crossing would include three bridges (two northbound and southbound traffic and a third for transit, bicycles, and pedestrians) or a stacked, two bridge configuration with transit, bicycle and pedestrian decks suspended beneath the vehicle deck. This alternative would use bus rapid transit; it would not include light-rail transit (LRT).
- Alternative 3: Similar to Alternative 2 except that LRT would be used instead of bus rapid transit.
- Alternative 4: Retained both existing I-5 bridges and add one new bridge. Existing bridges would be restriped to provide two northbound lanes on each bridge and provide safety shoulders for disabled vehicles. A new, wider bicycle and pedestrian facility would be added to the east side of the existing northbound (eastern) bridge. A new supplemental bridge would be constructed downstream of the existing bridges and would include four southbound traffic lanes, safety shoulders, and bus rapid transit; it would not include LRT
- Alternative 5: Similar to Alternative 4 except that LRT would be used instead of bus rapid transit.

The CRC Section 4(f) evaluation determined that:

- Land from 36 Section 4(f) properties (10 park and recreation properties and 26 historic sites) would be used under the CRC LPA, with 11 properties experiencing a use with greater than *de minimis* impact and 25 experiencing a *de minimis* impact. One park and recreation property (East Delta Park) and ten historic sites would not experience a use under Section 4(f).
- As part of the CRC LPA, no park and recreation properties or historic sites would experience a constructive use.

There were no prudent and feasible alternatives that would avoid all Section 4(f) resources. All prudent and feasible alternatives would use Section 4(f) properties. The CRC Final Section 4(f) evaluation analyzed several alternative options to evaluate avoidance and minimization of impacts to some of the Section 4(f) properties.

The evaluation considered the following measures to minimize harm to Section 4(f) properties in Portland:

- Moving the Marine Drive/I-5 Interchange ramps farther east or west.
- Other measures specified in the Section 106 Memorandum of Agreement, including:
  - Documenting a historic property prior to deconstruction using the Historic American Building Survey/ Historic American Engineering Record standards,
  - Attempting to relocate and adaptively reuse elements of a historic property,

  - Developing interpretive materials, and
  - Developing multiple property documentation for postwar boat and automobile dealership showroom buildings.

Measures to avoid or minimize harm to the northbound Interstate Bridge included:

- Reusing the existing bridge and crossings in alternative locations and keeping the existing bridge and providing a supplemental crossing. These were determined not to meet the Purpose and Need.
- Documenting the bridge; preparing a marketing plan to find alternative uses for the bridge or individual spans; incorporating decorative or interpretive elements of the existing bridge into the new bridge; communicating the structure's history through interpretive programs and a web site; and developing multiple property documentation for bridges in Oregon and Washington.

The evaluation identified measures to minimize harm to properties in Vancouver—in particular, the Waterfront Renaissance Park and Trail and Marshall Community Center and Park—including:

- Reduce harm to the west edge of the Vancouver National Historic Reserve (VNHR), by selecting the supplemental crossing, shifting the replacement crossing alignment to the west, or stacking northbound I-5 on-ramps from SR 14 vertically instead of aligning them horizontally.
- Reduce harm to the west edge of the VNHR and the Barracks Post Hospital, by reducing I-5 lane width or shoulder widths below standards, or eliminating one or more of the proposed auxiliary lanes from I-5 between SR 14 and Mill Plain.
- Reduce acquisitions of VNHR and to reduce harm to the Fort Vancouver Village area and Old Apple Tree Park, select the SR 14 left-loop interchange design, refine its design, or reorient the I-5/SR 14 interchange.
- Assist with the redevelopment and relocation of Waterfront Park and Trail.
- Minimize impacts to Marshall Community Center and Park, realign and narrow the Mill Plain to Fourth Plain interchange ramps, restripe the Community Center parking lot to reduce off-street parking spaces lost, and enter into a shared agreement with Clark park and ride to reduce lost on-street parking.

Several of the alternatives evaluated required design deviations within the study area and often resulted in (1) additional impacts to properties that would otherwise not be affected, (2) unacceptable safety or operational problems, or (3) were not consistent with the project's Purpose and Need. Reasonable minimization measures were identified during the CRC evaluation and were incorporated into the LPA. The CRC project team coordinated with parties that had jurisdiction over identified Section 4(f) properties, including Portland Parks and Recreation (PP&R), the National Park Service (NPS), Vancouver-Clark Parks and Recreation Department, Vancouver Public Schools, Washington State Department of Archaeology and Historic Preservation, Oregon State Historic Preservation Office, and the City of Vancouver to refine the proposed project footprint that reduced the number of Section 4(f) uses and resulted in a *de minimis* determination for many of the Section 4(f) uses. The CRC project team analyzed the LPA, Alternatives 2 and 3 (Replacement Crossing), and Alternatives 4 and 5 (Supplemental Crossing) following the seven factors in 23 CFR 774.3(c) to determine which alternative would cause the least overall harm. After evaluating each CRC alternative, FHWA and FTA determined that the LPA would result in the least overall harm of all alternatives, for the following reasons:

- *Ability to mitigate impacts to Section 4(f) properties, including any benefits to properties:* All alternatives were found to have similar ability to mitigate impacts, but the LPA and Alternatives 2 and 3 would provide the most benefit to Section 4(f) properties.
- *Severity of remaining harm after mitigation:* All alternatives were found to have generally equivalent severity of impacts after mitigation.

- *Relative significance of each Section 4(f) property:* Relative significance of 4(f) properties was found to be similar for all alternatives.
- *Views of officials with jurisdiction:* Officials with jurisdiction who expressed a preference generally preferred the LPA (modified version of Alternative 3).
- *Degree to which alternative meets the purpose and need for the project:* The LPA was found to best meet the project's Purpose and Need. Alternatives 4 and 5 were found to be considerably less effective at meeting the Purpose and Need.
- *Magnitude of impacts to non-Section 4(f) properties after mitigation:* The magnitude of non-Section 4(f) impacts was found to be lowest for Alternatives 2 and 3 (fewer acquisitions) and generally equivalent for the LPA and Alternatives 4 and 5.
- *Substantial cost difference among alternatives:* No substantial cost difference among alternatives was found.

4.1.6 IBR Draft Section 4(f) Evaluation

In 2011, FHWA issued a Final Section 4(f) determination on park and recreation properties and historic sites for the Columbia River Crossing (CRC) project. There were no wildlife or waterfowl refuges in the CRC project study area and there are none in the IBR Program study area. Where details of the CRC Final Section 4(f) Evaluation for a given property are still relevant and accurate, they have been included in the Draft Section 4(f) Evaluation for the IBR Program.

The analysis included in this Draft Section 4(f) Evaluation for the IBR Program incorporates relevant information for Section 4(f) properties from CRC to the degree that information is still accurate, but a new evaluation was prepared due to changes in:

- The affected environment, including changes in the eligibility of properties for protection under Section 4(f). The addition of sites due to sites aging in to historic eligibility account for the majority of changes.
- Regulations or guidance that have occurred since the 2011 determination including clarifications regarding *de minimis* impacts provided in FHWA's *2012 Section 4(f) Policy Paper.*
- The use of properties by the IBR Modified LPA with all design options as a result of changes in eligibility or other conditions described in Chapter 2.

This Section 4(f) Evaluation is being made available to the public to review and comment concerning the effects on the protected activities, features, and attributes for park and recreation properties and historic sites and preliminary *de minimis* impact findings for these properties as required by 23 CFR 774.5(b)(2) during the review period for the IBR Program's Draft Supplemental Environmental Impact Statement (SEIS) to provide an opportunity for wide public distribution.

4.2 IBR Section 4(f) Properties

4.2.1 Section 4(f) Park and Recreation Properties in the IBR Program Study Area

This section provides an overview of the Section 4(f) properties that were evaluated for potential use by the IBR Program Modified LPA with all design options, hereafter referred to as the Modified LPA, within the IBR Program study area for Parks and Recreation. The Park and Recreation Study Area is defined in the Parks and Recreation Technical Report. The IBR Program Parks and Recreation Technical Report discusses additional recreational properties in the IBR Program study area that are not subject to protection under Section 4(f) properties.

Table 4-1 summarizes the Section 4(f) park and recreation properties in the IBR Program study area. There are a total of 11 park and recreation facilities in the IBR Program study area including one park and recreation property in Portland and nine park and recreation properties in Vancouver.

Table 4-1. Summary Information about Section 4(f) Park and Recreation Properties in the IBR Program Study Area

State	Name	Facility Type	Location	Agency with Jurisdiction	Protected Site Features, Attributes, or Activities
Oregon	Marine Drive Trail	Regional Trail	Portland, Oregon	City of Portland	5-mile multiuse trail that includes sections with both transportation and recreational primary purposes. Only recreational sections are protected.
Oregon	East Delta Park	Regional Park	10737 N Union Court, Portland, OR	City of Portland	• 85 acres. • Softball and soccer fields, control-line flying field, sand volleyball courts, playground.
Washington	Vancouver Landing at Terminal 1	Public Dock and Park	100 Columbia Street, Vancouver, WA	Port of Vancouver	• Public dock and park located on the Columbia River to the west of I-5. • Updated in 2022 to include link to the Columbia River Renaissance Trail and a new “Rotary Way” walkway. • Also includes a small boat dock and serves river cruise vessels. • The Port plans to replace the dock with one that will support a public market.
	Vancouver Waterfront Park	Regional Park	Vancouver, WA	City of Vancouver (VPR&C)	• 7.3 acres. • Includes public open spaces, benches, a fountain, and 0.5 miles of trail connecting to the Columbia River Renaissance Trail. • Completed in 2018 as part of the Waterfront Vancouver development.

State	Name	Facility Type	Location	Agency with Jurisdiction	Protected Site Features, Attributes, or Activities
	Fort Vancouver NHS	National Park	800 Hathaway Road, Building 722, Vancouver, WA	NPS	• 209 acres (largely overlapping with the VNHR). • Historic interpretive sites and replica structures, multiuse trails, picnic tables, event and recreation fields, and reservable picnic shelter. • Newly constructed main visitor parking lot and improvements to E 5th Street, including repaving, new sidewalks, reoriented parking spaces, and bicycle and pedestrian routes completed in fall 2022. • NPS has reconstructed two replica village dwellings in the western portion of the property and maintains a tree alley that visually buffers the area.
	Old Apple Tree Park	Urban Natural Area	112 Columbia Way, Vancouver, WA	City of Vancouver (VPR&C)	• 1.3 acres. • Passive recreation, bicycle parking, and viewing; was the site of possibly the oldest apple tree in the Northwest (Heritage Apple Tree), which died in 2020—the tree was removed, leaving a stump and newly planted saplings that share a genetic makeup with the original tree. • The park is accessible from the Fort Vancouver NHS and using the Confluence Land Bridge.
	Marshall Community Center, Luepke Senior Center, and Marshall Park	Community Center and Public Swimming Pool, Senior Center, and Community Park	1015 E McLoughlin Boulevard, Vancouver, WA	City of Vancouver (VPR&C)	• 19 acres. • Community center, play equipment, community gardens, loop trail, picnic tables, horseshoe pits, and ball fields and the Marshall and Luepke Centers. • The community center contains a swimming pool, fitness center, two basketball courts, commercial kitchen, meeting rooms, offices, and studios for aerobics and arts and crafts. Luepke is a full-service senior center with multipurpose and meeting rooms. • The City of Vancouver installed new accessible play equipment in the park in fall 2022.

State	Name	Facility Type	Location	Agency with Jurisdiction	Protected Site Features, Attributes, or Activities
	Clark College Recreational Fields	Sports Fields and Courts	1500 E Mill Plain Boulevard, Vancouver WA	Clark College	• 13.5 acres. • Sports fields, courts.
	Leverich Community Park	Community Park	39th and M Streets, Vancouver, WA	City of Vancouver (VPR&C)	• 16 acres. • Disc golf course, picnic tables, paved walkways, reservable picnic shelter, restroom, and play equipment.
	Arnada Neighborhood Park	Neighborhood Park	610 E 25th Street, Vancouver, WA	City of Vancouver (VPR&C)	• 3-acre park. • Includes a gazebo, picnic shelter, play equipment, sport court, benches, and a paved walkway.
	Burnt Bridge Creek Trail	Multiuse Trail	Vancouver, WA	City of Vancouver (VPR&C)	• 8-mile paved multiuse trail that passes through the Burnt Bridge Creek Greenway on the east and west sides of I-5 with a pedestrian and bicycle-only bridge over the freeway.

I-5 = Interstate 5; NHS = National Historic Site; VPR&C = City of Vancouver Parks, Recreation, and Cultural Services

Complete descriptions and additional information for these facilities are available in the Parks and Recreation Technical Report, and further descriptions are contained in Section 4.3 of this evaluation. Figure 4-1 maps the locations of park and recreation properties in the IBR Program study area.

Figure 4-1. Section 4(f) Park and Recreation Properties: IBR Program Study Area

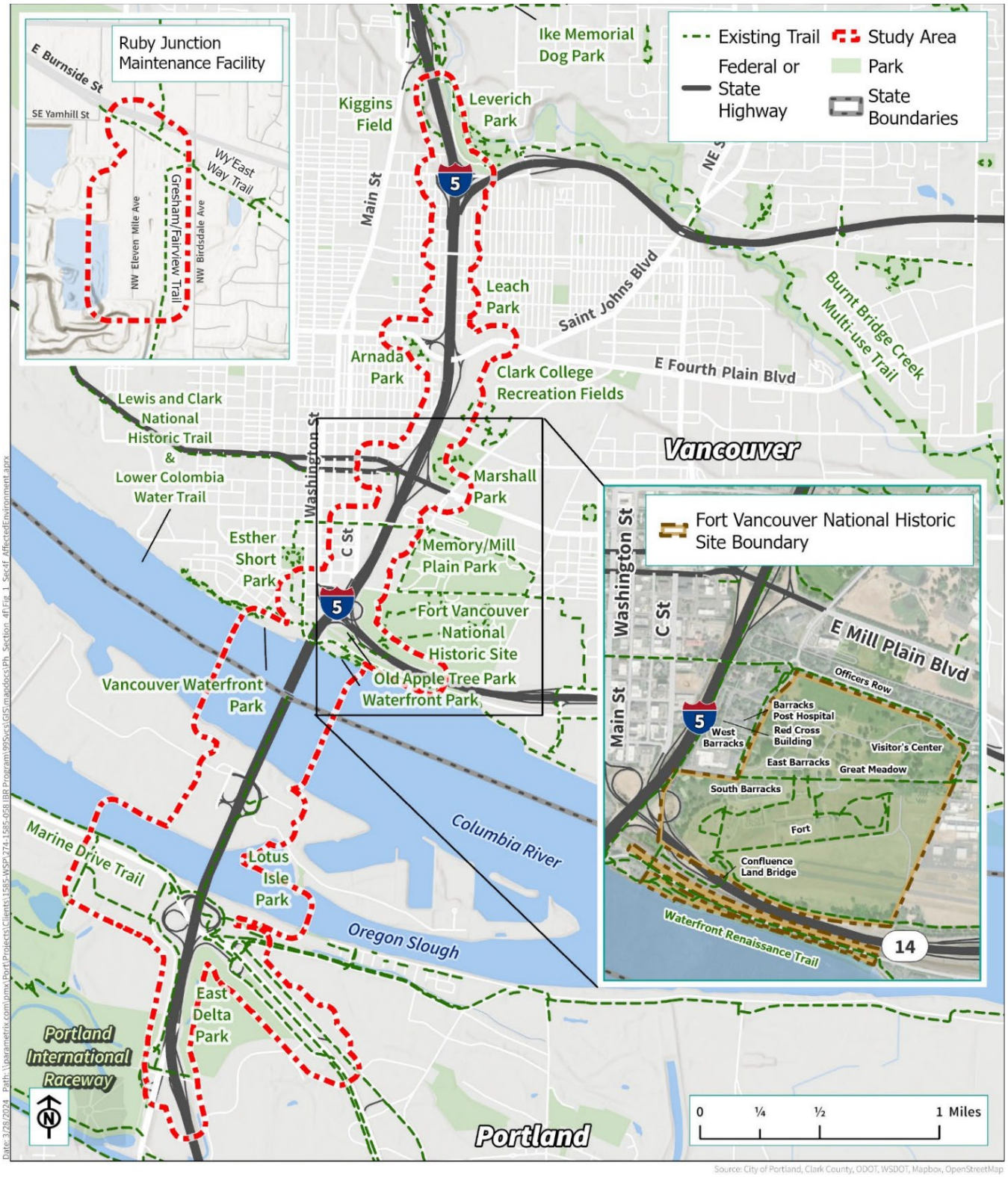


Figure 4-2 through Figure 4-5 provide more detailed maps of the Section 4(f) park and recreation properties in Oregon, of the Fort Vancouver National Historic Site (NHS), between Mill Plain Boulevard and Fourth Plain Boulevard, and north of Fourth Plain Boulevard (respectively).

Figure 4-2. Section 4(f) Park and Recreation Properties: Oregon

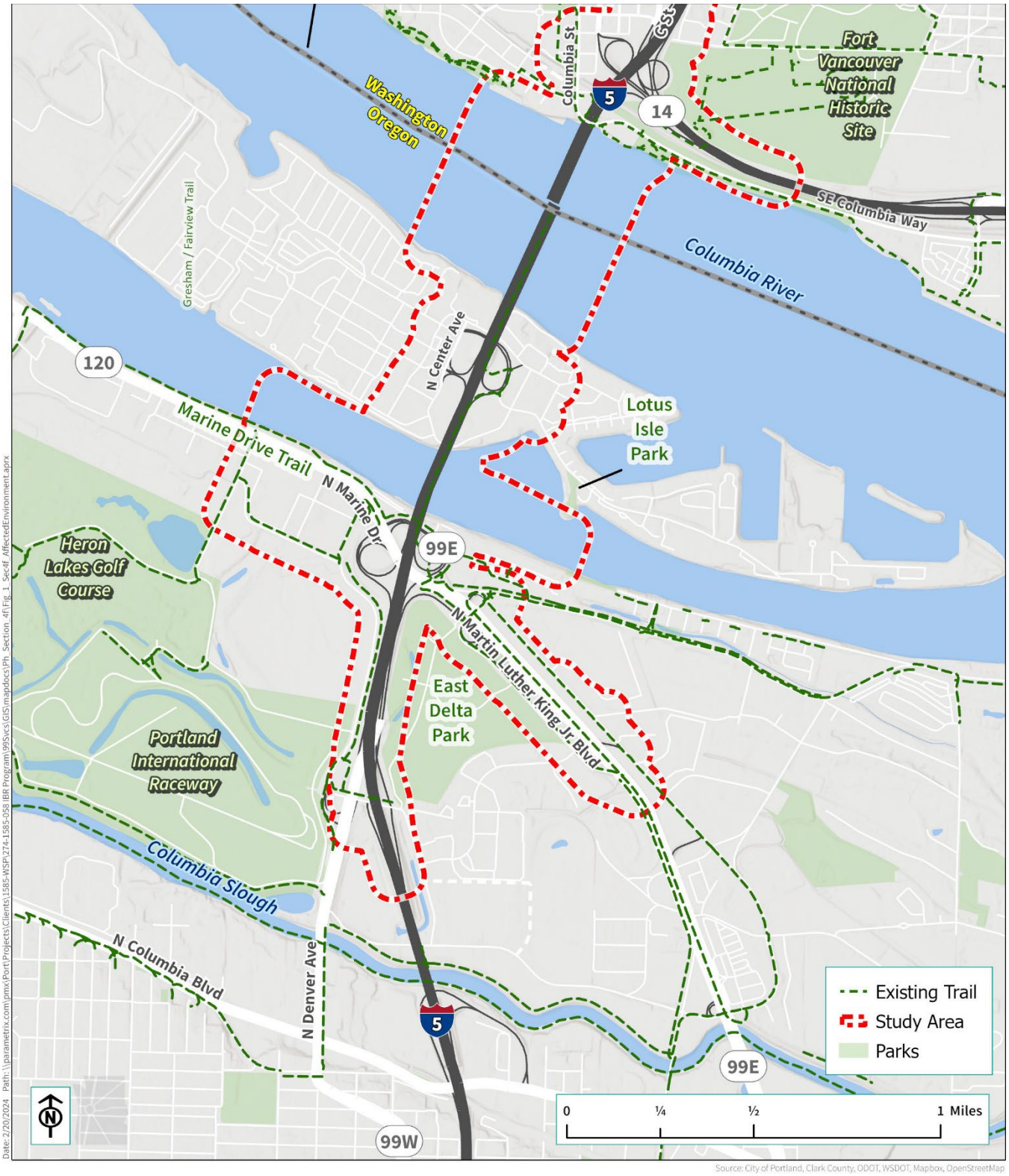
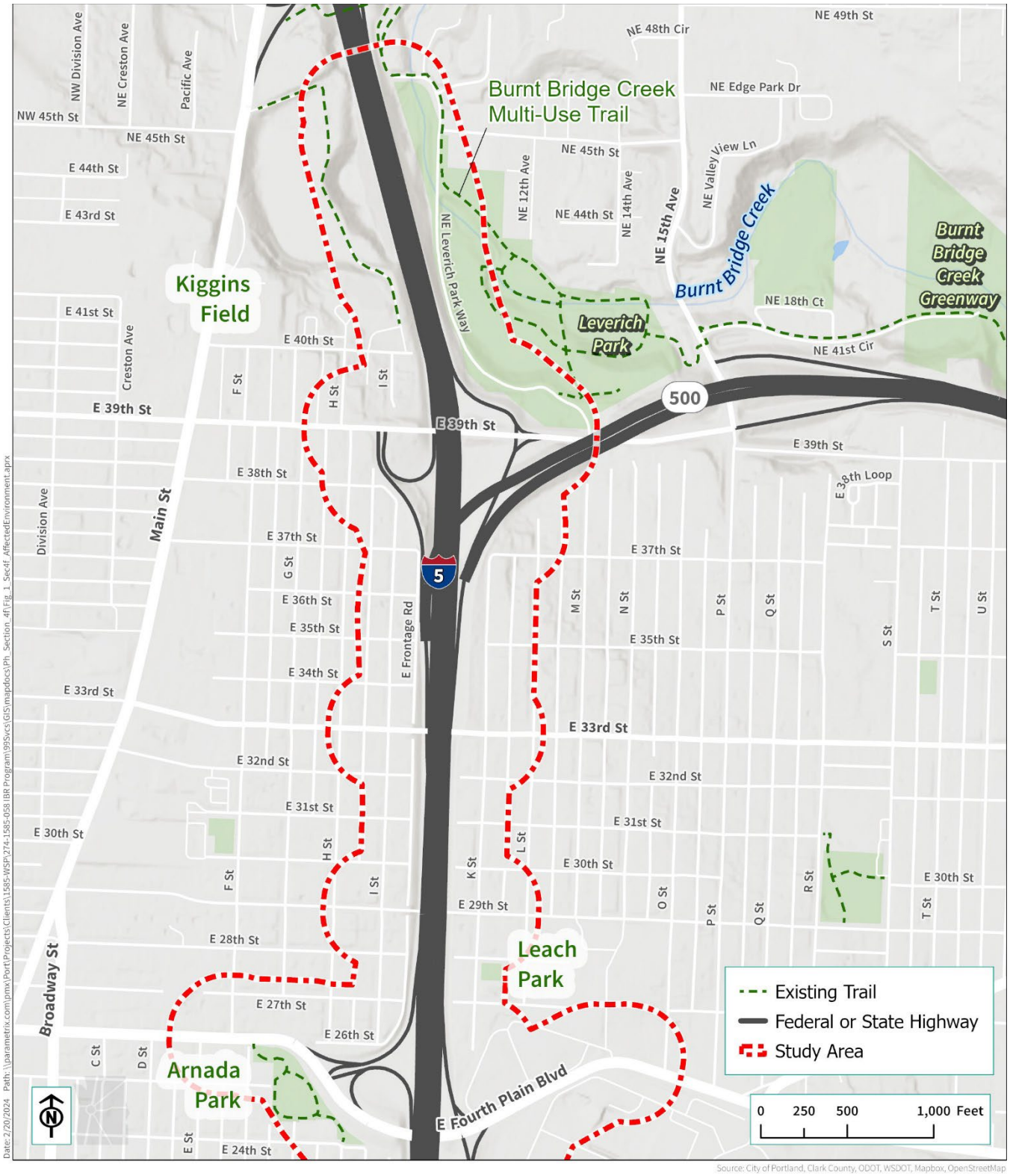


Figure 4-3. Section 4(f) Park and Recreation Properties: Fort Vancouver National Historic Site

Figure 4-4. Section 4(f) Park and Recreation Properties: Mill Plain Boulevard to Fourth Plain Boulevard

Figure 4-5. Section 4(f) Park and Recreation Properties: North of Fourth Plain Boulevard



The VNHR was created by Congress in 1996 and includes the Fort Vancouver NHS and related properties. The VNHR is cooperatively managed by the NPS, the Washington State Department of Archaeology and Historic Preservation, the Department of the Army, and the City of Vancouver.

A portion of the VNHR was listed as a historic district on the NRHP in 2008, whereas the NPS identifies the Fort Vancouver NHS as a park. For these reasons, the IBR Program's Draft Section 4(f) Evaluation treats the VNHR Historic District as a historic site inclusive of the Fort Vancouver NHS and treats the Fort Vancouver NHS separately as a park and recreational property to explicitly address both the public park and the historic significant activities, features, and attributes of the property. Table 4-1 provides summary information on Section 4(f) park and recreation properties in the IBR Program Study area.

Facilities within the study area that qualify for an exception under 23 CFR 774.13 and are not evaluated further for a use under Section 4(f) in Section 4.3 of this document are described below.

Wy' East Way Path: The Wy'East Way Path is a 2-mile path located in Gresham that runs along the light-rail line from Ruby Junction Station in Rockwood south to Cleveland Station in downtown Gresham. The City of Gresham's website emphasizes the Wy'East Way Path as a connection to the Gresham/Fairview Trail and Springwater Corridor, creating a continuous 6-mile loop through Gresham. The path is described as being an alternative transportation route to get around Gresham; the path provides easier access to local parks, trails, public transit, schools, and businesses. Per 23 CFR 774.13(f)(4), trails that are part of the local transportation system and function primarily for transportation are not required to receive Section 4(f) approval; therefore, the Wy'East Way Path, as trail that functions primarily for transportation, is not subject to Section 4(f).

Gresham-Fairview Trail: The Gresham-Fairview Trail is a 3.29-mile trail in Gresham that connects to the Springwater Trail at SW 10th Avenue and can also be accessed at Northeast Halsey Street at 201st Avenue from the north. Oregon Metro (Metro), the Portland area's regional government, emphasizes the purpose of the trail as connecting origins and destinations. The trail connects town centers, schools, employment centers, and housing in east Multnomah County with the MAX light-rail, provides access to the Columbia River for residents in Gresham and Fairview, connects to six other regional trails (including Springwater Corridor, Marine Drive Trail and Sandy River Connection), and provides access to major recreational and scenic resources including the Columbia River and local parks. The Gresham-Fairview Trail is part of the Metro's 40-Mile Loop Trail, which connects more than 30 parks in Multnomah County along the Columbia, Sandy, and Willamette Rivers, Johnson Creek, and the Tualatin Mountains.

Per 23 CFR 774.13(f)(4), trails, paths, bicycle lanes, and sidewalks that are part of the local transportation system and that function primarily for transportation do not require Section 4(f) approval. The Gresham-Fairview Trail primarily serves as a trail for movement of people through active transportation modes and connecting origins and destinations in the area and, therefore, does not require approval under Section 4(f).

Lower Columbia River Water Trail: The Lower Columbia Water Trail traverses the Columbia River, running underneath both the new and proposed bridges. Guidance provided by FHWA in the *Section 4(f) Policy Paper*, Question 21A indicates that Section 4(f) generally does not apply to rivers, but that it would apply to portions of publicly owned rivers, which are designated as recreation trails. The Lower Columbia Water Trail is not designated as part of the National Water Trail System. Because the Lower Columbia River Water Trail is informally designated by the Lower Columbia River Partnership, a nonprofit organization, and not an official with jurisdiction over a park and recreation area (which is an agency as defined under 23 CFR 774.17), the water trail is not protected under Section 4(f).

Columbia River Renaissance Trail (formerly referred to as Waterfront Renaissance Trail): The Columbia River Renaissance Trail is a 5-mile-long, 14-foot-wide multiuse paved trail starting at the intersection of Columbia Way and Columbia Street and extending east to Marine Park and Wintler Park. The trail is open from 7:00 a.m. to dusk, connects Vancouver's downtown to the Columbia River waterfront, and offers multiple benches for viewing. The Columbia River Renaissance Trail is a portion of the Discovery Historic Loop Trail and connects to the Fort Vancouver NHS. The portion of the trail in the study area is designated along the public sidewalk on the south side of Columbia Way. After construction is complete, the trail and Columbia Way would be realigned and reconstructed. The newly constructed portion of trail would continue to be located within City of Vancouver right of way for Columbia Way. In accordance with 23 CFR 774.13(f), and as per Question 15A of the *Section 4(f) Policy Paper*, "Section 4(f) would apply to a publicly owned, shared-use path or similar facility (or portion thereof) designated or functioning primarily for recreation…" (FHWA 2012). While considered in the CRC Final Section 4(f) Evaluation, because the affected portion of trail is located within public right of way that is a sidewalk and functions primarily for an active transportation purpose connecting to and between downtown Vancouver, the Vancouver waterfront, and several parks in the region, and the trail would remain as a sidewalk after construction, the Columbia River Renaissance Trail is not subject to Section 4(f).

Discovery Historic Loop Trail: The Discovery Historic Loop Trail is a 2.9-mile trail that connects the Fort Vancouver NHS and the VNHR with the Vancouver waterfront and downtown. The trail is located within and is a feature of the Fort Vancouver NHS Park for much of its extent. It also overlaps with the Columbia River Renaissance Trail along the waterfront. Because it is contained within the Fort Vancouver NHS and overlaps the Columbia River Renaissance Trail, it is not counted as a separate recreational property. The trail follows sidewalks on local streets in downtown Vancouver outside of the Fort Vancouver NHS and the Renaissance Trail. While considered in the CRC Final Section 4(f) Evaluation, per 23 CFR 774.13(f)(4), trails that are part of the local transportation system and function primarily for transportation, such as the Discovery Historic Loop Trail, are not subject to Section 4(f) approval.

Kiggins Bowl Sports Fields/Stadium: Located northwest of the I-5 and E 39th Street interchange, the Kiggins Bowl Sports Fields/Stadium is a Vancouver Public Schools facility that sits on the same property as Discovery Middle School. The Discovery Middle School property contains the school, parking lots bordering the school entrance on E 40th Street, internal vehicle circulation areas, and recreational facilities. The recreational facilities include sports fields, natural areas, a trail connecting to the Burnt Bridge Creek Trail, a track around an artificial turf soccer field, a football field, a 4,000-square-foot field house at the northern end of the football field, team rooms, public restrooms, and locker rooms. Planned improvements include modernizing the existing stadium to include seismic upgrades, a secondary press box, a new traffic surface over the seating risers, and upgrades to the lower-level locker rooms. Only the track surrounding the football fields is open to the public, with the remaining facilities requiring a contract with Vancouver Public Schools for their use.

Where public properties are managed for multiple purposes, such as for the Discovery Middle School property that contains the Kiggins Bowl Sports Fields/Stadium, Section 4(f) only applies to the portions of these lands that "function for, or are designated in the plans of the administering agency as being for, significant park, recreation, or wildlife and waterfowl refuge purposes" as per 23 CFR 774.11(d). Thus, only the portion of the property that contains the sports fields, natural areas, trail connection, track, football field, field house, team rooms, restrooms, and locker rooms are subject to Section 4(f), and not the portion of the property containing the school, as shown on Figure 4-6. Both the permanent land acquisition and the temporary easement needed by the Modified LPA, including all design options, would be small portions of the Discovery Middle School property that are located at the far southeastern corner, which is not within the area managed for recreational use.

While considered in the CRC Final Section 4(f) Evaluation, due to the shared use on the property, Discovery Middle School is not a Section 4(f) property under 23 CFR 774.11(d). The acquisition area and temporary easement from the facility would be located on the portion of the property used for school purposes and therefore would not meet the applicability criteria for Section 4(f).

Nearby Parks: The IBR Program Park and Recreation Technical Report notes that Lotus Isle Park, Esther Short Park, Leach Park, and Ike Memorial Dog Park "are located near to, but outside of the IBR Program study area and would not be affected by the Modified LPA or design options." These parks are not further discussed in this evaluation.

Figure 4-6. Kiggins Bowl Sports Fields/Stadium Modified LPA with Design Options

4.2.2 Section 4(f) Historic Sites in the IBR Program Study Area

This section summarizes the Section 4(f) historic sites evaluated for potential use by the IBR Program Modified LPA, including all design options, within the Section 106 cultural resources area of potential effect (APE), which is the Section 4(f) study area boundary for historic sites. See Section 3.8, Cultural Resources, of the Draft SEIS, which discusses how the cultural resources APE boundary was established. There are a total of 32 historic sites including four historic districts that include multiple sites eligible or listed under the NRHP within the cultural resources APE. Of these, 10 historic sites are in Portland and 22 historic sites are in Vancouver. Figure 4-7 through Figure 4-9 depict the geographic location of Section 4(f) historic sites in the IBR Program cultural resources APE, and Table 4-2 provides a summary description of these historic sites.

Figure 4-7. Summary of Section 4(f) Historic Sites in the IBR Program Study Area – Oregon

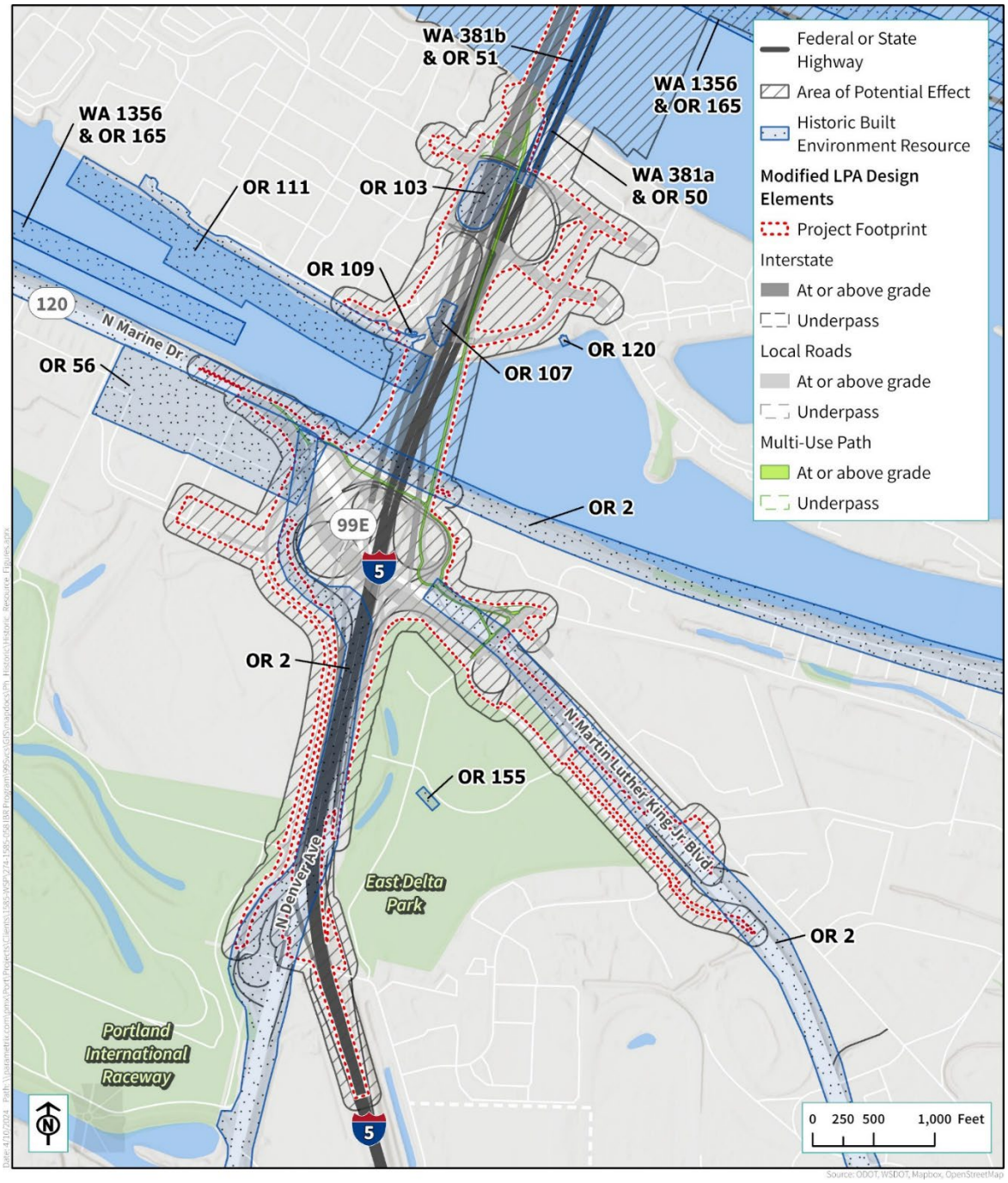


Figure 4-8. Summary of Section 4(f) Historic Sites in the IBR Program Study Area – Downtown Vancouver

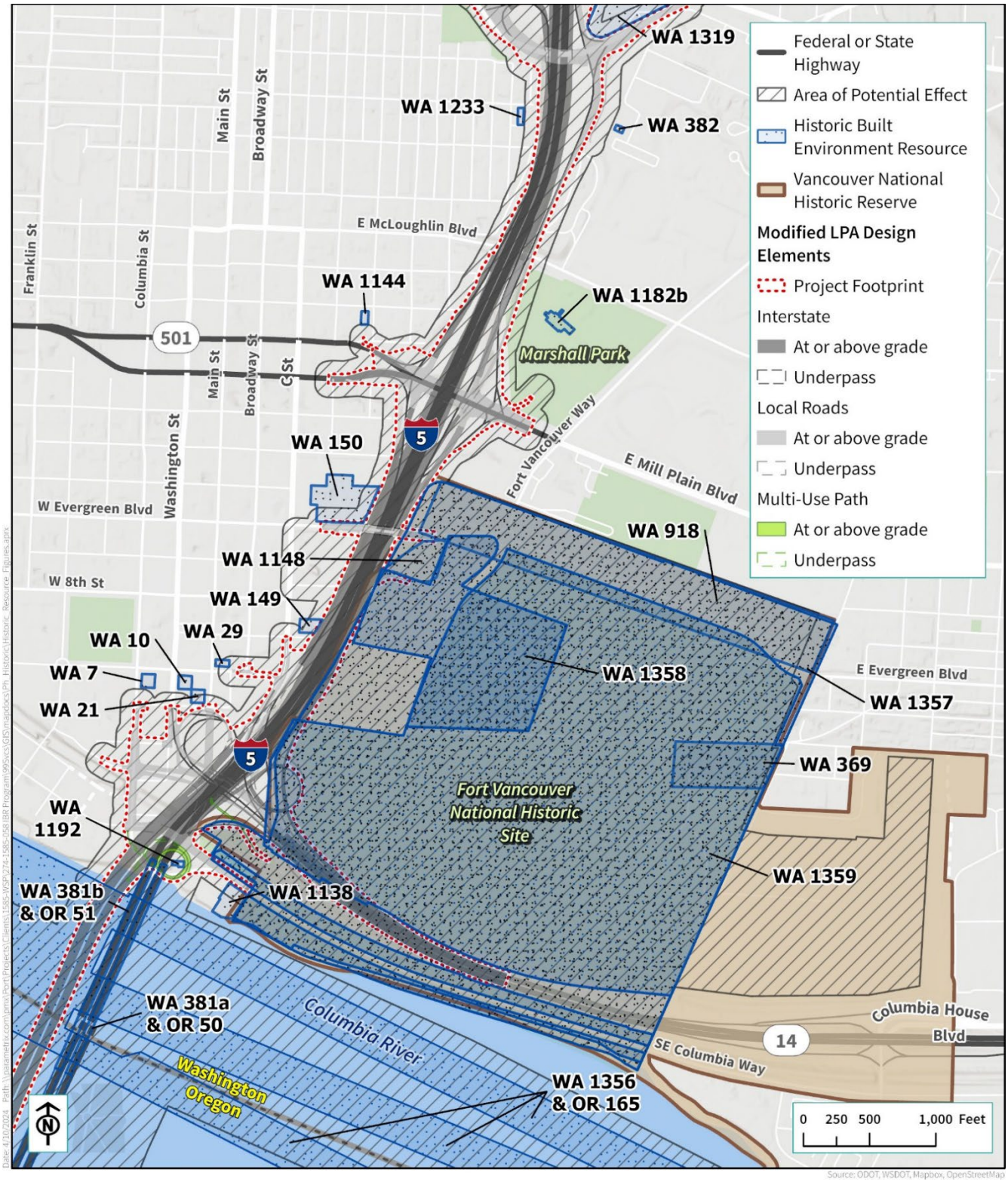


Figure 4-9. Summary of Section 4(f) Historic Sites in the IBR Program Study Area – Upper Vancouver

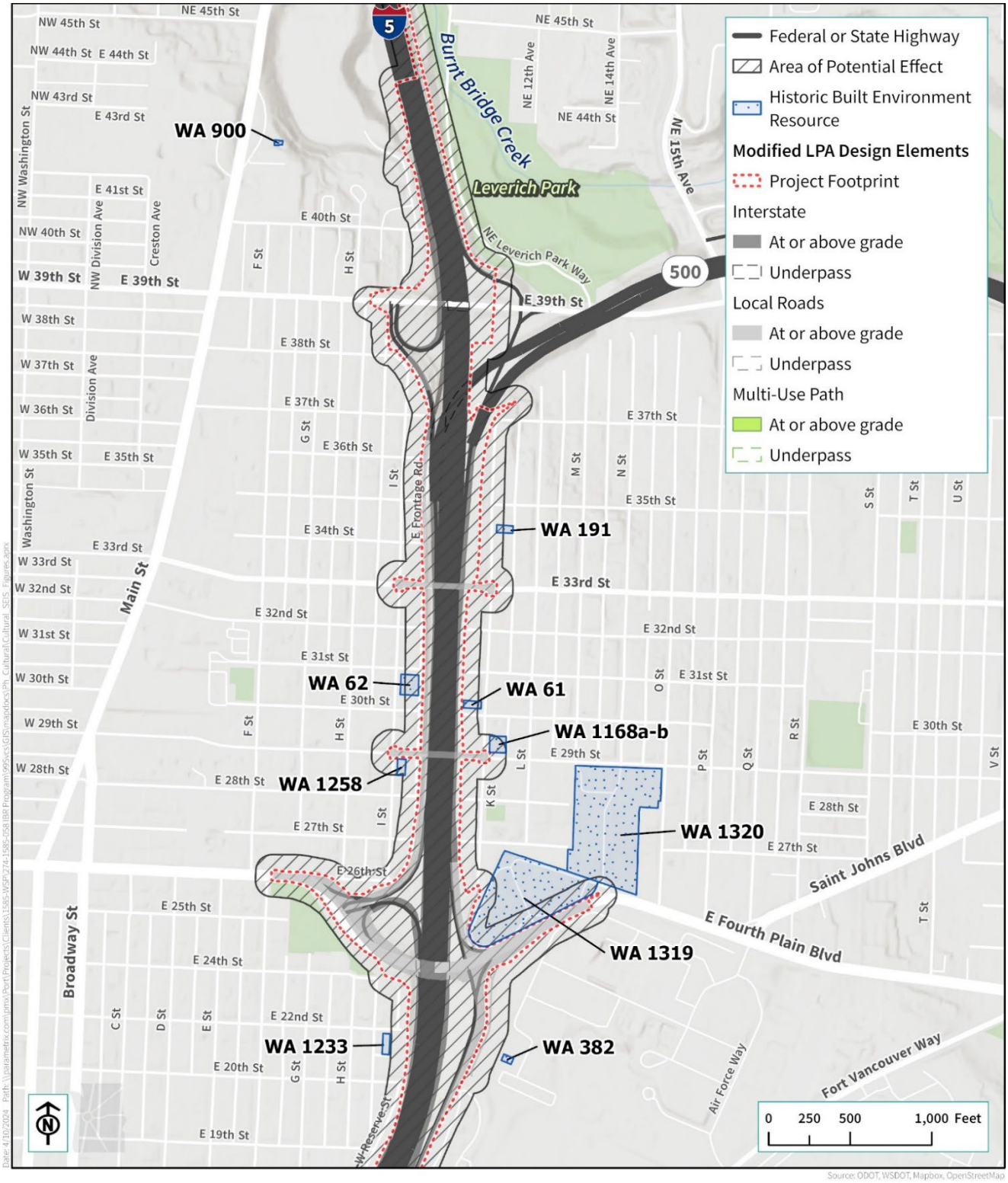


Table 4-2. Summary Information about Section 4(f) Historic Sites in the IBR Program Study Area

State ID	Name	Location	Description
OR 2	Columbia Slough Drainage Districts Historic District, Portland		The district consists of a group of four geographically contiguous Columbia Slough drainage districts that are located on the Columbia River floodplain between the Willamette and Sandy Rivers, occupying approximately 10,000 acres. Within the Columbia Slough Drainage Districts Historic District are six resource types: sloughs, canals, levees/ fills, pumping plants, weirs/dams, and ditch systems. The Columbia River Levee, North Denver Avenue Cross Levee, and Union Avenue/Martin Luther King Fill/Cross Levee are each an historic contributing element to the Columbia Slough Drainage Districts Historic District within the IBR Program study area.
OR 50	Northbound Interstate Bridge		The northbound Interstate Bridge is a steel truss bridge that crosses the Columbia River between Portland and Vancouver. Completed in 1917 and modified in 1958, the bridge is composed of a span across the Columbia River that measures 3,538 feet in length. The main span of the bridge in Vancouver is a steel through truss vertical lift span of the Pennsylvania-Petit type. The vertical lift span, when fully raised, creates a waterway clearance channel that measures 250 feet laterally and 178 feet vertically (OLW). The bridge is also composed of 10 steel through Pennsylvania truss secondary spans that range in length from 266 to 531 feet. The bridge was retrofitted in 1958 to mimic the design of the westerly, southbound bridge.
OR 56	Portland Assembly Center	2060 N Marine Drive, Portland	The Portland Assembly Center is a 1919 Georgian Revival and Modern building that is a complex of five interconnected exposition halls built between 1924 and 2001 and commonly known as the “Portland Expo Center.” The period of significance for the NRHP-eligible Portland Assembly Center is limited to 1942, corresponding to the period of Japanese American incarceration at the site.
OR 103	Toll Administration Building/ODOT Permit Center	12348 N Center Avenue, Portland	The Toll Administration Building/ODOT Permit Center is a Modern-style two-story building with a penthouse. The building was constructed in 1959 to administer tolling of vehicular traffic across the 1917 northbound Interstate Bridge and 1958 southbound Interstate Bridge and is located at the southern end of Hayden Island.
OR 107	Harbor Shops	11915 N Center Avenue, Portland	The Harbor Shops building is a Postmodern-style strip mall located at 11915 N Center Avenue in Portland. Constructed in 1978, this one-story building features an irregular footprint with an elongated “zigzag shape” and a flat roof with a high parapet.
OR 109	Jantzen Beach Water Tank	N Center Avenue, Portland	The Jantzen Beach Water Tank and Pump House are utilitarian structures located near the intersection of North Center Street and North Jantzen Avenue on Hayden Island in Portland. Initial construction of the water tank was completed in 1968.
OR 111	Jantzen Beach Moorage	1501 N Jantzen Avenue/1525–2055 N Jantzen Avenue, Portland	The Jantzen Beach Moorage is located at North Portland Harbor in the Columbia River. Originally built in 1935, the moorage offered leasable and—eventually—privately owned slips for floating homes starting in 1958. The property is 27.3 acres, and encompasses a linear dock, multiple finger piers, a parking lot, and associated hardscaping and landscaping. The moorage is host to approximately 175 floating homes located on the water of North Portland Harbor.

State ID	Name	Location	Description
OR 120	Hayden Island Yacht Club Clubhouse	12050 N Jantzen Drive, Portland	The Hayden Island Yacht Club Clubhouse is a yacht club clubhouse constructed in 1972. The building has a rectangular footprint measuring approximately 75 feet from north to south and approximately 60 feet from east to west. It has a split-level form, with the southern two-thirds of the building being single-story and the northern one-third structured as one-and-one-half stories.
OR 155	East Vanport Commercial Center	10850 N Denver Avenue, Portland	The East Vanport Commercial Center at 10850 North Denver Avenue was constructed in 1943 as the commercial core for the wartime housing project of East Vanport in the East Columbia neighborhood of Portland. The one-story building features a concrete slab foundation and a generally rectangular footprint measuring approximately 216 feet from northwest to southeast by approximately 64 feet from northeast to southwest.
OR 165	Lower Columbia River Federal Navigation Historic District	Columbia River from River Mile (RM) 3 to RM 145	The Lower Columbia River Federal Navigation Historic District (LCR Nav Historic District) is a series of structures built and maintained by USACE since in 1873. The boundary for the LCR Nav Historic District encompasses a series of noncontiguous structures, including navigation channels, six turning basins, 41 pike dike systems, and nine landforms created from dredge materials.
WA 7	Fendrich's Furniture	209 W 6th Street, Vancouver	Fendrich's Furniture is a two-story, square-in-plan commercial building constructed in 1947 with elements of Stripped Classical, Art Deco, and Streamline Moderne styles. It is constructed of reinforced concrete clad in brick veneer on the street-facing elevations, and it has a metal-capped parapet on its flat roof.
WA 10	Smith Tower	515 Washington Street, Vancouver	The building at 515 Washington Street, known as Smith Tower, is a Modern-style residential apartment complex constructed in 1966 and located in the Esther Short neighborhood of Vancouver. The principal form of the building is a 15-story cylindrical tower measuring approximately 100 feet in diameter and 158 feet in height; the distinctive building is visible from many areas of downtown Vancouver.
WA 21	Evergreen Hotel	500 Main Street, Vancouver	The Evergreen Hotel is an Italian Renaissance–style hotel located in downtown Vancouver and was constructed in 1928. The hotel has not undergone any major alterations and retains its character-defining features. These features include the site's central downtown location, two primary entrances with six broad bays (on the south and east elevations), marble balconies, arched motifs, sandstone style finish, projecting roof forms clad in Spanish tile, and expansive interior spaces with a large staircase and mezzanine.
WA 29	U.S. National Bank Building	601–603 Main Street, Vancouver	The U.S. National Bank Building was constructed in 1912 in downtown Vancouver. It is a five-story, steel-framed commercial building with Renaissance and Classical Revival style ornamentation.
WA 61	Porter House	3000 K Street, Vancouver	The Porter House is a circa 1912 Craftsman bungalow in the Rose Village neighborhood of Vancouver. The building has a T-shaped plan and a concrete foundation with a partial basement. The wood-framed exterior walls rise one and a half stories to a low-pitched, side-gabled roof with wide, overhanging eaves with exposed purlins and a wide fascia under the gable.

State ID	Name	Location	Description
WA 62	Hall House	903 E 31st Street, Vancouver	The Charles W. and Margaret B. Hall House is a Craftsman bungalow in the Shumway neighborhood of Vancouver. Constructed in 1912, the building has a rectangular plan and a full concrete basement. Its wood-framed exterior walls rise two stories in height to a front-gabled roof with a deep overhang, wide wood bargeboards, and wood knee braces.
WA 149	Normandy Apartments	318 E 7th Street, Vancouver	The Normandy Apartments building is a Tudor Revival style, multifamily housing complex. The building was originally constructed in 1928 and modified in 1960.
WA 150	House of Providence (Providence Academy)	400 E Evergreen Boulevard, Vancouver	The House of Providence (Providence Academy) is an institutional property. The property, constructed between 1873 and 1874, contains an ornate, three-story building that is clad in brick and shows the influence of the Georgian/Federal and French Colonial architectural styles.
WA 191	William H. and Myrtle Hood Residence	3405 K Street, Vancouver	The Hood Residence is a circa 1919 Craftsman bungalow in the Rose Village neighborhood of Vancouver. The building has a rectangular plan with a concrete foundation and a full basement. Its wood-framed exterior walls are clad in lapped wood siding and rise one story in height to a front-gabled roof with unenclosed eave overhangs and decorative knee brackets
WA 368, 369, 918, 109	VNHR	The district was listed in the NRHP in 2007 under Criteria A, C, and D with a period of significance beginning in 2,500 BP and ending in CE 1966.	The VNHR is an NRHP-listed historic district that encompasses 397.7 acres and includes a total of five historic properties—four listed or determined eligible historic districts and one historic site. Of the 397.7 acres within the VNHR boundary, 49.74 acres were WSDOT highway right of way at the time of listing of the reserve and do not contribute to eligibility. The Fort Vancouver site was first established as a national historic site in 1966 to preserve and interpret historically significant and exceptionally complex overlapping areas associated with Native American, Hudson's Bay Company, U.S. military, and NPS uses of land that have occurred over time.
WA 381a	Northbound Interstate Bridge		See description under OR 50.
WA 382	Radio Transmission Building	1601 E Fourth Plain Boulevard, Vancouver	The Radio Transmission Building at 1601 E Fourth Plain Boulevard is a Stripped Classical style building constructed in 1940. Within the city, the building is situated along the eastern edge of I-5 inside the campus of the Vancouver Veteran's Affairs Medical Center. The Radio Transmission Building has an L-shaped footprint constructed atop a concrete slab foundation that measures approximately 40 feet from north to south and 60 feet from east to west.
WA 900	Covington House	4201 Main Street, Vancouver	The Covington House at 4201 Main Street is an 1846 hall-and-parlor-pioneer log style, side-gabled single dwelling that presently functions as an events space. The building's T-shaped footprint is constructed atop a modern concrete masonry unit foundation.

State ID	Name	Location	Description
WA 1138	Who Song & Larry's	111 SE Columbia Way, Vancouver	The Who Song & Larry's Restaurant is a roadside style commercial building constructed in 1981. The building has a highly irregular plan and is constructed atop a concrete foundation. The walls of the building are clad in wood clapboard siding with corner boards and rise one to three stories in height.
WA 1144	Office Building	1514 E Street, Vancouver	The office building at 1514 E Street is a Postmodern/Northwest Regional–style office building constructed in 1977. The building is rectangular in plan with a reinforced concrete foundation and wood-framed walls that rise one story in height to a distinctive, steeply pitched roof that is hipped on three sides and gabled on one side.
WA 1148	Washington State Patrol District Five Headquarters	605 E Evergreen Boulevard, Vancouver	The Washington State Patrol District Five Headquarters (now the Vancouver Police Headquarters) is a two-story, Late Modern-style building constructed in 1975.
WA 1168	Duplex Residences	2901 K Street, Vancouver	The buildings at 2901–03 and 2905–07 K Street are single-story, Contemporary-style duplexes constructed in 1968 and located on a single tax lot in the Rose Village neighborhood of Vancouver.
WA 1182	Rudy Luepke Center for Senior Citizens	1009 E McLoughlin Boulevard, Vancouver	The Rudy Luepke Center for Senior Citizens at 1009 E McLoughlin Boulevard is a Northwest Regional–style building located in the Central Park neighborhood of Vancouver constructed in 1979. The building possesses an irregular footprint constructed atop a concrete foundation that measures approximately 93 feet from north to south and 164 feet from east to west.
WA 1192	Bridge Substation	100 SE Columbia Street, Vancouver	The Bridge Substation is a utilitarian electrical substation building. The building was originally constructed circa 1918.
WA 1233	Earls House	815 E 22nd Street, Vancouver	The Earls House is a World War II-Era cottage constructed in 1938 in the Arnada neighborhood of Vancouver. The building has a T-shaped footprint, a hipped roof with no eaves, and wood-framed walls with wood drop siding and fenestration including fixed corner windows.
WA 1258	Mickler House	901 E 29th Street, Vancouver	The Mickler House is a Workingman's Foursquare single-family dwelling located in Vancouver. The residence was constructed in 1907.
WA 1319	Vancouver Barracks National Cemetery	1200 E Fourth Plain Boulevard, Vancouver	The Vancouver Barracks National Cemetery, also referred to as the Army Post Cemetery, is a cemetery located near the southwestern corner of the Rose Village neighborhood in Vancouver. The property was established in 1882 as a permanent cemetery for the Vancouver Barracks, the earliest U.S. Army post in the American Pacific Northwest.
WA 1320	St. James Acres Cemetery	1401 E 29th Street, Vancouver	The St. James Acres Cemetery is a cemetery located at the southern edge of the Rose Village neighborhood in Vancouver.

AD = Anno Domini; BP = before present; I-5 = Interstate 5; NHS = National Historic Site; NPS = National Park Service; ODOT = Oregon Department of Transportation; OR = Oregon; USACE = U.S. Army Corps of Engineers; VNHR = Vancouver National Historic Reserve; VPR&C = City of Vancouver Parks, Recreation, and Cultural Services; WA = Washington; WSDOT = Washington State Department of Transportation

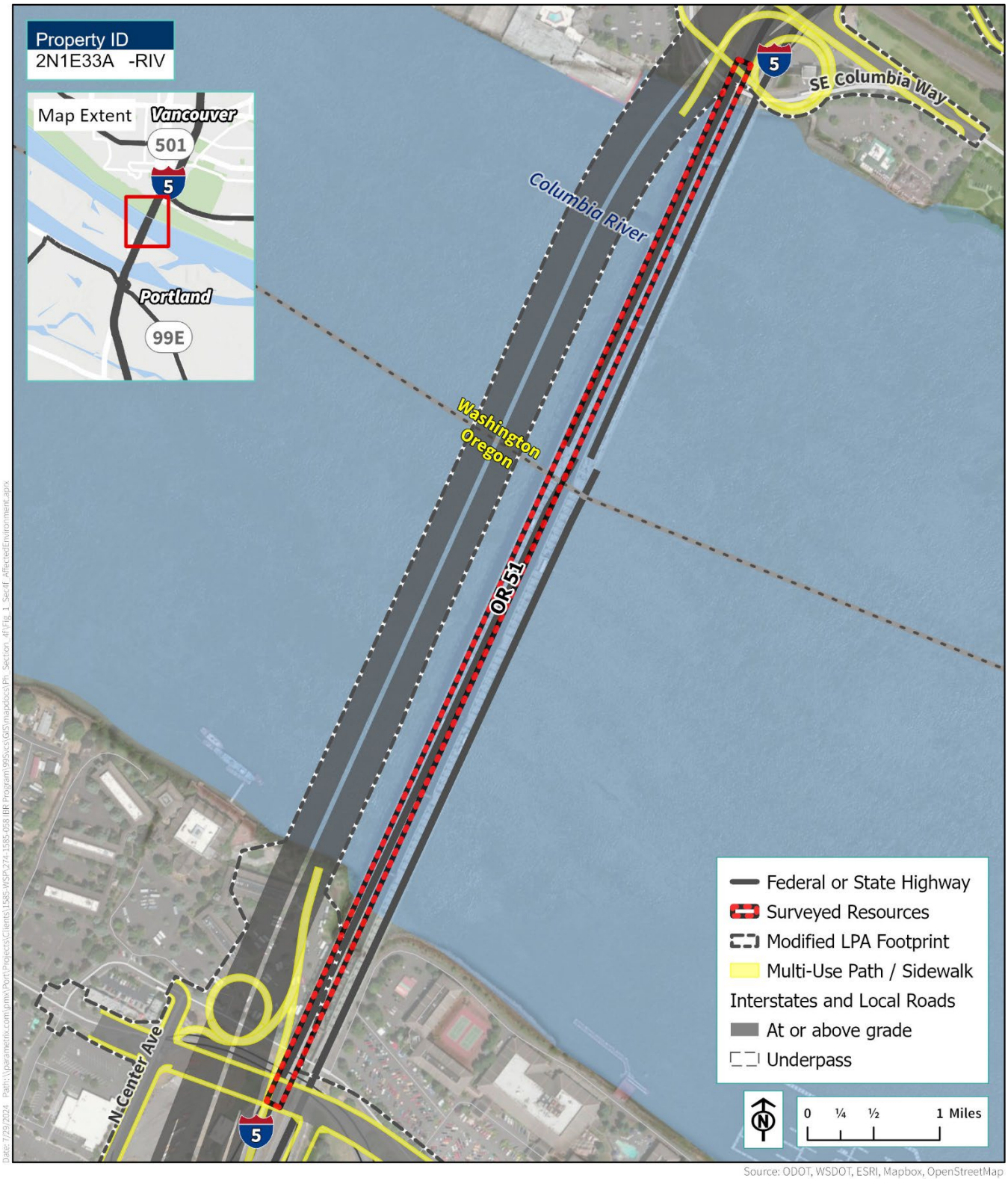
Southbound Interstate Bridge (Map ID – OR 51 and WA 381b)

The southbound Interstate Bridge is a steel truss bridge that crosses the Columbia River between Portland, Multnomah County, Oregon, and Vancouver, Clark County Washington (see Figure 4-10). Completed in 1958, the bridge spans the Columbia River and measures 3,538 feet in length. The bridge consists of 16 spans, 12 piers, and five bents, and it has a distinctive "humpback" raised form in the middle to allow for an alternate shipping channel in addition to the channel through the lift spans.

The southbound Interstate Bridge was determined eligible for the NRHP under Criteria A and C at the state level of significance in the areas of transportation and architecture. The bridge is significant under Criterion A because it is the second bridge to cross the Columbia River at this location between Vancouver and Portland. The bridge is also significant under Criterion C as a notable example of the bridge builder's art. It maintains its integrity of location, design, materials, workmanship, setting, feeling, and association, and its boundary is the entirety of the southbound bridge structure and also includes approach spans, sidewalks, and other appurtenances related to the transportation use of the bridge.

The Finding of Effect (FOE) documented in the Section 106 Level of Effect form for this site, which is contained in Appendix D of the Historic Built Environment Technical Report, is "Adverse Effect" for the Modified LPA and its design options. This finding received concurrence from the Washington Department of Archaeology and Historic Preservation (DAHP) and Oregon State Historic Preservation Office (SHPO) on October 13, 2023, and March 19, 2024, respectively.

Figure 4-10. IBR Program Improvements and Area of Permanent Incorporation for the Southbound Interstate Bridge



The Section 106 FOE for the southbound Interstate Bridge documented that the Modified LPA with all design options would result in a finding of "Adverse Effect." This finding received concurrence from the Washington DAHP on October 13, 2023, and from the Oregon SHPO on March 19, 2024. While the bridge has been determined eligible for listing on the NRHP as part of the Section 106 process, pursuant to 23 USC 103(c)(5) and 70 Federal Register (FR) 11,928 (March 10, 2005), the southbound Interstate Bridge is exempt from Section 4(f) review because the bridge was constructed without federal funding and incorporated into the Interstate Highway System after it was constructed and does not otherwise meet the exception to the exemption under 23 USC 103(c)(5). Because the southbound Interstate Bridge is exempt from Section 4(f) review, it is not evaluated for use.

4.3 Evaluation of Use of Section 4(f) Properties

4.3.1 Section Organization

This section evaluates the use of each property protected under Section 4(f). The use evaluation begins by addressing potential uses of Section 4(f) properties that would result from the IBR Program's Modified LPA and the design options with a brief summary of use in tabular format (see Table 4-3). Following the summary of use under Section 4(f) are detailed descriptions of each property and how it could be used, including permanent incorporation, temporary occupancy, and the potential for constructive use for properties that could experience proximity impacts. The evaluation for each property concludes with a Section 4(f) preliminary use determination.

No Section 4(f) properties are located in the vicinity of the Ruby Junction Maintenance Facility expansion.

This section is organized geographically from south to north and discusses uses of Section 4(f) properties located in the following areas:

- Properties in Oregon
- Properties in Washington

4.3.2 Summary of Use of Park, Recreational Areas, Waterfowl Refuges by the IBR Program Modified LPA with All Design Options

Table 4-3 summarizes the use of Section 4(f) properties for the design options of the Modified LPA. Of the 11 park and recreational facilities located in the study area that are subject to protection under Section 4(f), one would have a use with greater than *de minimis* impact, three would experience *de minimis* impacts and seven would experience no use of Section 4(f) properties under the Modified LPA or the design options.

Following the table are detailed descriptions of each Section 4(f) property, an evaluation of its use, and a preliminary determination. The use evaluation includes figures depicting areas of temporary occupancy and permanent use for each park and recreation property (to). The figures are at different scales, as noted.

All design options of the Modified LPA would result in use under Section 4(f) and, with the exception of small differences for the Fort Vancouver NHS, would result in the same area of use for the park and recreation facilities evaluated. Table 4-3 summarizes the area used and preliminary Section 4(f) evaluation for the park and recreation facilities evaluated under the Modified LPA and each design option.

At the Fort Vancouver NHS, the Modified LPA with all design options would result in slightly different levels of acquisition and temporary occupancy of the park as shown in Table 4-3. The different design options would permanently acquire area ranging from 17,000 to 20,000 square feet and would temporarily use area up to 50,000 square feet.

The Modified LPA park-and-ride design options would not use any additional Section 4(f) park and recreation properties beyond those identified for the Modified LPA and, therefore, is not discussed further.

Construction noise impacts for the Modified LPA with all design options would occur at various times throughout the approximately 9-year construction period. The construction measures discussed in Section 3.11.7 of this Draft SEIS would be applied to avoid, minimize, and mitigate temporary adverse noise impacts.

Noise and vibration effects on individual properties are discussed under the use evaluations, below. FHWA guidance (FHWA-HEP-10-025) states that all Section 4(f) properties should be analyzed as noise abatement activity category C, whether or not the underlying use is noise sensitive. Overall, many of the park and recreation properties do not rely on a quiet setting to convey their significance, and the Program's introduction of new atmospheric and audible intrusions would not diminish or impact the use and enjoyment of the property.

Table 4-3. Summary of Section 4(f) Evaluation for IBR Program Modified LPA Design Options for Park and Recreational Properties

Property, Property Size	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, and Centered I-5	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, without C Street Ramps, Centered I-5	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, and I-5 Shifted West	Modified LPA with Single-Level Fixed- or Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, and Centered I-5	Modified LPA with Single-Level Fixed- or Movable-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5	Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5
Marine Drive Trail 5 miles, including sections with both transportation and recreational primary purposes	• No permanent incorporation. Temporary occupancy of approximately 122 linear feet of recreational trail on levee. Based on 23 CFR 774.13(d), temporary occupancy of the trail would meet the exception criteria. • **Preliminary Determination**: No Section 4(f) use per 23 CFR 774.13(d).					
East Delta Park 3,811,500 square feet	• Acquires approximately 9,300 square feet of park land, including approximately 2,700 square feet of land from the western edge of the main park parcel and 6,700 square feet of vacant land for construction of the eastbound Martin Luther King Jr. Boulevard to North Union Court ramp and new shared-use path. Temporary occupancy of approximately 8,200 square feet for construction access to build a fill wall. • **Preliminary Determination**: Section 4(f) use. Based on CFR 774.17, this would be a *de minimis* impact because the project will not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f).					
Vancouver Landing at Terminal 1 Approximately 38,000 square feet	• No permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the park. • **Preliminary Determination**: No Section 4(f) use.					
Vancouver Waterfront Park 317,988 square feet	• No permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the park. • **Preliminary Determination**: No Section 4(f) use.					
Fort Vancouver NHS 8,886,240 square feet	• Acquires approximately 12,500 square feet of narrow strips of park land along the park's southern and western edges associated with modifications to the I-5/SR 14 interchange and the widening of I-5. Temporary occupancy of approximately 43,400 square feet for construction of a retaining wall. • Visual quality changes to five contributing historic resources that are part of the available recreational opportunities. • **Preliminary Determination:** Section 4(f) use because of permanent incorporation.	• Permanent Incorporation: Approximately 13,800 square feet • Temporary Occupancy: 33,900 square feet • Visual quality changes same as for the Modified LPA **Preliminary Determination:** Section 4(f) use because of permanent incorporation.	• Permanent Incorporation: Approximately 13,600 square feet • Temporary Occupancy: 34,200 square feet • Visual quality changes same as for the Modified LPA **Preliminary Determination**: Section 4(f) use because of permanent incorporation.	• Permanent Incorporation: Approximately 12,500 square feet • Temporary Occupancy: 35,200 square feet • Visual quality changes same as for the Modified LPA, but single-level configuration would be less prominent and less adverse to contributing historic resources and recreational opportunities. **Preliminary Determination**: Section 4(f) use because of permanent incorporation.	• Permanent Incorporation: Approximately 13,100 square feet • Temporary Occupancy: 34,700square feet • Visual quality changes same as for the Modified LPA, but single-level configuration would be less prominent and less adverse to contributing historic resources and recreational opportunities. **Preliminary Determination**: Section 4(f) use because of permanent incorporation.	• Permanent Incorporation: Approximately 13,100 square feet • Temporary Occupancy: 34,700square feet • Visual quality changes same as for the Modified LPA **Preliminary Determination**: Section 4(f) use because of permanent incorporation.
Old Apple Tree Park 56,628 square feet	• Acquires approximately 3,500 square feet of park land to construct a new shared-use path. A permanent airspace easement would also be required, of approximately 4,400 square feet, for the maintenance of the I-5 northbound to SR 14 elevated ramp. Temporary occupancy of approximately 7,200 square feet for construction access for the elevated ramp. • **Preliminary Determination**: Section 4(f) use. Based on CFR 774.17, this would be a *de minimis* impact because the project will not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f).					
Marshall Community Center, Luepke Senior Center, and Marshall Park 827,640 square feet	• Acquires approximately 25,200 square feet for placement of a fill wall. Displaces up to four horseshoe pits, as well as trees located in state right of way and within park boundary. Temporary occupancy of approximately 19,100 square feet along the western boundaries of the park parcel. • **Preliminary Determination**: Section 4(f) use. Based on CFR 774.17, this would be a *de minimis* impact because the project will not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f).					
Clark College Recreational Fields 566,280 square feet	• No permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the park. • **Preliminary Determination**: No Section 4(f) use.					
Leverich Community Park 696,960 square feet	• No permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the park. • **Preliminary Determination:** No Section 4(f) use.					

Property, Property Size	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, and Centered I-5	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, without C Street Ramps, Centered I-5	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, and I-5 Shifted West	Modified LPA with Single-Level Fixed- or Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, and Centered I-5	Modified LPA with Single-Level Fixed- or Movable-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5	Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5
Arnada Neighborhood Park 130,680 square feet	• Temporary occupancy of approximately 2,800 square feet at the north boundary of the park (land would be restored following construction). Based on 23 CFR 774.13(d), temporary occupancy of the park would meet the exception criteria. • **Preliminary Determination**: No Section 4(f) use per 23 CFR 774.13(d).					
Burnt Bridge Creek Trail 42,240 linear feet	• No permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the trail. • **Preliminary Determination**: No Section 4(f) use.					

Note: The square footages presented in this table were rounded to the nearest hundred.
I-5 = Interstate 5; LPA = Locally Preferred Alternative; NHS = National Historic Site; SR = State Route

4.3.3 Use of Section 4(f) Park and Recreation Properties (Oregon)

Marine Drive Trail

Description

The Marine Drive Trail is a 5-mile trail located along North Portland Harbor, connecting I-5 and the Marine Drive interchange with Kelley Point Park. The Marine Drive Trail extends from the North Portland Harbor bridge through the Marine Drive interchange, then merges with a public sidewalk on the north side of Marine Drive before veering slightly north onto a levee located on private property. The portion of the Marine Drive Trail closest to the study area is a sidewalk located on Metro-owned property through an easement held by the City of Portland running from the east side of the study area to the western edge of the Red Shores LLC property.

Based on available parcel ownership information from the Multnomah County Assessor, the majority of the length of the trail is located within ODOT right of way or City of Portland right of way and is a sidewalk adjacent to Marine Drive and the Marine Drive interchange from the eastern edge of the study area until the trail turns north onto the levee. In addition, Metro, the Portland area's regional government, designates the Marine Drive Trail a regional trail. Metro's regional trails web page emphasizes the trails purpose as connecting origins and destinations. The web page states that regional trails "connect pedestrians and cyclists to their favorite places across the region" and that "trails are designed to serve a variety of functions." (Metro n.d.). Metro describes the 40-Mile Loop Trail, of which the Marine Drive Trail is a part, as connecting more than 30 parks in Multnomah County along the Columbia, Sandy, and Willamette Rivers; Johnson Creek; and the Tualatin Mountains. The web page also emphasizes linking recreation areas to local communities (e.g., a transportation purpose).

The majority of the length of the trail within the IBR Program study area is located on a public sidewalk adjacent to Marine Drive and meets the exception in 23 CFR 774.13(f)(4) as part of the local transportation system. The FHWA *Section 4(f) Policy Paper* Question 1A provides further guidance on this issue, stating that the primary purpose of a park or recreation area is related to the property's primary function: "Incidental, secondary, occasional or dispersed activities…do not constitute a primary purpose within the context of Section 4(f)" (FHWA 2012). The Marine Drive Trail's emphasis on connecting origins and destinations in the region identify it primarily for active transportation purposes and secondarily for recreation. Therefore, the trail serves a function that is primarily the movement of people through active transportation modes (walking, biking, running, etc.) while also serving a recreational purpose and a purpose secondarily for recreation. All Marine Drive Trail segments that are located in public roadway right of way or are sidewalks, are part of local transportation system, and function primarily for transportation meet the exception under 23 CFR 774.13(f)(4) and are not a Section 4(f) recreational property.

PP&R maintains the trail segment on the levee and considers it to be a recreational facility and is therefore subject to protection under Section 4(f).

Use Evaluation for the Modified LPA

The Modified LPA with all design options would realign and reconstruct Marine Drive which would require approximately 3,000 linear feet of the 5-mile Marine Drive Trail to be closed, detoured, and demolished during bridge construction, then rebuilt in a similar location to current regional trail standards.

Under the Modified LPA with all design options, this realignment and reconstruction would occur east of the recreational trail segment on the levee. However, the recreational trail segment on the levee would be temporarily occupied for the construction of a stormwater pond. A 122 linear-foot segment of trail would be temporarily closed and occupied in this area during the stormwater facility construction.

Temporary Occupancy

The temporary occupancy (see Section) of the trail segment on the levee would meet the exception criteria in 23 CFR 774.13(d) and would not constitute a use under Section 4(f) as described below:

Temporary duration, i.e., less than the time needed for construction of the project, and there would be no change in ownership of the land

The construction of the Marine Drive recreation trail segment is anticipated to take up to 6 years which is less than the 9-year construction of the Columbia River bridges. The portion of the trail that would be temporarily occupied is owned by Metro and maintained by PP&R and would continue to be owned by Metro following construction.

Scope of the work must be minor, i.e., both the nature and the magnitude of the changes to the Section 4(f) property are minimal

The Marine Drive Trail is 5 miles long. The temporarily occupied and reconstructed trail segment is less than 1% of the entire trail length. During construction, bicycles, pedestrians, and other trail users would be detoured to the other side of Marine Drive and, at times, along the south side of the Portland Expo Center, for approximately 2,000 to 4,000 feet, depending on the stage of construction. Trail users would connect back to the existing alignment of the Marine Drive Trail at the signalized intersection with Force Avenue west of the construction area. The detour of 2,000 to 4,000 linear feet would be 8% to 15% of the total trail length. The trail detour would provide similar functionality as the portion that would be reconstructed on the north side of the road. For portions not affected by construction east and west of the IBR Program footprint, trail users would continue to be able to use the trail during construction with no additional effects. Therefore, the work would be minor and the nature and the magnitude of the changes to the trail would be minimal.

There are no anticipated permanent adverse physical impacts, nor will there be interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis

The temporary detour would maintain continuous trail access during construction and would not diminish or interfere with the protected activities, features, or attributes of the trail on permanent or temporary basis.

The land being used must be fully restored, i.e., the property must be returned to a condition which is at least as good as that which existed prior to the project; and

Following construction, the IBR Program would reconstruct the trail to a condition similar to that which existed prior to construction.

There must be documented agreement of the official(s) with jurisdiction over the Section 4(f) property regarding the above conditions.

Agreement from the official with jurisdiction, the City of Portland, is pending.

The temporary effects on the Marine Drive Trail meet the requirements of 23 CFR 774.13(d) for an exception from Section 4(f) use.

Preliminary Determination

The IBR Program Modified LPA with all design options would temporarily occupy 122 linear feet of the trail; the temporary occupancy would meet the temporary occupancy exception criteria in 23 CFR 774.13 and therefore would not be a use under Section 4(f). Based on the analysis described above, preliminary determination is that neither the Modified LPA nor design options would result in a use under Section 4(f).

East Delta Park

Description

East Delta Park (Figure 4-11) is a 3,811,500-square-foot neighborhood/regional park located adjacent to I-5 between Martin Luther King Jr. Boulevard and N Denver Avenue. Facilities at East Delta Park include a sports complex with seven lighted softball fields, five grass soccer fields, four synthetic soccer fields, six sand volleyball courts, a playground, picnic tables, restrooms, a parking lot, support buildings, and nature trails. The park has received Section 6(f) funds (Section 3.21, Section 6[f] and Federal Lands to Parks).

Figure 4-11. East Delta Park

Immediately to the north of the 3,811,500-square-foot main park parcel located south of North Union Court, the City of Portland owns a 63,000-square-foot parcel between North Union Court and Martin Luther King Jr. Boulevard that sits vacant and serves no recreational purpose, 43,560 square feet of which was transferred to PP&R under the Federal Lands to Parks (FLP) Program (Section 3.21, Section 6[f] and Federal Lands to Parks). Immediately east of the 63,000 square-foot City-owned parcel was an off-leash dog park installed within ODOT's Martin Luther King Jr. right of way; the dog park is temporarily closed for maintenance. While the dog park is closed, PP&R intends to reopen it once they can restore and maintain it. Because the former off-leash dog park location is ODOT right of way, no agreement exists between ODOT and the City of Portland for its recreational use, and it has never been designated as recreational by the property owner, it is not park or recreational land subject to protection under Section 4(f).

The Owen Softball Complex within the park is the location of the Delta Park Powwow and Encampment, an annual celebration of Native American culture. The Powwow celebrated its 50th year in 2023.

Use Evaluation for the Modified LPA

Permanent Incorporation

The Modified LPA, inclusive of all design options, would acquire approximately 2,600 square feet of land from the western edge of the main park parcel, which is a vegetated slope adjacent to I-5 and serves no recreational purpose. The Modified LPA would also permanently incorporate an approximately 6,700-square-foot portion of the 63,000-square-foot vacant parcel between North Union Court and Martin Luther King Jr. Boulevard for the eastbound Martin Luther King Jr. Boulevard to North Union Court ramp to construct a new shared-use path. The total permanent incorporation of East Delta Park would be approximately 9,300 square feet of the 3,811,500-square-foot park, or less than 1%. The use of 6,700 square feet of vacant land north of the main park parcel and 2,600 square feet along the western edge of the park neither serves nor is planned for a recreational purpose.

The vacant parcel is not used by PP&R and neither it nor the acquired areas on the western edge of the main park parcel provides a recreational function. The equivalent land area, which was converted to transportation use, would be replaced (see Section 3.21.6 for more information); therefore, the Modified LPA would not adversely affect the activities, features, or attributes that qualify East Delta Park for Section 4(f) protection.

Temporary Occupancy

The Modified LPA would also temporarily occupy approximately 8,200 square feet from the northern corner of East Delta Park (Table 4-3) to gain construction access to the I-5 right of way to build a fill wall. The temporarily affected area of the park contains grass that is periodically mowed, as well as trees and shrubby vegetation. As part of Program construction activities, approximately 10 trees along the western edge of the park may require removal or their root systems impacted. The IBR Program will obtain a Tree Removal Permit from the City of Portland and removed trees would be replaced. Construction of the retaining wall on the western edge of the park would take six months or less, and construction in the 63,000-square-foot vacant park land north of Union Court may take up to 5 years.

The park and its recreational features would remain open during construction, including the sports fields, nature trail, play structure, and picnic tables. Following construction, the vegetated slope would be revegetated and restored to equivalent prior conditions. There would be No Adverse Effect on the activities, features, or attributes of the park from the temporary occupancy.

Preliminary Determination

The IBR Program Modified LPA with all design options would permanently incorporate 9,300 square feet from Delta Park. The permanent incorporation would constitute a use of Delta Park under Section 4(f). Temporary occupancy under the Modified LPA with all design options would be an additional 8,200 square feet. Based on the analysis described in this section, neither the Modified LPA nor the design options would adversely affect the activities, features, or attributes that qualify East Delta Park for Section 4(f) protection, pending concurrence of the official with jurisdiction.

The Modified LPA with all design options would result in temporary and permanent Section 4(f) *de minimis* impact to East Delta Park consistent with the definition in 23 CFR Part 774.17.

Based on the analysis described in this section, the preliminary determination is that neither the Modified LPA nor the design options would adversely affect the activities, features, or attributes that qualify East Delta Park for Section 4(f) protection, pending concurrence of the official with jurisdiction.

4.3.4 Use of Section 4(f) Park and Recreation Properties (Washington)

Park and Recreation Properties Evaluated to Have No Use under Section 4(f)

Vancouver Landing at Terminal 1

Description

Vancouver Landing at Terminal 1 (Landing) is a public dock and park located on the Columbia River to the west of I-5. The Landing is owned and maintained by the Port of Vancouver. In 2022, the Port completed an upgrade to the Landing, which included removing the old amphitheater, rebuilding the landing, linking the existing Renaissance Trail to the Landing, and adding a walkway called Rotary Way. The park occupies a portion of the overall Landing and includes landscaped gardens, benches, interpretive signage, walkways, views of the Columbia River, and space for large events or concerts in its upper portion. The Landing also includes a lower portion that consists of a small boat dock and serves river cruise vessels. The Port of Vancouver recently deconstructed and removed the old Red Lion Hotel and Quay Restaurant and will remove the 100+ year-old dock that remains. A new dock will eventually be built in its place to support a new public market. Figure 4-12 depicts Vancouver Landing.

Figure 4-12. Vancouver Landing at Terminal 1

Note: Boundary is based on input from the Port of Vancouver and is approximate.

Use Evaluation for the Modified LPA

No permanent incorporation of Vancouver Landing is proposed as a result of construction of the Modified LPA, inclusive of all design options.

There would be no temporary occupancy of the Vancouver Landing as a result of the Modified LPA, inclusive of all design options.

Constructive Use

The thresholds for constructive use are described in Section 4.1.4 of this evaluation. Because there would be no permanent incorporation or temporary occupancy that rises to the level of use under Section 4(f), the following analysis evaluates the IBR Program Modified LPA with all design options for constructive use on Vancouver Landing consistent with the criteria in 23 CFR 774.15(e) as listed in Section 4.1.4 of this evaluation.

Noise Level Increase

FHWA applies the noise abatement criteria of 67 A-weighted decibels (dBA) Leq(h) for activity category C to Section 4(f) properties. The Modified LPA would not result in operational noise exceedances of these criteria (see Figure 3.11-7 in Section 3.11, Noise and Vibration). Construction noise would be temporary. As such, noise levels would not substantially diminish the use and enjoyment of the park. Noise levels for the Modified LPA with I-5 shifted west design option are expected to be slightly greater than for the Modified LPA because this design option would be located closer to Vancouver Landing, but would continue to be under the noise abatement criteria.

Impairment of Aesthetic Features

Users of Vancouver Landing enjoy views of the Columbia River to the west and south. Eastward views are of the river and the existing Interstate Bridge. The number of in-water piers for the existing Interstate Bridge limits eastward views along the river from Vancouver Landing. The visual analysis in Section 3.9, Visual Quality, discusses effects for the Modified LPA at one key viewpoint (KVP) in Vancouver Waterfront Park, designated as KVP 20, located approximately 1,500 feet west of Vancouver Landing. Table 3.9-6 documents the visual impact as "adverse" at that location due to the higher bridge deck and obstructions of eastward views changing project coherence.

The new bridges, under the Modified LPA and the design options, would be located immediately east of Vancouver Landing, changing southward views of the river, but would open up eastward views under the bridge because the bridge deck would be higher and there would be fewer in-water piers. Westward views would remain unchanged. Eastward views would change under the Modified LPA and the design options by having the bridge located closer, while opening up views under the bridge along the river. These changes in views, while identified as adverse because they would affect project coherence, would not substantially impair the aesthetic enjoyment of Vancouver Landing because views would remain unchanged to the west and south, while views to the east would replace the existing bridges with the new bridges in the viewshed. Aesthetic impacts would vary by bridge configuration. Neither the movable nor fixed-span configurations would substantially impair views from Vancouver Landing.

Restricted Access

The Modified LPA would not directly impact vehicular, pedestrian, or bicycle access to Vancouver Landing. Vehicles access the park from SE Columbia Way through the Vancouver Waterfront Development and would continue to do so after construction of the new Columbia River bridges. SE Columbia Way would be realigned and reconstructed east of Vancouver Landing and underneath the new Columbia River bridges. The reconstructed SE Columbia Way would contain sidewalks, bicycle lanes, and vehicular lanes, and Main Street would also be extended south from downtown to connect to SE Columbia Way, providing overall access enhancements in the vicinity of Vancouver Landing.

During construction of the Modified LPA and associated improvements to the local street network, there could be temporary street closures and increases in traffic due to rerouting from I-5 to local streets that may result in temporary access restrictions to Vancouver Landing, but local street connections to the park would remain open and the park would be accessible.

Therefore, changes to access in the vicinity of Vancouver Landing would not substantially impair its activities, features and attributes.

Vibration Impacts

As described in the *IBR Program Noise and Vibration Technical Report,* Vancouver Landing is not a vibration-sensitive facility; vibration would not damage or substantially impair use of the park.

Ecological Intrusion

Vancouver Landing is not a wildlife or waterfowl refuge. This criterion does not apply.

For these reasons, a constructive use would not occur for the Vancouver Landing park.

Preliminary Determination

The Modified LPA and the design options would not result in long-term direct effects on the Vancouver Landing at Terminal 1 Park, other than changes in eastern and southern views toward the new Columbia River bridges. These changes in views are not expected to adversely affect the function or enjoyment of Vancouver Landing. Land from Vancouver Landing would not be permanently incorporated or temporarily occupied under the Modified LPA or design options. Nor would there be constructive use of the park due to proximity impacts resulting from the Modified LPA or the design options. Neither construction of the Modified LPA nor the design options would result in a Section 4(f) use of Vancouver Landing park.

Vancouver Waterfront Park

Description

Completed in 2018, Vancouver Waterfront Park is one of the newest parks in the city located at the north end of the Interstate Bridge (Figure 4-13). It covers 317,988 square feet that is part of the 1,524,600-square-foot Vancouver Waterfront Development, which is under ongoing development. The park is open from 5 a.m. to 10 p.m. and includes public open spaces overlooking the Columbia River with expansive views east, south, and west along the river. The park includes benches, walking paths, a fountain, landscaped open areas, and a 0.5-mile trail extension connecting to the Columbia River Renaissance Trail farther east.

Use Evaluation for the Modified LPA

No permanent incorporation of Vancouver Waterfront Park would result from the Modified LPA, inclusive of all design options.

The Modified LPA, inclusive of all design options, would not result in a temporary occupancy of Vancouver Waterfront Park.

Constructive Use

The thresholds for constructive use are described in Section 4.1.4 of this evaluation. Because there would be no permanent incorporation or temporary occupancy that rises to the level of use under Section 4(f), the following analysis evaluates the IBR Program Modified LPA with all design options for constructive use of the Vancouver Waterfront Park consistent with the criteria in 23 CFR 774.15(e) as listed in Section 4.1.4 of this evaluation.

Noise Level Increase

> The Modified LPA would not result in noise exceedances of the FHWA noise abatement criteria of 67 dBA (see Figure 3.11-7 in Section 3.11, Noise and Vibration). Construction noise would be temporary. The projected noise levels would not interfere with the use and enjoyment of the park. Therefore, noise levels would not substantially impair the use and enjoyment of the park. Noise levels for the Modified LPA with I-5 shifted west design option are expected to be slightly greater than for the Modified LPA because this design option would be located closer to Vancouver Waterfront Park, but would be under the threshold of 67 dBA.

Impairment of Aesthetic Features

> Vancouver Waterfront Park is located farther west than Vancouver Landing at Terminal 1; however, the effects discussed for Vancouver Landing at Terminal 1 would also apply at Vancouver Waterfront Park, only to a lesser magnitude because the visual changes would be at a greater distance. Aesthetic impacts would vary by bridge configuration. Neither the movable nor fixed-span configurations would substantially impair the activities, features, or attributes of the Vancouver Waterfront Park.

Restricted Access

Neither the Modified LPA nor the design options would directly impact vehicular, pedestrian, or bicycle access to Vancouver Waterfront Park.

During construction of the Modified LPA and local street network, there could be temporary street closures and increases in traffic due to rerouting from I-5 to local streets, but local street connections to the park would remain open and the park would be accessible.

Vibration Impacts

As described in the *IBR Program Noise and Vibration Technical Report*, Vancouver Waterfront Park is not a vibration-sensitive facility; vibration would not damage or substantially impair use of the park.

Ecological Intrusion

Vancouver Waterfront Park is not a wildlife or waterfowl refuge. This criterion does not apply.

For these reasons, a constructive use would not occur for the Vancouver Waterfront Park from the Modified LPA or design options.

Preliminary Determination

Land from Vancouver Waterfront Park would not be permanently incorporated or temporarily occupied. Nor would there be a constructive use of the park due to proximity impacts. Construction of the Modified LPA or the design options would not result in a Section 4(f) use of Vancouver Waterfront Park.

Figure 4-13. Vancouver Waterfront Park

Clark College Recreation Fields

Description

The Clark College Recreation Fields depicted in Figure 4-14, located north of McLoughlin Boulevard and west of Fort Vancouver Way, are a 566,280-square-foot facility owned and maintained by Clark College and open to students and staff. The softball field, tennis courts, and open fields are open to the public and are subject to protection under Section 4(f). The baseball and soccer field are not open to the public and are excluded from protection under Section 4(f). Immediately to the west of the Clark College Recreation Fields is another parcel of land, approximately 4.5 acres, consisting of landscaped areas (grass and trees), and buildings, that was formerly a rest stop and is owned by the State of Washington but used by Clark College for non-recreational purposes and not open to the public. The 4.5-acre parcel does not qualify as a park and recreational facility and is not subject to protection under Section 4(f).

Figure 4-14. Clark College Recreation Fields Modified LPA with All Design Options

Use Evaluation for the Modified LPA

There would be no permanent incorporation of land by the Modified LPA, inclusive of all design options, from the Clark College Recreation Fields.

There would be no temporary occupancy of land under the Modified LPA, inclusive of all design options, from the Clark College Recreation Fields. Although it would be used for staging, the 4.5-acre parcel used for athletic offices, storage, and parking is not designated for recreational use and would not be subject to approval under Section 4(f) under the exception specified in 23 CFR 774.11(d) for use of non-recreational land in a facility used for multiple purposes.

Constructive Use

A constructive use may occur when a transportation project does not incorporate land from a Section 4(f) property, but the proximity impacts are so severe after incorporation of impact mitigation, they result in a substantial impairment of the property's protected activities, features, or attributes. Because there would be no permanent incorporation or temporary occupancy that rises to the level of use under Section 4(f), the following analysis evaluates the IBR Program Modified LPA with all design options for constructive use on the Clark College Recreation Fields consistent with the criteria in 23 CFR 774.15(e) as listed in Section 4.1.4 of this evaluation.

Noise Level Increase

The Modified LPA would not result in noise exceedances of the FHWA noise abatement criteria of 67 dBA (see Figure 3.11-9 in Section 3.11, Noise and Vibration). Construction noise would be temporary. Therefore, noise levels would not substantially impair the activities, features, and attributes of the Clark College Recreation Fields.

Impairment of Aesthetic Features

Aesthetic features or attributes are not important contributing elements to the value of the Clark College Recreation Fields. No substantial impairment of visual or aesthetic qualities would result from the location of the Modified LPA.

Restricted Access

Neither the Modified LPA nor the design options would result in either temporary or permanent access changes to Clark College Recreation Fields. The recreation fields are accessed from Fort Vancouver Way, and parking is provided in a lot adjacent to this road. Users of the recreation fields may experience delays from additional traffic resulting from I-5 freeway reconstruction under the Modified LPA and the design alternatives, but the delays would not diminish the utility of the facility.

Vibration Impacts

As described in the *IBR Program Noise and Vibration Technical Report*, the Clark College Recreation Fields are not a vibration-sensitive facility; vibration would not damage or substantially impair use of the park.

Ecological Intrusion

Clark College Recreation Fields are not a wildlife and waterfowl refuge. This criterion does not apply.

For these reasons, a constructive use would not occur for Clark College Recreation Fields.

Preliminary Determination

Construction of the Modified LPA, including all design options, would not result in permanent incorporation or temporary occupancy of land at the Clark College Recreation Fields. There would be no constructive use of the park. The Modified LPA, including all design options, would result in no use under Section 4(f) for the Clark College Recreation Fields.

Leverich Community Park

Description

Leverich Community Park is a 696,960-square-foot community park located on the east side of I-5 in the northeast corner of the I-5/SR 500 interchange. The park is owned and maintained by the City of Vancouver Parks, Recreation, and Cultural Services (VPR&C) and is open to the public between 5 a.m. and 10 p.m. Site facilities include a disc golf course, picnic tables, paved walkways, a picnic shelter, restrooms, and play equipment.

Use Evaluation for the Modified LPA

No permanent incorporation of land in Leverich Park would result from the Modified LPA, inclusive of all design options.

No temporary occupancy of land in Leverich Park would result from the Modified LPA, inclusive of all design options.

Constructive Use

The thresholds for constructive use are described in Section 4.1.4 of this evaluation. Because there would be no permanent incorporation or temporary occupancy that rises to the level of use under Section 4(f), the following analysis evaluates the IBR Program Modified LPA, including all design options, for constructive use on the Leverich Community Park consistent with the criteria in 23 CFR 774.15(e) as listed in Section 4.1.4 of this evaluation.

Noise Level Increase

> The IBR Program Noise and Vibration Technical Report modeled noise levels in Leverich Park below the 67 dBA FHWA criteria (see Figure 3.11-10 in Section 3.11, Noise and Vibration of this SEIS and Figure 4-6 in the Noise and Vibration Technical Report). Construction noise would be temporary. The Modified LPA and the design options would result in barely perceptible differences in noise levels of up to 3 dBA within Leverich Park. Because noise levels would be less than those listed in the FHWA noise abatement criteria, no substantial impairment of the activities, features, or attributes of Leverich Park would occur as a result of noise from the Modified LPA or any of the design options.

Impairment of Aesthetic Features

> Aesthetic features or attributes are not important contributing elements to the value of Leverich Community Park. The visual character of Leverich Community Park consists of adjacent residential development, busy roads, open space, and other natural environmental elements such as water, riparian vegetation, and natural banks and hillsides. Views of I-5 to the west include the freeway and tall trees in WSDOT's right of way. The visual analysis in Section 3.9, Visual Quality, discusses effects for the Modified LPA at one key viewpoint (KVP 41) in Leverich Park. Table 3.9-9 documents the visual impact as "neutral" at this location. There would be no substantial impairment to the aesthetic features or attributes from construction of the Modified LPA. In the vicinity of Leverich Community Park, Program

improvements for the other design options would be the same as for the Modified LPA and not substantially impair the aesthetic qualities of Leverich Community Park.

Restricted Access

Neither the Modified LPA nor the design options would result in temporary or permanent changes to vehicular, pedestrian, or bicycle access to Leverich Community Park. Vehicular access is currently available from three parking lots in the park (Figure 4-15), which can be accessed from NE Leverich Park Way connecting to 39th Street. Park access points also exist for cyclists and pedestrians along adjacent roadways surrounding the park. Cyclists and pedestrians can access the Burnt Bridge Creek Trail, which parallels the northern boundary of the park from access points at NE 15th Avenue or NE Leverich Park Way.

Vibration Impacts

As described in the *IBR Program Noise and Vibration Technical Report*, Leverich Park is not a vibration-sensitive facility. Vibration would not substantially impair the use of Leverich Park.

Ecological Intrusion

Leverich Park is not a wildlife or waterfowl refuge. This criterion does not apply.

For these reasons, a constructive use would not occur for Leverich Community Park.

Preliminary Determination

Construction of the Modified LPA and the design options would not result in a Section 4(f) use of Leverich Community Park. The Modified LPA, including all design options, would not permanently incorporate or temporarily occupy land within Leverich Community Park and would not substantially impair the activities, features, and attributes that qualify the park for protection under Section 4(f) or result in a constructive use of the park.

Figure 4-15. Leverich Community Park and Burnt Bridge Creek Trail

Arnada Neighborhood Park

Description

Arnada Neighborhood Park is a 130,680-square-foot public park located on the west side of I-5 and south of W Fourth Plain Boulevard. The park is open from 5 a.m. to 10 p.m. The site facilities include a gazebo, picnic shelter, play equipment, a sports court, benches, a paved walkway, and open, grassy areas. As depicted in Figure 4-16, the park is accessible from pedestrian connections to adjacent residential areas to the west and south and from the sidewalk on E Fourth Plain Boulevard.

Use Evaluation for the Modified LPA

The Modified LPA, inclusive of all design options, would not result in permanent incorporation of land in Arnada Neighborhood Park.

Temporary Occupancy

Construction of the Modified LPA, inclusive of all design options, would result in temporary occupancy of 2,800 square feet of land in Arnada Neighborhood Park associated with the reconstruction of E Fourth Plain Boulevard and freeway ramps immediately north of the park. The temporarily occupied area would be needed for a temporary construction easement to provide room for construction activities associated with the reconstruction of E Fourth Plain. Landscaping consisting of grass and small trees may be removed within this area but would be replaced upon completion of construction. Temporary occupancy of land within Arnada Neighborhood Park would meet the conditions required for exceptions (23 CFR 774.13(d)), including:

Temporary duration, i.e., less than the time needed for construction of the project, and there would be no change in ownership of the land

> Construction of improvements to E Fourth Plain Boulevard and freeway ramps proposed as part of the Modified LPA may last up to 5 years, less than the total 5- to 7-year duration of construction for the Columbia River bridges. Arnada Neighborhood Park is owned and maintained by VPR&C and would remain so after construction.

Scope of the work must be minor, i.e., both the nature and the magnitude of the changes to the Section 4(f) property are minimal.

> During construction, trees that are close to the construction limits would be protected in accordance with the City of Vancouver's standards in its municipal code (Vancouver Municipal Code 20.770.090, Tree Vegetation, and Soil Protection During Construction). A small amount of vegetation at the park's northern boundary adjacent to Fourth Plain Boulevard would be temporarily affected for the reconstruction of the roadway and sidewalk and would be replaced upon completion of construction. The park's recreation features, including the gazebo, picnic shelter, play equipment, a sports court, benches, and a paved walkway, and open, grassy areas, would continue to be available during construction. The scope of the work within the park would be minor, and there would be no permanent changes to the property.

Figure 4-16. Arnada Neighborhood Park

There are no anticipated permanent adverse physical impacts, nor would there be interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis.

The park's protected activities, features, and attributes would continue to be publicly available during construction, including the gazebo, picnic shelter, play equipment, sports court, benches, and a paved walkway. Landscaping would be replaced upon construction completion, if affected. There would be no adverse physical impacts or interference with the protected activities, features, or attributes of the property on either a temporary or permanent basis.

The land being used must be fully restored, i.e., the property must be returned to a condition which is at least as good as that which existed prior to the project.

Upon completion of construction, landscaping would be restored to its original condition.

There must be documented agreement of the official(s) with jurisdiction over the Section 4(f) property regarding the above conditions.

Agreement from the official with jurisdiction, VPR&C, is pending.

The temporary effects on Armada Neighborhood Park meet the requirements of 23 CFR 774.13(d) for an exception from Section 4(f) use; therefore, temporary occupancy of the park during construction of the Modified LPA would not constitute a Section 4(f) use.

Constructive Use

The thresholds for constructive use are described in Section 4.1.4 of this evaluation. Because there would be no permanent incorporation or temporary occupancy that rises to the level of use under Section 4(f), the following analysis evaluates the IBR Program Modified LPA, including all design options, for constructive use on the Arnada Community Park consistent with the criteria in 23 CFR 774.15(e) as listed in Section 4.1.4 of this evaluation.

Noise Level Increase

Arnada Neighborhood Park is an active recreational facility located within 200 feet of I-5, and freeway noise is prevalent. Both the existing and projected noise levels meet FHWA noise abatement criteria for highway projects (see Figure 3.11-9 in Section 3.11, Noise and Vibration). Construction noise would be temporary. Noise levels for the design options would be similar to those of the Modified LPA.

Arnada Neighborhood Park is approximately 0.75 miles north of the proposed terminus of the transit line that would be located at Evergreen Boulevard and therefore would not experience increases in transit noise. This would be the same for all design options.

The projected noise levels would not substantially interfere with the use and enjoyment of the park.

Impairment of Aesthetic Features

Aesthetic features or attributes are not important contributing elements to the value of Arnada Neighborhood Park. Arnada Neighborhood Park is a small neighborhood park surrounded by residential developments to the west and south and E Fourth Plain Boulevard to the north and east. Views from the park toward surrounding areas are generally blocked by existing vegetation and land cover. The visual analysis in Section 3.9, Visual Quality, discusses effects for the Modified LPA at one key viewpoint (KVP 34) in Arnada Park. Table 3.9-7 documents the visual impact as "neutral" at this location from the Modified LPA. The Modified LPA would not substantially impair the aesthetic features or attributes of the park.

Impacts from the Modified LPA design options are anticipated to be the same as or similar to those of the Modified LPA.

Restricted Access

Existing pedestrian access to Arnada Neighborhood Park is available from various access points surrounding the park. Pedestrians can access the park via the sidewalk along E Fourth Plain Boulevard, as well as from E 25th Street and G Street. Interchange upgrades for the Modified LPA with all design options at E Fourth Plain Boulevard may result in temporary impacts to pedestrian access to Arnada Neighborhood Park from sidewalks along E Fourth Plain Boulevard, but access from surrounding neighborhood streets to the park would remain unaffected by the proposal. Pedestrian access along E Fourth Plain Boulevard would be restored upon construction completion.

There is no vehicular access to the park. As a neighborhood park, the park is intended for access by pedestrians, with no vehicular access areas provided.

Because pedestrian access to the park would be temporarily impacted, but restored upon completion of construction, the Program effects on access would not substantially diminish the utility of the park.

Vibration Impacts

As described in the *IBR Program Noise and Vibration Technical Report*, Arnada Park is not a vibration-sensitive facility; vibration would not damage or substantially impair use of the park.

Ecological Intrusion

Arnada Neighborhood Park is not a wildlife or waterfowl refuge. This criterion does not apply.

For these reasons, a constructive use would not occur for Arnada Neighborhood Park from the Modified LPA and the design options.

Preliminary Determination

Based on the analysis above, there would be no Section 4(f) use of Arnada Neighborhood Park by the Modified LPA or the design options. The Modified LPA with all design options would temporarily occupy 2,800 square feet of land in the park; the temporary occupancy would meet the exception criteria in 23 CFR 774.13(d) and would not constitute a use under Section 4(f). Neither the Modified LPA nor the design options would result in permanent incorporation of park land, nor would they lead to a constructive use of the park.

Burnt Bridge Creek Trail

Description

The Burnt Bridge Creek Trail is an 8-mile paved multiuse trail that passes through the Burnt Bridge Creek Greenway located on the east and west sides of I-5, north of the I-5/SR 500 interchange. The trail passes over I-5 on a pedestrian and bicycle-only overcrossing south of the I-5/Main Street interchange.

Use Evaluation for the Modified LPA

The Modified LPA, inclusive of all design options, would not result in permanent incorporation of any portion of the Burnt Bridge Creek Trail.

No temporary occupancy of the Burnt Bridge Creek Trail would result from construction of the Modified LPA, inclusive of all design options.

Constructive Use

The thresholds for constructive use are described in Section 4.1.4 of this evaluation. Because there would be no permanent incorporation or temporary occupancy that rises to the level of use under Section 4(f), the following analysis evaluates the IBR Program Modified LPA with all design options for constructive use on the Burnt Bridge Creek Trail consistent with the criteria in 23 CFR 774.15(e) as listed in Section 4.1.4 of this evaluation.

Noise Level Increase

The Burnt Bridge Creek Trail runs through an active recreational facility, Leverich Community Park. The trail is located within 250 feet of I-5, and freeway noise is prevalent in this location. The IBR Program Noise and Vibration Technical Report models existing noise levels for the Modified LPA at several locations near the trail, including points VE-005, VE-008, and VE-016. Existing noise levels range from 60 to 65 dBA at these locations. The model projects that noise would rise to a range of 61 to 66 dBA for the No-Build Alternative and the Modified LPA, with no observation point increasing more than 1 dBA, a less than perceptible amount. Both the existing and projected noise levels for the Modified LPA meet FHWA noise abatement criteria for highway projects. Program improvements for each design option would be largely the same near the Burnt Bridge Creek Trail and, therefore, noise levels are expected to be the same as for the Modified LPA. The analysis shows that the Burnt Bridge Creek Trail is not a noise-sensitive facility, and the design options would not substantially interfere with use of the trail.

Impairment of Aesthetic Features

The visual character of the Burnt Bridge Creek Trail consists of adjacent residential development, open space, and natural environmental elements such as water, riparian vegetation, and natural banks and hillsides. Views of I-5 to the west are framed by tall trees, curving roads, and hilly topography. The visual analysis in Section 3.9 discusses effects for the Modified LPA at one key viewpoint (KVP 41) for the Burnt Bridge Creek Trail. Table 3.9-9 documents the visual impact as “neutral” at this location. The proximity of the Modified LPA would not substantially impair the aesthetic features or attributes of the Burnt Bridge Creek Trail. Visual impacts from the design options experienced by users of Burnt Bridge Creek Trail would be largely similar to the Modified LPA.

Restricted Access

Construction of the Modified LPA and the design options would not impair temporary or permanent access to the Burnt Bridge Creek Trail. Current trail access points are located along adjacent roadways surrounding the multiuse trail, which provides access for biking, walking, and running. Trail users can access the trail from access points at NE 15th Avenue or NE Leverich Park Way. Additional paths are also accessible to reach the trail through Leverich Park. These accesses would remain available during and after construction.

Vibration Impacts

The Burnt Bridge Creek Trail is not a vibration-sensitive facility. Vibration from the Modified LPA or any of the design options would not substantially impair the use of the Burnt Bridge Creek Trail.

Ecological Intrusion

The Burnt Bridge Creek Trail is not a wildlife or waterfowl refuge. This criterion does not apply.

For those reasons, a constructive use would not occur for the Burnt Bridge Creek Trail from the Modified LPA and the design options.

Preliminary Determination

Based on analyses described above, construction of the Modified LPA or the design options would not result in a Section 4(f) use of the Burnt Bridge Multiuse Trail. None of the design options would permanently incorporate or temporarily occupy land for Burnt Bridge Creek Trail nor would they result in a constructive use.

Park and Recreation Property Evaluated to have a Use with Greater Than *de minimis* Impact Under Section 4(f)

Fort Vancouver NHS

Description

The Fort Vancouver NHS is a 204-acre park located almost entirely within the VNHR Historic District and is managed by the NPS. Within this area are approximately 0.5 miles of waterfront south of SR 14 and SE Columbia Way, separate from the remainder of Fort Vancouver NHS. This separated section contains passive and active recreation opportunities including grass-landscaped areas, picnic areas, a segment of the Columbia River Renaissance Trail, and views of and access to the Columbia River for swimming.

The Fort Vancouver NHS was designated as a National Monument in 1948 and enlarged with its name changed to "Fort Vancouver National Historic Site" in 1961 concurrent with its designation as a park under the jurisdiction of the NPS. The NHS was listed on the NRHP as a historic site in 1966. The Fort Vancouver NHS meets the criteria for Section 4(f) protection as a public park. The VNHR Historic District, which overlaps the NHS, is a historic district that was listed in the NRHP in 2007. As an NRHP-listed historic district, the VNHR Historic District meets the Section 4(f) definition of a historic site and is evaluated as such under Section 4(f) separately from the Fort Vancouver NHS park property. The VNHR Historic District, which includes all of the historic features of the NHS, is evaluated in Section.

The NPS identifies various recreational activities, features, and attributes within the Fort Vancouver NHS, including bringing dogs to the park, watching sunrises and sunsets, picnicking, birdwatching, bicycling, playing in the playground, becoming a junior ranger, visiting the reconstructed fur trade fort, and interpretive walking trails to the Fort Vancouver Village, Japanese Castaways' Memorial, Fort Vancouver Garden, and the Spruce Mill Trail. These recreational activities, features, and attributes including passive and active recreational opportunities further described below.

Active Recreational Activities and Features

Active recreational features of Fort Vancouver NHS include trails, walking paths, and sidewalks throughout the park, as well as a playground and open spaces. The Discovery Historic Loop Trail is a 2.9-mile trail that extends east on Evergreen Boulevard over I-5 through Fort Vancouver NHS on multiuse paths and local streets, over SR 14 at the Confluence Land Bridge or under SR 14 at the Columbia Way interchange connecting to the Columbia River Renaissance Trail. The Discovery Historic Loop Trail is used for organized walks throughout the year, including the Discovery Walk Festival held in April.

Approximately 0.6 miles of the 5-mile-long Columbia River Renaissance Trail runs parallel to SE Columbia Way through the waterfront area within Fort Vancouver NHS and offers active recreational opportunities such as biking and walking. The segment of the Columbia River Renaissance Trail located on the west side of the waterfront area, is also a portion of the Discovery Historic Loop Trail.

Other active recreational opportunities within Fort Vancouver NHS include various paths and trails connecting areas of the Fort. The City of Vancouver maintains all roads, sidewalks, paths, and landscaped areas along the park borders, which includes 0.2 miles of concrete paths and 0.6 miles of decomposed granite trails, an unpaved path leading from East 5th Street to a maintenance storage area in the Hudson's Bay Company (HBC) Village in the southwest corner of the fort, 0.7 miles of concrete sidewalk along Columbia Way, and 0.3 miles of concrete/asphalt bordering the waterfront area. The paths around the reconstructed HBC Fort connect it to open fields surrounding the Fort, Village House 1 and Village House 2, the garden area immediately north of the central Fort, and the Spruce Mill Trail that connects to the Headquarters Building and the Pearson Air Museum. The gravel paths and trails in the NHS offer biking, walking, and jogging activities, and the paved paths are available for skateboarding and roller skating in addition to biking, walking, and jogging activities.

The "Confluence Land Bridge," a landscaped pedestrian walkway that spans SR 14 and connects Fort Vancouver to the waterfront, was constructed in 2008. The Confluence Land Bridge landing is located southwest of the reconstructed HBC Fort and connects the existing Fort Vancouver NHS facilities through extensions to the existing trail system. On the south side of SR 14, the bridge links to Old Apple Tree Park via a new trail from the bridge landing. The earth-covered and landscaped bridge follows a curving, multimodal path and includes artwork and interpretations of the site's importance in tribal history. The Confluence Land Bridge was created through a partnership of the nonprofit Confluence Project (the NPS, the City of Vancouver, and WSDOT) and was funded through federal, state, and private sources.

The Fort Vancouver NHS Playground is located in the northeastern part of the Fort and offers active recreation for children and includes two play structures.

Passive Recreational Activities and Features

The fort includes numerous historical buildings from different periods associated with Native American, HBC, U.S. military, and NPS uses of the land that occurred over time. Fort Vancouver NHS includes the Vancouver Barracks Historic District determined eligible in 1984. It includes the HBC ("Kanaka") Village, and the East and South Barracks, the Pearson Air Museum, Fort Vancouver Visitors Center, NPS Administration building, Japanese Memorial, a garden immediately north of the HBC Kanaka Village, and other historic and cultural components. The historical buildings, monuments, and cultural landscapes of the Fort Vancouver NHS are not solely valuable for their historic significance, but also serve as the subject of interpretive programs and the junior ranger program offered at the park. The historic and cultural landscape is an integral setting to the recreational attributes, features, and activities of the NHS. While Section 4(f) requires evaluating park and recreational features separately from historic sites, in the case of Fort Vancouver NHS, the historical context is part of the recreational experience and viewing the historic and cultural landscape is a passive recreational activity of the NHS.

Several structures within the NHS support operation of the park and its visitor experience. The administrative area of the Fort Vancouver NHS contains four buildings: the visitor center, administration building, employee residence, and maintenance shop. There are 16 structures at the reconstructed HBC Fort: the Fort Palisade, the Bastion, the Chief Factor's House, the Kitchen, the Bakehouse, the Blacksmith Shop, the Indian Trade Shop, the Fur Store, the Wash House, the Jail, the Carpenter Shop, the Belfry, the Flagpole, House 1, House 2, and the Wellsweep. The Proulx House is planned for future reconstruction as a major interpretive element.

NPS plans to complete a replica historic village (HBC Village) in the western portion of the NPS property. Construction of two of the village houses is complete. Planned extensions to the trail system within the Fort would be tied to the historic village and the Confluence Land Bridge in the southwestern portion of the Fort Vancouver NHS near the I-5/SR 14 interchange. This development would occur on land owned by the NPS.

Although separated from Fort Vancouver NHS by the BNSF Railway tracks and SE Columbia Way, the waterfront area is a 217,800-square-foot portion of the Fort Vancouver offering passive recreational activities such as picnicking and viewing the Columbia River. Waterfront Park includes grass-covered open spaces, picnic tables and portions of the Columbia River Renaissance Trail that offers active recreation such as walking, running, and bicycling. The Columbia River is also accessible to swimmers and nonmotorized watercraft from paths and stairs leading to the water's edge within the waterfront area. Parking areas adjacent to SE Columbia Way serve the waterfront area and Columbia River Renaissance Trail. The waterfront is open from 7:00 a.m. to dusk.

Use Evaluation for the Modified LPA

Use of the Fort Vancouver NHS by the Modified LPA inclusive of all design options would include permanent incorporation for right-of-way acquisition along I-5 and SR 14, temporary occupancy for construction of project components in these same areas, and changes to noise and views that would be experienced by visitors to the Fort Vancouver NHS.

Permanent Incorporation

The Modified LPA with double-deck fixed-span configuration would acquire approximately 12,500 square feet of the entire 204-acre park, representing less than 1% of the park area. The acquisitions would be narrow land strips along the Fort Vancouver NHS's southern and western edges associated with the modifications to the I-5/SR 14 interchange and the widening of I-5. The acquisitions would be located west of the Confluence Land Bridge along SR 14 and adjacent to I-5 near 5th Street (see Figure 4-18). The acquired land adjacent to SR 14 is composed of existing and planned landscaping and would also be near the partial reconstruction of the HBC Village but would not interfere with the NPS's plans for reconstruction of this area. The areas proposed for acquisition do not have specific designated recreational use and are not developed with trails, sports fields, benches, or other recreational features.

There would be changes in views to the south and west from the Confluence Land Bridge and the HBC Village due to changes in the heights of the interchange ramps and the new bridges across the Columbia River.

The Modified LPA without C Street ramps design option would acquire approximately 13,800 square feet of land within the park, while the Modified LPA with I-5 shifted west design option would acquire approximately 13,600 square feet. The Modified LPA (any bridge configuration) with two auxiliary lanes design option would acquire slightly more land than the Modified LPA—13,100 square feet—due to the wider right of way needed to accommodate the additional lanes. The Modified LPA single-level fixed-span or movable-span configuration with one auxiliary lane design option would acquire the same amount of land as the Modified LPA—12,500 square feet. As with the Modified LPA, the areas acquired under the design options would be narrow strips of land adjacent to SR 14 and I-5 for construction of the freeway ramp and widening of I-5.

Visual and Auditory Effects

As identified in the Section 106 process, the Modified LPA would adversely affect five of the contributing resources within the boundaries of the Fort Vancouver NHS. These resources include the Munitions Storehouse (Building 102), Original Pearson Hangar (Building 189), Pearson Field Office (Building 194), Work Shop (Building 786), and the Fort Vancouver NHS Visitor Center. Affects to these resources would include indirect auditory and visual effects.

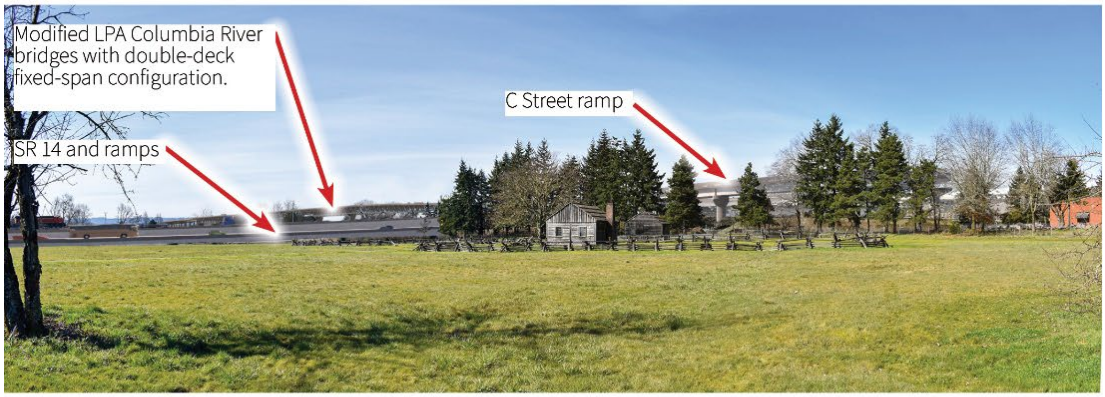
Aesthetic Features

Section 3.9, Visual Quality, notes that there would be visual changes with the construction of the Modified LPA and the SR 14 interchange inclusive of all design options. The visual changes would be most prominent for the Modified LPA with double-deck fixed-span configuration. The upper-roadway deck height of the new double-deck bridge would be 166 feet high (NAVD88), 76 feet taller than the existing bridge deck. The lift span tower of

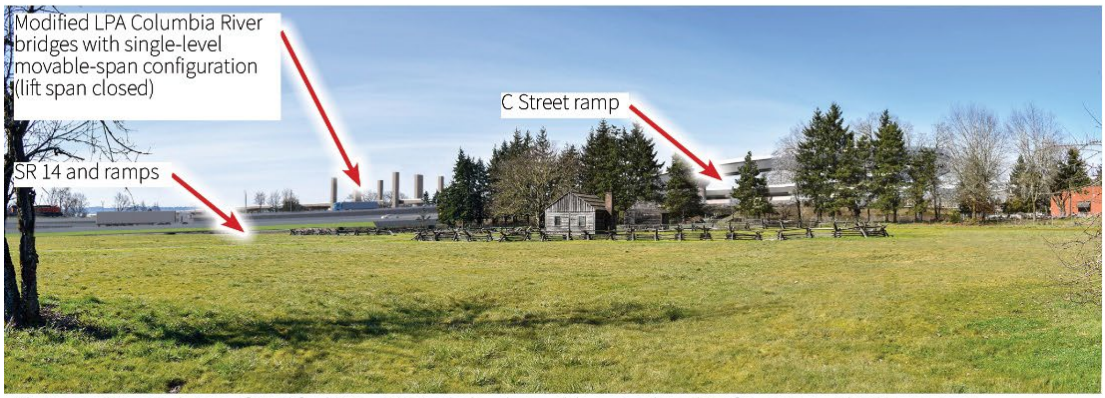
the existing bridge is 247 feet tall. Visual changes would also result from construction of the single-level fixed-span configuration and the single-level movable-span configuration, which have decks of 137 feet and 122 feet high (NAVD88), respectively. The tower height of the single-level movable-span configuration would be approximately 243 feet. Existing views in the Greater Central Park Landscape Unit (the unit that the Fort Vancouver NHS is located within) would include noticeable view changes resulting in changes to visual quality affecting the setting of the Fort Vancouver NHS. The visual character of these resources themselves would remain unchanged. Fort Vancouver NHS contributing historic resources that are part of the cultural landscapes and recreational opportunities and include: (1) Munitions Storehouse (Building 102): Original Pearson Hangar (Building 189); Pearson Field Office (Building 194); Work Shop (Building 786); and Fort Vancouver NHS Visitor Center. The visual impacts associated with the movable-span configuration when closed would be less adverse than those of the Modified with LPA double-deck fixed-span configuration and the single-level fixed-span configuration; however, the towers for the movable-span configuration would be visible. shows the visual changes between existing conditions and the Modified LPA as simulated for Fort Vancouver NHS as documented in the Visual Quality Technical Report.

Figure 4-17. Fort Vancouver National Historic Site - Visual Change Comparison between Existing Conditions and the Modified LPA

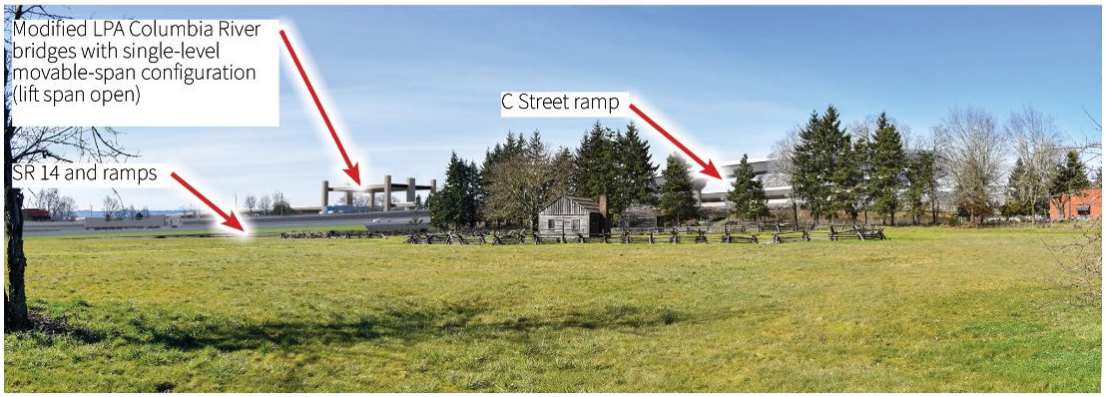
Existing Conditions



Photographic simulation of Modified LPA with double-deck fixed-span configuration with C Street Ramp



Photographic simulation of Modified LPA with single-level movable-span closedconfiguration with C Street ramp



Photographic simulation of Modified LPA with single-level movable-span open configuration with C Street ramp

Noise Level Increase

As documented in Section 3.11, Noise and Vibration, existing modeled traffic noise ranges from 53 to 75 dBA within the Fort Vancouver NHS. The highest noise levels, which are adjacent to I-5 and SR 14, approach or exceed the noise abatement criteria of 67 dBA. These levels would be expected to increase between 0 and 8 dBA under the Modified LPA because of the IBR Program and traffic growth (see Figure 3.11-18 in Section 3.11, Noise and Vibration). Per FHWA *Section 4(f) Policy Paper* Question 7A, constructive use of Section 4(f) property is only possible in the absence of a permanent incorporation of land or a temporary occupancy of the type that constitutes a Section 4(f) use*;* therefore, it would not occur.

Temporary Occupancy

Construction of the Modified LPA would require temporary occupancy of approximately 35,300 square feet of the Fort Vancouver NHS for construction of a retaining wall along I-5 in the western portion of the fort, representing less than 1% of the 204-acre park.

Construction of the Modified LPA design options would temporarily occupy land for construction of a retaining wall along I-5 (and). The occupied land would range from 33,900 square feet under the Modified LPA without C Street ramps design option to 35,200 square feet for the Modified LPA single-level configuration with one auxiliary lane design option. The other design options would temporarily occupy 34,200 square feet (Modified LPA with I-5 shifted west) and 34,700 square feet (Modified LPA with single-level bridge [fixed- or movable-span configuration] with two auxiliary lanes and double-deck fixed-span configuration with two auxiliary lanes). The proposed temporary occupancy would include larger impacts to areas around E 5th Street and the FHWA building parking lot.

Construction would increase noise, vibration, and dust that may temporarily affect recreational activities, but the effect would not be adverse to the extent that it interferes with use of the park.

Fifth Street may be closed or have restricted access, thereby affecting access to the FHWA Western Federal Lands Building, which is outside of the park and not part of the recreational attributes or features of the park. Construction near the SR 14 westbound to I-5 northbound elevated ramp would occur near, but outside of, areas planned for construction of the HBC Village, and would not interfere with NPS's plans for reconstruction of this area. The recreational activities, features, and attributes of the park, including viewing the historic landscape, walking or rolling along recreational trails, picnicking, and attending events at Fort Vancouver, would remain available during construction and would not be substantially affected during construction; therefore, the additional area of temporary occupancy during construction is included in the overall use determination for the park. shows the area of permanent incorporation and temporary occupation for the Modified LPA and each design option.

Table 4-4. Permanent and Temporary Use under the IBR Program Design Options for the Fort Vancouver National Historic Site

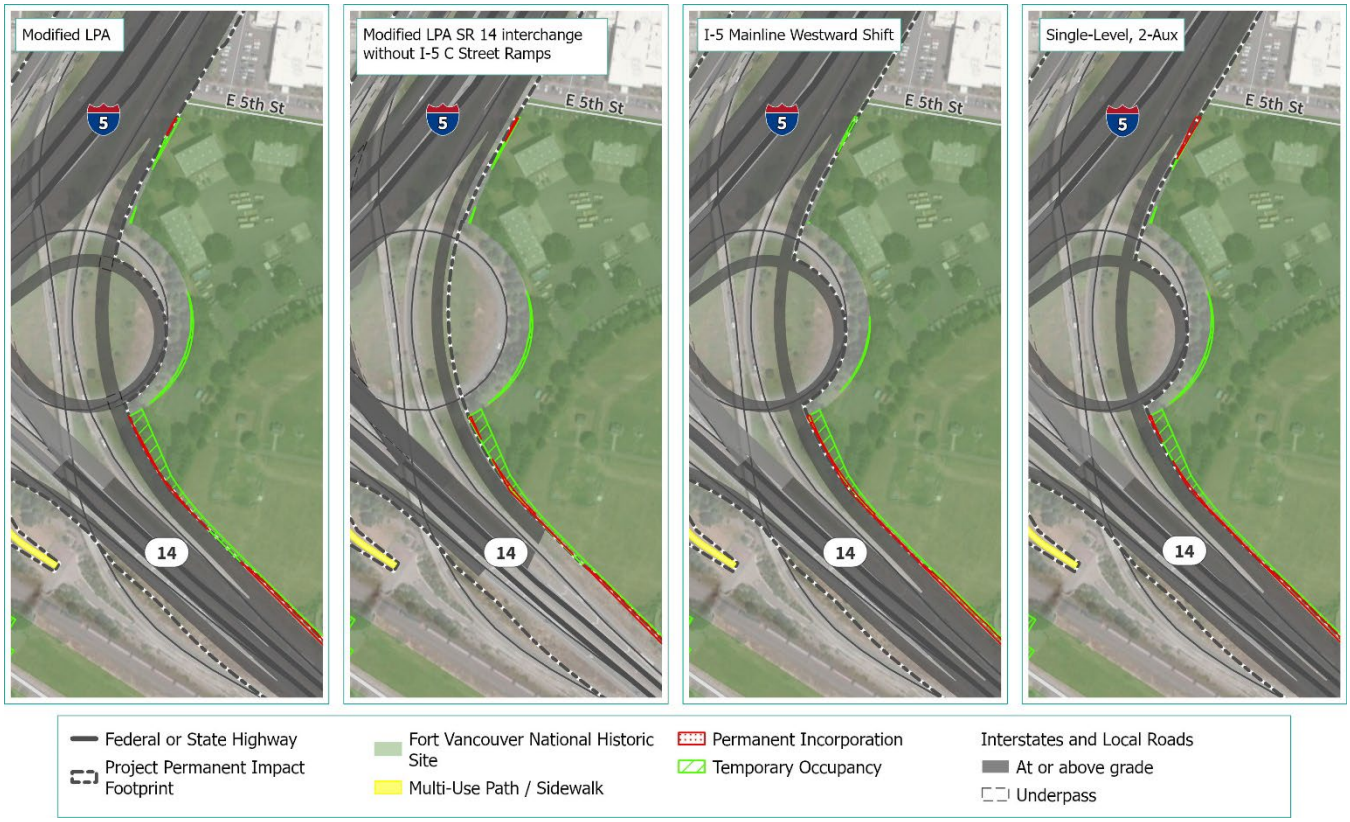
Design Options	Permanent Incorporation	Temporary Occupancy
Modified LPA Double-Deck Fixed-Span Configuration with One Auxiliary Lane, C Street Ramps, and Centered I-5	Approximately 12,500 square feet	Approximately 35,300 square feet
Modified LPA SR 14 Interchange without C Street Ramps	Approximately 13,800 square feet	Approximately 33,900 square feet
Modified LPA I-5 Shifted West	Approximately 13,600 square feet	Approximately 34,200 square feet

Design Options	Permanent Incorporation	Temporary Occupancy
Modified LPA Single-Level Fixed- or Movable-Span Configuration with One Auxiliary Lane	Approximately 12,500 square feet	Approximately 35,200 square feet
Modified LPA Single-Level Fixed- or Movable-Span Configuration with Two Auxiliary Lanes	Approximately 13,100 square feet	Approximately 34,700 square feet
Double-Deck Fixed-Span Configuration with Two Auxiliary Lanes	Approximately 13,100 square feet	Approximately 34,700 square feet

Preliminary Determination

The Modified LPA with all design options would permanently incorporate 12,500 to 13,800 square feet of land and temporarily occupy approximately 33,900 to 35,300 square feet of land in the southern and western reaches of the Fort Vancouver NHS adjacent to SR 14 and I-5. This incorporation would result in a use under Section 4(f). This area is also included in the area calculated for incorporation from the VNHR Historic District.

Figure 4-18. Fort Vancouver National Historic Site – Comparison of Modified LPA Design Options



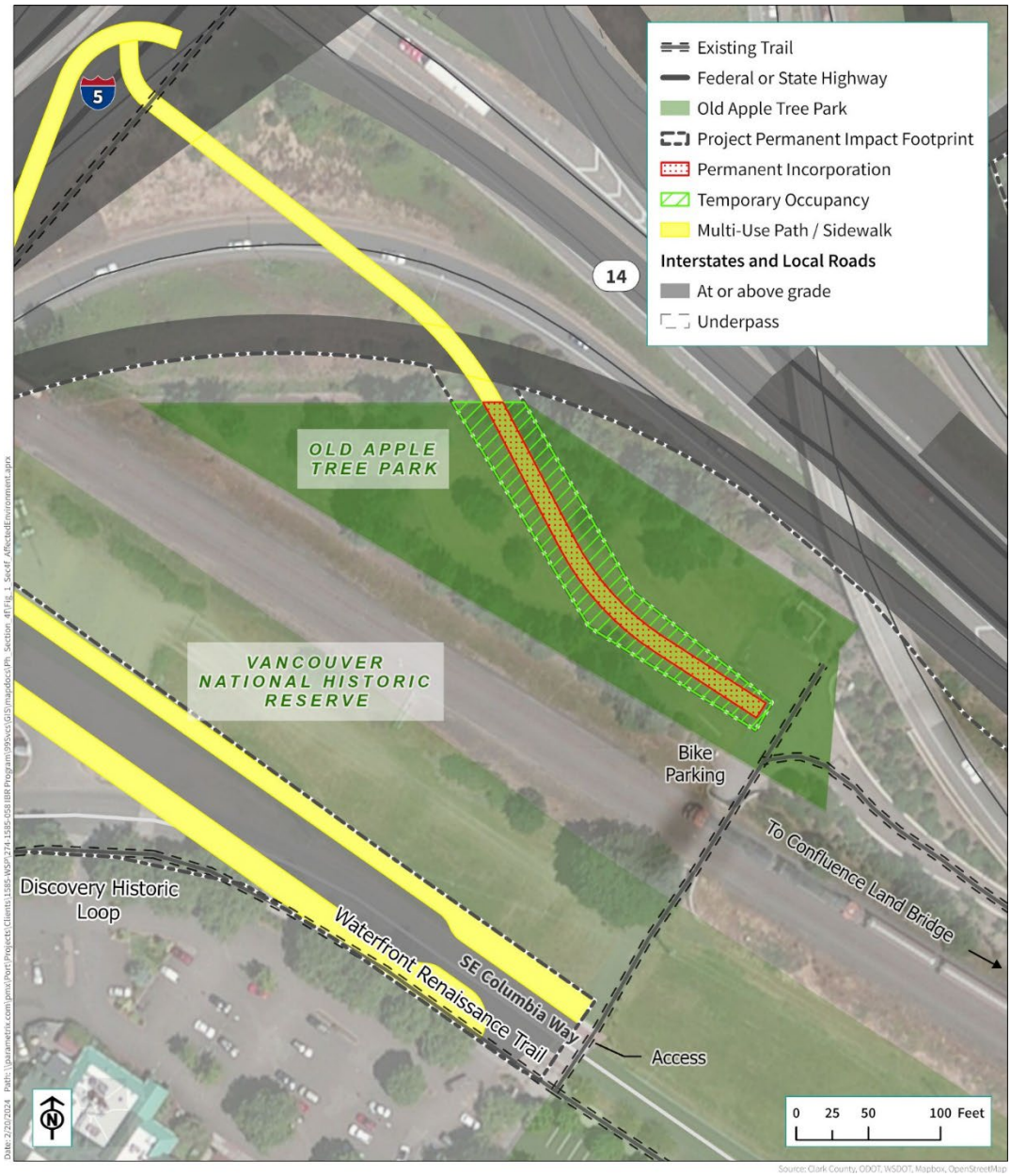
Park and Recreation Properties Evaluated to Have a Use with *de minimis* Impact under Section 4(f)

Old Apple Tree Park

Description

Old Apple Tree Park, depicted in Figure 4-19, is a 56,628-square-foot community park located north of the Columbia River and BNSF Railway and south of SR 14 and within the boundaries of the VNHR. Old Apple Tree Park can be accessed from the Fort Vancouver NHS waterfront beneath the railroad or from the Fort Vancouver NHS using the Confluence Land Bridge over SR 14. The Old Apple Tree from which the park derives its name died in 2020 at the age of 194, but its history lives on through saplings that share its genetic makeup planted in the same location. Old Apple Tree Park still provides passive recreational space, viewing, and bicycle parking for the Confluence Land Bridge.

Figure 4-19. Old Apple Tree Park



Use Evaluation for the Modified LPA

The Modified LPA would construct a new shared-use path through the lawn on the west side of the park, which would require approximately 3,500 square feet of land. The path would link the park to Main Street and downtown Vancouver. Users of the Confluence Land Bridge would travel through Old Apple Tree Park to reach the Fort Vancouver NHS. Under an agreement with WSDOT, VPR&C may own, operate, and maintain the trail and provide WSDOT a construction easement to build the trail as part of the Modified LPA which would enhance recreational activities of the park. The final path alignment in this park is being coordinated with VPR&C and would meet *de minimis* impact requirements.

In addition to the shared-use path connection, the Modified LPA would also require a permanent airspace easement, of approximately 4,400 square feet, over the northwest corner of Old Apple Tree Park for maintenance of the I-5 northbound to SR 14 elevated ramp. This easement would provide WSDOT with the right to enter Old Apple Tree Park with equipment to perform routine inspections of the ramp structure. This easement would not affect landscape on the park and would only be temporarily used for inspection and potentially maintenance of the ramp. It is anticipated that during the ramp inspection when the easement would be in use, access to the park would remain open and would not affect the activities, features, or attributes of the park property. The new I-5 northbound to SR 14 interchange ramp would be located closer to Old Apple Tree Park than the existing ramp, coming within 5 to 10 feet of its northern boundary. The ramp would not adversely impact user experience since the forested buffer along the northern edge of the park would remain, reducing the visual presence of the ramp. The airspace easement would not adversely affect the activities, features, or attributes of Old Apple Tree Park and would result in a *de minimis* impact.

Construction of the elevated ramp would occur immediately north of the park under the Modified LPA and would require access to and temporary occupancy of an approximately 7,200-square-foot portion of, but no permanent acquisition of land from, the park. Construction activities and equipment would be confined to the western and northern portion of the park and immediately adjacent to the new shared-use trail that is a grassed, landscaped, passive recreational area. This portion of the open landscaped area would be unavailable during elevated ramp construction, which would last up to 6 years. The existing shared-use path through the park, which is a segment of the Discovery Historic Loop Trail, and the Old Apple Tree monument, which are the primary recreational features of the park, would remain open and accessible to the public. The temporary occupancy for construction work is included in the *de minimis* impact determination for the park.

Preliminary Determination

The Modified LPA with all design options would enhance 3,500 square feet of land from Old Apple Tree Park for the construction of a shared-use path and require 4,400 square feet for an air space easement. The permanent incorporation would constitute a use of Old Apple Tree Park under Section 4(f). Additionally, the Modified LPA with all design options would temporarily occupy a 7,200-square-foot portion of the park to provide access for elevated ramp construction. Pending consultation with the VPR&C, USDOT has determined that the Program would have a *de minimis* impact to the protected activities, features, and attributes of the park.

Marshall Community Center, Luepke Senior Center, and Marshall Park

Description

The Marshall Community Center and Park is an 827,640-square-foot community park located on the east side of I-5 south of McLoughlin Boulevard. The park, which was renovated in 2006, is owned by the City of Vancouver and maintained by VPR&C and is open from 5:00 a.m. to 10:00 p.m. The park facilities include a large, fully accessible playground with multiple features, community gardens, a loop trail, picnic tables, horseshoe pits, ball fields, the Marshall and Luepke Centers, and the Ruby Luepke Center for Senior Citizens (WA 1182b).

The City completed a playground restoration in 2022. In 2010, a large group picnic shelter was added to Marshall Park. The property was originally transferred to the City of Vancouver in 1986 through the FLP Program, as administered by the NPS. The FLP parcel is described in the original Application for Federal Surplus Property as a grassy area that is used by the public. It is adjacent to a horseshoe pit area and is gently sloping from south to north. The existing parcel also contains a few medium-sized trees that provide a partial vegetative buffer between Marshall Park and I-5.

The Marshall Community Center, open weekdays from 6:00 a.m. to 8:00 p.m., with shortened hours on Fridays and weekends, has a swimming pool, a fitness center, two basketball courts, a commercial kitchen, meeting rooms, administrative offices, an aerobics dance studio, and an arts and crafts studio. The parking lot contains 272 parking spaces, including 26 spaces accessible under the American with Disabilities Act.

The Luepke Senior Center is a full-service senior center with a multipurpose room and meeting rooms.

Use Evaluation for the Modified LPA

The Modified LPA would acquire approximately 25,200 square feet of property from Marshall Park, which includes the Marshall Community Center and Luepke Senior Center. As illustrated in Figure 4-20, the permanent property acquisition would occur along the western edge of the parcel for the fill wall for the I-5 northbound to Fourth Plain Boulevard elevated off-ramp. The permanent acquisition would displace up to four horseshoe pits, as well as trees located in state right of way and within the park boundary that currently serve as a visual buffer between the community center campus and I-5. The fill wall would be located along the border of the parking lot and would be up to 20 feet high.

Trees removed within the park would be subject to the City of Vancouver's replacement requirements during the tree removal permitting process. Landscaping would be restored to its original condition once construction is complete. Under an agreement with the City of Vancouver (VPR&C), the IBR Program would replace the four displaced horseshoe pits within the park. The four new pits would be located near the other horseshoe pits with no loss of recreational function.

The 25,200-square-foot permanent acquisition of land within the park represents a small portion (approximately 3%) of the overall park area. Approximately 6,300 square feet of the 25,200-square-foot acquisition could be replaced with surplus WSDOT right of way. WSDOT would construct a new shared-use path from E Mill Plain Boulevard, providing a southern connection and enhancing pedestrian access to the park. Because the Modified LPA would replace a portion of the acquired land and horseshoe pits and would replant trees that would be removed, it would not adversely impact the activities, features, or attributes qualifying the park for protection under Section 4(f) consistent with 23 CFR 774.17.

The Modified LPA would require the temporary use of approximately 19,100 square feet along the western boundaries of the parcel. Access to and from the Marshall Community Center would be maintained for the duration of construction. It is possible that one of the two access points may need to be closed for short periods to complete construction. During potential access closures, the one-way access between the two main parking lots would likely be signed for two-way traffic to allow for full use of the parking facility; this would likely require flaggers or some other mitigation as this access is currently only one lane. Access closures would be coordinated with the City of Vancouver (VPR&C) and facility users. As discussed in Sections 3.11.4 and 3.9.4, facility users would experience temporary increased levels of noise and construction lighting during the construction of the Fourth Plain off-ramp. However, because access to the facilities would remain open throughout construction, there would be no adverse effects on the activities, features, or attributes of the park that qualify the park for protection under Section 4(f).

Figure 4-20. Marshall Community Center, Luepke Senior Center, and Marshall Park – Modified LPA with All Design Options

As per 23 CFR 774.15, constructive use of Section 4(f) property is only possible in the absence of a permanent incorporation of land or a temporary occupancy of the type that constitutes a Section 4(f) use. The Modified LPA and the design options would permanently incorporate and temporarily occupy land during construction. Therefore, no constructive use would occur.

Preliminary Determination

Construction of the Modified LPA and the design options would result in acquisition and permanent incorporation of approximately 25,200 square feet of land from Marshall Park, which houses the Marshall Community Center and Luepke Senior Center and would also remove trees screening the park from I-5 and up to four horseshoe pits. The permanent incorporation would constitute a use of Marshall Park under Section 4(f). The land, trees, and horseshoe pits would be replaced under the Modified LPA, resulting in both a permanent and a temporary construction-phase *de minimis* impact to the park, community center, and senior center pending concurrence from VPR&C.

4.3.5 Summary of Use of Historic Sites by the IBR Program Modified LPA with All Design Options

This section is organized based on Section 106 determinations of effects to historic sites and discusses uses of Section 4(f) historic sites located in the following areas:

- Sites in Oregon
- Sites in Washington

Historic sites meeting the criteria for protection under Section 4(f), and subject to review under Section 106, are grouped into four categories of use for the historic sites evaluation.

i. **Historic sites within the Section 106 Area of Potential Effect (APE) that would have no Section 4(f) use**. Sites within this category may have a Section 106 determination of "No Effect" or "No Adverse Effect" as well as no permanent or temporary use of the property. This category can also include sites that have a Section 106 determination of "Adverse Effect" but would not have permanent incorporation of land. Therefore, these sites are evaluated for constructive use. There are 15 sites under this category.

ii. **Historic sites for which the temporary occupancy exception applies under Section 4(f), and for which, therefore, there is no Section 4(f) use**. Sites in this category, which is a subcategory of historic sites that would have no Section 4(f) use, have a Section 106 determination of "No Adverse Effect." There are four sites with a preliminary determination of "No Adverse Effect" under Section 106 for which the temporary occupancy exception applies under Section 4(f), with regard to the Modified LPA, including all design options. Additionally, there is one site for which the temporary occupancy exception applies with regard to the Modified LPA, including all design options except for the Modified LPA with I-5 shifted west design option.

iii. **Historic sites evaluated to have a use with greater than *de minimis impact* under Section 4(f)**. Generally, these sites have a Section 106 determination of "Adverse Effect." There are eight sites with an "Adverse Effect" determination and a use with greater than *de minimis* impact under Section 4(f) for the Modified LPA with all design options, including a group of contributing resources that are part of the VNHR Historic District and are evaluated as one historic site.

iv. **Historic sites evaluated to have a *de minimis* impact under Section 4(f)**. As with the previous category, these sites generally have a Section 106 determination of "No Adverse Effect." There are four sites with a preliminary determination of "No Adverse Effect" under Section 106 and an anticipated *de minimis* impact under Section 4(f) for the Modified LPA with all design options; additionally, there is one site with a preliminary determination of "No Adverse Effect" under Section 106 and an anticipated *de minimis* impact under Section 4(f) for the Modified LPA with I-5 shifted west design option only.

The Modified LPA, including all design options, would result in the use of certain historic sites under Section 4(f). Table 4-5 summarizes the preliminary use determination for the historic sites evaluated for the Modified LPA and for each design option. The Modified LPA park-and-ride design option would not use any of the Section 4(f) historic sites and, therefore, is not discussed further.

Of the 32 historic sites within the Section 106 APE identified as Section 4(f) properties, two historic sites in Oregon and 18 in Washington would have no Section 4(f) use for the Modified LPA with all design options (this includes five sites in Washington for which the temporary occupancy exception applies); two historic sites in Oregon, one in Washington, and one in the Columbia River between Oregon and Washington would have a *de minimis* impact for the Modified LPA with all design options; and four historic sites in Oregon, three in Washington, and the northbound Interstate Bridge between the two states would have a Section 4(f) use for the Modified LPA with all design options.

Table 4-5. Summary of Section 4(f) Evaluation for Historic Sites for IBR Program Modified LPA Design Options

State	Historic Site	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Without C Street Ramps, Centered I-5	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Shifted West	Modified LPA with Single-Level Fixed- or Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	Modified LPA with Single-Level Fixed- or Movable-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5	Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5
Oregon	Columbia Slough Drainage Districts Historic District (OR 2), Portland	Permanent incorporation of approximately 182,300 square feet and temporary occupancy of approximately 140,800 square feet of the more than 150-square-mile historic district. No changes to location of contributing resources or the overall character of the surrounding setting. **Preliminary Determination**: Section 4(f) use. Based on CFR 774.17, this would be a *de minimis* impact because there would be No Adverse Effect under Section 106.					
	Northbound Interstate Bridge (OR 50 / WA 381a)	Permanent incorporation of the entire site (approximately 85,600 square feet) and removal of the NRHP-listed bridge. **Preliminary Determination**: Section 4(f) use because the bridge would be demolished.					
	Portland Assembly Center (OR 56), 2060 N Marine Drive, Portland	Permanent incorporation of approximately 244,800 square feet from the far southern, eastern, and western edges of the site and temporary occupancy of approximately 1,408,700 square feet. No substantial impairment of the protected activities, features, or attributes of the site. **Preliminary Determination**: Section 4(f) use. Based on CFR 774.17, this would be a *de minimis* impact because there would be No Adverse Effect under Section 106.					
	Toll Administration Building/ODOT Permit Center (OR 103), 12348 N Center Avenue, Portland	Permanent incorporation of the entire site (approximately 163,700 square feet) and removal of the NRHP-eligible building and landscape features. **Preliminary Determination**: Section 4(f) use because of permanent incorporation.					
	Harbor Shops (OR 107), 11915 N Center Avenue, Portland	Permanent Incorporation of the entire site (approximately 52,200 square feet) and removal of the NRHP-eligible building and landscape features. **Preliminary Determination**: Section 4(f) use because of permanent incorporation.					
	Jantzen Beach Water Tank (OR 109), N Center Avenue, Portland	Permanent incorporation of the entire site (approximately 3,200 square feet) and removal of the NRHP-eligible structures and landscape features. **Preliminary Determination**: Section 4(f) use because of permanent incorporation.					
	Jantzen Beach Moorage (OR 111), 1501 N Jantzen Avenue/1525-2055 N Jantzen Avenue, Portland	Permanent incorporation of approximately 85,900 square feet and removal of a section of dock, at least two finger piers, and approximately 20 floating shelters from the NRHP-eligible moorage. Additionally, temporary occupancy of approximately 19,400 square feet. **Preliminary Determination**: Section 4(f) use because of permanent incorporation.					
	Hayden Island Yacht Club Clubhouse (OR 120), 12050 N Jantzen Drive, Portland	No permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the historic site. **Preliminary Determination**: No Section 4(f) use.					
	East Vanport Commercial Center (OR 155), 10850 N Denver Avenue, Portland	No permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the historic site. **Preliminary Determination**: No Section 4(f) use.					
	Lower Columbia River Federal Navigation Historic District (OR 165)	Permanent incorporation of approximately 2,000 square feet from the Upper Vancouver Turning Basin and temporary occupancy of area up to approximately 1,000 feet east of the existing bridge and up to approximately 1,000 feet west of the proposed bridges. Overall, no substantial impairment of the protected activities, features, or attributes of the more than 140-mile-long historic district. **Preliminary Determination**: Section 4(f) use. Based on CFR 774.17, this would be a *de minimis* impact because there would be No Adverse Effect under Section 106.					
Washington	Normandy Apartments (WA 149), 318 E 7th Street, Vancouver	Permanent incorporation of approximately 700 square feet and temporary occupancy of 300 square feet along the eastern boundary of the historic site for construction of noise and retaining walls and elevated LRT alignment. Landscape elements would be removed and new construction would be in proximity to the NRHP-eligible building. **Preliminary Determination**: Section 4(f) use because of permanent incorporation.	Permanent incorporation of the entire site (approximately 14,690 square feet) and removal of the building and landscape features. **Preliminary Determination**: Section 4(f) use because of permanent incorporation.	Permanent incorporation of approximately 700 square feet and temporary occupancy of 300 square feet along the eastern boundary of the historic site for construction of noise and retaining walls and elevated LRT alignment. Landscape elements would be removed and new construction would be in proximity to the NRHP-eligible building. **Preliminary Determination**: Section 4(f) use because of permanent incorporation.			
	Bridge Substation (WA 1192), 100 SE Columbia Street, Vancouver	Permanent incorporation of the entire site (approximately 3,200 square feet) and removal of the NRHP-eligible building. **Preliminary Determination**: Section 4(f) use because of permanent incorporation.					

State	Historic Site	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Without C Street Ramps, Centered I-5	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Shifted West	Modified LPA with Single-Level Fixed- or Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	Modified LPA with Single-Level Fixed- or Movable-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5	Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5
	Vancouver National Historic Reserve Historic District (WA 368, 369, 918, 109), Vancouver	Permanent Incorporation: Approximately 65,600 square feet Temporary Occupancy: Approximately 110,100 square feet **Preliminary Determination**: Section 4(f) use.	Permanent Incorporation: Approximately 66,900 square feet Temporary Occupancy: Approximately 108,700 square feet **Preliminary Determination**: Section 4(f) use.	Permanent Incorporation: Approximately 53,400 square feet Temporary Occupancy: Approximately 121,600 square feet **Preliminary Determination**: Section 4(f) use.	Permanent Incorporation: Approximately 63,700 square feet Temporary Occupancy: Approximately 111,900 square feet **Preliminary Determination**: Section 4(f) use.	Permanent Incorporation: Approximately 68,400 square feet Temporary Occupancy: Approximately 107,300 square feet **Preliminary Determination**: Section 4(f) use.	Permanent Incorporation: Approximately 68,400 square feet Temporary Occupancy: Approximately 107,300 square feet **Determination**: Section 4(f) use.
	Fendrich's Furniture (WA 7), 209 W 6th Street, Vancouver	No permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the site. **Preliminary Determination**: No Section 4(f) use.					
	Evergreen Hotel (WA 21), 500 Main Street, Vancouver	Temporary occupancy of approximately 400 square feet requiring temporary closure of south entrance to the NRHP-eligible building. Based on 23 CFR 774.13(d), temporary occupancy of the park would meet the exception criteria. **Preliminary Determination**: No Section 4(f) use.					
	House of Providence (Providence Academy) (WA 150), 400 E Evergreen Boulevard, Vancouver	Temporary occupancy of approximately 4,700 square feet from the southern boundary of the historic site. Based on 23 CFR 774.13(d), temporary occupancy of the historic site would meet the exception criteria. **Preliminary Determination**: No Section 4(f) use.		Permanent incorporation of approximately 9,800 square feet from the eastern boundary of the historic site and temporary occupancy of approximately 2,100 square feet from the southern boundary. **Preliminary Determination**: Section 4(f) use. *De minimis* impact because there would be No Adverse Effect under Section 106.	Temporary occupancy of approximately 4,700 square feet from the southern boundary of the historic site. Based on 23 CFR 774.13(d), temporary occupancy of the historic site would meet the exception criteria. **Preliminary Determination**: No Section 4(f) use.		
	William H. and Myrtle Hood Residence (WA 191), 3405 K Street, Vancouver	No permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the site. **Preliminary Determination**: No Section 4(f) use.					
	Office Building (WA 1144), 1514 E Street, Vancouver	No permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the site. **Preliminary Determination**: No Section 4(f) use.					
	Duplex Residences (WA 1168), 2901 K Street, Vancouver	Temporary occupancy of approximately 300 square feet at the southwest corner of the historic site, the possible removal of grass lawn (this would be replaced in-kind following construction), and preservation in place of one ornamental shrub. Based on 23 CFR 774.13(d), temporary occupancy of the historic site would meet the exception criteria. **Preliminary Determination**: No Section 4(f) use.					
	Earls House (WA 1233), 815 E 22nd Street, Vancouver	No permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the site. **Preliminary Determination**: No Section 4(f) use.					
	Mickler House (WA 1258), 901 E 29th Street, Vancouver	Temporary occupancy of approximately 48 square feet at the north boundary of the historic site and possibly disturbance of a fence and walkway (these would be restored following construction). Based on 23 CFR 774.13(d), temporary occupancy of the historic site would meet the exception criteria. **Preliminary Determination**: No Section 4(f) use.					
	Vancouver Barracks National Cemetery (WA 1319), 1200 E Fourth Plain Boulevard, Vancouver	No permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the site. **Preliminary Determination**: No Section 4(f) use.					

State	Historic Site	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Without C Street Ramps, Centered I-5	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, I-5 Shifted West	Modified LPA with Single-Level Fixed- or Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	Modified LPA with Single-Level Fixed- or Movable-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5	Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5
	St. James Acres Cemetery (WA 1320), 1401 E 29th Street, Vancouver	No permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the site. **Preliminary Determination**: No Section 4(f) use.					
	Smith Tower (WA 10), 515 Washington Street, Vancouver	No permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the site. **Preliminary Determination**: No Section 4(f) use.					
	U.S. National Bank Building (WA 29), 601-603 Main Street, Vancouver	No permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the site. **Preliminary Determination**: No Section 4(f) use.					
	Porter House (WA 61), 3000 K Street, Vancouver	Subsurface easement for installation of subterranean tie-back anchors (per Question 28A of the *Section 4(f) Policy Paper*, Section 4(f) would not apply). No other permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the site. **Preliminary Determination**: No Section 4(f) use.					
	Hall House (WA 62), 903 E 31st Street, Vancouver	Subsurface easement for installation of subterranean tie-back anchors (per Question 28A of the *Section 4(f) Policy Paper*, Section 4(f) would not apply). No other permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the site. **Preliminary Determination**: No Section 4(f) use.					
	Radio Transmission Building (WA 382), 1601 E Fourth Plain Boulevard, Vancouver	No permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the site. **Preliminary Determination**: No Section 4(f) use.					
	Covington House (WA 900), 4201 Main Street, Vancouver	No permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the site. **Preliminary Determination**: No Section 4(f) use.					
	Who Song & Larry's (WA 1138), 111 SE Columbia Way, Vancouver	Temporary occupancy of approximately 200 square feet. Based on 23 CFR 774.13(d), temporary occupancy of the historic site would meet the exception criteria. **Preliminary Determination**: No Section 4(f) use.					
	Washington State Patrol District Five Headquarters (WA 1148), 605 E Evergreen Boulevard, Vancouver	Permanent Incorporation of approximately 800 square feet and temporary occupancy of approximately 600 square feet. No substantial impairment of the protected activities, features, or attributes of the site. **Preliminary Determination**: Based on CFR 774.17, this would be a *de minimis* impact because there would be No Adverse Effect under Section 106.					
	Rudy Luepke Center for Senior Citizens (WA 1182), 1009 E McLoughlin Boulevard, Vancouver	No permanent incorporation or temporary occupancy, and no substantial impairment of the protected activities, features, or attributes of the site. **Preliminary Determination**: No Section 4(f) use.					

4.3.6 Use of Section 4(f) Historic Sites (Oregon)

Historic Sites Evaluated to Have No Use under Section 4(f)

Permanent Incorporation and Temporary Occupancy (Modified LPA with All Design Options) – No Use

The two historic sites listed in Table 4-6 were evaluated under Section 106 to have a finding of "No Effect" for the Modified LPA, including design options. Neither of these historic sites would be permanently incorporated or temporarily occupied by the Modified LPA or the design options. Therefore, there would be no direct use under Section 4(f) of these sites.

Constructive Use

A constructive use occurs when a transportation project does not incorporate land from a Section 4(f) property, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired (23 CFR 774.15[a]). A constructive use does not occur when compliance with the requirements of 36 CFR 800.5 (Assessment of adverse effects) for proximity impacts of the proposed action, on a site listed in or eligible for the NRHP, results in an agreement of "No Effect" or "No Adverse Effect" (23 CFR Section 774.15[f][1]). The Section 106 evaluation for the Program determined that there would be "No Effect" to the historic sites listed in Table 4-6. Because the Program would have "No Effect" to the historic sites, it would not substantially impair the protected activities, features, or attributes of the Section 4(f) properties and, therefore, it would not result in a constructive use of either historic site.

Table 4-6. Historic Sites (Portland) – No Use under Section 4(f)

Site ID	Historic Site
OR 120	Hayden Island Yacht Club Clubhouse
OR 155	East Vanport Commercial Center

Historic Sites Evaluated to Have Use with a Greater than *de minimis* Impact under Section 4(f)

Harbor Shops Building (Map ID – OR 107)

Description

The Harbor Shops building is a Postmodern-style strip mall located at 11915 N Center Avenue in Portland. Constructed in 1978, this one-story building features an irregular footprint with an elongated zigzag shape and a flat roof with a high parapet. The Harbor Shops Building is eligible for inclusion in the NRHP under Criterion A, at the local level of significance, in the areas of commerce and community planning and development. The Harbor Shops Building is also eligible, at the local level of significance, under Criterion C in the area of architecture as an intact example of a strip mall property type. Although it has experienced minor alterations to its interior configuration and exterior signage related to tenant turnover, the strip mall generally retains integrity of location, design, setting, materials, workmanship, feeling, and association to this period. The boundary of the historic site coincides with the boundary of the tax lot and includes the Harbor Shops Building as well as the associated parking lot and planted medians.

The Harbor Shops Building was determined eligible for the NRHP in 2023, in an evaluation process carried out as part of the IBR Program. The FOE documented in the Section 106 Level of Effect form for this site, which is contained in Appendix D of the Historic Built Environment Technical Report, is "Adverse Effect" for the IBR

Program Modified LPA and its design options. This finding received concurrence from the Oregon SHPO on March 19, 2024.

Use Evaluation for the Modified LPA

The Modified LPA, including all design options, would acquire and permanently incorporate the Harbor Shops Building into right of way to construct the proposed northbound and southbound Columbia River bridges (see Figure 4-21). Construction of the bridges would require the demolition of extant features on the NRHP-eligible historic site, including the primary commercial building, surface parking lots and circulation, and planted medians. The Modified LPA would remove the features that convey the Harbor Shops Building's significance under NRHP Criteria A and C and would eliminate the site's integrity of location, design, setting, materials, workmanship, feeling, and association; as recommended in the Section 106 FOE, the Modified LPA would have an "Adverse Effect" on the site. The Modified LPA would permanently incorporate the entirety of the approximately 52,200-square-foot Harbor Shops Building site and would constitute a use of the site under Section 4(f).

As the entire site would be permanently incorporated, there would be no temporary occupancy of the Harbor Shops Building site by the Modified LPA, inclusive of all design options.

Preliminary Determination

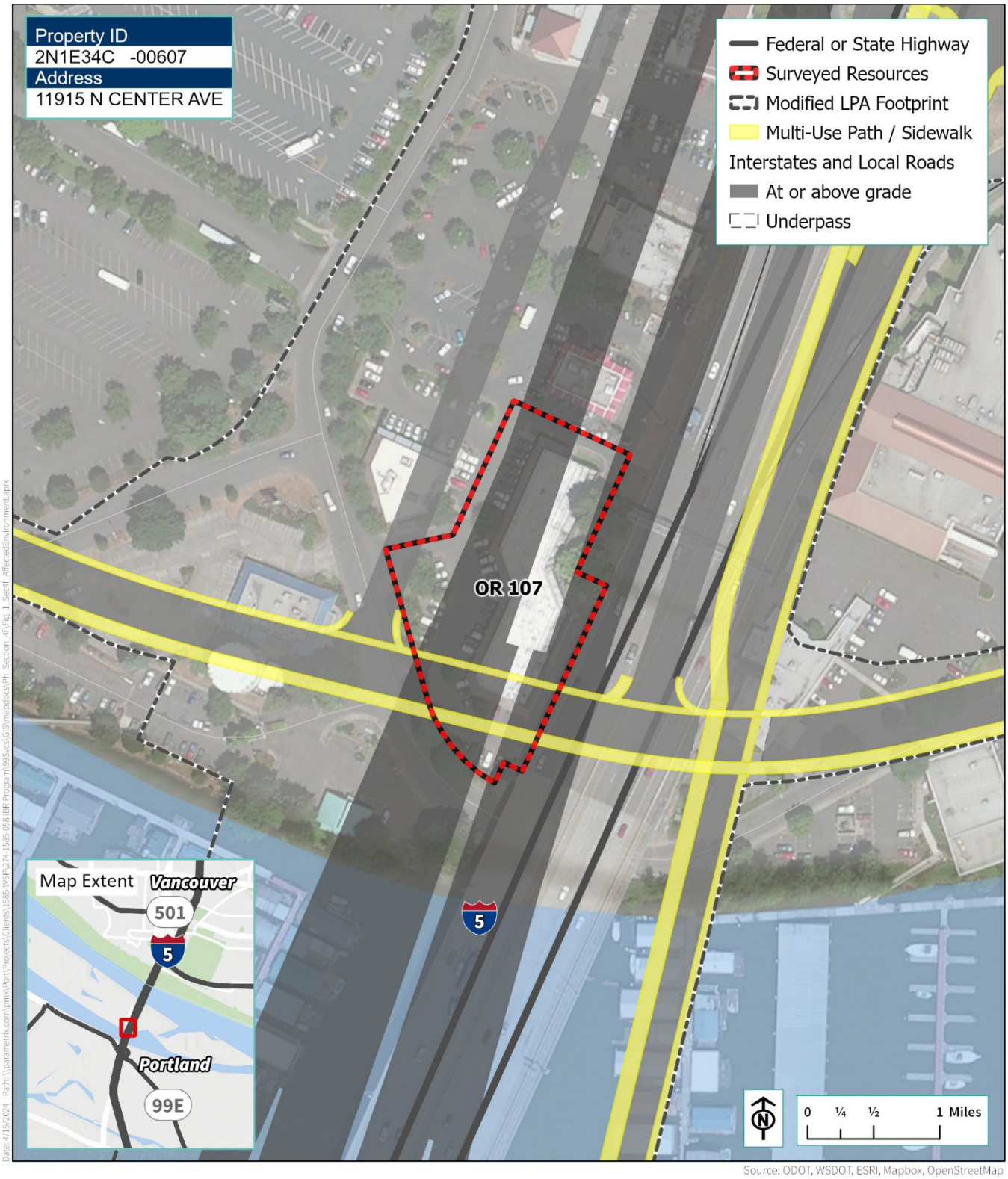
The Modified LPA and its design options would all require the acquisition of the Harbor Shops Building and the subsequent removal of all its extant features, which would render the historic site no longer eligible for the NRHP. Consistent with the definition of use set forth in 23 CFR 774.17, which states that a use of Section 4(f) property occurs "when land is permanently incorporated into a transportation facility," FHWA and FTA have determined that the Modified LPA and its design options would result in a use under Section 4(f) for the Harbor Shops Building.

Jantzen Beach Water Tank and Pump House (Map ID – OR 109)

Description

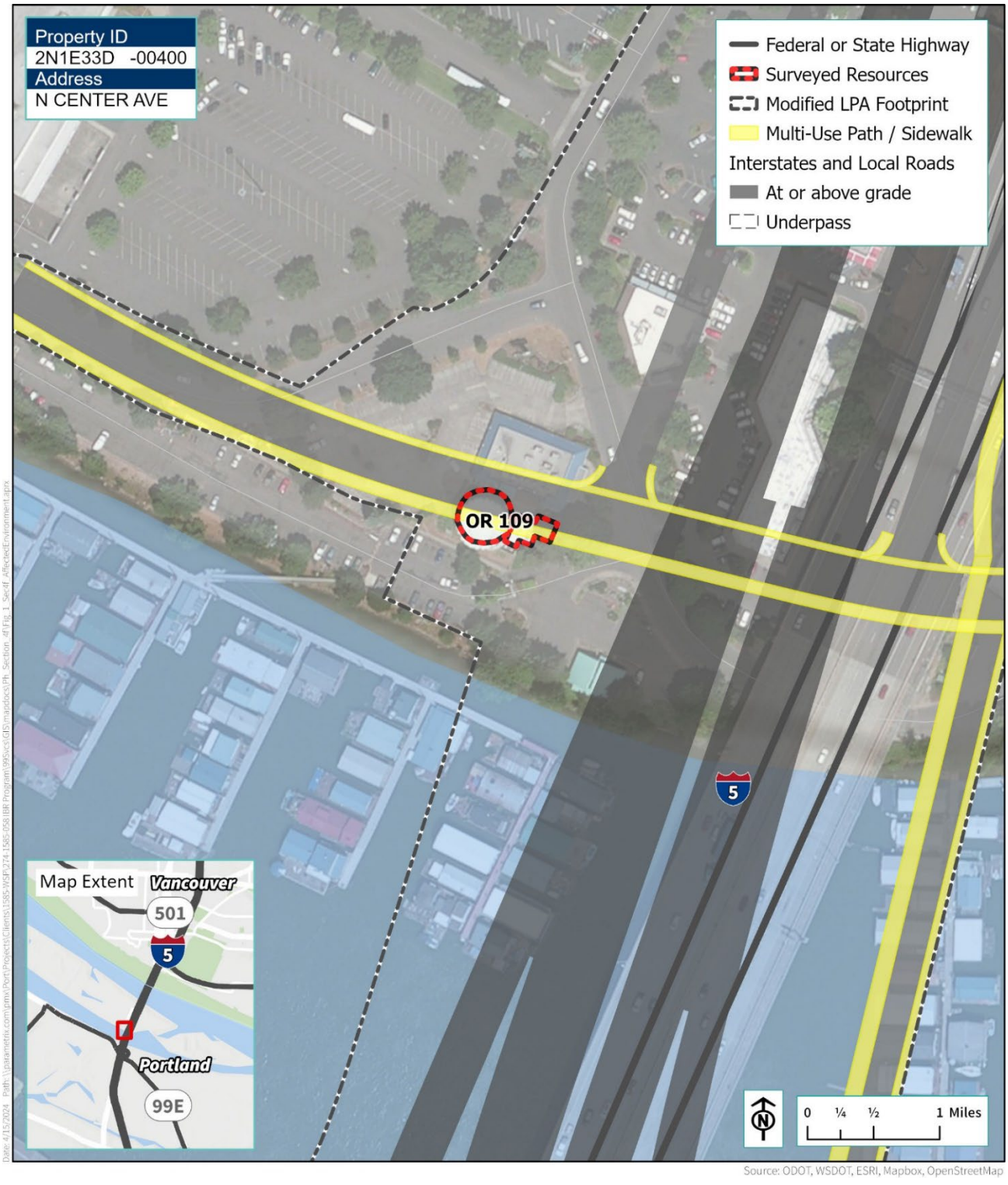
The Jantzen Beach Water Tank and Pump House are utilitarian structures located near the intersection of North Center Street and North Jantzen Avenue on Hayden Island in Portland. Initial construction of the water tank was completed in 1968. The Jantzen Beach Water Tank and Pump House are eligible for inclusion in the NRHP under Criterion A at the local significance level in the area of community planning and development, and under Criterion C at the local significance level in the area of engineering. The historic site is a good example of a welded steel water tank that remains intact and continues to convey its original construction method and materials. Overall, the Jantzen Beach Water Tank and Pump House retain integrity of location, materials, workmanship, feeling, and association; however, the site's integrity of design has been diminished by the changes to the pump house, and its integrity of setting has been diminished by the addition of various site features (fencing, sidewalk, etc.) after the period of significance. Due to the changes to the setting, the historic site's boundary is limited to the extent of the respective footprints of the water tank, pump house, and the associated back-up diesel generator. The Water Tank and Pump House is not currently functioning.

Figure 4-21. IBR Program Improvements and Area of Permanent Incorporation for the Harbor Shops Building



The Jantzen Beach Water Tank and Pump House was determined eligible for the NRHP in 2023, in an evaluation process carried out as part of the IBR Program. The FOE documented in the Section 106 Level of Effect form for this site, which is contained in Appendix D of the Historic Built Environment Technical Report, is "Adverse Effect" for the IBR Program Modified LPA and its design options. The finding received concurrence from the Oregon SHPO on March 19, 2024.

Figure 4-22. IBR Program Improvements and Area of Permanent Incorporation for the Jantzen Beach Water Tower and Pump House



Use Evaluation for the Modified LPA

The Modified LPA, inclusive of all design options, would permanently incorporate the entirety of the approximately 3,200-square-foot Jantzen Beach Water Tank and Pump House site as right of way to construct a new road that would join the existing North Jantzen Avenue alignment west of the subject property (see Figure 4-22, above). Construction of the new road would require the demolition of all extant features of the property, including the water tank, pump house, and the associated back-up diesel generator. The Modified LPA would remove the features that convey the property's significance under NRHP Criteria A and C and would eliminate the property's integrity of location, design, setting, materials, workmanship, feeling, and association, resulting in a Section 106 FOE of "Adverse Effect" to the NRHP-eligible property. The Modified LPA would therefore constitute a use of the Jantzen Beach Water Tank and Pump House site under Section 4(f).

As the entire site would be permanently incorporated, there would be no temporary occupancy of the historic site by the Modified LPA, inclusive of all design options.

Preliminary Determination

The Modified LPA and its design options would all require the acquisition of the Jantzen Beach Water Tank and Pump House historic site and the subsequent removal of all its extant features, which would render the historic site no longer eligible for the NRHP. Consistent with the definition of use set forth in 23 CFR 774.17, which notes that a use of Section 4(f) property occurs "when land is permanently incorporated into a transportation facility," FHWA and FTA have determined that the Modified LPA and its design options would result in a use under Section 4(f) for the Jantzen Beach Water Tank and Pump House.

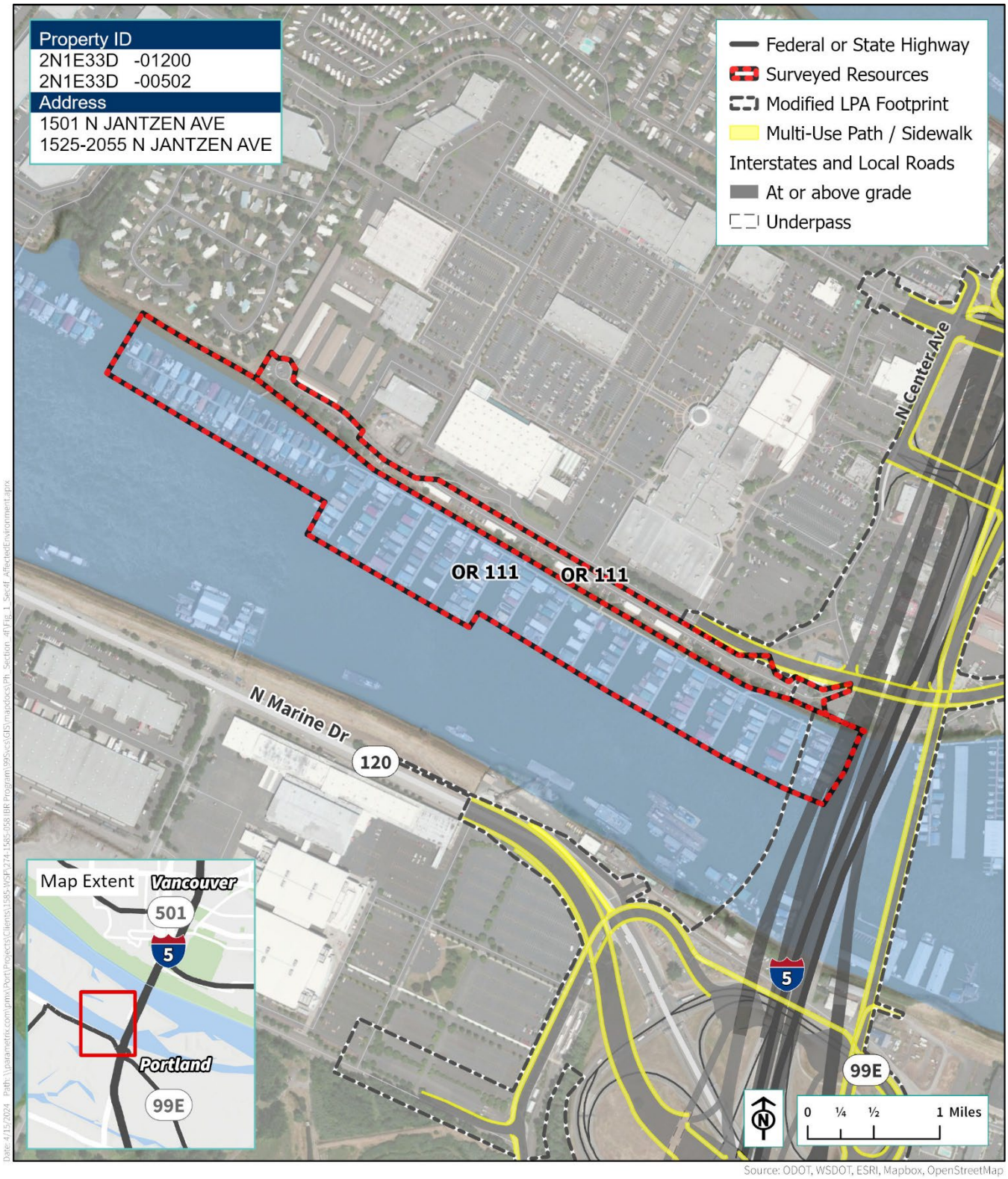
Jantzen Beach Moorage (Map ID – OR 111)

Description

The Jantzen Beach Moorage is located at North Portland Harbor in the Columbia River. Originally built in 1935, the moorage offered leasable and—eventually—privately owned slips for floating homes starting in 1958. The property is 27.3 acres and encompasses a linear dock, multiple finger piers, a parking lot, and associated hardscaping and landscaping. The moorage is host to approximately 175 floating homes located on the water of North Portland Harbor. Figure 4-23 depicts the identified boundary of the historic site. The property is eligible for inclusion in the NRHP under Criterion A for its significance at the local level in the area of community planning and development, and at the local level in the area of maritime history.

The Jantzen Beach Moorage was determined eligible for the NRHP in 2023, in an evaluation process carried out as part of the IBR Program. The FOE documented in the Section 106 Level of Effect form for this site, which is contained in Appendix D of the Historic Built Environment Technical Report, is "Adverse Effect" for the IBR Program Modified LPA and its design options. This finding received concurrence from the Oregon SHPO on March 19, 2024.

Figure 4-23. Aerial Map of Jantzen Beach Moorage (1501, 1525-2055 North Jantzen Avenue), Showing Boundary in Red



Use Evaluation for the Modified LPA

The Modified LPA, inclusive of all design options, would replace the existing North Portland Harbor bridge with new bridges. A new LRT bridge would also cross North Portland Harbor to the west of the new North Portland Harbor bridges. Construction of these two structures would permanently incorporate approximately 85,900 square feet of the Jantzen Beach Moorage historic site and result in removal of a section of dock, at least two finger piers, and approximately 20 floating shelters. The Modified LPA, under all design options, would also temporarily occupy 19,400 square feet of the Jantzen Beach Moorage during construction. This occupancy is considered in the "Adverse Effect" determination under Section 106. The temporary occupancy of the site by the Modified LPA is incorporated in the use determination. Figure 4-23, above, depicts how the Modified LPA would intersect with the property. These structures are contributing elements of the NRHP-eligible Jantzen Beach Moorage. Removal of these elements would reduce the resource's integrity of location, design, setting, materials, workmanship, and feeling, resulting in a finding of "Adverse Effect" for the NRHP-eligible Jantzen Beach Moorage under Section 106. Thus, the permanent incorporation would constitute a use of the historic site under Section 4(f).

Preliminary Determination

The Modified LPA and its design options would all permanently incorporate approximately 85,900 square feet of the Jantzen Beach Moorage historic site and the subsequent removal of character-defining features including a section of dock, at least two finger piers, and approximately 20 floating shelters. FHWA and FTA have determined that the Modified LPA and its design options would result in a use under Section 4(f) for the Jantzen Beach Moorage.

Historic Sites Evaluated to Have Use with a *de minimis* Impact under Section 4(f)

Columbia Slough Drainage Districts Historic District (Map ID – OR 2)

Description

The Columbia Slough Drainage Districts Historic District comprises four geographically contiguous drainage districts on the Columbia River floodplain between the Willamette River and the Sandy River, occupying more than 10,000 acres. Within the Columbia Slough Drainage Districts Historic District are elements including levees and cross levees, pump stations, weirs/dams, canals, sloughs, and drainage ditch systems and flood walls. The district is eligible for the NRHP under Criterion A for its association with early drainage district development in Oregon, which reflected the national reclamation movement that began in the 1880s, and under Criterion C as a major engineered drainage system that was initially constructed in the early 20th century. Its boundary is delineated by the levees, major drainages evaluated to be contributing, as well as reasonable immediate areas surrounding pump stations, weirs, and dams; the interior areas within the district's drainage districts are not included within the boundaries.

The Columbia Slough Drainage Districts Historic District was identified as eligible for the NRHP in a draft nomination prepared for the U.S. Army Corps of Engineers (USACE) in 2019. The FOE documented in the Section 106 Level of Effect form for this site, which is contained in Appendix D of the Historic Built Environment Technical Report, is "No Adverse Effect" for the IBR Program Modified LPA and its design options. This finding received concurrence from the Oregon SHPO on March 18, 2024.

Figure 4-24. IBR Program Improvements and Area of Permanent Incorporation for the Columbia Slough Drainage Districts Historic District

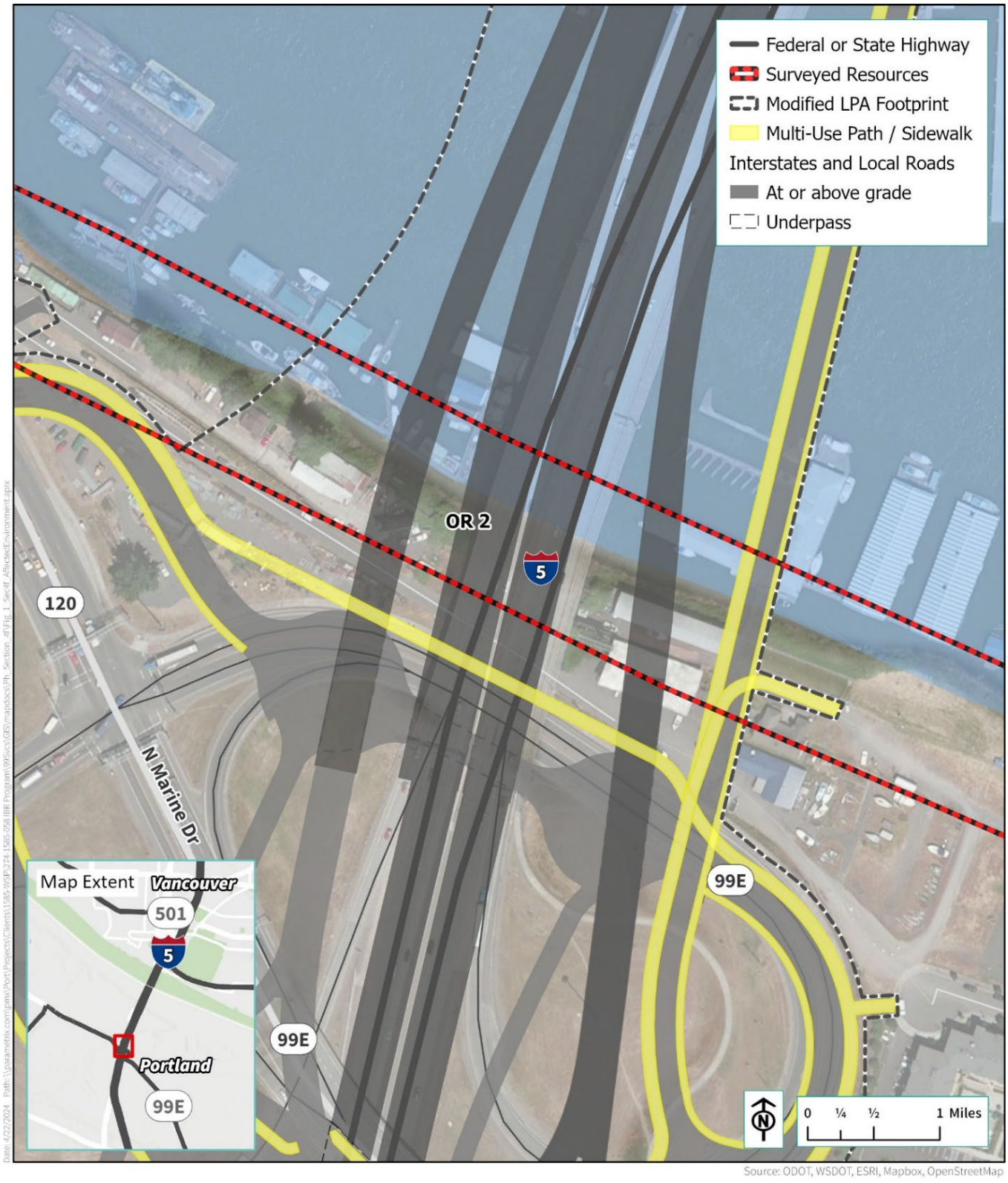
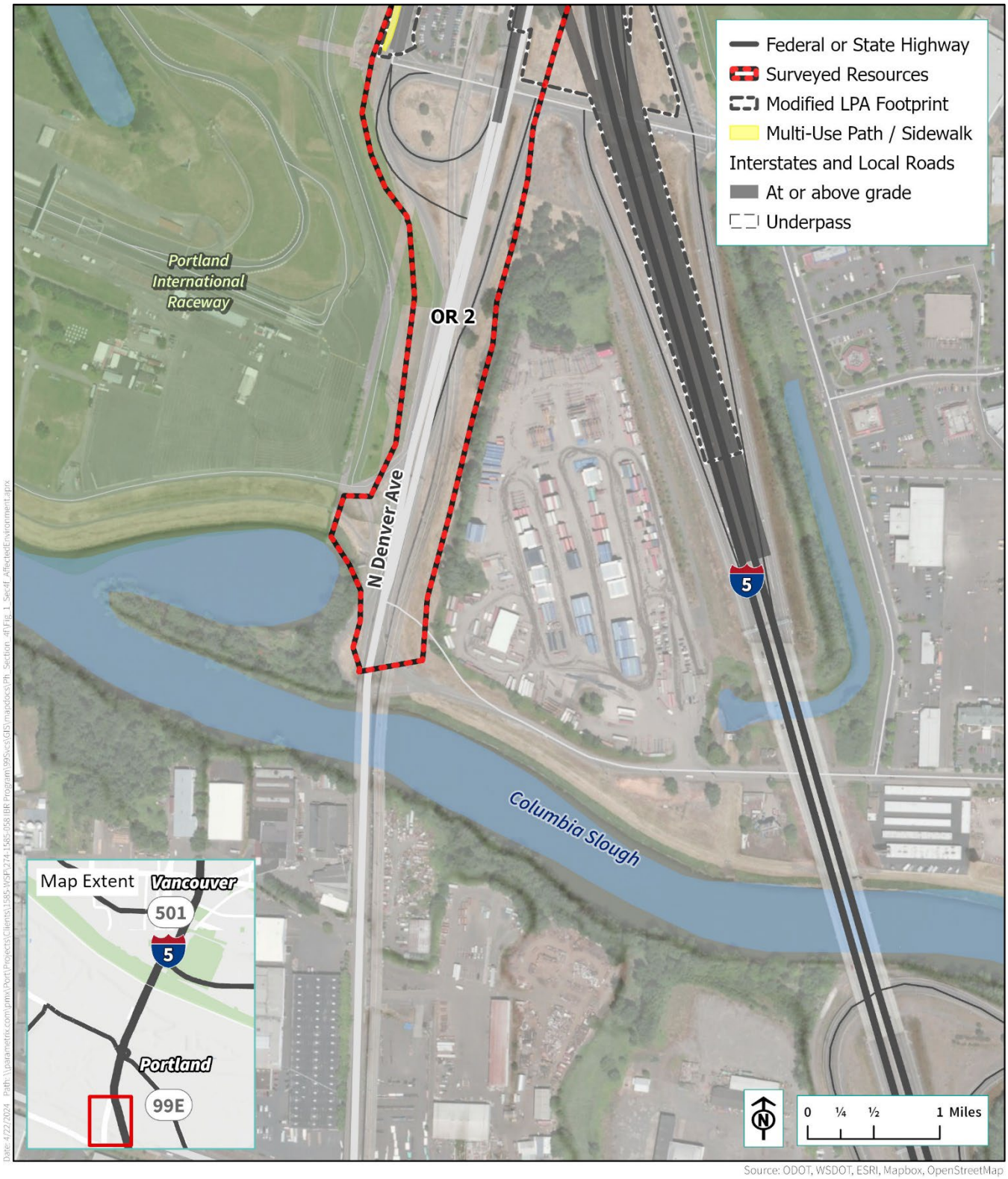


Figure 4-25. IBR Program Improvements and Area of Permanent Incorporation for the Columbia Slough Drainage Districts Historic District



Use Evaluation for the Modified LPA

The Modified LPA straddles the boundary between Peninsula Drainage District No. 1 and Peninsula Drainage District No. 2 and includes portions of four resources that are contributing to the Columbia Slough Drainage Districts Historic District: the Columbia River Levee (Figure 4-24), the Union Avenue/Martin Luther King Jr. Boulevard Cross Levee, the N Denver Avenue Cross Levee, and the Mud Slough Drainage. The Modified LPA, inclusive of all design options, would acquire approximately 182,300 square feet from the historic district, including portions of these four contributing resources. Within the permanent acquisition, the Modified LPA would:

- Reconstruct and widen I-5 between N Victory Boulevard and the Columbia River, on and over portions of the N Denver Avenue Cross Levee, the Mud Slough Drainage, and the Columbia River Levee (Figure 4-25).
- Construct new LRT alignment, new Columbia River bridges, and a new arterial bridge across the North Portland Harbor and over the Columbia River Levee.
- Conduct roadway improvements and create a new shared-use path along N Marine Drive to the west of I-5, on the Columbia River Levee.
- Conduct roadway improvements and create new shared-use paths along N Martin Luther King Jr. Boulevard, NE Union Court, and N Vancouver Way to the east of I-5, on and beside the Union Avenue/Martin Luther King Jr. Boulevard Cross Levee.
- Conduct roadway improvements and create a new shared-use path along N Expo Road, at the west side of the N Denver Avenue Cross Levee.
- Conduct roadway improvements along N Denver Avenue to the north of N Victory Boulevard, on the N Denver Avenue Cross Levee.
- Create new stormwater facilities near N Victory Boulevard and N Denver Avenue and around the I-5 Martin Luther King Jr. Boulevard overpass.

The Modified LPA would not require major changes to the alignments, heights, or widths of the Columbia River Levee, the Union Avenue/Martin Luther King Jr. Boulevard Cross Levee, or the N Denver Avenue Cross Levee, nor would it require infill of the Mud Slough Drainage. As such, the Modified LPA would not substantially impair the character-defining features of the contributing levees and slough, and it would therefore not diminish the Columbia Slough Drainage Districts Historic District's integrity of location, materials, design, or workmanship such that the district could no longer convey its significant development history and engineering merit. While the Modified LPA would alter approximately 182,300 square feet of infrastructure within and around the historic district, it would not change the location of contributing resources or the overall character of the surrounding setting. The Columbia Slough Drainage Districts Historic District would, overall, retain integrity of setting, feeling, and association during construction and after the Program is completed.

Temporary occupancy of other areas within the Columbia Slough Drainage Districts Historic District during construction of the Modified LPA, inclusive of all design options, would include approximately 140,800 square feet for a temporary construction easement to accommodate construction activities, in addition to the area of permanent incorporation. The temporary occupancy area, which was considered in the Section 106 FOE for the historic district, would be a small portion of the overall district and would not adversely affect the qualities of the district that make it eligible for the NRHP.

In conclusion, the Modified LPA would not substantially impair the activities, features, or attributes that contribute to the Columbia Slough Drainage Districts Historic District's NRHP eligibility. The Section 10 FOE for the district therefore includes a finding of "No Adverse Effect" for the Modified LPA. Based on this finding,

and consistent with the definition of *de minimis* impact in 23 CFR 774.17, FHWA and FTA have found that the Modified LPA would result in a *de minimis* impact for permanent incorporation to this site.

Preliminary Determination

The acquisition of right of way within the Columbia Slough Drainage District Historic District, including from contributing resources, would constitute a use under Section 4(f). The Section 106 FOE for the Columbia Slough Drainage Districts Historic District is "No Adverse Effect" for the Modified LPA, including all design options; the Oregon SHPO concurred with this finding on March 18, 2024. Based on this finding, and consistent with the definition of *de minimis* impact in 23 CFR 774.17, FHWA and FTA have determined that the Modified LPA and its design options would have a *de minimis* impact on the Columbia Slough Drainage Districts Historic District.

Portland Assembly Center (Map ID – OR 56)

Description

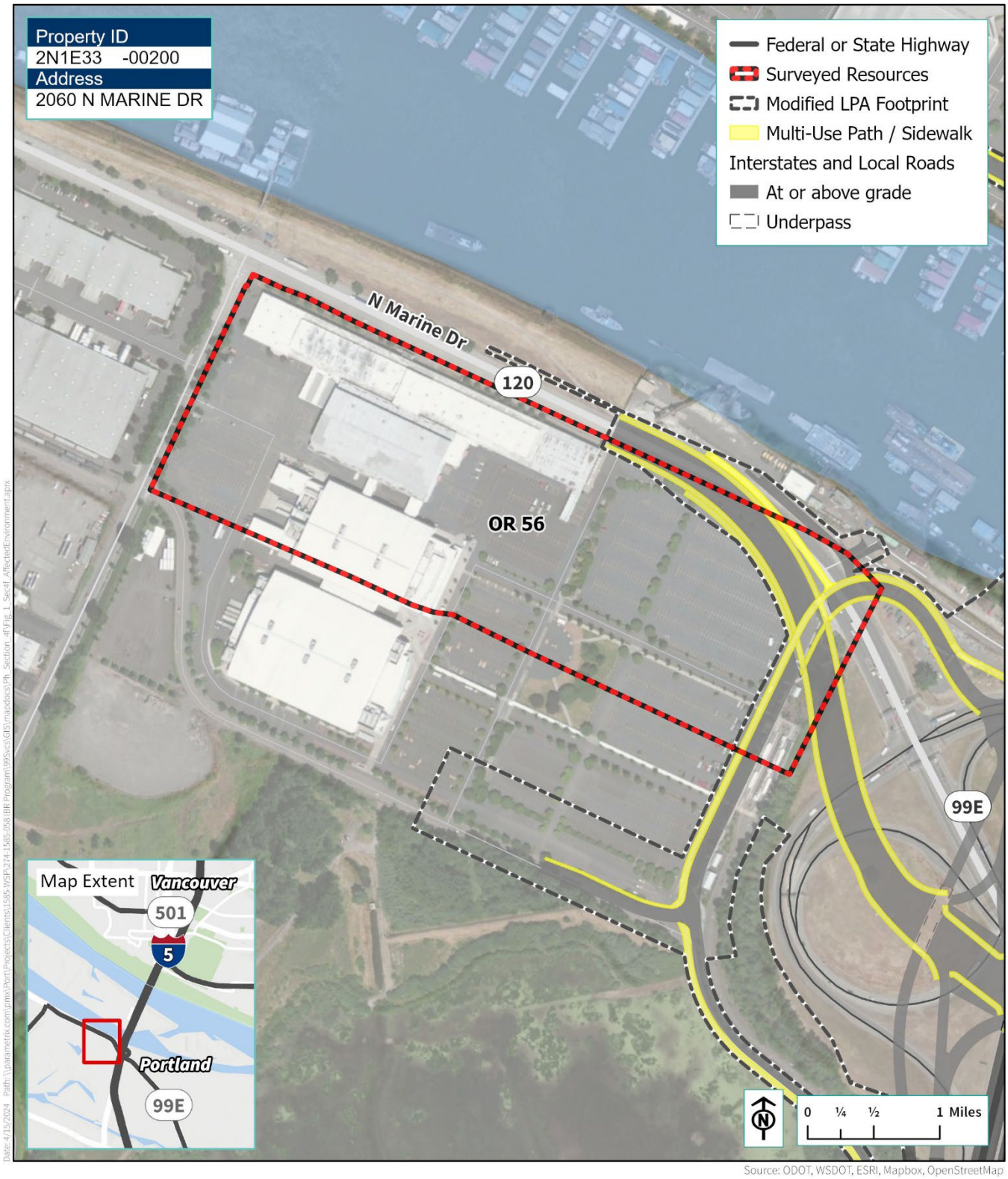
The Portland Assembly Center, located at 2060 North Marine Drive in Portland, is a Georgian Revival and Modern building comprising five interconnected exposition halls built between 1924 and 2001. It is commonly known as the "Portland Expo Center." The Portland Assembly Center is eligible for the NRHP under Criterion A for its association with the World War II Homefront and the events of Japanese American incarceration. The period of significance for the NRHP-eligible Portland Assembly Center is limited to 1942, corresponding to the period of Japanese American incarceration at the site. The historic site is one of only 16 Temporary Assembly Centers originally designated by the Wartime Civil Control Administration and is the only such site in Oregon, making it unique in its association with this period. Its boundary is the area that was contained within the barbed wire fence of the 1942 facility; this is contained within the larger tax lot (R323452). Within the boundary, character-defining features of the site include the essential physical features of Halls A, B, and C that date to the period of significance and those aspects of setting and location that were conducive to its selection as an assembly center: namely the site's flat topography; orientation along the Columbia River; views of North Portland Harbor and the Columbia River Levee; proximity to nearby population centers and transportation infrastructure including the roadway, waterway, and rail lines; its semi-industrial land use, which allowed for immediate availability of energy and water; and its spatial arrangement including the open east half of the site and covered space for shelter and recreation.

The Portland Assembly Center was determined eligible for the NRHP in 2023, in an evaluation process carried out as part of the IBR Program. The FOE documented in the Section 106 Level of Effect form for this site, which is contained in Appendix D of the Historic Built Environment Technical Report, is "No Adverse Effect" for the IBR Program Modified LPA and its design options. This finding received concurrence from the Oregon SHPO on March 18, 2024.

Use Evaluation for the Modified LPA

The Modified LPA, inclusive of all design options, would permanently acquire 244,800 square feet of property from the far southern, eastern, and western edges of the Portland Assembly Center site within and adjacent to the parking lot. Within the area of permanent acquisition, activities would include modifications to Marine Drive West, along the eastern side of the Portland Assembly Center's historic boundary, and the construction of a new light-rail vehicle overnight facility to the south of the property, outside of its historic boundary (see Figure 4-26).

Figure 4-26. IBR Program Improvements and Area of Permanent Incorporation for the Portland Assembly Center



Both of these areas have been substantially altered since the site's 1942 period of significance by the installation of a surface parking lot and various landscaping features such as sidewalks and vegetated islands. The permanent acquisition and effect of the Modified LPA upon the Portland Assembly Center would not further reduce the site's integrity because the incorporated area has no remaining integrity from the period of significance.

Temporary occupancy of the Portland Assembly Center during construction of the Modified LPA, inclusive of all design options, would include 1,408,700 square feet. Proposed activities would not adversely affect the features of the site that make it eligible for the NRHP. Specifically, these activities would not alter the essential physical features of Halls A, B, and C that date to the 1942 period of significance, nor would they alter the site's spatial arraignment, relatively flat topography, orientation along the Columbia River, views of North Portland Harbor and the Columbia River Levee, proximity to nearby population centers and transportation infrastructure, or semi-industrial land use.

The permanent acquisition and the temporary occupancy of the Portland Assembly Center would result in a Section 106 finding of "No Adverse Effect" for the Modified LPA.

Preliminary Determination

The acquisition of right of way from the Portland Assembly Center would constitute a use under Section 4(f). The Section 106 FOE for the Portland Assembly Center is "No Adverse Effect" for the Modified LPA and its design options; the Oregon SHPO concurred with this finding on March 18, 2024. Based on this finding, and consistent with the definition of *de minimis* impact in 23 CFR 774.17, FHWA and FTA have determined that the Modified LPA, including all design options, would have temporary and permanent *de minimis* impacts on the Portland Assembly Center.

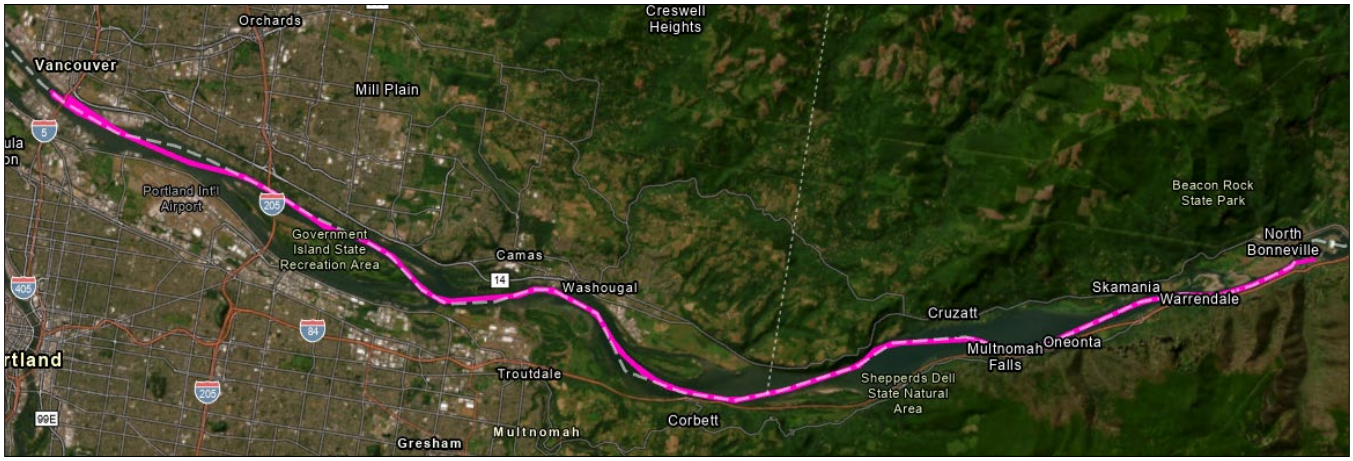
Lower Columbia River Federal Navigation Historic District (Map ID – OR 165)

Description

The Lower Columbia River Federal Navigation Historic District (LCR Nav Historic District), located along the Columbia River from its mouth (River Mile [RM] 3) to the Bonneville Lock and Dam (RM 145), is a series of structures built and maintained by USACE starting in 1873. USACE's federal navigation system along the LCR has helped develop the Pacific Northwest and build its economy by allowing for safe transport of imports and exports, and it also represents a major engineering feat. The boundary for the LCR Nav Historic District encompasses a series of noncontiguous structures, including navigation channels that extend from RM 3 to RM 145, six turning basins, 41 pike dike systems, and nine landforms created from dredge materials. Figure 4-27 depicts the extent of the Lower Columbia River Federal Navigation Channel (LCR FNC), which is one of the district's contributing structures.

The LCR Nav Historic District was determined eligible for the NRHP under Criterion A in the areas of commerce and maritime history and under Criterion C in the area of engineering, in a draft nomination prepared for the USACE in 2023. The FOE documented in the Section 106 Level of Effect form for this site, which is contained in Appendix D of the Historic Built Environment Technical Report, is "No Adverse Effect" for the Modified LPA and its design options. The finding received concurrence from the Washington State DAHP on October 13, 2023, and from the Oregon SHPO on March 18, 2024.

Figure 4-27. Aerial Map of the Lower Columbia River Federal Navigation Channel



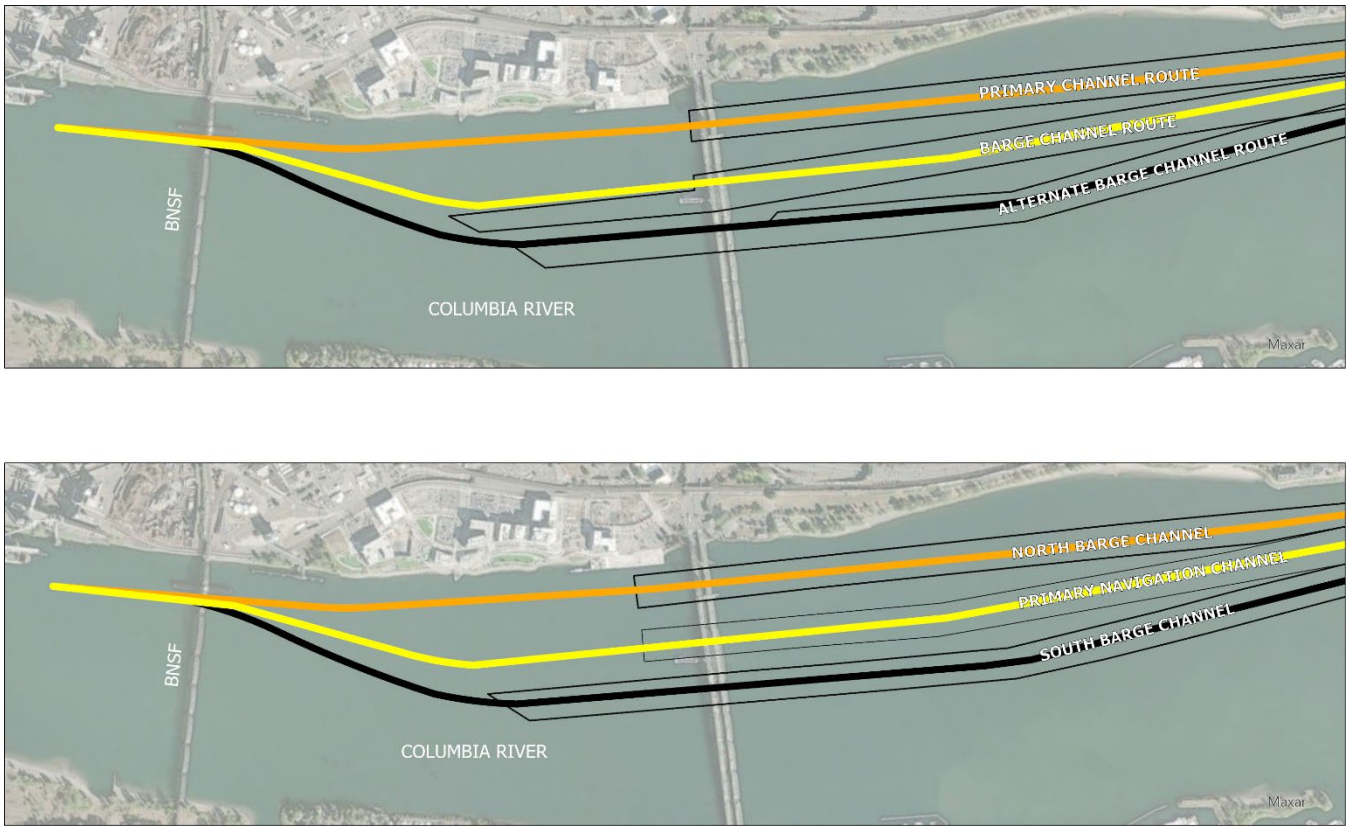
Source: USACE 2023

Use Evaluation for the Modified LPA

The Modified LPA would construct two adjacent bridges carrying I-5 across the Columbia River located immediately downstream (west) of the existing Interstate Bridge, and temporary in-water staging/work areas extending up to approximately 1,000 feet upstream (east) of the existing bridges and up to approximately 1,000 feet downstream (west) of the proposed bridges. These activities would occur over a small portion of two of the district's contributing resources: the LCR FNC from Vancouver to Bonneville Lock and Dam and the Upper Vancouver Turning Basin. The LCR FNC from Vancouver to Bonneville Lock and Dam contains three navigation channel routes (primary, barge, and alternate barge) which would be revised to correspond with the maximum vertical clearance and air draft provided by the proposed bridges. Subject to approval by USACE and U.S. Coast Guard (USCG), the channel routes would be slightly realigned, and the relative locations of the primary navigation channel (currently the northernmost route) and the barge channel (currently the middle route) would be switched so that the north barge channel would become the northernmost route and the primary navigation channel would become the middle route; the relative location of the alternate barge channel (the south barge channel) would remain the same, as would the width of the overall FNC (Figure 4-28). The Upper Vancouver Turning Basin, which marks the west end of the FNC, would shift downstream between approximately 300 and 325 feet to maintain its approximately 2,000 feet of length under the Modified LPA with all design options; its existing width of approximately 800 feet also would be maintained (Figure 4-29).

While these Program-related activities would result in alterations to the district, they would be minor, limited to the margins of two of the contributing structures within the more than 140-mile-long district, and would not reduce the integrity of location, setting, materials, design, workmanship, feeling, and association of either structure or of the district as a whole. Both the contributing structures and the district would retain their integrity and character-defining features under the Modified LPA.

Figure 4-28. Existing and Proposed Channel Routes within the Lower Columbia River Federal Navigation Channel



Note: Top figure shows the Existing Channel Routes within the LCR FNC from Vancouver to Bonneville Lock and Dam. Bottom figure shows the Proposed Channel Routes within the LCR FNC from Vancouver to Bonneville Lock and Dam. The proposed exchange of the relative location of the barge channel route (orange) and the primary channel route (yellow) (IBR, "Navigation Impact Report," rev. May 2022, 2-21) subject to approval by USACE and USCG.

Figure 4-29. Upper Vancouver Turning Basin

NOTE: The red outline denotes the boundary of the Upper Vancouver Turning Basin. The green outlines denote the location of the Lower Columbia River federal navigation channel (including its three channel routes) from Vancouver, Washington (RM 106.5) to Bonneville Lock and Dam (RM 145) (USACE 2023).

Temporary occupancy of the LCR Nav Historic District under the Modified LPA would include temporary in-water staging/work areas extending up to approximately 1,000 feet upstream (east) of the existing bridge and up to approximately 1,000 feet downstream (west) of the proposed bridges. This was considered in the Section 106 FOE for the historic site and was determined to not adversely affect the qualities of the site that make it eligible for the NRHP.

The Section 106 FOE for the historic district includes a finding of "No Adverse Effect" for the Modified LPA.

Preliminary Determination

The acquisition of right of way within the LCR Nav Historic District, including from contributing resources, would constitute a use under Section 4(f). The Section 106 FOE for the LCR Nav Historic District is "No Adverse Effect" for the Modified LPA, including all design options; the Washington DAHP and Oregon SHPO concurred with this finding on October 13, 2023, and March 18, 2024, respectively. Based on this finding, and consistent with the definition of *de minimis* impact in 23 CFR 774.17, FHWA and FTA have determined that the Modified LPA and its design options would have a *de minimis* impact on the district.

4.3.7 Use of the Interstate Bridge

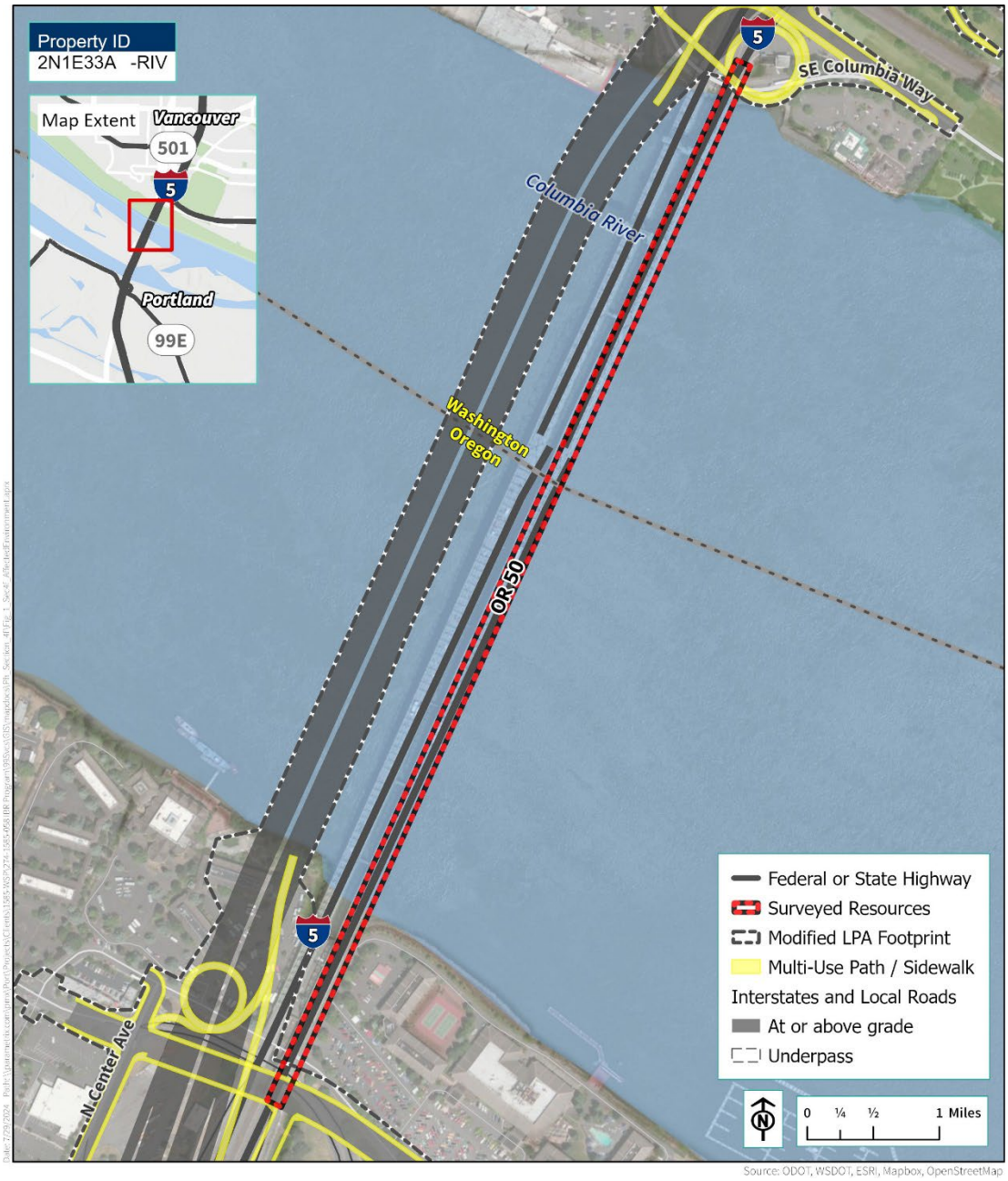
Northbound Interstate Bridge (Map ID – OR 50 and WA 381a)

Description

The northbound Interstate Bridge is a steel truss bridge (see Figure 4-30) that crosses the Columbia River between Portland and Vancouver. Completed in 1917 and modified in 1958, the bridge spans the Columbia River and measures 3,538 feet in length. The main span of the bridge in Vancouver is a steel through truss vertical lift span of the Pennsylvania-Petit type. The vertical lift span, when fully raised, creates a waterway clearance channel that measures 250 feet laterally and 178 feet vertically (above ordinary low water). The bridge is also composed of 10 steel through Pennsylvania truss secondary spans, which range in length from 266 to 531 feet. The bridge was retrofitted in 1958 to mimic the design of the westerly, southbound bridge.

The northbound Interstate Bridge was listed in the NRHP in July 1982 under Criteria A and C. The bridge is listed under Criterion A as a major engineering and financial accomplishment being the first highway bridge across the Columbia River to connect between the states of Oregon and Washington and is listed under Criterion C as an early example of a vertical lift steel bridge and an example of a bridge built by the engineering firm Harrington, Howard and Ash—renowned bridge engineers during the 20th century. The bridge maintains its integrity of location, design, materials, workmanship, and setting, and its boundary is the entirety of the northbound bridge structure and also includes approach spans, sidewalks, and other appurtenances related to the transportation use of the bridge. The FOE documented in the Section 106 Level of Effect form for this site, which is contained in Appendix D of the Historic Built Environment Technical Report, is "Adverse Effect" for the IBR Program Modified LPA and its design options. This finding received concurrence from the Washington DAHP on October 13, 2023, and from the Oregon SHPO on March 19, 2024.

Figure 4-30. IBR Program Improvements and Area of Permanent Incorporation for the Northbound Interstate Bridge



Use Evaluation for the Modified LPA

The Modified LPA, inclusive of all design options, would replace the existing Interstate Bridge with new bridges, which would necessitate the removal of the existing northbound Interstate Bridge (see Figure 4-30). The demolition of the existing bridge would destroy the structure's integrity of location, design, setting, materials workmanship, feeling, and association, and would therefore constitute an "Adverse Effect" to this NRHP-listed structure under Section 106. The northbound Interstate Bridge would be permanently incorporated by the demolition, removal, and replacement for the Modified LPA, constituting a use of this historic site under Section 4(f).

As the entire historic site would be permanently incorporated, there would be no temporary occupancy of the northbound Interstate Bridge by the Modified LPA, including all design options.

Preliminary Determination

The Modified LPA and its design options would all require the acquisition of the northbound Interstate Bridge and its subsequent removal, which would render the historic site no longer eligible for the NRHP. Consistent with the definition of use set forth in 23 CFR 774.17, which notes that a use of Section 4(f) property occurs "when land is permanently incorporated into a transportation facility," FHWA and FTA have determined that the Modified LPA and its design options would result in a use under Section 4(f) for the northbound Interstate Bridge. None of the exceptions under 23 CFT 774.13 would apply.

4.3.8 Use of Section 4(f) Historic Sites (Washington)

Historic Sites Evaluated to Have No Section 4(f) Use

Permanent Incorporation and Temporary Occupancy (Modified LPA with All Design Options) - No Use

Sites with No Effect under Section 106

Eleven historic sites listed in Table 4-7 were evaluated under Section 106 to have a finding of "No Effect" in Vancouver. None of these historic sites would be permanently incorporated or temporarily occupied by the Modified LPA or the design options. Therefore, there would be no direct use under Section 4(f) of these resources and the sites are not evaluated further for permanent incorporation or temporary occupancy.

Sites with Subsurface Easements

Two historic sites listed in Table 4-7, the Porter House and Hall House, were evaluated under Section 106 to have a finding of "No Adverse Effect" in Vancouver. These sites would require subsurface easement on portions of the site for installation of subterranean tie-back anchors (see Appendix D of the Historic Built Environment Technical Report for FOEs). No other permanent or temporary use of these properties would occur. Per Question 28A of the *Section 4(f) Policy Paper* (FHWA 2012), Section 4(f) applies to tunneling or other subsurface-only activities if they:

- Disturb archaeological sites that are on or eligible for the NRHP, which warrant preservation in place;
- Cause disruption that would permanently harm the purposes for which the park, recreation, wildlife or waterfowl refuge was established;
- Substantially impair the historic values of a historic site; or
- Otherwise do not meet the exception for temporary occupancy.

Of these, only the third and fourth bullets (historic sites and temporary occupancy) are relevant to analysis of built historic sites such as those in Table 4-7, none of which have associated known archaeological sites or function as public parks. Installation and use of tie-back anchors would neither result in a change to the property's physical, auditory, or visual setting; cause vibration sufficient to damage these sites; or inhibit access to the sites. Therefore, subterranean installation of tie-back anchors would not substantially impair the historic integrity of these sites. Section 4(f) would not apply to the subterranean easements to accommodate tie-back anchors. Surface-level constructive activities would not enter the historic boundary of these sites. Therefore, the Modified LPA or design options would not permanently incorporate or temporarily occupy lands within the boundary of these sites or alter their character-defining features to construct the project.

Constructive Use

A constructive use does not occur when compliance with the requirements of 36 CFR 800.5 (Assessment of adverse effects) for proximity impacts of the proposed action, on a site listed on or eligible for the NRHP, results in an agreement of "No Effect" or "No Adverse Effect" (23 CFR Section 774.15). The Section 106 evaluation for the Program determined that there would be "No Effect" or "No Adverse Effect" on the historic sites listed in Table 4-7. Because the Program would have "No Effect" or "No Adverse Effect" on the historic sites, it would not substantially impair the activities, features, or attributes of the Section 4(f) properties and, therefore, it would not have a constructive use of the historic sites.

Table 4-7. Historic Sites (Vancouver) – No Use under Section 4(f)

Section 106 Determination	Site ID	Historic Site
No Historic Properties Affected ("No Effect")	WA 7	Fendrich's Furniture
	WA 10	Smith Tower
	WA 29	U.S. National Bank Building
	WA 191	William H. and Myrtle Hood Residence
	WA 382	Radio Transmission Building
	WA 900	Covington House
	WA 1144	Office Building
	WA 1182	Rudy Luepke Center for Senior Citizens
	WA 1233	Earls House
	WA 1319	Vancouver Barracks National Cemetery
	WA 1320	St. James Acres Cemetery
No Historic Properties Adversely Affected ("No Adverse Effect") – Historic Sites with Subsurface Easements Only	WA 61	Porter House
	WA 62	Hall House

Historic Sites Evaluated to Have Temporary Occupancy Exception under Section 4(f)

2901 K Street (Map ID – WA 1168)

Description

The buildings at 2901–03 and 2905–07 K Street (collectively referred to as 2901 K Street) are single-story, Contemporary-style duplexes constructed in 1968 and located on a single tax lot in the Rose Village neighborhood of Vancouver, Washington (see Figure 4-31). The dup lexes are eligible for listing in the NRHP under Criterion A at the local level of significance in the area of community planning and development, as well as under Criterion C in in the area of architecture.

Figure 4-31. IBR Program Improvements and Area of Permanent Incorporation for 2901 K Street

The boundary for the historic site is defined by the tax lot boundary and includes both buildings, their shared courtyard, grass lawn, and rear concrete driveways. The FOE documented in the Section 106 Level of Effect form for this site, which is contained in Appendix D of the Historic Built Environment Technical Report, is "No Adverse Effect" for the IBR Program Modified LPA and its design options. This finding received concurrence from the Washington DAHP on October 13, 2023.

Use Evaluation for the Modified LPA

The Modified LPA would require widening the I-5 roadway to the west of the 2901 K Street site and the reconstruction of the I-5 overcrossing at E 29th Street. In all design options, the construction of new pedestrian and bicycle facilities at the E 29th Street overcrossing would involve improvements to the K Street and E 29th Street intersection, which is immediately southwest of the 2901 K Street site. The replacement of the overcrossing and improvements to pedestrian and bicycle facilities would result in negligible visual changes and would not alter the residential character of the historic site and its association with development history or Contemporary-style architecture. Furthermore, these activities would not require any permanent right of way from the historic site. As such, there would be no permanent incorporation of the 2901 K Street site.

The Modified LPA would, however, require an approximately 300-square-foot temporary construction easement that extends to the site's southwest corner, which presently contains a portion of the site's grass lawn and a single mature ornamental shrub. The temporary occupancy of the 2901 K Street site for the Modified LPA, inclusive of all design options, would meet the conditions required for exceptions (23 CFR 774.13(d)), including:

Temporary duration, i.e., less than the time needed for construction of the project, and there would be no change in ownership of the land

The easement would be needed for a duration less than the construction period for the project.

Scope of the work must be minor, i.e., both the nature and the magnitude of the changes to the Section 4(f) property are minimal

Surface-level construction activities are not anticipated to enter the tax lot of 2901 K Street, which is the boundary for the historic site, nor would any additional structures or elements be constructed within the boundary. Overall, the Modified LPA would not substantially impair the site's character-defining features or reduce its integrity and ability to convey its significance. For these reasons, the temporary occupancy of the 2901 K Street site would result in minimal changes to the property in both nature and magnitude.

There are no anticipated permanent adverse physical impacts, nor will there be interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis

There are no anticipated permanent adverse physical impacts to the 2901 K Street site as a result of construction of the Modified LPA, nor would there be interference with the site's character-defining features. These features include its linear massing, Dutch gable roofs, covered parking, shared courtyard, and landscaping elements, including grass lawns and shrubs growing against the building's walls. While the lawn within the temporary construction easement may be removed for construction, it would be restored following completion of construction. The ornamental shrub located in the temporary construction easement would be preserved in place, consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties. The historic site would therefore maintain its ability to convey its significant development history and association with the Contemporary style, for which it is eligible for the NRHP. This is supported by the Section 106 FOE for the historic site, which includes a finding of "No Adverse Effect" for the Modified LPA.

The land being used must be fully restored, i.e., the property must be returned to a condition which is at least as good as that which existed prior to the project; and

The Modified LPA would not construct any additional structures or elements within the boundary of the 2901 K Street site. If construction activities within the temporary construction

easement should require the removal of a portion of the lawn, this landscape feature would be restored to its original state when construction completes. The ornamental shrub located in the temporary construction easement would be preserved in place.

There must be documented agreement of the official(s) with jurisdiction over the Section 4(f) property regarding the above conditions.

Consultation with the official with jurisdiction, the Washington SHPO, is ongoing.

For these reasons, the temporary occupancy of the 2901 K Street site during construction of the Modified LPA satisfies the temporary occupancy exemption criteria and would not constitute a use under Section 4(f).

Preliminary Determination

Based on the analysis above, there would be no Section 4(f) use of the 2901 K Street site by the Modified LPA, including all design options. The Modified LPA, including all design options, would require a small temporary easement at the southwest corner of the historic site, but this would meet the temporary occupancy exception criteria in 23 CFR 774.13(d) and would not constitute a use under Section 4(f). The Modified LPA, including all design options, would not result in permanent incorporation of any portion of the site, nor would they lead to a constructive use of the site.

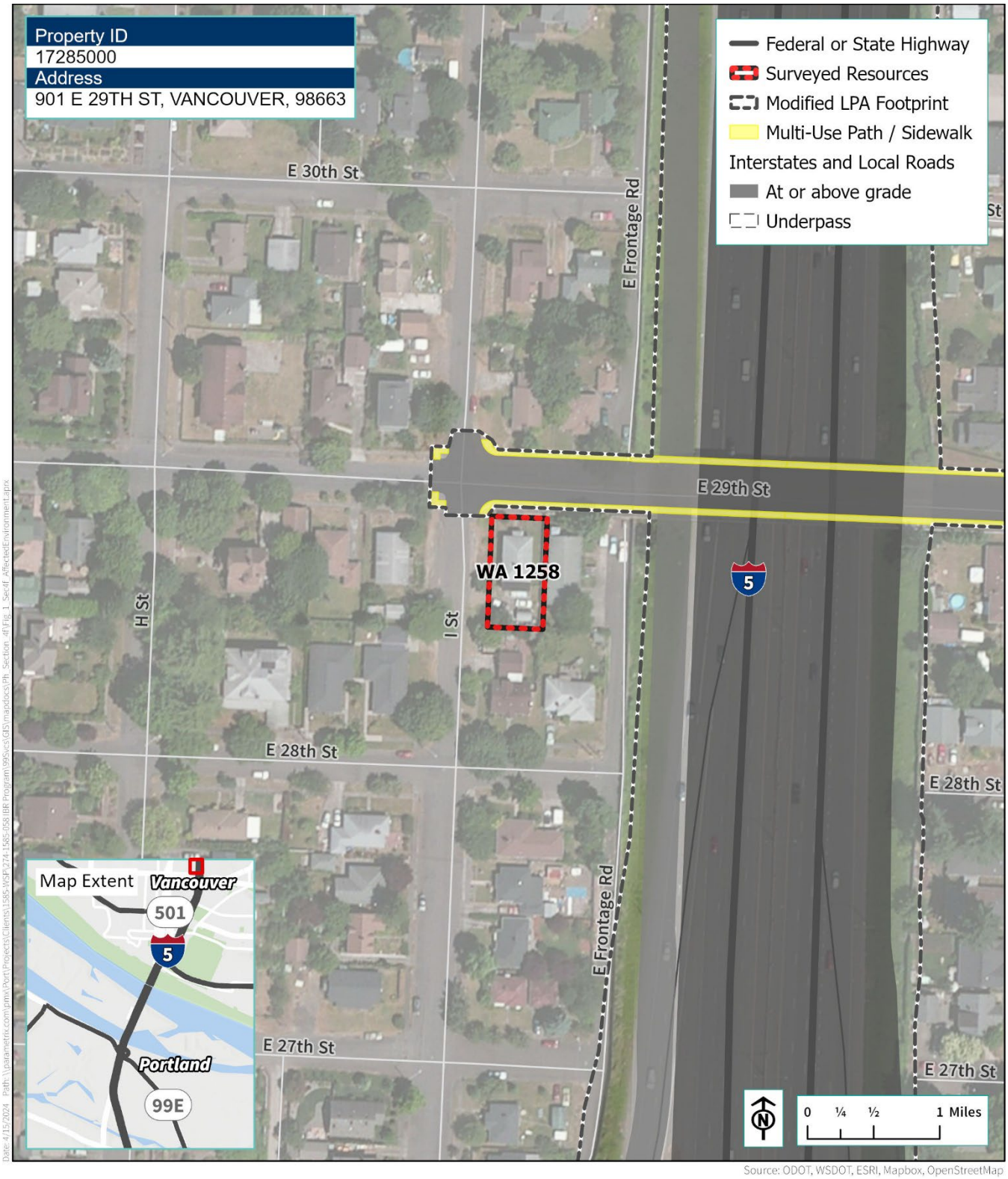
Mickler House (Map ID – WA 1258)

Description

The Mickler House is a Workingman's Foursquare single-family dwelling located at 901 E 29th Street in Vancouver, Washington (see Figure 4-32). Constructed in 1907, the Mickler House is eligible for inclusion in the NRHP under Criterion A at the local level of significance in the area of community planning and development. The dwelling is a particularly early example of development in the area and is also representative of the first wave of urban residents to occupy the Vancouver Heights subdivision, which is now part of the Shumway neighborhood. The building retains its integrity of location, design, workmanship, feeling, and association; however, it has somewhat diminished integrity of setting and materials.

The boundary of the Mickler House site coincides with its tax lot boundaries, which have remained unchanged since the end of the period of significance. Within the boundary, only the residence and the front walkway contribute to the site's significance. All other elements, including the paved driveway, shed, fence, and deck, are noncontributing. The FOE documented in the Section 106 Level of Effect form for this site, which is contained in Appendix D of the Historic Built Environment Technical Report, is "No Adverse Effect" for the IBR Program Modified LPA and its design options. The finding received concurrence from the Washington DAHP on October 13, 2023.

Figure 4-32. IBR Program Improvements near 901 E 29th Street



Use Evaluation for the Modified LPA

The Modified LPA, inclusive of all design options, would reconstruct and widen the I-5 corridor, which is currently separated from the NRHP-eligible Mickler House by one residential parcel, J Street, and a concrete noise wall. Adjacent to the site, the Modified LPA would construct improvements to E 29th Street between the I-5 overcrossing and the I Street intersection. These improvements would potentially include enhancements to pedestrian and traffic access (e.g., sidewalks, curb ramps, signage), but they would not include the reconfiguration of the current roadway or the construction of additional traffic lanes; this section of E 29th Street would remain a two-lane, two-way road. It is anticipated that the Modified LPA would not require any permanent right of way from the Mickler House site. As such, there would be no permanent incorporation of the Mickler House site.

The Modified LPA would, however, require a temporary construction easement of approximately 50 square feet from the northern edge of the Mickler House site. Construction activities within the temporary construction easement could potentially interfere with or require the removal of an existing wood fence that delineates the historic site's tax lot boundary and/or disturb the northern edge of a concrete-paved walkway connecting the north elevation of the Mickler House to the sidewalk along E 29th Street. The temporary occupancy of the site for the Modified LPA, inclusive of all design options, would meet the conditions required for exceptions (23 CFR 774.13(d)), including:

Temporary duration, i.e., less than the time needed for construction of the project, and there would be no change in ownership of the land

> The easement would be needed for a duration less than the construction period for the project.

Scope of the work must be minor, i.e., both the nature and the magnitude of the changes to the Section 4(f) property are minimal

> Surface-level construction activities at the Mickler House would be located at the northwest corner of the site. The Modified LPA would not modify any character-defining features of the Mickler House, including its one-story height, hipped roof with boxed eaves, wood tongue and groove siding with flat wood corner boards, double-hung wood windows, or setback from the adjacent streets; nor would it construct additional structures or elements within the boundary of the historic site. Overall, the Modified LPA would not substantially impair the site's character-defining features or reduce its integrity or ability to convey its significance. For these reasons, the temporary occupancy of the Mickler House site would result in minimal changes to the property in both nature and magnitude.

There are no anticipated permanent adverse physical impacts, nor will there be interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis

> There are no anticipated permanent adverse physical impacts to the Mickler House site as a result of construction of the Modified LPA, nor would there be any modification of the site's character-defining features. While the existing wood fence and concrete-paved walkway may be disturbed by construction, the fence does not contribute to the historic site's significance and the fence and walkway would be restored following completion of construction (see below). The historic site would therefore maintain its ability to convey its significant development history, for which it is eligible for the NRHP. This is supported by the Section 106 FOE for the historic site, which includes a finding of "No Adverse Effect" for the Modified LPA.

The land being used must be fully restored, i.e., the property must be returned to a condition which is at least as good as that which existed prior to the project.

The Modified LPA would not construct any additional structures or elements within the boundary of the Mickler House site. If construction activities within the temporary construction easement should disturb the northern edge of the concrete-paved walkway or require the removal of the wood fence, these landscape features would be restored to their original state once construction completes.

There must be documented agreement of the official(s) with jurisdiction over the Section 4(f) property regarding the above conditions.

Consultation with the official with jurisdiction, the Washington SHPO, is ongoing.

For these reasons, the temporary occupancy of the Mickler House site during construction of the Modified LPA would meet the conditions required for exceptions (23 CFR 774.13(d)) and not constitute a use under Section 4(f).

Preliminary Determination

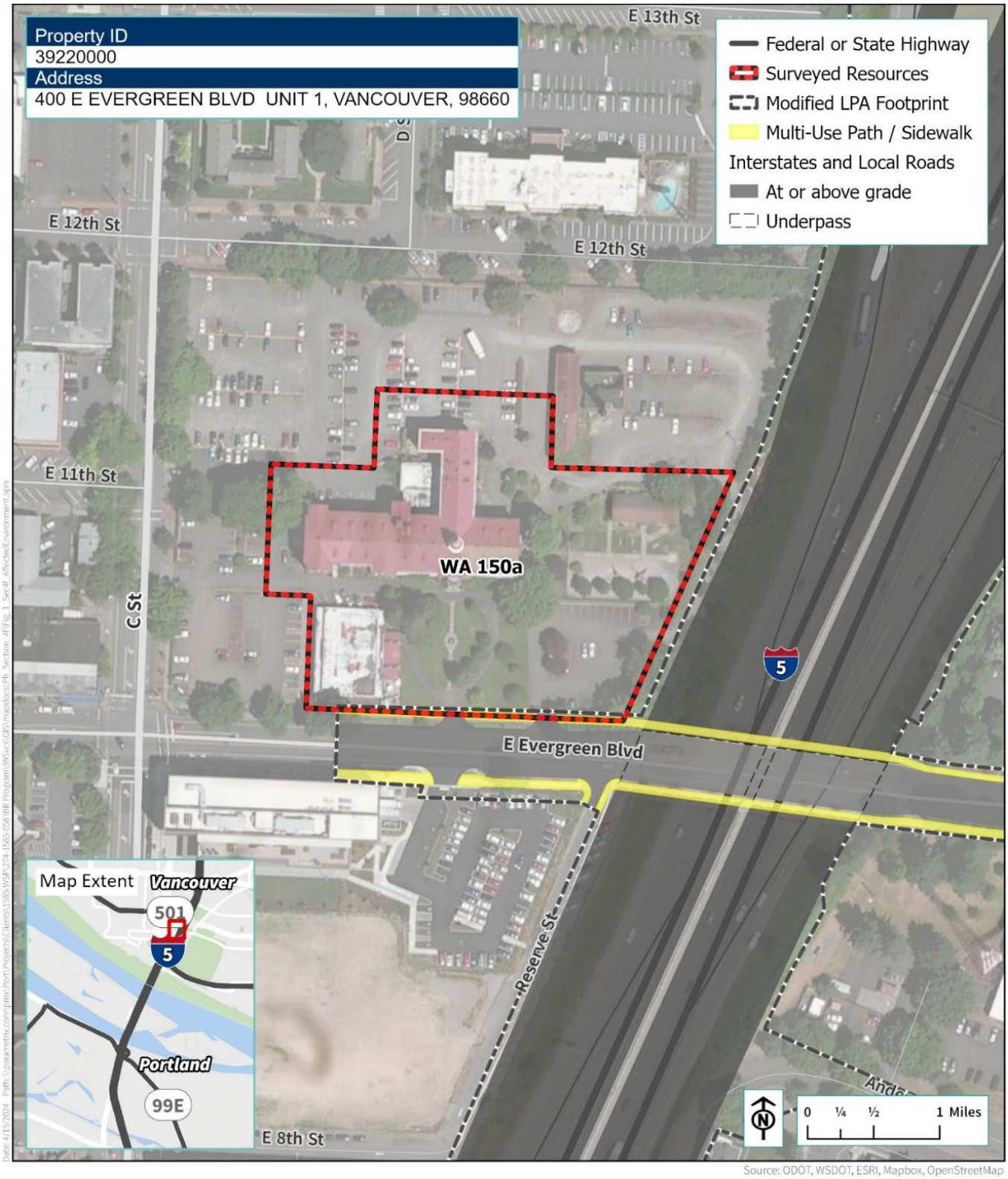
Based on the analysis above, there would be no Section 4(f) use of the Mickler House site by the Modified LPA or its design options. The Modified LPA with all design options would require a small temporary easement at the northern edge of the historic site, but this would meet the temporary occupancy exception criteria in 23 CFR 774.13(d) and would not constitute a use under Section 4(f). Neither the Modified LPA nor the design options would result in permanent incorporation of any portion of the site, nor would they lead to a constructive use of the site.

House of Providence (Map ID – WA 150)

Description

The House of Providence (Providence Academy) is an institutional property located at 400 East Evergreen Boulevard in Vancouver, Washington (see Figure 4-33). The property, constructed between 1873 and 1874, contains an ornate, three-story building that is clad in brick and shows the influence of the Georgian/Federal and French Colonial architectural styles. The House of Providence is eligible for listing in the NRHP under Criteria A, B, and C, in recognition of the property's close association with the achievements of Mother Joseph of the Sacred Heart, who was the leader of the Sisters of Providence in the late 19th century and the architect of the House of Providence's primary building.

Figure 4-33. IBR Program Improvements and Area of Permanent Incorporation for House of Providence



The boundary for the House of Providence is defined by the tax lot boundary that contains the NRHP-eligible building and encompasses all extant historic features that convey the institution's original campus-like qualities. The FOE documented in the Section 106 Level of Effect form for this site, which is contained in Appendix D of the Historic Built Environment Technical Report, is "No Adverse Effect" for the IBR Program Modified LPA and its design options. This received concurrence from the Washington DAHP on February 14, 2024.

Use Evaluation for the Modified LPA

The Modified LPA would reconstruct and widen the I-5 roadway to the east of the House of Providence. Although the widened interstate right of way would not encroach into the boundary of the historic site, the Modified LPA would construct a new retaining wall along the parcel's eastern boundary where no such wall currently exists. This would require one subsurface easement along the eastern edge of the historic site's boundary to accommodate tie-back anchors for the proposed retaining wall along I-5. The subsurface easement would extend approximately 100 feet into the boundary but would remain more than 100 feet from the primary building and its associated landscaping. Per Question 28A of the *Section 4(f) Policy Paper* (FHWA 2012), Section 4(f) applies to tunneling or other subsurface-only activities if they:

- Disturb archaeological sites that are on or eligible for the NRHP, which warrant preservation in place;
- Cause disruption that would permanently harm the purposes for which the park, recreation, wildlife or waterfowl refuge was established;
- Substantially impair the historic values of a historic site; or
- Otherwise do not meet the exception for temporary occupancy.

Of these, only the third (historic sites) and fourth (temporary occupancy) bullets are relevant to analysis of this historic site. At the House of Providence, installation and use of tie-back anchors under the Modified LPA would not result in a change to the site's physical, auditory, or visual setting because they would be entirely underground; cause vibration sufficient to damage the site because they are small diameter anchors drilled into the ground; or inhibit access to the site. Therefore, subterranean installation of tie-back anchors would not substantially impair the historic integrity of the site, and Section 4(f) would not apply to the subterranean easement to accommodate tie-back anchors.

In addition to the subterranean easement at the House of Providence, the Modified LPA would require a 4,700-square-foot temporary construction easement along the site's southern boundary at E Evergreen Boulevard. The easement would extend approximately 10 feet into the House of Providence's boundary, where no character-defining landscape features remain extant. The temporary occupancy of the site for the Modified LPA would meet the conditions required for exceptions (23 CFR 774.13(d)), including:

Temporary duration, i.e., less than the time needed for construction of the project, and there would be no change in ownership of the land

The easement would be needed for a duration less than the construction period for the project.

Scope of the work must be minor, i.e., both the nature and the magnitude of the changes to the Section 4(f) property are minimal

The proposed road improvements along E Evergreen Boulevard are limited to the southern edge of the House of Providence Site and would occur more than 100 feet away from the site's primary contributing building. Overall, the improvements would not substantially impair the site's character-defining features or any of the aspects of the site's location or setting that

enable it to convey its significance. For these reasons, the temporary occupancy of the House of Providence would result in minimal changes to the property in both nature and magnitude.

There are no anticipated permanent adverse physical impacts, nor will there be interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis

There are no anticipated permanent adverse physical impacts to the House of Providence as a result of construction of the Modified LPA. Construction would not require the permanent use of this portion of the House of Providence site. The site's character-defining features would remain intact and unaltered, and the Modified LPA would not diminish the site's integrity of location, design, setting, materials, workmanship, feeling, or association despite the proposed temporary construction easement and the adjacent infrastructure improvements. This is supported by the Section 106 FOE for the historic site, which includes a finding of "No Adverse Effect" for the Modified LPA.

The land being used must be fully restored, i.e., the property must be returned to a condition which is at least as good as that which existed prior to the project; and

The Modified LPA would not construct any additional structures or elements within the boundary of the House of Providence site and would restore to pre-construction conditions the hedge and curb within the temporary construction easement.

There must be documented agreement of the official(s) with jurisdiction over the Section 4(f) property regarding the above conditions.

Consultation with the official with jurisdiction, the Washington SHPO, is ongoing.

For these reasons, the temporary occupancy of the House of Providence site during construction of the Modified LPA would meet the conditions required for exceptions (23 CFR 774.13(d)) and not constitute a use under Section 4(f).

Use Evaluation for the Modified LPA with I-5 Shifted West Design Option

The Modified LPA with I-5 shifted west design option would have a different impact to the House of Providence than the Modified LPA and other design options. The Modified LPA with I-5 shifted west design option would permanently incorporate approximately 9,800 square feet of land from the east side of the House of Providence historic site. Because the east portion of the site has already been heavily altered and does not retain integrity to its period of significance, the permanent acquisition would not impact contributing elements of the site and would not substantially impair the site's ability to convey its significance. This design option would also include approximately 2,000 square feet of temporary occupancy, which was considered in this finding.

Because neither the permanent acquisition nor the temporary occupancy of the House of Providence would substantially impair the activities, features, or attributes that contribute to its NRHP eligibility, the Section 106 FOE for the historic site includes a finding of "No Adverse Effect." Based on this finding, and consistent with the definition of *de minimis* impact in 23 CFR 774.17, FHWA and FTA have found that the Modified LPA with I-5 shifted west design option's permanent acquisition and temporary occupancy would have a *de minimis* impact to this site

Preliminary Determination

Based on the analysis above, there would be no Section 4(f) use of the House of Providence site by the Modified LPA with or without C Street ramps, with any bridge configuration, with one or two auxiliary lanes, or with centered I-5. The Modified LPA and these design options would each require a temporary easement along the southern boundary of the historic site, but these easements would meet the temporary occupancy

exception criteria in 23 CFR 774.13(d) and would not constitute a use under Section 4(f). The Modified LPA and these design options would not result in permanent incorporation of any portion of the site, nor would they lead to a constructive use of the site.

The Modified LPA with I-5 shifted west would require the permanent incorporation of 9,800 square feet from the eastern edge of the House of Providence site, as well as temporary occupancies at the southern edge of the site. The Section FOE for the House of Providence is "No Adverse Effect" for the Modified LPA with I-5 shifted west; the Washington DAHP concurred with this finding on February 14, 2024. Based on this finding, and consistent with the definition of *de minimis* impact in 23 CFR 774.17, FHWA and FTA have determined that the Modified LPA with I-5 shifted west would result in temporary and permanent *de minimis* impacts under Section 4(f) for the House of Providence site.

Evergreen Hotel (Map ID – WA 21)

Description

The Evergreen Hotel, located at 500 Main Street, is an Italian Renaissance–style hotel located in downtown Vancouver (see Figure 4-34).

The hotel was constructed in 1928. The Evergreen Hotel was listed in the NRHP in 1979 under Criterion A, at the local level or significance, in the area of community planning and development and commerce. The hotel has not undergone any major alterations and retains its character-defining features. These features include the site's central downtown location, two primary entrances with six broad bays (on the south and east elevations), marble balconies, arched motifs, sandstone style finish, projecting roof forms clad in Spanish tile, and expansive interior spaces with a large staircase and mezzanine. Overall, the site retains integrity of location, materials, workmanship, feeling, and association; however, its integrity of design has been slightly diminished by infill to some of the exterior bays, and its integrity of setting has been diminished by the surrounding development of downtown Vancouver after the period of significance. The boundary for the Evergreen Hotel coincides with its tax lot boundary, which is contiguous with the building footprint.

The FOE documented in the Section 106 Level of Effect form for this site, which is contained in Appendix D of the Historic Built Environment Technical Report, is "No Adverse Effect" for the IBR Program Modified LPA and its design options. The finding received concurrence from the Washington DAHP on October 13, 2023.

Figure 4-34. IBR Program Improvements in Relation to the Evergreen Hotel

Use Evaluation for the Modified LPA

The Modified LPA activities adjacent to the site would consist of improvements to the intersection of Main Street and E 5th Street, within existing right of way at the southeast corner of the property. Additional activities located near the property would include the construction of a new, elevated on-ramp connecting SR 14 westbound to I-5 southbound and a new bridge supporting LRT; both of these structures would be constructed to the south of the Evergreen Hotel and would be clearly visible from the property. The elevated on-ramp would come within approximately 70 feet of the Evergreen Hotel's boundary but would not require any permanent incorporation of land from the historic site.

A constructive use does not occur when compliance with the requirements of 36 CFR 800.5 (Assessment of adverse effects) for proximity impacts of the proposed action, on a site listed in or eligible for the NRHP, results in an agreement of "No Effect" or "No Adverse Effect" (23 CFR Section 774.15).

The Modified LPA would, however, require a temporary construction easement along the historic site's southern boundary for the improvements to the intersection of Main Street and E 5th Street. Construction activities would not contact the Evergreen Hotel building and would not alter any of its character-defining features, but one of the primary entrances (located on the south elevation) would potentially be inaccessible during construction. However, the building's other primary entrance, located on the east elevation, would remain unobstructed and continue to function as normal. Access signage and instrumentation, such as vibration or noise monitors, may be placed in the hotel during construction.

The temporary occupancy of the Evergreen Hotel for the Modified LPA including design options, would meet the conditions required for exceptions (23 CFR 774.13(d)), including:

Temporary duration, i.e., less than the time needed for construction of the project, and there would be no change in ownership of the land

The signage and instrumentation and the south access limitation to the hotel would occur for a duration less than the construction period for the project.

Scope of the work must be minor, i.e., both the nature and the magnitude of the changes to the Section 4(f) property are minimal

Construction activities would not contact the Evergreen Hotel and would not alter any of its character-defining features, but the south entrance would be rendered inaccessible during construction. Any temporary signage or instrumentation would not permanently alter the site and would be removed at the end of construction. The hotel's east primary entrance would remain unobstructed and continue to function as normal. As the east entrance would remain accessible during construction, the building would retain its ability to convey its significance during construction despite the temporary obstruction of the primary entrance on the south elevation.

There are no anticipated permanent adverse physical impacts, nor will there be interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis

There are no anticipated permanent adverse physical impacts to the Evergreen Hotel as a result of construction of the Modified LPA, nor would there be interference with the Evergreen Hotel's character-defining features related to the development history of downtown Vancouver. While the south primary entrance would potentially be inaccessible during construction, the east primary entrance would remain accessible, and the site would maintain its ability to convey its significant development history and role in the development of downtown Vancouver. This is supported by the Section 106 FOE for the historic site, which includes a finding of "No Adverse Effect" for the Modified LPA.

The land being used must be fully restored, i.e., the property must be returned to a condition which is at least as good as that which existed prior to the project; and

Upon completion of construction, the primary entrance on the south elevation would be returned to regular use. Any temporary signage or instrumentation would be removed, and the site would thus be fully restored to its condition prior to the Modified LPA.

There must be documented agreement of the official(s) with jurisdiction over the Section 4(f) property regarding the above conditions.

Consultation with the official with jurisdiction, the Washington SHPO, is ongoing.

For these reasons, the temporary occupancy of the Evergreen Hotel site would meet the requirements of 23 CFR 774.13(d) for an exception from Section 4(f) use; therefore, temporary occupancy of the site during construction of the Modified LPA or options would not constitute a use under Section 4(f).

Preliminary Determination

Based on the analysis above, there would be no Section 4(f) use of the Evergreen Hotel by the Modified LPA or the design options. The Modified LPA with all design options would temporarily close the southern entrance of the hotel, but the temporary occupancy would meet the exception criteria in 23 CFR 774.13(d) and would not constitute a use under Section 4(f). Neither the Modified LPA nor the design options would result in permanent incorporation of any portion of the site, nor would they lead to a constructive use of the site.

Who Song & Larry's Restaurant (Map ID – WA 1138)

Description

Who Song & Larry's Restaurant at 111 SE Columbia Way is a roadside style commercial building constructed in 1981 and located along the north shore of the Columbia River in Vancouver, Washington (see Figure 4-35). Who Song & Larry's Restaurant is eligible for inclusion in the NRHP under Criterion C, at the local level of significance, in the areas of architecture and commerce. It is the best-known example of the roadside style's use within the corporate limits of Vancouver and demonstrates its hallmarks including a distinctive eye-catching design meant to attract and serve customers traveling by car on the adjacent interstate. Character-defining features include the building's general form and massing, its complex roof forms, intricate fenestration and detailing, and its associated parking area. The building's outdoor dining area, river-facing viewsheds, and visibility to I-5 are also important features of its original design and are considered character-defining.

The boundary of the Who Song & Larry's Restaurant site is defined by the southern edge of the outdoor dining deck to the south, the eastern boundaries of the subject parcels (marked on site by a concrete dwarf wall) to the east, the southern edge of the SE Columbia Way sidewalk to the north, and the western boundaries of the subject parcels to the west, excluding the northwest extension. The FOE documented in the Section 106 Level of Effect form for this site, which is contained in Appendix D of the Historic Built Environment Technical Report, is "No Adverse Effect" for the IBR Program Modified LPA and its design options. This finding received concurrence from the Washington DAHP on October 13, 2023.

Figure 4-35. IBR Program Improvements in Relation to the Who Song & Larry's Restaurant

Use Evaluation for the Modified LPA

The Modified LPA would involve road improvements along the existing SE Columbia Way to the north, a proposed new shared-use path and bridge to the west, and a construction impact area within the Columbia River waterway to the east. Road improvements along SE Columbia Way would potentially include enhancements to pedestrian and traffic access (e.g., sidewalks, curb ramps, signage), but they would not include the reconfiguration of the current roadway or the construction of additional traffic lanes; this section of SE Columbia Way would remain a two-lane, two-way road. This narrow easement would only be temporary and would be located approximately 150 feet away from the site's primary building. As a result, the Modified LPA, inclusive of all design options, would not require any permanent right of way from the Who Song & Larry's Restaurant.

The Modified LPA, inclusive of all design options, would require a temporary construction easement along the site's northern boundary for improvements to SE Columbia Way. Construction activities would not contact the principal Who Song & Larry's Restaurant building and would not alter any of its character-defining features, but the primary vehicular entrance to the north would potentially be rendered inaccessible during construction. However, the site would still be made accessible from the eastern side of the boundary. Access signage and instrumentation, such as vibration or noise monitors, may be placed in the restaurant during construction.

The temporary occupancy of the Who Song & Larry's site for the Modified LPA would meet the conditions required for exceptions (23 CFR 774.13(d)), including:

Temporary duration, i.e., less than the time needed for construction of the project, and there would be no change in ownership of the land

> The easement would be needed for a duration less than the construction period for the project.

Scope of the work must be minor, i.e., both the nature and the magnitude of the changes to the Section 4(f) property are minimal

> While the proposed road improvements along SE Columbia Way would be partially visible from the north side of the Who Song & Larry's site, activities would occur 150 feet away from the site's primary building. Additionally, there are two rows of mature trees—with a sidewalk in between them—running along SE Columbia Way that would partially visually obscure the proposed road improvements. Overall, the improvements would not substantially impair the site's character-defining features or any of the aspects of the site's location or setting that enable it to convey its significance. For these reasons, the temporary occupancy of the Who Song & Larry's site would result in minimal changes to the property in both nature and magnitude.

There are no anticipated permanent adverse physical impacts, nor will there be interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis

> There are no anticipated permanent adverse physical impacts to the Who Song & Larry's Restaurant site as a result of construction of the Modified LPA, nor would there be modification of the site's character-defining features. The historic site would therefore maintain its ability to convey its significance as the best-known example of the roadside style's use within the corporate limits of Vancouver, for which it is eligible for the NRHP. This is supported by the Section 106 FOE for the historic site, which includes a finding of "No Adverse Effect" for the Modified LPA.

The land being used must be fully restored, i.e., the property must be returned to a condition which is at least as good as that which existed prior to the project; and

Upon completion of construction, access to the site along the northern boundary would be returned to regular use. Any temporary signage or instrumentation would be removed, and the site would be fully restored to its condition prior to the Modified LPA.

There must be documented agreement of the official(s) with jurisdiction over the Section 4(f) property regarding the above conditions.

Consultation with the official with jurisdiction, the Washington SHPO, is ongoing.

For these reasons, temporary occupancy of the Who Song & Larry Restaurant site during construction of the Modified LPA would meet the conditions required for exceptions (23 CFR 774.13(d)) and not constitute a use under Section 4(f).

Preliminary Determination

Based on the analysis above, there would be no Section 4(f) use of the Who Song & Larry's Restaurant by the Modified LPA or the design options. The Modified LPA with all design options would temporarily close the northern entrance of the restaurant site, but the temporary occupancy would meet the exception criteria in 23 CFR 774.13(d) and would not constitute a use under Section 4(f). Neither the Modified LPA nor the design options would result in permanent incorporation of any portion of the site, nor would they lead to a constructive use of the site.

Historic Sites Evaluated to Have Use with a Greater than *de minimis* Impact under Section 4(f)

Normandy Apartments (Map ID – WA 149)

Description

The Normandy Apartments building is a Tudor Revival style, multifamily housing complex located at 318 E 7th Street in Vancouver (see Figure 4-36). Originally constructed in 1928 and modified in 1960, the historic site is eligible for listing in the NRHP under Criteria A and C, at the local level of significance, in the areas of community planning and development and architecture. The Normandy Apartments building retains integrity of location, materials, workmanship, feeling, and association, and has slightly reduced integrity of design and setting.

The boundary of the historic site is defined by the right of way of I-5 to the east, the sidewalk paving of E 7th Street to the south, and an adjacent parcel to the north. The western portion of the original tax lot has been repaved as part of the surface parking lot; no walkways or other historic features are intact. Because of this, the western boundary of the property is aligned with the western edge of the building footprint. The FOE documented in the Section 106 Level of Effect form for this site, which is contained in Appendix D of the Historic Built Environment Technical Report, is "Adverse Effect" for the IBR Program Modified LPA and its design options. This finding received concurrence from the Washington DAHP on October 13, 2023.

Figure 4-36. IBR Program Modified LPA Improvements in Relation to the Normandy Apartments

Figure 4-37. IBR Program Modified LPA with I-5 Shifted West Design Option in Relation to the Normandy Apartments

Use Evaluation for the Modified LPA

The Modified LPA would reconstruct and widen the I-5 corridor to the east of the Normandy Apartments. Related activities would include the construction of a new, elevated LRT alignment; a ramp connecting I-5 to SR 14; and retaining and noise walls immediately east of the building. These activities would require one narrow, approximately 700-square-foot permanent acquisition paralleling the eastern margin of the boundary of the historic site, as well as one approximately 5,000-square-foot subsurface easement extending under the southern portion of the apartment building's east wing to accommodate for tie-back anchors on the retaining wall.

These tie-back anchors would have no permanent surface disturbance within the boundaries of the historic site. Per Question 28A of the *Section 4(f) Policy Paper* (FHWA 2012), Section 4(f) applies to tunneling or other subsurface-only activities if they:

- Disturb archaeological sites that are on or eligible for the NRHP, which warrant preservation in place;
- Cause disruption that would permanently harm the purposes for which the park, recreation, wildlife or waterfowl refuge was established;
- Substantially impair the historic values of a historic site; or
- Otherwise do not meet the exception for temporary occupancy.

Of these, only the third (historic sites) and fourth (temporary occupancy) bullets are relevant to analysis of the Normandy Apartments. Installation and use of the tie-back anchors would neither result in a change to the property's physical, auditory, or visual setting; cause vibrations sufficient to damage the property; nor inhibit access to the property. Subsurface installation of the tie-back anchors would not substantially impair the historic values of the property. Therefore, Section 4(f) would not apply to the subsurface easements to accommodate tie-back anchors.

Section 4(f) would, however, apply to the permanent acquisition and temporary construction easement paralleling the eastern boundary of the Normandy Apartments (see Figure 4-36). The Modified LPA with or without C Street ramps, with any bridge configuration, one or two auxiliary lanes, and centered I-5 would all have the same acquisition requirements. For the Modified LPA and these design options, the permanent acquisition would measure 705 square feet, while the temporary easement would include an additional 300 square feet. Both would include landscaping elements that currently screen the apartment building from I-5, though neither would include any portion of the apartment building itself. Activities within and around the acquisition and easement, including construction of the proposed noise and retaining walls and elevated LRT alignment, would be located in proximity to the building. The retaining wall would be located approximately 5 feet from its southeast corner; this would considerably reduce the approximately 33-foot-wide buffer that currently separates the building from the western edge of the pavement for the I-5 off-ramp connecting to SR 14. Furthermore, the proposed noise and retaining walls and elevated LRT alignment would be new intrusions, not replacing any preexisting elements of a similar design or function. The proposed elevated LRT alignment, which would rise to the approximate height of the apartment building, would block views of the property from the east. Collectively, the permanent incorporation, temporary occupancy, and effects of the Modified LPA would change the current setting of the historic site and reduce the Normandy Apartments' integrity of setting, feeling, and association to an extent that it would no longer be able to convey its significant association with the interwar development of Vancouver, for which it has been determined NRHP-eligible under Criterion A. The Modified LPA would therefore constitute an "Adverse Effect" to the Normandy Apartments under Section 106.

I-5 shifted west would result in the same use determination, though the effects would be different (see Figure 4-37). The Modified LPA with I-5 shifted west design option would shift the I-5 mainline and ramps approximately 40 feet west of its current location. This option would require the permanent right-of-way acquisition of the Normandy Apartments property and removal of the building and the landscaping elements to the east of the building and in the courtyard. The I-5 shifted west design option would, therefore, permanently incorporate approximately 14,700 square feet of the property. This would be a greater incorporation and greater harm to the historic site than would occur under the other Modified LPA design options.

Preliminary Determination

The Section 106 FOE for the Normandy Apartments includes a finding of "Adverse Effect" for the Modified LPA, including all design options; the Washington DAHP concurred with this finding on October 13, 2023. The Modified LPA with I-5 shifted west design option would require the permanent right-of-way acquisition of the entire Normandy Apartments historic site and the removal of all of its historic features resulting in a use under Section 4(f). The Modified LPA and all other design options (excluding I-5 shifted west design option) would require a permanent incorporation of 705 square feet and a temporary occupancy of 300 feet paralleling the eastern boundary of the historic site. The Modified LPA and all other design options would therefore result in a use under Section 4(f). Therefore, FHWA and FTA have determined that the Modified LPA, including all design options, would result in a Section 4(f) use of this historic site.

Bridge Substation (Map ID – WA 1192)

Description

The Bridge Substation is a utilitarian electrical substation building located at 100 SE Columbia Way in Vancouver, Washington (see Figure 4-38). The two-story portion of the Bridge Substation was originally constructed in 1911 as the Mount Hood Railway and Power Company Vancouver Substation. This substation was located approximately 1 mile to the east of 100 SE Columbia Way and was relocated to its present location in 1913. The Bridge Substation is eligible for inclusion in the NRHP under Criterion C, at the local level in the area of architecture. The building is significant as a relatively rare surviving example of the electrical substation building type constructed between the late 1880s and early 1920s.

The building retains most of its character-defining features indicative of its utilitarian style and electrical substation building type. However, a one-story, west addition was constructed in 1927, and an entrance pavilion was subsequently added to the same part of the building. The primary setting of the building consists of the BNSF Railway embankment to the north and east, SE Columbia Way to the southeast and south, the 1917 Interstate Bridge to the southwest, and I-5 to the west. The setting has changed little from the 1960s and is consistent with the period of significance. As a result, the building retains its integrity of location, setting, workmanship, and feeling, while its integrity of materials, design, and association have been somewhat diminished. The boundary of the site is delineated by the original, eastern portion of the building located at its present site since 1913. The FOE documented in the Section 106 Level of Effect form for this site, which is contained in Appendix D of the Historic Built Environment Technical Report, is "Adverse Effect" for the IBR Program Modified LPA and its design options. This finding received concurrence from the Washington DAHP on October 13, 2023.

Figure 4-38. IBR Program Modified LPA Improvements in Relation to the Columbia Street Bridge Substation

Use Evaluation for the Modified LPA

The Modified LPA, inclusive of all design options, would acquire and permanently incorporate the Bridge Substation site into right of way, to construct a proposed shared-use path and shared-use path bridge. Construction of the path and bridge would include demolition of the Bridge Substation. As a result, no features that allow the site to convey its historic significance as a NRHP-eligible site under Criterion C would remain following the completion of construction. As described in the Section 106 FOE, the Modified LPA would have an "Adverse Effect" on the site. The Modified LPA would permanently incorporate the entirety of the Bridge Substation site.

As the entire site would be permanently incorporated, there would be no temporary occupancy of the Bridge Substation site by the Modified LPA, inclusive of all design options.

Preliminary Determination

The Modified LPA with all design options would require the acquisition of the Bridge Substation and the subsequent removal of all its extant features, rendering the historic site no longer eligible for the NRHP. Consistent with the definition of use set forth in 23 CFR 774.17, which states that a use of Section 4(f) property occurs "when land is permanently incorporated into a transportation facility," FHWA and FTA have determined that the Modified LPA and its design options would result in a use under Section 4(f) for the Bridge Substation.

The use of the Bridge Substation would be a greater than *de minimis* impact, which for historic sites requires a Section 106 finding of "No Adverse Effect" (23 CFR 774.17). Due to the extent of proposed activities at the Bridge Substation, including the demolition of the primary building and its site features, the Section 106 FOE for the historic site includes a finding of "Adverse Effect" for the Modified LPA with all design options; the Washington DAHP concurred with this finding on October 13, 2023.

VNHR Historic District (Multiple)

Description

The VNHR Historic District is an NRHP-listed historic district that encompasses 397.7 acres and includes a total of five historic properties, including four NRHP-listed or determined eligible historic districts and one historic site (see Figure 4-39). Of the 397.7 acres within the VNHR Historic District boundary, 49.7 acres were WSDOT highway right of way at the time the district was listed and do not contribute to eligibility. The Fort Vancouver site was first established as a National Monument in 1948 and redesignated as a national historic site in 1961 to preserve and interpret historically significant and exceptionally complex overlapping areas associated with Native American, HBC, U.S. military, and NPS uses of land that have occurred over time. The originally recognized Fort Vancouver NHS's boundaries have expanded over time, and the original site was encompassed by the NRHP-listing of the VNHR Historic District in 2007.

The VNHR Historic District includes 74 contributing historic built environment resources, as well as an additional 12 contributing archaeological sites and two objects. The district was listed in the NRHP in 2007 under Criteria A, C, and D with a period of significance beginning 2,500 years before present (BP) and ending in 1966 of the common era (CE). Other NRHP individually eligible or listed historic districts encompassed within the boundary, and considered collectively in this Section 4(f) evaluation, of the VNHR Historic District include:

- Pearson Field Historic District (Determined NRHP-Eligible District, 1990)
- Vancouver Barracks Historic District (Determined NRHP-Eligible District, 1984)
- Officers Row Historic District (NRHP District, 1974)
- Fort Vancouver NHS (NRHP Site, 1966)

Figure 4-39. IBR Program Modified LPA Improvements in Relation to the VNHR Historic District

The boundary of the VNHR Historic District is delineated by the alleyway behind Officers Row to the north, I-5 to the west, the north shore of the Columbia River to the south, and a boundary corresponding to the alignment of East Reserve Street to the east. Within these bounds, the site encompasses approximately 207 acres within the VNHR Historic District in three noncontiguous sections. The sections are divided by the alignment of SR 14 and the SE Columbia Way creating a large northern section and two elongated narrow sections to the south. The boundary is generally defined by existing linear features, including roadways or extant property lines; however, its southwest corner runs into the alignment of the I-5 and SR 14 interchange and includes over four acres of noncontributing property that is owned and managed by WSDOT.

The Fort Vancouver NHS is also a unit in the National Park System and qualifies for protection of its recreational activities, features, and attributes under Section 4(f) as a public park in addition to its protection as a historic site. The use of the Fort Vancouver NHS under the provisions of a public park is evaluated in Section 4.3.4

Use Evaluation for the Modified LPA

The Modified LPA would reconstruct and widen the I-5 corridor to the west of the VNHR Historic District. The boundary of the VNHR Historic District includes approximately 50 acres of right of way owned and operated by WSDOT for transportation purposes. Because a portion of the VNHR Historic District was already being used as a transportation facility when the district was listed and does not contribute to the district, the Modified LPA, including all design options, within that boundary does not constitute a Section 4(f) use and is not included in the incorporation areas. Within the VNHR Historic District, the Modified LPA would require the permanent acquisition of a narrow strip of land (less than 1 acre in total) along the district's western edge, small segments (less than 0.05 acres in total) along the alignment of SR 14, as well as additional segments in the district's southwestern corner near the Old Apple Tree (less than 0.3 acres in total) and the embankment of the BNSF Railway alignment. These permanent acquisitions of approximately 65,600 square feet would constitute a use of the VNHR Historic District under Section 4(f).

The Modified LPA with the I-5 shifted west design option would move the I-5 mainline and ramps 40 feet west of its current location.

The Modified LPA also would require a subsurface easement extending approximately 50 feet beneath the site's northwest corner to accommodate tie-back anchors for a new retaining wall within the Historic District's Boundary. These tie-back anchors would have no permanent surface disturbance within the boundaries of the historic district. Per Question 28A of the *Section 4(f) Policy Paper* (FHWA 2012), Section 4(f) applies to tunneling or other subsurface-only activities if they:

- Disturb archaeological sites that are on or eligible for the NRHP, which warrant preservation in place;
- Cause disruption that would permanently harm the purposes for which the park, recreation, wildlife or waterfowl refuge was established;
- Substantially impair the historic values of a historic site; or
- Otherwise do not meet the exception for temporary occupancy.

The tie-back anchors would not disturb archaeological sites within the VNHR Historic District that warrant preservation in place. The tie-backs would not impair the historic value of the site, nor would they require additional temporary occupancy for their installation. For these reasons, the subsurface easements for tie-backs would not constitute additional use of the VNHR Historic District under Section 4(f) beyond the permanent incorporation identified above.

As identified through the Section 106 process, the IBR Program would adversely affect 14 of the contributing resources within the boundaries of the VNHR Historic District. Contributing resources to the NRHP-listed historic district constitute activities, features, or attributes of the district that qualify it for protection under Section 4(f). The 14 resources are:

- House (Building 1)
- House (Building 2)
- Duplex (Building 3)
- Duplex (Building 4)
- Munitions Storehouse (Building 102)
- Original Pearson Hangar (Building 189)
- Pearson Field Office (Building 194)
- Post Hospital (Building 614)
- Non-Commissioned Officer (NCO) Family Quarters (Building 635)
- NCO Family Quarters (Building 644)
- NCO Family Quarters (665)
- Work Shop (Building 786)
- Army Road System
- Fort Vancouver NHS Visitor Center

Adverse effects on these resources include direct effects through incorporation and anticipated construction vibrations, as well as indirect effects, including auditory and visual effects. These effects constitute potential harm to the district.

Permanent Incorporation of Land

The Modified LPA requires the permanent incorporation of approximately 65,600 square feet of the VNHR Historic District, including a small portion of the Army Road System, a contributing feature of the district, at the west end of E 5th Street; small segments along the alignment of SR 14; segments at the southwestern corner of the historic district; and the embankment of the BNSF Railway alignment. Although the site's integrity of setting has already been substantially diminished by the surrounding urban context and construction of I-5 during the early 1950s, the Modified LPA would further diminish its integrity of setting, feeling, and association. The Modified LPA with the I-5 shifted west design option would decrease the incorporation and demolition of a segment of the Army Road System between three and nine feet.

The single VNHR Historic District contributing resource incorporated under the Modified LPA is the Army Road System.

Vibration Effects

As noted in Section 3.11, Noise and Vibration, unmitigated ground-borne vibration could exceed FTA damage risk criteria to resources within the VNHR Historic District. Potential for structural damage was identified to the Post Hospital (Building 614) and NCO Family Quarters (Buildings 635 and 644).

The Modified LPA with I-5 shifted west would reduce the potential risk of vibration damage to both of the NCO Family Quarters Buildings (Building 635 and 644) by moving construction activities more than 100 feet from the building's footprint. Construction would still occur within 100 feet of the Post Hospital building's footprint; therefore, vibration damage risk to the Post Hospital would continue to occur under the Modified LPA with 1-5 shifted west design option.

The Section 106 process, once completed, will result in a Programmatic Agreement on the treatment of historic properties that will identify provisions to reduce and mitigate adverse effects to historic properties. It may include requirements to reduce the potential for harm from vibration during construction, such as condition inspection, monitoring vibration during construction, preemptive maintenance and repair, and limits on certain equipment or activities. Damage caused by construction vibration would be repaired in accordance with the Secretary of the Interior Standards for the Treatment of Historic Properties (36 CFR 68).

Archaeological Resources

Archaeological sites that are NRHP eligible and that meet certain conditions, such as warranting preservation in place, are subject to the provisions and protections of Section 4(f). Archaeological sites are not considered worthy of preservation in place if their primary importance is for the information that can be learned from data recovery.

As referenced above, 12 significant archaeological sites, or archaeological contributing elements to the VNHR Historic District, are located in the APE. Previous construction of I-5 and SR 14 likely affected several sites. The APE also includes an area where a historic military cemetery was located. While graves were exhumed and re-interred at another cemetery during the late 1800s, archaeological research has indicated that not all of the remains were relocated. During the construction of I-5, unmarked graves were reportedly discovered, and other potential grave shafts have been identified in the vicinity of the historic cemetery. The exact location of the cemetery is not included in this document because of the sensitive nature of the resource.

Three of HBC Village archaeological resources within the VNHR Historic District—Kanaka House, Tayenta's House, and House 4—qualify as Section 4(f) properties because they warrant preservation in place, based on consultation with the officials with jurisdiction. None of the other affected archaeological sites in the APE, either inside or outside the VNHR Historic District, were determined to warrant preservation in place under CRC (CRC 2011). Consistent with 23 CFR 774.13(b)(2), as part of the CRC project the officials with jurisdiction over the Section 4(f) properties were consulted and agreed with the Administration finding that each of the other archaeological resources within the VNHR Historic District are "important chiefly because of what can be learned by data recovery and has minimal value for preservation in place." While the Section 106 process for the IBR Program has not yet identified any new information that would change this determination, identification of resources and related consultation is ongoing. Data recovery excavations or other appropriate mitigation would be conducted for these sites in accordance with the Section 106 Programmatic Agreement, once executed.

The Washington DAHP reviewed and concurred with the determinations of Section 4(f) (in)eligibility as part of the CRC project consultation. Concurrence from the Washington DAHP on the findings of effect was obtained in January of 2011. The prior consultation is currently being confirmed as part of the IBR Program and the NPS, a consulting party, has expressed consistent views with the prior consultation regarding these resources. Though the exact extent of the three sites warranted for preservation in place is unknown, they may be adversely affected by the construction of the IBR Program, which would constitute a Section 4(f) use.

Aesthetic Features

The proximity of the Modified LPA would not substantially impair the aesthetic features or attributes of the Section 4(f) property that contribute to its integrity of setting, feeling, and association to the extent that the property's historic value is substantially diminished. Section 3.9, Visual Quality, notes that there would be visual changes with the construction of the Modified LPA elevated structure. Existing views in the Greater

Central Park Landscape Unit (the unit that VNHR Historic District is located within) would include noticeable view changes. As a result, visual quality changes within the VNHR Historic District would affect the setting of the district; however, the visual character of the resources themselves would remain unchanged.

VNHR Historic District contributing resources affected by visual setting include:

- Munitions Storehouse (Building 102)
- Original Pearson Hangar (Building 189)
- Pearson Field Office (Building 194)
- Work Shop (Building 786)
- Fort Vancouver NHS Visitor Center

In comparison to the Modified LPA with double-deck fixed-span configuration, the Modified LPA with single-level fixed-span configuration would be slightly wider and would have a slimmer vertical profile.

The Modified LPA single-level movable-span configuration would include two side-by-side, single-level steel girder bridges with a movable span between Piers 5 and 6. The movable-span configuration would be a vertical lift span with counterweights. Similar to the No-Build Alternative, permanent visual impacts would be associated with the lift towers that would protrude into the skyline for areas in Vancouver and Fort Vancouver (Figure 4-39). Because it would have a lower bridge deck (122 feet [NAVD88]) in the closed position, the single-level movable-span configuration would have fewer visual effects than the fixed-span configurations. Even with the higher lift towers, visual impacts associated with the lower bridge deck of the Modified LPA with movable-span configuration would be less adverse than those of the Modified LPA with double-deck fixed-span and single-level fixed-span configurations.

Noise Level Increase

According to the analysis provided in Section 3.11, Noise and Vibration, existing traffic noise levels modeled at the VNHR Historic District range from 52 to 75 dBA, with the highest levels at unshielded areas along I-5 and SR 14. Existing noise levels approach or exceed the noise abatement criteria of 67 dBA and noise levels would range from 54 to 72 dBA with the Modified LPA. VNHR Historic District contributing resources affected by noise include:

- House (Building 1)
- House (Building 2)
- Duplex (Building 3)
- Duplex (Building 4)
- NCO Family Quarters (Building 665)

Program activities would increase existing noise levels at these contributing resources within the VNHR Historic District boundary from existing levels of between 60 dBA and 65 dBA. The increase in value is dependent on the selected design option but would increase from 65 dBA to 72 or 73 dBA at House (Building 1), from 62 dBA to 72 dBA at House (Building 2), from 60 dBA to 66 dBA at Duplex (Building 3), from 63 dBA to 66 dBA at Duplex (Building 4), and from 61 to 66 dBA at NCO Family Quarters (Building 665).

Temporary Occupancy

Temporary occupancy of the VNHR Historic District during construction would include approximately 110,100 square feet for temporary construction easements adjacent to each permanent acquisition. The temporary occupancy areas include property along a narrow strip of land (less than 2 acres in total) along the district's western edge, small segments (less than 0.1 acres in total) along the alignment of SR 14, as well as additional segments in the district's southwestern corner near the Old Apple Tree (less than 0.6 acres in total) and the embankment of the BNSF Railway alignment.

The temporary occupancy of the VNHR Historic District varies by each of the design options from 107,300 to 121,600 square feet, as shown in Table 4-5.

Preliminary Determination

Based on application of the Criteria of Adverse Effect as defined in 36 CFR 800.5, the permanent incorporations required by the Modified LPA would alter the character-defining features of VNHR Historic District and consequently reduce its eligibility for inclusion in the NRHP. Therefore, the Section 106 FOE for the VNHR Historic District includes a finding of "Adverse Effect" for the Modified LPA, including all design options; the Washington DAHP concurred with this finding on October 13, 2023. Additionally, the Modified LPA would result in permanent incorporation and temporary occupancy use of land within the VNHR Historic District as described above. Therefore, FHWA and FTA have determined that the Modified LPA would result in a Section 4(f) use of the VNHR Historic District. All design options would constitute an "Adverse Effect" to the VNHR Historic District under Section 106. The selection of the Modified LPA with I-5 shifted west design option would reduce harm to contributing elements to the district; however, this design option would still use land from the 4(f) property. The temporary occupancy of the site by the Modified LPA is considered in the "Adverse Effect" determination under Section 106 and incorporated in the use determination under Section 4(f) that is described above.

Historic Sites Evaluated to Have Use with a *de minimis* Impact under Section 4(f)

Washington State Patrol District Five Headquarters (Map ID – WA 1148)

Description

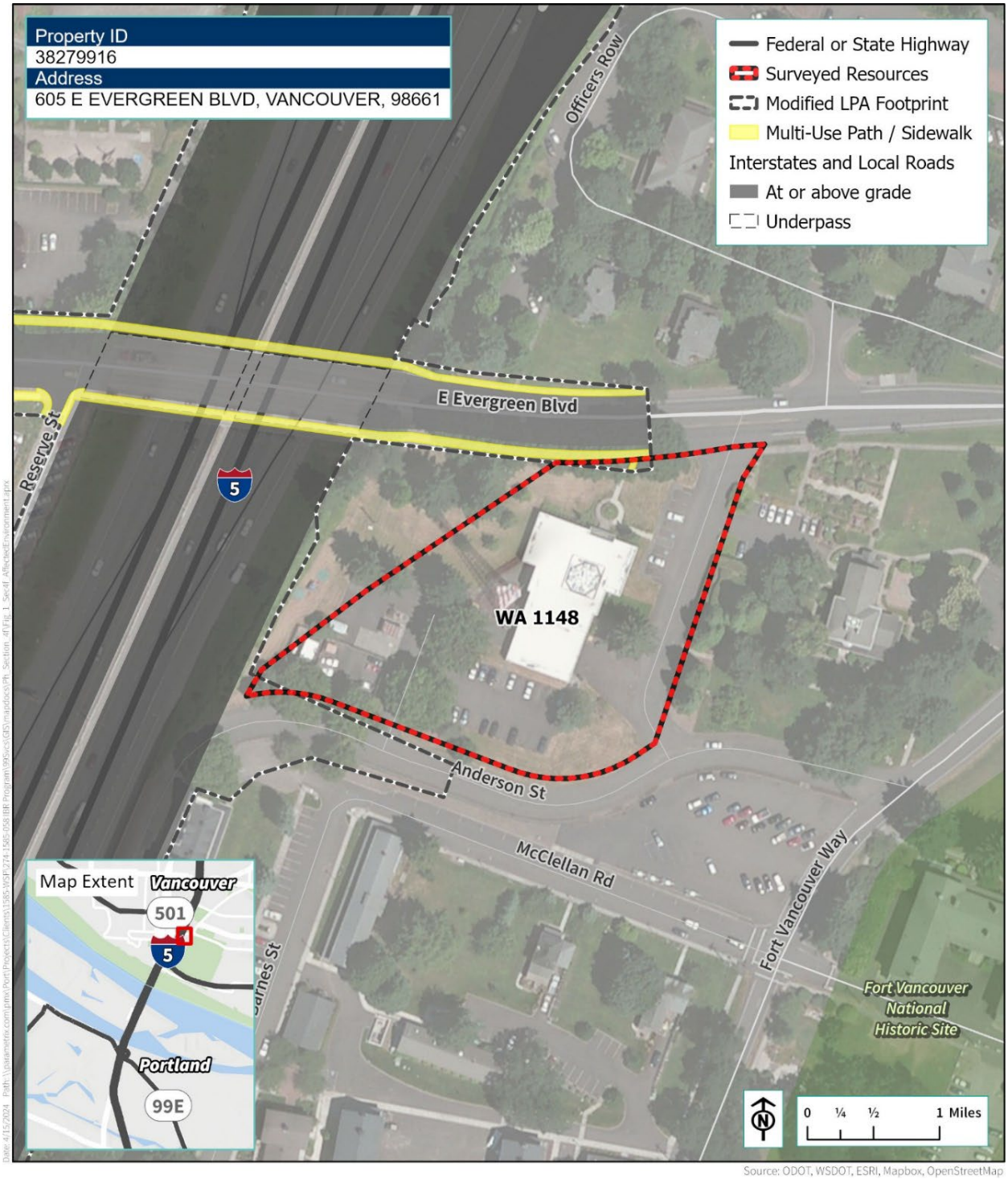
The Washington State Patrol (WSP) District Five Headquarters (now the Vancouver Police Headquarters) is a two-story, Late Modern-style building located at 605 E Evergreen Boulevard on the west edge of the VNHR in Vancouver, Washington (see Figure 4-40). The WSP District Five Headquarters is eligible for inclusion in the NRHP under Criterion A, at the local level of significance, in the areas of community planning and development and politics and government. The site is eligible for inclusion under Criterion A for its association with the transition of the VNHR from military to civilian use, as well as continued development and expansion of the WSP presence in Vancouver and Southwest Washington. The resource is also significant under Criterion C at the local level of significance in the area of architecture as a representative example of the Late Modern style. Overall, the resource retains its integrity of location, design, workmanship, feeling, and association while its integrity of setting and materials has only been slightly diminished. The principal building, walkways, circular planting box, landscaping, parking areas, and communications tower contribute to the site's historic significance. The radio equipment shelter and a new fueling station do not contribute to the site's historic significance.

The boundary of the historic site is defined by the boundary of the tax lot. The FOE documented in the Section 106 Level of Effect form for this site, which is contained in Appendix D of the Historic Built Environment Technical Report, is "No Adverse Effect" for the IBR Program Modified LPA and its design options. This finding received concurrence from the Washington DAHP on October 13, 2023.

Use Evaluation for the Modified LPA

The Modified LPA would construct additional interstate lanes to the west of the WSP District Five Headquarters, as well as improvements along the existing Anderson Street alignment to the south and the E Evergreen Boulevard alignment to the north (see Figure 4-40).

Figure 4-40. IBR Program Improvements and Area of Permanent Incorporation for the Washington State Patrol District Five Headquarters



The various infrastructure improvements proposed by the Modified LPA would alter the current setting of the WSP District Five Headquarters site through the introduction of new visual, atmospheric, and audible elements. However, because the site does not rely upon a quiet setting to convey its significance, the Modified LPA would not reduce any significant atmospheric or audible qualities. The radio equipment shelter and asphalt-paved parking lot, both of which are enclosed by a fence, distance the site from the proposed construction activity on Anderson Street to the south. To the north, the principal building and associated features are deeply set back from the public right of way. The Program would not diminish the site's integrity of location, design, materials, workmanship, feeling, or association in a manner that would diminish its ability to convey its significance. The Modified LPA, inclusive of all design options, would permanently acquire approximately 800 square feet of property from the WSP District Five Headquarters from the southwest corner of the site, adjacent to Anderson Street, and from the northern boundary of the property, adjacent to E Evergreen Boulevard. The permanent acquisition and effect of the Modified LPA upon the WSP District Five Headquarters would occur along the extreme boundary edges at the southwest and northwest corners, and would not substantially impair the site's principal building, walkways, circular planting box, landscape features, parking areas, or communications tower. Thus, the Modified LPA would not remove or alter any character-defining features or contributing elements that allow the site to convey its significance as a Late Modern municipal building associated with the VNHR and WSP.

Temporary occupancy of the WSP District Five Headquarters during construction of the Modified LPA, inclusive of all design options, would include approximately 600 square feet for temporary construction easements adjacent to each permanent acquisition. The temporary occupancy areas are minor and distant from the site's contributing elements and character-defining features, including the principal building, walkways, circular planting box, landscaping, parking areas, and communications tower.

Because neither the permanent acquisition nor the temporary occupancy of the WSP District Five Headquarters would substantially impair the activities, features, or attributes that contribute to its NRHP eligibility, the Section 106 FOE for the historic site includes a finding of "No Adverse Effect" for the Modified LPA.

Preliminary Determination

The acquisition of right of way from the WSP District Five Headquarters would constitute a use under Section 4(f). The Section 106 FOE for the WSP District Five Headquarters is "No Adverse Effect" for the Modified LPA, including all design options; the Washington DAHP concurred with this finding on October 13, 2023. Based on this finding, and consistent with the definition of *de minimis* impact in 23 CFR 774.17, FHWA and FTA have determined that the Modified LPA and its design options would have temporary and permanent *de minimis* impacts under Section 4(f) for the WSP District Five Headquarters.

4.4 Avoidance Alternatives

In accordance with 23 CFR 774.3, FHWA cannot approve the use of Section 4(f) property unless it is determined that there is no feasible or prudent avoidance alternative to the use of the land from a 4(f) property and the action includes all possible planning to minimize harm resulting from such use, or the use of the property will have only a *de minimis* impact. An alternative is not feasible if it cannot be built as a matter of sound engineering judgment. An alternative may not be prudent, according to 23 CFR 774.17(3), for multiple reasons, including if it compromises the project to a degree that it is unreasonable to proceed with the project considering its stated Purpose and Need. In other words, alternatives that do not adequately meet the project's Purpose and Need can be dropped from further Section 4(f) consideration.

A comprehensive alternative analysis was completed during CRC. In early phases of the CRC alternative development and screening process, the project team evaluated a wide range of potential alternative crossing corridors up and downstream of the existing I-5 bridge summarized in Chapter 2 of the CRC project Final EIS (Figure 4-41) and described below:

- A Western Highway crossing 2 to 3 miles west of I-5 that would connect suburban Clark and Multnomah counties.
- A Bi-State Industrial Corridor crossing near the BNSF Railway bridge, 1 mile west of I-5.
- A new crossing at 33rd Avenue in Portland, 2 to 3 miles east of I-5.
- Improvements to I-205 only.
- A new Columbia River crossing 10 to 12 miles east of I-5, that would connect Camas/East Clark County in Washington to Troutdale, Oregon.

Potential avoidance alternatives evaluated during screening also included a package of transportation demand management (TDM) and transportation system management (TSM) measures. The TSM/TDM alternative included very limited capital construction and therefore did not directly result in impacts to Section 4(f) properties, but was determined not to meet fundamental elements of the project's Purpose and Need.

The screening process evaluated how well each alternative crossing corridor would meet the Purpose and Need and determined that, while most of these alternatives could provide transportation benefits, they would do little to address the mobility, transit or safety problems in the I-5 corridor or to serve the proposed action's targeted travel markets. These five alternative crossing corridors failed to meet most or all of the elements of the CRC project's Purpose and Need. Although, these alternatives would have avoided affecting the Section 4(f) properties impacted by the alternatives evaluated in the CRC Draft EIS and Final EIS, because they would be located in other corridors, given the density and distribution of historic and recreational resources within the north Portland and Vancouver areas, these corridors would very likely result in use of different Section 4(f) properties. Alternatives and options that avoid one or more of the Section 4(f) properties (23 CFR 77.17) but have use of other Section 4(f) properties, are not avoidance alternatives. Therefore, the five alternative crossing corridors were not feasible and prudent avoidance alternatives.

Figure 4-41. Alternative Corridors Evaluated during the CRC Initial Screening Process

Source: CRC 2011

After eliminating the alternatives outside the I-5 corridor, the screening process selected a No-Build Alternative (Alternative 1) and four potential build alternatives (Alternatives 2 through 5) located in the immediate vicinity of the existing I-5 bridge summarized in Table 2-1 of Chapter 2, Description of Alternatives, none of which avoided all Section 4(f) resources.

The CRC Section 4(f) analysis concluded with a determination that "there are no alternatives that can simultaneously meet the project's Purpose and Need while also avoiding all Section 4(f) resources" (CRC 2011, page 5-60). Specifically, all alternative corridors evaluated as part of CRC would require substantial out-of-direction travel for transit passengers, bicyclists and pedestrians, and would do nothing to address the identified I-5 safety deficiencies, high crash rates, and seismic vulnerability. The conclusion in the CRC determination that none of the alternative corridors were feasible and prudent avoidance alternatives continues to be applicable because none of the alternatives would meet the Purpose and Need for the IBR Program.

During the early planning phase for the IBR Program, feedback from partner agencies, tribes, organizations, and the public identified changed conditions within the study area that have occurred since the issuance of the CRC project Record of Decision (ROD) in 2011 and the preparation of the two NEPA re-evaluations in 2012 and 2013 (CRC LPA). In response, the IBR Program identified that several components of the CRC LPA required design modifications. Potential options for each of these components went through a multitiered screening process that included input from Program partners, tribes, and community members. The components evaluated were Hayden Island and Marine Drive interchange configurations; the configurations of the replacement bridge over the Columbia River; transit mode, transit alignment, and transit termini; and auxiliary lanes. As the IBR Program conceptual design progressed, additional design options emerged in response to agency and public input and to improve operations or safety or to avoid or reduce impacts, including new interchanges, options for park-and-ride locations, and different bridge configurations.

Within each design area, the IBR Program collaborated with agency partners to develop high-level design options to respond to changes while incorporating current regional values and priorities. These options were subsequently screened for their ability to meet the Program's Purpose and Need statement and to achieve other desired outcomes related to changed conditions, including avoidance and minimization considerations related to the built environment. The design options that performed the best in the screening process were then combined to create the Modified LPA and its design options. The Modified LPA with all design options is fully described in Chapter 2 of this Draft SEIS. The design options include:

- A second auxiliary lane in each direction of I-5 from approximately Marine Drive to Mill Plain Boulevard.
- Different bridge types and configurations across the Columbia River including single-level fixed-span configurations and a single-level movable-span configuration.
- A shift of I-5 up to 40 feet westward in downtown Vancouver near the SR 14 interchange.
- Elimination of the existing C Street ramps in downtown Vancouver.
- Potential site options for park and rides to serve LRT riders in Vancouver include three site options near the Waterfront Station and two near the Evergreen Station (up to one park and ride would be built for each station).

Compared to the CRC LPA, the IBR Modified LPA with all design options reduces the amount of necessary right-of-way acquisitions from the Fort Vancouver NHS and the VNHR Historic District, reduces residential and nonresidential building displacements, reduces the overall bridge and construction footprint, and reduces the visual complexity of the I-5 structures on Hayden Island; however, none of these options fully avoid Section 4(f) properties.

The central findings from CRC's avoidance alternatives evaluation continue to apply to the IBR Program: (1) there are no alternative corridors either up or downstream from the I-5 corridor that can avoid all Section 4(f) properties; (2) there are no alternatives or design options within the I-5 corridor that avoid all Section 4(f) properties; and (3) while a TSM/TDM alternative would avoid all Section 4(f) properties, it would not meet the Purpose and Need. This preliminary 4(f) analysis shows that none of the Modified LPA design options would entirely avoid 4(f) uses either; therefore, there are no feasible and prudent alternatives that can simultaneously meet the IBR Program's Purpose and Need while also avoiding all Section 4(f) properties as required by 23 CFR 774(a)(1) and 774.17(4).

Section 4.5 evaluates measures to minimize harm to Section 4(f) properties from the IBR Program Modified LPA, including all design options, and Section 4.6 analyzes which of the feasible and prudent alternatives and options would have the least overall harm on Section 4(f) properties.

4.5 Measures to Minimize Harm

FHWA and FTA cannot approve the non-*de minimis* use of Section 4(f) properties unless there is no feasible and prudent avoidance alternative and the action includes all possible planning to minimize harm to the property resulting from the use (23 CFR 774.3). Differences in remaining harm between the Modified LPA design options are address in Section 4.6.

In accordance with 23 CFR 774.17, a *de minimis* impact determination subsumes the requirement for all possible planning to minimize harm by reducing the impacts on the Section 4(f) property to a *de minimis* level. All possible planning includes measures to minimize harm. Properties with use that would be greater than *de minimis* under Section 4(f), as documented in Section 4.3, are listed in Table 4-8.

For the historic sites that were evaluated under CRC and are included within the IBR Program cultural resources APE, the avoidance and minimization measures that applied under CRC also generally apply to the IBR Program Modified LPA with minor modifications and are summarized below. Historic sites determined NRHP eligible that would have a use under Section 4(f) for the IBR Program Modified LPA are included in and are discussed in this section. The Section 106 consultation process is ongoing for the IBR Program and will result in a Programmatic Agreement to resolve adverse effects under Section 106. All measures committed to in the Section 106 Programmatic Agreement will become committed measures to minimize harm under Section 4(f). Public parks with a use under Section 4(f) for the IBR Program Modified LPA also are included in and are discussed in this section.

Table 4-8. Section 4(f) Properties with Use with a Greater than *de Minimis* Impact by the IBR Program Modified LPA with All Design Options

Property Type and Location	Historic Site Identifier	Section 4(f) Property
Historic Sites in Portland	OR 103	The Toll Administration Building/ODOT Permit Center
	OR 107	The Harbor Shops
	OR 109	The Jantzen Beach Water Tank and Pump House
	OR 111	The Jantzen Beach Moorage
The Interstate Bridge	OR 50 and WA 381a	The Northbound Interstate Bridge
Historic Sites in Vancouver	WA 149	The Normandy Apartments
	WA 1192	The Bridge Substation
	WA (multiple)	Vancouver National Historic Reserve Historic District
Public Parks	N/A	Fort Vancouver NHS

Avoiding and minimizing adverse impacts to Section 4(f) properties has been an integral part of identifying, developing, and refining the IBR Program design options. These measures include efforts to avoid known historic resources and sensitive cultural areas, to minimize the physical footprint of the Modified LPA, including all design options, and, where possible, to locate the Program within existing transportation right of way. This is illustrated through the properties listed in Table 4-6 and Table 4-7 that are within the Section 106 APE but are avoided by the project design. The following general measures would minimize harm incorporated into the Modified LPA, including all design options:

- Reducing the overall project footprint through use of retaining walls with tie-back anchors rather than fill slopes and acquisition of additional area adjacent to the freeway for all Section 4(f) properties, including the Fort Vancouver NHS and the VNHR Historic District.

- Reducing the footprint of the replacement bridge over land.
- Reducing the construction footprint and visual complexity of I-5 structures over Hayden Island and scaling them to their surroundings.

As outlined in the previous section, there are no alternatives that can meet the project's Purpose and Need and avoid all Section 4(f) properties. However, a variety of design options and refinements avoid at least some of the Section 4(f) properties and minimize harm to others. This section evaluates how well the alternatives, options, and other potential minimization measures could avoid one or more of the Section 4(f) properties, reduce the effects on one or more Section 4(f) properties, or potentially mitigate harm to Section 4(f) properties.

In consultation with PP&R, NPS, Vancouver Parks, Recreation & Cultural Services Vancouver Public Schools, Washington DAHP, Oregon SHPO, and the City of Vancouver, the proposed Modified LPA footprint has been refined and the number and severity of Section 4(f) uses has been reduced, and in many cases only a *de minimis* impact remains. Program planning and design actions to minimize harm to public park and historic Section 4(f) properties in the study area are discussed below. For historic sites, the Section 106 process is ongoing and will culminate in a Programmatic Agreement to resolve adverse effects to historic properties. The stipulations in the Programmatic Agreements will constitute commitments under NEPA and Section 4(f) to implement the identified measures to avoid, minimize, and mitigate harm to historic properties.

As outlined in the definition section at 23 CFR 774.17:

> *All possible planning means that all reasonable measures identified in the Section 4(f) evaluation to minimize harm or mitigate for adverse impacts and effects must be included in the project.*
>
> > *(1) With regard to public parks, recreation areas, and wildlife and waterfowl refuges, the measures may include (but are not limited to): design modifications or design goals; replacement of land or facilities of comparable value and function; or monetary compensation to enhance the remaining property or to mitigate the adverse impacts of the project in other ways.*
> >
> > *(2) With regard to historic sites, the measures normally serve to preserve the historic activities, features, or attributes of the site as agreed by the Administration and the official(s) with jurisdiction over the Section 4(f) resource in accordance with the consultation process under 36 CFR part 800.*
> >
> > *(3) In evaluating the reasonableness of measures to minimize harm under § 774.3(a)(2), the Administration will consider the preservation purpose of the statute and:*
> >
> > > *(i) The views of the official(s) with jurisdiction over the Section 4(f) property;*
> > >
> > > *(ii) Whether the cost of the measures is a reasonable public expenditure in light of the adverse impacts of the project on the Section 4(f) property and the benefits of the measure to the property, in accordance with § 771.105(d) of this chapter; and*
> > >
> > > *(iii) Any impacts or benefits of the measures to communities or environmental resources outside of the Section 4(f) property.*
> >
> > *(4) All possible planning does not require analysis of feasible and prudent avoidance alternatives, since such analysis will have already occurred in the context of searching for feasible and prudent alternatives that avoid Section 4(f) properties altogether under § 774.3(a)(1), or is not necessary in the case of a de minimis impact determination under § 774.3(b).*

For the IBR Program, all measures agreed to by the Administration[1] and the official(s) with jurisdiction to resolve adverse effects to historic properties will be included as stipulations in the Section 106 Programmatic Agreement and be commitments of the Program as measures to reduce harm under Section 4(f) recorded in the Final 4(f) Approval and ROD. A draft of the Section 106 Programmatic Agreement will be distributed for public review prior to the Final SEIS.

This section is organized geographically from the south end to the north end of the I-5 corridor and discusses the options and measures in the context of the Section 4(f) properties located in each geographic area of the project. These resources include the following:

- Resources in Portland
- The northbound Interstate Bridge (located in both Portland and Vancouver)
- Resources in Vancouver

All reasonable minimization measures have been incorporated into project design or mitigation commitments and compose the least harm alternative. The following analysis describes the different options or alternatives that were considered to minimize harm to Section 4(f) properties that would be used by the IBR Program, but may or may not have been implemented depending on whether they are reasonable or met the Purpose and Need. Many of the measures discussed were dismissed as either not reasonable, would not reduce harm, and/or would not meet the Purpose and Need.

4.5.1 Minimizing Harm to Resources in Oregon

There are four historic sites located in Portland that would have use with a greater than *de minimis* impact by the IBR Program Modified LPA with all design options under Section 4(f) which are listed in Table 4-8, above.

Historic Sites in Portland

Four historic sites are located within the right of way for the Modified LPA in Oregon and identified as having a greater than *de minimis* impact from the IBR Program. These historic sites include:

- The Toll Administration Building/ODOT Permit Center (OR 103): The Modified LPA with all design options would require the acquisition of the building and FHWA and FTA have determined that this would result in a use under Section 4(f).
- The Harbor Shops (OR 107): This site would be permanently incorporated under the Modified LPA with all design options, resulting in a use under Section 4(f).
- The Jantzen Beach Water Tank and Pump House (OR 109): The Modified LPA with all design options would permanently incorporate this site as right of way, resulting in a use under Section 4(f).
- The Jantzen Beach Moorage (OR 111). The Modified LPA with all design options would permanently incorporate approximately 85,900 square feet of the site and reduce the resource's integrity, resulting in in a use under Section 4(f).

[1] "Administration" is defined in 23 CFR 774.17 as: "The FHWA, FRA, or FTA, whichever is approving the transportation program or project at issue."

For constructability reasons, the mainline in the area of these Section 4(f) resources would be wider and shifted off the existing I-5 alignment for the Modified LPA, including all design options. The new freeway ramps in a different configuration, the arterial bridge at the Marine Drive interchange, and transit all combine to change where the widest points in the project are situated, leading to new property impacts along the corridor in Portland. The Program improvements under the Modified LPA, including all design options, would connect to roadways and intersections to provide better overall circulation and mobility on and leading to I-5 for automobiles, bicycles and pedestrians. The Modified LPA with I-5 shifted west design option would shift the I-5 mainline approximately 40 feet west of the existing I-5 mainline over Hayden Island and North Portland Harbor to connect to the new Columbia River bridges that would be built west of the existing bridge and more westerly than the existing alignment in part to reduce impacts to Fort Vancouver NHS and the VNHR Historic District north of the river, which are nationally significant park and historic properties.

The wider footprint of the Modified LPA with all design options, in combination with the more westerly location of I-5 on the Oregon side of the Columbia River, will use the four other historic sites that are located immediately to the west of the existing I-5 improvements on Hayden Island and in North Portland Harbor. Measures to minimize harm on Portland historic sites, therefore, include measures to reduce the right-of-way width of I-5, realigning the Modified LPA farther east or west to avoid these sites, or eliminating certain Program elements. The following analysis groups these four historic sites into common measures to minimize harm, because the analysis and findings are the same for each resource.

Reducing the Right-of-Way Width of I-5 under the Modified LPA with All Design Options

Measures to reduce the right of way of I-5 from Hayden Island south to approximately Marine Drive could include reducing or eliminating project elements such as shoulders, travel lanes, or LRT tracks. The Modified LPA, including all design options, must meet federal and state highway design requirements for safety, to avoid substandard roadway design, and maintain or improve traffic operations. The project could potentially reduce the number of through travel lanes from three to two in each direction or eliminate the wider shoulders on I-5 from Marine Drive through Hayden Island that would accommodate bus-on-shoulder service. Another option would include eliminating auxiliary lanes. These measures could reduce, but would not eliminate, impacts to the Jantzen Beach Moorage, would not substantially reduce harm to the other three historic sites in Portland with Section 4(f) use, and they would not meet the Program's Purpose and Need. Each auxiliary lane is 8 feet wide; the one- or two-auxiliary-lane design options would add width to the Program improvements as compared to the existing condition. It is important to note, however, that the existing condition contains entrance and exit ramps over Hayden Island proximate to the historic sites.

The IBR Program purpose is "to improve I-5 corridor mobility by addressing present and future travel demand and mobility needs in the IBR study area." Specific objectives include: "a) improve travel safety and traffic operations on the Interstate Bridge and associated interchanges; b) improve connectivity, reliability, travel times, and operations of public transportation modal alternatives in the study area; c) improve highway freight mobility and address interstate travel and commerce needs in the study area; and d) improve the Interstate Bridge's structural integrity (seismic stability)." Eliminating project elements such as travel lanes, auxiliary lanes, shoulders, or LRT tracks would not improve traffic operations; connectivity, reliability, travel times, or operations of public transportation modes, nor would it improve highway freight mobility. Because eliminating these project elements would affect the IBR Program's ability to meet its Purpose and Need, their elimination is not a reasonable measure to minimize harm.

The Modified LPA footprint on Hayden Island is determined by local street improvements and would not be affected by a second auxiliary lane; therefore, the use of historic properties on Hayden Island would not change among the design options. Because reducing or eliminating auxiliary lanes would not reduce harm to the properties, it is not a reasonable measure to minimize harm.

Reducing the width of project elements such as shoulders, and travel lanes would not meet federal and state highway design requirements and could compromise safety. For these reasons, reducing the width of the project is not a reasonable measure to minimize harm.

Realigning Program Elements East or West

The IBR Program Modified LPA with all design options sought to minimize harm to other Section 4(f) properties, as well as non-Section 4(f) resources including businesses and residences in North Portland and on Hayden Island by using the existing I-5 alignment and right of way to the maximum degree possible. Shifting the Modified LPA or design options alignments to the east or west would create large-scale impacts to businesses and residents in North Portland and Hayden Island and to other Section 4(f) properties. A shift to the east would potentially displace East Delta Park. A shift to the west would potentially displace the Smith-Bybee Wetlands, Portland Assembly Center, and a larger area from the Jantzen Beach Moorage.

In addition, an eastward or westward alignment shift would displace non-Section 4(f) resources including existing residences and businesses. A shift to the east would potentially displace Tipp Top Marine, Courtyard by Marriott North Portland, Residence Inn by Marriott Portland North, Red Lion on the River Jantzen Beach, and multiple shopping centers on North Portland and Hayden Island. A shift to the west would potentially displace the Roadway Inn and Suites Portland – Jantzen Beach, Jantzen Beach Center (a regionally important shopping center), and residential areas including Hayden Island Mobile Home Village/Hayden Island Manufactured Home Community, a likely concentration of low-income residents.

For these reasons, an eastward or westward alignment shift is not a reasonable measure to minimize harm to the four historic sites in Portland. Expanding the footprint of the existing alignment to the minimum extent needed to meet Purpose and Need for the project would have the least overall harm to the totality of Section 4(f)-protected properties within Portland.

Eliminating Program Elements

Eliminating project elements such as travel lanes, auxiliary lanes, safety shoulders, connecting roadways, or surface street improvements would narrow the project alignment and could reduce or avoid use of the Toll Administration Building/ODOT Permit Center (OR 103), and the Harbor Shops (OR 107), and the Jantzen Beach Moorage (OR 111), but would not meet the Program's Purpose and Need including: improving mobility along the I-5 corridor by addressing current and future travel demand; improving travel safety and traffic operations on the Interstate Bridge and associated interchanges; improving connectivity, reliability, travel times, and operations of public transportation modal alternatives in the study area; and improving highway freight mobility and addressing interstate travel and commerce needs in the study area. As discussed in Chapter 2, the project elements have been designed to provide mobility and safety improvements as identified in the Purpose and Need. Reducing the number of travel or auxiliary lanes would not improve mobility along the I-5 corridor. Eliminating safety shoulders would not improve travel safety. Eliminating connecting roadways and surface street improvements would not improve connectivity. Eliminating these elements would not be reasonable measures to minimize harm because doing so would be contrary to the Purpose and Need for the Program.

If the realignment of Jantzen Drive were eliminated from the Program, the Jantzen Beach Water Tank could be avoided, but the reconstructed Jantzen Drive would provide connectivity across the island on the south shore that does not currently exist to meet the Program's Purpose and Need related to improving connectivity. The location of Jantzen Drive is driven by the 100-year flood elevation, climate resiliency, roadway geometric design requirements, and structural design considerations for the Interstate Bridge and the North Portland Harbor bridge. Therefore, the roadway cannot be moved or eliminated from the design.

4.5.2 Minimizing Harm to the Northbound Interstate Bridge

The IBR Program Modified LPA would remove the northbound Interstate Bridge. Pursuant to 23 USC 103(c)(5) and 70 FR 11928 (March 10, 2005), the southbound Interstate Bridge is exempt from Section 4(f) review as further explained in Section 4.2.2 of this evaluation. Thus, the southbound bridge is not evaluated for measures to minimize harm.

As discussed in Section 4.4 the CRC project evaluated a range of potential river crossings that would avoid the removal of the northbound Interstate Bridge, none of which met the project's Purpose and Need and were therefore dropped from further consideration. The CRC project team also evaluated a range of I-5 crossing options that would reuse rather than remove the northbound Interstate Bridge. These crossing options were also eliminated from further consideration because they either did not meet the project's Purpose and Need or performed poorly when measured against screening criteria developed for the project (see Section 2.7 of the CRC Final EIS for a discussion of alternative screening [CRC 2011]). Of the alternative river crossings, the Supplemental River Crossing (CRC Alternatives 4 and 5), would have had less harm on the 1917 bridge. However, the supplemental crossing had an accumulation of performance deficiencies, adverse impacts, and other factors that would have made it an unreasonable alternative and, therefore, an unreasonable measure to reduce harm to the northbound Interstate Bridge (see Section 5.5.2 of the CRC Final EIS for a discussion of the supplemental crossing [CRC 2011]). If the 1917 bridge were left in place, it would continue to be at risk of mechanical failure or damage from a seismic event.

The conclusion of the CRC evaluation for measures to minimize harm that none of the alternative river crossings were reasonable remains applicable because all identified reasonable alternatives, including the IBR Program Modified LPA with all design options, would remove the northbound Interstate Bridge.

Consultation under the Section 106 process for the Modified LPA is ongoing and will culminate in a Programmatic Agreement to resolve adverse effects to historic properties. The Programmatic Agreement will stipulate measures to address the removal of the northbound Interstate Bridge. Once agreed upon through the Section 106 consultation process, all measures identified in the Programmatic Agreement will be included as committed measures to minimize harm under Section 4(f).

4.5.3 Minimizing Harm to Resources in Washington

Three historic sites and one park and recreation property are located near the Modified LPA with all design options adjacent to both sides of I-5 in Vancouver. Several additional sites were avoided using retaining walls to limit the width of the improved I-5 (Table 4-7). The Modified LPA or design options would result in a use with greater than *de minimis* impact under Section 4(f) of the following historic sites in Vancouver:

- The Normandy Apartments (WA 149):
- The Modified LPA with all design options (excluding the with I-5 shifted west design option) would require a narrow, 705-foot acquisition paralleling the eastern property boundary and would remove the landscaping screening the building from I-5. The site's setting would also be changed with retaining walls placed 5 feet from the building and the construction of elevated LRT tracks that would rise to the height of the building, blocking views to the east. These Program improvements would result in an adverse effect under Section 106 and a use under Section 4(f).
- Under the Modified LPA with I-5 shifted west shift design option, the building would be demolished, resulting in an adverse effect under Section 106 and a use under Section 4(f) in the Modified LPA with I-5 shifted west design option.
- The Bridge Substation (WA 1192): This site would be permanently incorporated under the Modified LPA with all design options, resulting in a use under Section 4(f).

- The VNHR Historic District and Fort Vancouver NHS (WA Multiple): Land within this historic district and park and recreation property would be permanently incorporated and temporarily occupied under the Modified LPA with all design options, resulting in a use under Section 4(f).

The resources above would be affected by the highway widening, I-5/SR 14 interchange improvements, and the elevated LRT alignment in downtown Vancouver. The following discussion highlights measures to minimize harm by resource.

The Normandy Apartments (WA 149)

The Normandy Apartments are located at 318 7th Street in downtown Vancouver immediately west of the existing I-5 improvements. While the Modified LPA with all design options would incorporate land from the Normandy Apartments, the Modified LPA with I-5 shifted west design option would require demolition of the entire property. Balancing of harm between Section 4(f) properties is discussed in Section 4.6.

Potential measures to minimize harm for the Modified LPA with all design options, including the I-5 shifted west design option, include reducing the dimensions of or eliminating project elements including travel lanes, shoulders, auxiliary lanes, or LRT tracks. For reasons, described below, eliminating Program elements would not meet the Program's Purpose and Need because it would not address present and future travel demand and mobility needs; would not improve traffic operations; would not improve connectivity, reliability, travel times, and operations of public transportation modal alternatives in the study area and would not improve highway freight mobility:

- **Eliminating Program Components:** The Modified LPA, including all design options, would have three northbound and three southbound travel lanes in downtown Vancouver, as does the existing interstate. I-5 through the Program study area frequently experiences bottlenecked traffic in which speeds are less than 45 miles per hour for large portions of the day as summarized in Table 3.1-13 in Section 3.1, Transportation. Southbound, the Interstate Bridge experiences a bottleneck from 6:00 a.m. to 9:00 a.m. extending up to 3 miles long northward into downtown Vancouver. The northbound bridge experiences a bottleneck from 11:15 a.m. to 8:00 p.m. for 10+ miles. As discussed in Chapter 2, the project elements have been designed to provide mobility and safety improvements as identified in the Purpose and Need. Reducing the number of travel lanes, shoulders, auxiliary lanes, or LRT tracks would only exacerbate bottlenecks and would not address the Program's Purpose and Need because it would not improve traffic operations or travel times. Eliminating safety shoulders would not improve travel safety. Because eliminating lanes or shoulders would not meet the Program's Purpose and Need, it would not be a reasonable alternative to minimize harm to the Normandy Apartments. Due to its more westerly location and greater impact on the Normandy Apartments, eliminating Program components would be least effective for the Modified LPA with I-5 shifted west design option.
- **Reducing the Width of Program Components:** All components of the Modified LPA with all design options, including travel lanes, auxiliary lanes, shoulders, and LRT tracks, have been designed to meet federal and state highway design requirements. Reducing the width of project components would be contrary to the Program's Purpose and Need because it would compromise safety, traffic, freight, and transit operations depending on the component and is therefore not a reasonable measure. For example, reducing shoulder width would prevent disabled vehicles from pulling out of and away from the travel lanes, reducing the safety benefit of the shoulders.

The Bridge Substation (WA 1192)

The Bridge Substation is located immediately east of the northbound Interstate Bridge and would be demolished under the Modified LPA with all design options to construct a shared-use path and shared-use path bridge. The shared-use path bridge would provide access from the elevated bridge deck immediately north of the Columbia River shoreline to the downtown Vancouver street network at grade level. Potential measures to minimize harm include moving, modifying the design of, or eliminating the shared-use path and shared-use path bridge.

- **Modifying the Design of the Shared-Use Path and Shared-Use Path Bridge:** Potential design modifications to the shared-use path bridge would include elongating or enlarging the circular shared-use path bridge to be more of an oval shape, while leaving the Bridge Substation in place. Enlarging the shared-use path bridge would require the redesign of Columbia Way to follow the current street alignment which would also conflict with on-land structural supports for the bridge and would not be a structurally feasible design for the new Columbia River bridges.
- Elongating the shared-use path bridge would require additional permanent property acquisition from Who Song & Larry's (another Section 4(f) protected historic site) and a viable business. Therefore, modifying the design of the shared-use path and bridge would not be a reasonable measure to minimize harm.
- **Eliminating the Shared-Use Path and Shared-Use Path Bridge:** The Program's Purpose and Need statement includes improving "the I-5 corridor mobility by addressing present and future travel demand and mobility needs in the IBR study area." The mobility of bicycles and pedestrians through the I-5 corridor would not be improved without the shared-use path and shared-use path bridge and, therefore, eliminating these elements from the Program design would not meet the Purpose and Need and would not result in a reasonable alternative. Without the shared-use path, there would be no bicycle and pedestrian connection across the Columbia River in the I-5 corridor.

The Vancouver Barracks National Cemetery (WA 1319)

Initial designs for the Modified LPA, including all design options, would have required removal of historic contributing elements of the Vancouver Barracks National Cemetery. Design refinements explored alignment revision and narrowing of roadway and sidewalk areas to remain outside of this property entirely, which reduced the effects under Section 106 on the historic property to less than adverse resulting in no use under Section 4(f). These refinements were incorporated as measures to minimize harm to a property that would otherwise be used.

VNHR Historic District and Fort Vancouver NHS (WA Multiple)

The Modified LPA with all design options would result in permanent incorporation and temporary occupancy of land within VNHR Historic District and Fort Vancouver NHS as described in Sections 4.3.8 and 4.3.4 of this evaluation. The Modified LPA with I-5 shifted west and Modified LPA without C Street ramps design options were developed to minimize acquisition from the VNHR Historic District and Fort Vancouver NHS. The effects of those design choices on other resources and measures of system performance are discussed in the least overall harm analysis (Section 4.6). The permanent incorporations for the Modified LPA with double-deck fixed-span configuration, Modified LPA without C Street ramps, and Modified LPA with single-level with two auxiliary lanes design options would incorporate approximately 100, 200, or 700 square feet of the Army Road System, which is a contributing feature to the VNHR, respectively, resulting in a use of the VNHR Historic District. The Modified LPA with I-5 shifted west design option would avoid the area of incorporation of a segment of the Army Road System and reduce the area of permanent incorporation from the VNHR Historic District compared to the other design options by between 10,000 and 15,000 square feet to approximately 53,400 square feet (Table 4-5).

In addition to permanent incorporation of land, the IBR Program Modified LPA with all design options would adversely affect 11 of the contributing resources within the VNHR Historic District NHS under Section 106, as discussed in Section 4.3.8. Adverse effects to these resources include:

- Vibration: Within the VNHR Historic District, the Post Hospital and NCO Family Quarters (Buildings 635 and 644) could experience ground-borne vibration exceeding FTA damage risk criteria that could result in the potential for structural damage. The Modified LPA with I-5 shifted west design option would reduce the risk of vibration damage to both of the NCO Family Quarters Buildings by moving construction 100 feet west of the buildings, but vibration risk for the Post Hospital would still occur.
- Three HBC archaeological resources, Kanaka House, Tayenta's House, and House 4, that have been considered worthy of preservation in place are located within this area. Though the exact extent of these three sites is not known, they may be adversely affected by the construction of the Modified LPA, including all design options, which would constitute a Section 4(f) use.
- Aesthetic features: The Munitions Storehouse, Original Pearson Hangar, Pearson Field Office, Work Shop, and Fort Vancouver NHS Visitor Center, all of which are located in both the VNHR Historic District and the Fort Vancouver NHS, would experience affects to their visual setting resulting from the higher bridge heights. In particular, the movable-span configuration would have lift towers that would protrude into the skyline and would have a bridge deck height of 122 feet (NAVD88), whereas the Modified LPA with double-deck fixed-span configuration would have a second deck height of 166 feet (NAVD88). Therefore, the Modified LPA with single-level movable-span configuration would have fewer visual effects than with the double-deck fixed-span configuration.
- Noise level increases: House (Building 1), House (Building 2), Duplex (Building 3), Duplex (Building 4), and NCO Family Quarters (Building 665) would experience noise increases from 60 to 65 dBA to between 66 and 72 dBA, under the Modified LPA. These sound levels would approach or exceed the noise abatement criteria of 67 dBA under the Modified LPA. The Modified LPA with I-5 shifted west would slightly reduce noise by moving I-5 to the west.

Evaluated measures to minimize harm to the VNHR Historic District and Fort Vancouver NHS from the Modified LPA with all design options include eliminating project elements or shifting the Program alignment further west as evaluated under the Modified LPA with I-5 shifted west design option. Measures to minimize harm to the VNHR Historic District and the Fort Vancouver NHS include eliminating project elements, and standard mitigation measures for noise and vibration effects.

Eliminating Program Components

Eliminating project elements such as travel lanes, auxiliary lanes, or safety shoulders may reduce or eliminate permanent incorporation of the VNHR District and Fort Vancouver NHS required under the Modified LPA with all design options, but, in most cases would not meet the project's Purpose and Need as described in the analysis for the Normandy Apartments above. For these reasons, eliminating project elements, including travel lanes, auxiliary lanes, and safety shoulders, is not reasonable for any design options of the Modified LPA.

The Modified LPA without C Street ramps design option eliminates the C Street loop ramp from I-5 northbound into downtown Vancouver that would require approximately 15,000 additional square feet of land acquisition from the VNHR Historic District and the Fort Vancouver NHS as compared to the Modified LPA. While this design option would not provide as high a level of access and connectivity to downtown Vancouver, it would meet the Program's Purpose and Need and is a reasonable measure to minimize harm to the VNHR Historic District and the Fort Vancouver NHS and is further considered in Section 4.6.

Shifting the Program's Alignment Farther West

The Modified LPA with I-5 shifted west design option would shift the Program alignment approximately 40 feet farther west. This design option would reduce permanent incorporation and, therefore, use of the VNHR Historic District and the Fort Vancouver NHS, as well as meet the Program's Purpose and Need. This design option would require permanently incorporating the Normandy Apartments (WA 149), another Section 4(f) resource, as discussed in Section 4.6.6, displacing the residents of 33 apartment units and would not be a reasonable measure to minimize harm.

Standard Minimization Measures for Noise, Vibration, and Visual Effects

House (Building 1),House (Building 2), and NCO Family Quarters (Building 665) would experience noise increases from 61 to 65 dBA to between 66 and 72 dBA under the Modified LPA. This would approach or exceed the noise abatement criteria. As noted in the IBR Program Noise and Vibration Technical Report, for

noise mitigation to be feasible, WSDOT requires that it be physically constructable; reduce noise levels by at least 5 dBA for a minimum of three first-row impacted receivers; and at least one receiver must achieve the design goal of a 7-dBA noise reduction. The Modified LPA with I-5 shifted west design option would cause slightly lower increase in noise for House (Building 1) and House (Building 2) than the other design options, but would require demolition of the Normandy Apartments. Noise mitigation is not reasonable in this area, per WSDOT noise abatement policy as detailed in Section 3.11.6.

The Section 106 process will result in a Programmatic Agreement with mitigation or other commitments to resolve adverse effects to historic properties. For contributing historic resources affected by vibration, such as the Post Hospital, these are expected to include condition inspection; monitoring vibration during construction; pre-emptive stabilization, maintenance, and repair; limits on certain equipment or activities; and repair of construction damage in accordance with the Secretary of the Interior Standards for the Treatment of Historic Properties (36 CFR 68).

For any noted adverse visual effects to the VNHR Historic District and Fort Vancouver NHS, such as to the Munitions Storehouse (Building 102), the Original Pearson Hangar (Building 189), the Pearson Field Office (Building 194), the Work Shop (Building 786), and the Fort Vancouver NHS Visitor Center, the Modified LPA with I-5 shifted west design option would be less prominent as viewed from these resources although effects would still be adverse. Tradeoffs between the remaining harm on various resources between the design options is addressed in Section 4.6.

4.6 Least Overall Harm Analysis

In accordance with 23 CFR 774.3, if there are no prudent and feasible alternatives that avoid the use of all Section 4(f) properties, then FHWA can approve only the alternative that causes the least overall harm. Replacing the existing bridges on the same alignment would not be a prudent and feasible alternative because it would require complete demolition of at least one bridge prior to reconstruction; therefore, traffic could not be maintained during the multiyear construction period. Section 4(f) properties on which the project would have only *de minimis* impacts, or for which the project would result in no use, do not need to be considered in the least overall harm analysis (23 CFR 774.17). The IBR Program would have use with greater than *de minimis* impact of eight historic sites and one park property subject to protection under Section 4(f) and is therefore subject to the requirement to identify the alternative with least overall harm. The single park property, the Fort Vancouver NHS, is located within the VNHR Historic District, which is one of the eight historic sites with use that is greater than *de minimis*. Each of the Modified LPA design options is considered to be an "alternative" solely for purposes of the least overall harm analysis under Section 4(f).

Table 4-9 summarizes the use of Section 4(f) properties by design option. The Modified LPA without C Street ramps design option would have the smallest area of use of Section 4(f) historic sites, with 12.0 acres permanently incorporated. The remaining Modified LPA design options have similar overall use of Section 4(f) properties ranging from approximately 12.4 to 12.5 acres.

The park-and-ride location options would not result in a use of any Section 4(f) property beyond what is already considered for the Modified LPA with all design options and are therefore not considered in the least overall harm analysis.

Table 4-9. Use with Greater than *de Minimis* Impact of Section 4(f) Properties by Alternative

Alternative	Number of Section 4(f)-Protected Properties with Use Greater than *de Minimis*	Section 4(f) Properties with Permanent Use Greater than *de Minimis*	Section 4(f) Properties with Temporary Use Greater than *de Minimis*
Modified LPA with Double-Deck Fixed-Span Configuration with One Auxiliary Lane, C Street Ramps, and Centered I-5	8 historic sites and 1 park	12.4 acres, including 0.3 acres that are both a public park and historic site	3.0 acres
Modified LPA SR 14 Interchange without C Street Ramps	8 historic sites and 1 park	12.5 acres, including 0.3 acres that are both a public park and historic site	3.0 acres
Modified LPA with I-5 Shifted West	8 historic sites and 1 park	12.5 acres, including 0.3 acres that are both a public park and historic site	3.2 acres
Modified LPA Single-Level Fixed- or Movable-Span Configuration with One Auxiliary Lane	8 historic sites and 1 park	12.4 acres, including 0.3 acres that are both a public park and historic site	3.0 acres

Alternative	Number of Section 4(f)-Protected Properties with Use Greater than *de Minimis*	Section 4(f) Properties with Permanent Use Greater than *de Minimis*	Section 4(f) Properties with Temporary Use Greater than *de Minimis*
Modified LPA with Single-Level Fixed- or Movable-Span Configuration with Two Auxiliary Lanes	8 historic sites and 1 park	12.5 acres, including 0.3 acres that are both a public park and historic site	2.9 acres
Modified LPA with Double-Deck Fixed-Span Configuration with Two Auxiliary Lanes	8 historic sites and 1 park	12.5 acres, including 0.3 acres that are both a public park and historic site	2.9 acres

As discussed in Section 4.5, there are no prudent and feasible alternatives that would avoid all Section 4(f) properties. Therefore, it is necessary to analyze which alternative would cause the least overall harm. Section 4.6 identifies all reasonable measures to minimize harm or mitigate adverse impacts. This is an important consideration in determining the least harm alternative. In addition, regulations in 23 CFR 774.3(c) provide the following direction for determining the alternative that would cause the least overall harm:

(c) If the analysis … concludes that there is no feasible and prudent avoidance alternative, then the Administration may approve only the alternative that:

(1) Causes the least overall harm in light of the statute's preservation purpose. The least overall harm is determined by balancing the following factors:

i. The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property);

ii. The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection;

iii. The relative significance of each Section 4(f) property;

iv. The views of the official(s) with jurisdiction over each Section 4(f) property;

v. The degree to which each alternative meets the purpose and need for the project;

vi. After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f); and

vii. Substantial differences in costs among the alternatives.

The following section addresses each of the factors in the least overall harm analysis.

4.6.1 Ability to Mitigate Adverse Impacts to Each Section 4(f) Property, Including Any Measures That Result in Benefits

All of the alternatives have a similar ability to mitigate impacts to Section 4(f) properties in Washington, with the exception of the Modified LPA with I-5 shifted west and the Modified LPA without C Street ramps. The Modified LPA design options would have similar impacts on the VNHR Historic District and the Fort Vancouver NHS, requiring relatively small acquisitions ranging from approximately 1.2 to 1.6 acres on the western and southwestern edges of the VNHR Historic District or 0.3 acres for Fort Vancouver NHS adjacent to I-5 and SR 14. The Modified LPA with I-5 shifted west design option would have greater impacts to the Normandy Apartments (WA 149) in downtown Vancouver than any of the other Modified LPA design options and would require complete removal of this historic site with no ability to mitigate this impact. The Modified LPA with I-5 shifted west design option would have less impact on the VNHR Historic District than all other design options, including approximately 0.3 acres less than the Modified LPA with single-level (fixed- or movable-span) configuration with two auxiliary lanes and the double-deck fixed-span configuration with two auxiliary lanes and approximately 0.2 to 0.3 acres less than the other Modified LPA design options. All design options would have approximately 0.3 acres of use of Fort Vancouver NHS. The Modified LPA with I-5 shifted west design option would have severe impacts on the Normandy Apartments (WA 149) and would have no ability to mitigate adverse impacts on this historic site.

For Oregon historic sites, all Modified LPA design options would have the same effect on historic resources, with no ability to mitigate impacts to these sites.

Section 4.5 analyzes the measures that could be used to minimize impacts to Section 4(f) properties and determines which measures would be reasonable.

Modified LPA with all Design Options

The Modified LPA with all design options would provide all of the reasonable measures to minimize harm listed in Section 4.5 of this evaluation. Program-wide, measures to minimize harm primarily include:

- Reducing the overall project footprint through use of retaining walls with tie-back anchors rather than fill slopes and acquisition of additional area adjacent to the freeway.
- Reducing necessary right-of-way acquisitions from the VNHR Historic District and Fort Vancouver NHS.
- Reducing the footprint of the existing Interstate Bridge over land.
- Reducing the construction footprint and visual complexity of I-5 structures over Hayden Island and scaling them to their surroundings.
- Incorporate commitments agreed upon through the Section 106 Programmatic Agreement consultation process to resolve adverse effects to historic properties.

In addition, the Modified LPA with all design options would provide the measures to minimize harm listed for the CRC LPA in Section 4.1.5, except that the Modified LPA mitigations would not include transit access to Marshall Park since transit would not occur along McLoughlin Boulevard. The Columbia River Renaissance Trail is not protected under Section 4(f), as discussed in Section 4.2.1.

Key differences in adverse impacts between the Modified LPA and its design options are that the Modified LPA with I-5 shifted west design option would require complete removal of the Normandy Apartments in downtown Vancouver with no ability to mitigate this impact on this Section 4(f) historic site. The Modified LPA would have less overall impact on historic sites than the other design options due to a smaller footprint within the Fort Vancouver NHS (Table 4-3).

All Modified LPA design options have the ability to mitigate harm to the VNHR Historic District and Fort Vancouver NHS using the measures identified above and the measures identified in the CRC LPA (see Section). In particular, the Modified LPA with I-5 shifted west design option would result in less harm to the VNHR Historic District that the other Modified LPA design options.

However, the Modified LPA with I-5 shifted west design option would also result in severe harm to the Normandy Apartments through demolition of the structure, with no ability to mitigate that harm. The other Modified LPA design options would reduce harm to the Normandy Apartments to a partial acquisition of land, as discussed in the use evaluation in Section 4.3.8.

The Modified LPA with any of the design options would not have the ability to fully mitigate impacts to historic sites in Oregon, as discussed in Section 4.5.1 of this evaluation.

4.6.2 The Relative Severity of the Remaining Harm after Mitigation to the Protected Activities, Attributes, or Features That Qualify Each Section 4(f) Property for Protection

Section of this evaluation discusses measures to minimize harm after including the effects of reasonable mitigation measures. For all design options, the footprint of improvements and the use of Section 4(f) properties is the same south of the Columbia River.

The footprint over the Columbia River would differ across design options based on bridge configuration and the number of auxiliary lanes. The northbound Interstate Bridge would be completely removed by all design options, resulting in severe remaining harm for this Section 4(f) historic site and little ability to mitigate it. The only other Section 4(f) property within the Columbia River is the Lower Columbia River Federal Navigation Channel with a *de minimis* impact, which is not subject to all possible planning to minimize harm under 23 CFR 774.17.

North of the Columbia River, the Modified LPA design options have substantially the same alignment and footprint and would have similar use of Section 4(f) properties, with the exception of the VNHR Historic District, Fort Vancouver NHS, and the Normandy Apartments, which are discussed below.

Normandy Apartments

Except for the Modified LPA with I-5 shifted west design option, the Modified LPA and other design options would have the same use and relative severity of remaining harm to the protected activities, features, and attributes that qualify the Normandy Apartments for protection under Section 4(f) (Figure 4-37). The protected attributes and features of the Normandy Apartments include its eligibility as a historic site under Criteria A and C at the local level of significance in the areas of community planning and development and architecture. The Normandy Apartments building retains integrity of location, materials, workmanship, feeling, and association and has slightly reduced integrity of design and setting due to the original construction of I-5.

The Modified LPA with all design options would result in permanent incorporation of land from the Normandy Apartments site. Except for the Modified LPA I-5 with I-5 shifted west design option, this would include removal of landscaping and placement of a soundwall within 5 feet of the building, which would compromise the site's setting, feeling, and association. In addition, the elevated LRT tracks would be located near the building, affecting views to the east. These Program improvements would result in remaining harm to the Normandy Apartments site.

The Modified LPA with I-5 shifted west design option would shift the I-5 mainline and ramps 40 feet west of its current location. This option would require permanent right-of-way acquisition of the Normandy Apartments property and removal of the building and the landscaping elements to the east of the building and in the courtyard. The Modified LPA with I-5 shifted west design option would permanently incorporate approximately 14,700 square feet of the property and require demolition of the apartment building. This would be a greater incorporation and greater harm to the historic site than would occur under the Modified LPA and all other design options; it would completely remove all protected attributes and features that qualify the site for protection under Section 4(f).

Therefore, removal of the Normandy Apartments under the Modified LPA with I-5 shifted west design option would cause substantially greater harm to this resource than the Modified LPA and all other design options.

The VNHR Historic District and Fort Vancouver NHS

The Modified LPA with all design options would adversely affect 14 contributing resources within the VNHR Historic District under Section 106 (Table 4-5). They would incorporate land from the Fort Vancouver NHS (Table 4-4). Adverse effects on the VNHR Historic District include incorporation of land from the Army Road System, thereby resulting in a use of the district. However, acquisitions within the VNHR Historic District and Fort Vancouver NHS would primarily be of noncontributing resources, including landscaping along SR 14. The Modified LPA without C Street ramps design option would result in less use of the VNHR Historic District than the other Modified LPA design options, including the Modified LPA with I-5 shifted west option. However, changes would occur to the same noncontributing resources and would not change the use of, or harm to, contributing resources discussed in Section 4.3.8. Other potential harm identified for contributing resources includes visual, noise, and vibration effects, as discussed in Section 4.3.4. There would be visual and noise effects on recreational users of the Fort Vancouver NHS.

The single-level movable-span configuration with either one or two auxiliary lanes would be visually less prominent than the fixed-span configurations, but the vertical lift span would introduce vertical lift towers of a height similar to that of the existing bridge. The lift towers would have a greater maximum height than any of the other alternatives.

The Modified LPA with I-5 shifted west design option would result in less use of the VNHR Historic District than the Modified LPA and all other design options, with the exception of the Modified LPA without C Street ramps design option. This option would decrease the incorporation and demolition of a segment of the Army Road System by 3 to 9 feet. The Modified LPA with I-5 shifted west design option would slightly reduce the potential risk of vibration damage to both of the NCO Family Quarters Buildings (Buildings 635 and 644) by moving construction activities to more than 100 feet from the building's footprint. Construction would still occur within 100 feet of the Post Hospital building's footprint; therefore, there would still be a risk of vibration damage to the Post Hospital under the Modified LPA with I-5 shifted west design option. Although this design option would reduce use of and risk to VNHR Historic District contributing resources, use of, and risk to, contributing resources would still occur.

The Modified LPA with I-5 shifted west design option would result in the smallest remaining harm to the protected features and attributes that qualify the VNHR Historic District for protection than the Modified LPA and all other design options. Although total use of the VNHR Historic District would be less under the Modified LPA without C Street ramps design option, severity of remaining harm to contributing resources would be identical to the Modified LPA and greater than with the Modified LPA with I-5 shifted west design option (Figure 4-39).

The Modified LPA with one auxiliary lane design option would result in the least permanent incorporation of Fort Vancouver NHS (Table 4-5). All of the design options would have the same visual and auditory effects on contributing resources in the Fort.

4.6.3 Relative Significance of Each Section 4(f) Property

Modified LPA with All Design Options

The majority of historic sites that would be used by the Modified LPA or design options are NRHP eligible at the local significance level (Table 4-10). As a National Historic District, the VNHR Historic District is of greater significance as a whole than the individually eligible historic properties that would also be affected by the Modified LPA with all design options. The Fort Vancouver NHS is a National Park Unit, making it a nationally significant park property. It is also listed on the NRHP as a nationally significant historic site and is included in the VNHR Historic District.

Table 4-10. Relative Significance of Section 4(f) Properties with Use with a Greater than *de Minimis* Impact

Property	Significance
Northbound Interstate Bridge (OR 50 and WA 381a)	NRHP-listed at the regional significance level
The Toll Administration Building/ODOT Permit Center – 12348 N Center Avenue (OR 103)	NRHP-eligible at the state significance level
Harbor Shops – 11915 N Center Avenue (OR 107)	NRHP-eligible at the local significance level
Jantzen Beach Water Tank – N Center Avenue (OR 109)	NRHP-eligible at the local significance level
Jantzen Beach Moorage – 1501 N Jantzen Avenue/1525-2055 N Jantzen Avenue (OR 111)	NRHP-eligible at the local significance level
Normandy Apartments – 318 E 7th Street (WA 149)	NRHP-eligible at the local significance level
Bridge Substation – 100 SE Columbia Street (WA 1192)	NRHP-eligible at the local significance level
Vancouver National Historic Reserve Historic District (WA Multiple)	NRHP-listed district at the national significance level
Fort Vancouver National Historic Site	National Park Unit

NRHP = National Register of Historic Places; ODOT = Oregon Department of Transportation

4.6.4 Views of Officials with Jurisdiction over Each Section 4(f) Property

Discussions with officials with jurisdiction are ongoing for the IBR Program, as described in Section 4.7, Coordination. Discussions with the NPS, City of Portland, City of Vancouver, and Port of Vancouver confirmed that park properties identified as protected under Section 4(f) are significant. PP&R requested additional details and coordination about trail connections in and around Delta Park. VPR&C expressed general agreement with preliminary *de minimis* and temporary occupancy findings, pending public comment. Consultation under Section 106 identified the historic sites eligible for Section 4(f) protection within the IBR APE. NPS expressed that the portion of the VNHR Historic District that is also within the NRHP-listed boundary of the Fort Vancouver NHS is more significant than other parts of the VNHR Historic District because it was established by an act of Congress. The Oregon SHPO and Washington DAHP concurred with the Section 106 FOE for historic architecture on March 19, 2024, and October 13, 2023, respectively.

4.6.5 Degree to Which Each Alternative Meets the Purpose and Need for the Program

The Purpose and Need for the IBR Program is detailed in Chapter 1 of this Draft SEIS. As summarized below for each element of the Purpose and Need, the Modified LPA, including all design options, would meet the Purpose and Need; however, the degree to which each alternative addresses the Purpose and Need would vary as discussed for each element of the Purpose and Need.

Growing Travel Demand and Congestion and Impaired Freight Movement

The Modified LPA (with any design options) would improve congestion, safety issues, and freight movement. However, there are some differences in their performance, and certain design options would perform better than others. Compared to the No-Build Alternative, the Modified LPA would decrease travel (measured by vehicle miles traveled) by 1% in both the Portland metropolitan region and traffic subarea and travel times (measured by vehicle hours traveled) by 1% in the Portland metropolitan region and up to 3% in the subarea. The subarea is defined as a ring around I-5 and I-205 from where they meet in Vancouver to where they both intersect with I-84 in Portland. The Modified LPA (with either one or two auxiliary lanes) would result in an 11% decrease in delay (measured in vehicle hours of delay) in the Portland region and a 30% (one auxiliary lane) to 32% (two auxiliary lanes) decrease in delay in the subarea, compared to the No-Build Alternative.

The Modified LPA single-level movable-span configuration would involve periodic bridge openings and gate closures that would interrupt traffic operations (including freight and buses), LRT, and active transportation. Daytime bridge openings could impact traffic congestion for an hour or more, while nighttime bridge openings would have less impact to traffic congestion and transit operations (approximately 12 minutes would be needed for the bridge opening/closure, with the remainder of the hour needed for traffic operations to return to pre-opening conditions). The restrictions on when bridge openings would be permitted may change to reduce interruptions to all modes of transportation on the new Columbia River bridges. The fixed-span configurations would reduce congestion, improve vehicular and transit safety, and improve truck freight movement slightly more than the movable-span configuration. However, when open, the movable-span configuration would provide vertical clearance for river navigation than would the other bridge configurations. The higher vertical navigation clearance of the fixed-span bridge options compared to the No-Build Alternative would enable more vessels to pass under the bridges without requiring a bridge opening, resulting in fewer restrictions on the time needed to pass under the fixed-span configuration.

The Modified LPA has 10 intersections that do not meet agency performance standards for level of service (LOS) during either the AM and/or PM peak hours. An additional nine study area intersections would operate below agency standards during the AM and/or PM peak hours for the design option without C Street ramps. Removal of the C Street ramps would redirect trips between downtown Vancouver and I-5 to the Mill Plain Boulevard interchange, resulting in higher volumes compared to the other design options.

Overall, the Modified LPA without C Street ramps design option would perform less well than the other design options in meeting the project need to address growing congestion. The design options with two auxiliary lanes would perform slightly better than the options with one auxiliary lane at addressing growing congestion.

Safety and Vulnerability to Incidents

The Modified LPA under all design options would reduce the number of crashes in the corridor compared to the No-Build Alternative, with some differences among the options. The Modified LPA with double-deck fixed-span configuration, one auxiliary lane, and C Street ramps design option is predicted to experience 23% fewer crashes than the No-Build Alternative.

The Modified LPA with two auxiliary lanes design option is predicted to reduce crashes compared to the one auxiliary lane option by up to 6%. Under the Modified LPA without C Street ramps design option, more traffic would travel through the Mill Plain Boulevard interchange, which may increase the likelihood of crashes on the affected ramps and intersections; however, the removal of the C Street northbound off-ramp and southbound on-ramp is likely to offset these crashes and have a safety performance similar to that of the Modified LPA with C Street ramps design option.

While the impacts of the movable-span configuration cannot be quantified within the predictive analysis, the movable span is associated with a higher likelihood of crashes. It is therefore likely that the single-level movable-span configuration would perform slightly worse (i.e., experience more crashes) than the two fixed-span configurations but better (i.e., experience fewer crashes) than the No-Build Alternative.

Overall, the Modified LPA without C Street ramps design option and the design options with a movable span would perform less well than the other design options in meeting the project need to address safety. The design options with two auxiliary lanes would perform slightly better than the options with one auxiliary lane at addressing safety.

Substandard Bicycle and Pedestrian Facilities

The Modified LPA includes a shared-use path over North Portland Harbor and the Columbia River, as well as various improvements along connecting facilities. The alignment of the shared-use path in the Modified LPA ties into planned active transportation projects in Portland and Vancouver.

The effects of the Modified LPA design options would be similar because they offer either the same or similar improvements for active transportation. The single-level movable-span configuration would involve delays in active transportation due to bridge openings, whereas the other two bridge configurations would not. It is possible that openings could be limited to nighttime hours to reduce conflicts with active transportation, vehicular traffic, and transit; however, changes to bridge opening restrictions have not been determined.

The shared-use path across the Columbia River on all bridge configurations under the Modified LPA would be at a higher elevation over the Columbia River than the No-Build Alternative. In the single-level fixed-span configuration, the shared-use path would be at an elevation of 137 feet, while the single-level movable-span configuration would be 122 feet. The path transition from the I-5 northbound bridge down to Columbia Way would require extensive ramp lengths to span the vertical distance at a grade that meets or exceeds Americans with Disabilities Act requirements. The Modified LPA design incorporates a helix ramp to make this transition, but this design introduces considerable additional path length. While lower than the Modified LPA with double-deck fixed-span configuration, the paths in these configuration options would still be higher than under the No-Build Alternative, requiring all users to climb longer distance to get over the peak. In both options, users would experience a level of security similar to the No-Build Alternative by being separated from traffic. The Modified LPA with double-deck fixed-span configuration would provide active transportation users on the lower deck some shelter from weather conditions while making them not visible to traffic.

Overall, all of the design options would address active transportation needs to a similar degree.

Limited Public Transportation Operation, Connectivity, and Reliability

The Modified LPA with all design options would improve transit operations, connectivity, and reliability. In general, the Modified LPA design options would provide similar improvements to the public transportation system (i.e., extend LRT from Expo Center Station to Evergreen Boulevard, construct an LRT station on Hayden Island, provide bus-on-shoulder service, etc.). The single-level movable-span configuration would require delays to transit operations due to bridge openings. It is possible that openings could be limited to nighttime hours to reduce conflicts with active transportation, vehicular traffic, and transit; however, changes to bridge opening restrictions have not been determined.

There would be small routing changes to access downtown Vancouver in the Modified LPA without C Street ramps design option and travel time improvements for express bus transit in the two-auxiliary-lane design option. The other design options would all have similar effects on transit service.

Overall, all of the design options would address transit needs to a similar degree.

Seismic Vulnerability

The Modified LPA (including all design options) would improve seismic resiliency in the corridor by replacing the Interstate Bridge and North Portland Harbor bridge with a modern, seismically resilient crossing. There are additional structural considerations for a single-level movable-span configuration. While the bridge would be designed for seismic event(s), a movable span with moving parts and machinery is more likely to suffer misalignment and/or damage from a seismic event that would be detrimental to resuming operations without significant cost and down time. While the movable-span design option would meet seismic vulnerability safety requirements, it would be less resilient than the fixed-span options because it would likely require substantially greater time and effort to restore full operation after a substantial seismic event.

Overall, the Modified LPA movable-span design options would perform less well than the other design options in meeting the project need related to seismic resiliency.

4.6.6 After Reasonable Mitigation, the Magnitude of Any Adverse Impacts to Resources Not Protected by Section 4(f)

The Modified LPA was developed in part to reduce impacts to various resources. The primary differences in impacts and benefits to non-Section 4(f) resources between the alternatives are compared below.

Acquisitions and Displacements

The new transportation facilities and their long-term operation and maintenance would require permanent property acquisitions and displacements (Section 3.3, Property Acquisitions and Displacements). The number and location of acquisitions would generally be the same for all Modified LPA design options, except that the Modified LPA with I-5 shifted west design option would require additional acquisitions amounting to 1 acre, and the displacement of a 33-unit apartment complex and three commercial businesses in downtown Vancouver. The proposed locations for park and rides would require a total of 1.6 acres between sites 2 and 3 and displace one business. Two alternative park-and-ride locations are proposed for the Evergreen Station, which would require the full acquisition of an additional 3.16 acres. See Section 3.3, Property Acquisitions and Displacements, for additional information about acquisitions and displacements.

Transportation

The Modified LPA would reduce travel times and congestion along I-5 and improve traffic safety, multimodalism, freight mobility and access, and pedestrian and bicycle infrastructure compared to the No-Build Alternative. The Modified LPA with two auxiliary lanes design option has the potential to further reduce travel times and the duration of congestion by improving the efficiency of traffic flow. Transportation impacts are similar between the Modified LPA and the remaining design options (single-level fixed-span configuration, I-5 shifted west design option, and park-and-ride locations design option), with the exception of a slightly greater reduction to northbound PM peak travel time with the elimination of the C Street ramps and delays to all transportation modes during bridge openings with the single-level movable-span configuration. An additional nine study area intersections would not meet agency LOS performance standards under the Modified LPA without C Street ramps design option. See Section 3.1, Transportation, for additional information about transportation benefits and effects.

Aviation and Navigation Safety and Efficiency

The fixed-span bridge configurations proposed under the Modified LPA would improve aviation safety compared to the No-Build Alternative by reducing intrusion into the Pearson Field protected airspace. The single-level movable-span configuration would penetrate the Pearson Field protected airspace, when in the open and closed position, due to the lift span tower heights. All bridge configurations would reduce the potential for bird nesting and roosting.

The new crossing would also reduce the number of piers across the Columbia River and increase horizontal clearance. The Modified LPA fixed-span configurations (single-level or double-deck) would have a lower vertical navigation clearance than the single-level movable-span configuration, which is the only bridge option that provides a vertical navigation clearance of at least 178 feet (OLW, in the open position) per the USCG's Preliminary Navigation Clearance Determination (USCG 2022). The Modified LPA with either the double-deck or single-level fixed-span configurations (all bridge type options) would reduce the maximum clearance from 178 feet to 116 feet (OLW), requiring adjustments to some vessels or business operations.

The Modified LPA with double-deck fixed-span configuration would shift the 2,000-foot-long Vancouver Upper Turning Basin downstream approximately 300 feet compared to the No-Build Alternative, while the single-level configurations would shift it approximately 325 feet. Likewise, construction of the Modified LPA west of the existing Interstate Bridge would also reduce the distance between the proposed Columbia River bridges and the BNSF Railway bridge by 300 to 325 feet, resulting in a shorter available distance for vessels to align with the openings of the two bridges. See Section 3.2, Navigation, and Section 3.22, Aviation, for additional information about navigation and aviation benefits and effects, respectively.

The Modified LPA would increase the number of piers in North Portland Harbor because it would increase the number of bridges crossing the waterway.

Land Use, Circulation, and Development

The Modified LPA would alleviate capacity and mobility constraints along I-5, improve multimodalism, and address the need for regional high-capacity transit in a manner consistent with state, regional, and local plans. Interchange improvements at Denver/Interstate, Marine Drive, Hayden Island, SR 14/City Center, Mill Plain, Fourth Plain, and SR 500/Main Street would improve access and connectivity within the region.

Land use patterns would remain largely unchanged under the Modified LPA, with some differences in circulation and development between design options. The Modified LPA with two auxiliary lanes design option would require slightly more acquisition of property at Fort Vancouver but would further improve mobility and access for freight and employment compared to the Modified LPA. Approximately 35 businesses and 580 employees

would be displaced under the Modified LPA and most design options. The Modified LPA with I-5 shifted west design option would displace an additional three businesses and approximately 140 employees because the alignment would require more acquisitions in downtown Vancouver.

The reduced highway grade associated with the single-level fixed-span configuration (all bridge type options) would benefit freight vehicle speed and have corresponding economic benefits for the region. The Modified LPA without C Street ramps design option would create additional traffic delay near the Mill Plain Boulevard interchange and in downtown Vancouver, potentially having an economic impact to local businesses. The park-and-ride locations would all have similar effects. See Section 3.4, Land Use and Economic Activity, for additional information about land use benefits and effects.

Neighborhood Access and Mobility

The design options would have neighborhood impacts similar to those of the Modified LPA, with the exception of reduced transportation reliability due to bridge backups under the single-level movable-span configuration. Specifically for Hayden Island, the improvements to a more continuous street system, pedestrian and bicycle facilities, and transit connections could benefit residents and community cohesion. See Section 3.5, Neighborhoods and Equity, for additional information about neighborhood benefits and effects.

Natural Environment Impacts

The Modified LPA with all design options would improve water quality through updates to stormwater management and treatment. The replacement bridges and existing bridge removal would physically change the benthic and overwater footprint over the Columbia River and North Portland Harbor.

All design options would result in similar ecosystem effects but would differ in quantity and intensity. The Modified LPA with two auxiliary lanes design option would require an additional 4.8-acre (2.3%) increase in elevated overwater shading and contributing impervious area compared to one auxiliary lane. The single-level fixed-span configuration requires structural changes that would increase benthic impacts (net loss of 0.03 acres) and shading (additional 4 acres), but without meaningfully different effects on habitat function or water quality. The single-level movable-span configuration would bring similar increases to benthic habitat impacts (net loss of 0.07 acres) and overwater shading (additional 1.58 acres) at a slightly higher level than the fixed span due to a larger number of drilled shafts and shaft caps and a larger bridge deck. The Modified LPA with single-level fixed-span and single-level movable-span configurations would have wetland impacts similar to those of the double-deck fixed-span configuration (0.58 acres). The Modified LPA with I-5 shifted west design option and the Modified LPA without C Street ramps design option would have similar impacts to the natural environment. For additional information about these resources, see Section 3.14, Water Quality and Hydrology, for water quality, Section 3.15, Wetlands and Other Waters, for wetlands and waters, and Section 3.16, Ecosystems, for ecosystems.

Environmental Justice

The Modified LPA with all design options would have both beneficial and adverse effects on environmental justice (EJ) populations. There are no notable differences in effects among the design options, with the exception of increased residential displacements under the Modified LPA with I-5 shifted west design option. Beneficial effects include improved air quality; transit connectivity and service frequency; active transportation connectivity and safety; and vehicle travel reliability. For adverse effects, construction of the Modified LPA and any design option(s) would displace residences and businesses in high-priority and meaningfully greater EJ neighborhoods,[2] impacts from tolling, and noise impacts. The Modified LPA with I-5 shifted west would result in the displacement of an additional 33 residential units (Normandy Apartments) and three businesses. Although the Normandy Apartments are not identified by the U.S. Department of Housing and Urban Development as a low-income housing tax credit property, the 33 displacements would occur within the Esther Short neighborhood, a high-priority EJ area for low-income populations.

[2] See Section 3.20, Environmental Justice, for an explanation of what constitutes a “high-priority” and “meaningfully greater” EJ neighborhood or area.

The mitigation strategies related to acquisition and displacement and noise and vibration include statutory requirements, best management practices, and obligations the IBR Program must comply with under existing law (e.g., a noise wall is currently proposed to mitigate noise impacts). The Program is evaluating including a low-income tolling program as part of IBR implementation. Once fully developed, a low-income tolling program would play a critical role in mitigating disproportionately high and adverse effects of tolling on EJ populations. See Section 3.20, Environmental Justice, for additional information about benefits and effects for EJ populations.

4.6.7 Substantial Differences in Costs Among the Alternatives

The estimated capital cost ranges for the alternatives are provided in Table 4-11. These are high-level conceptual cost estimates that will be further refined by the IBR Program in 2024. Where a comparison is provided, the comparison is to the estimated cost of the Modified LPA with double-deck fixed-span configuration, one auxiliary lane, C Street ramps, and centered I-5. Overall, while there would be substantial differences between alternatives in the cost of the bridge alone, when factored into complete program costs, the differences would be within 10%.

Table 4-11. Cost Estimates

Alternative	Capital Cost
Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, and Centered I-5	Program cost: 5 to 7.5 billion (YOE $) [a] Bridge cost alone: 860 million to 1.3 billion (YOE $) [a]
Modified LPA with Single-Level Fixed-Span Configuration and One Auxiliary Lane	Program cost: Between 3% less and 2% more than the Modified LPA, depending on bridge type (i.e., steel or concrete segmental girder bridge, extradosed bridge, or finback bridge) Bridge cost alone: between 22% less and 13% more than the Modified LPA
Modified LPA with Single-Level Movable-Span Configuration and One Auxiliary Lane	Program cost: Program cost approximately 7% more than the Modified LPA Bridge cost alone: approximately 43% more than the Modified LPA
Modified LPA with all other design options	Program cost: Less than 1% difference from the Modified LPA

a Cost range is a risk-loaded estimate with 80% probability that the cost will be within the range.
I-5 = Interstate 5; LPA = Locally Preferred Alternative; YOE = year of expenditure dollars

4.6.8 Conclusion of Least Overall Harm Analysis

Overall, the difference in harm between the Modified LPA design options would be small, as summarized in Table 4-12, which draws from the information and analysis in this 4(f) evaluation. The locations of that information are cited in the first column of the table. Based on the consideration and balancing of all factors, the least overall harm alternative is the Modified LPA with double-deck fixed-span configuration, as explained further in text after the table.

Table 4-12. Summary of Least Overall Harm Analysis

Factor	1 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	2 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, without C Street Ramps, Centered I-5	3 Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, and I-5 Shifted West	4 Modified LPA with Single-Level Fixed- or Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5	5 Modified LPA Single-Level Fixed- or Movable-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5	6 Modified LPA Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5
Ability to mitigate impacts to 4(f) properties, including any benefits to properties (addressed in Section 4.6.1)	Direct use of VNHR Historic District would fall in the middle of the range of all alternatives (1.5 acres; 0.3 acres for Fort Vancouver NHS) and could not be offset. Use of Oregon historic sites could not be avoided and would be the same as most Modified LPA design options (9.0 acres). No use of the Normandy Apartments.	Same use of and ability to mitigate Section 4(f) properties as Column 1; direct use of the VNHR Historic District would be 1.5 acres; 0.3 acres for Fort Vancouver NHS.	Same use of and ability to mitigate Section 4(f) properties as Column 1, with the exception that direct use of VNHR Historic District would be the smallest of all alternatives (1.2 acres; 0.3 acres for Fort Vancouver NHS) and the Normandy Apartments site would be completely acquired and the building demolished. Impacts to Normandy Apartments would be severe and unavoidable with no ability to mitigate impacts.	Same use of and ability to mitigate Section 4(f) properties as Column 1, and same remaining harm; direct use of VNHR Historic District would be 1.5 acres; 0.3 acres for Fort Vancouver NHS.	Same use of and ability to mitigate Section 4(f) properties as Column 1 and same remaining harm, with the exception that direct use of VNHR would be at the top of the range (1.6 acres; 0.3 acres for Fort Vancouver NHS).	Same use of and ability to mitigate Section 4(f) properties as Column 1, with the exception that direct use of VNHR would be at the top of the range of all alternatives (1.6 acres; 0.3 acres for Fort Vancouver NHS).
Severity of remaining harm after mitigation (addressed in Section 4.6.2)	*De minimis* impact to three parks. Use with greater than *de minimis* impact of 8 historic sites and the Fort Vancouver NHS. Total use of 12.4 acres. The Modified LPA area of incorporation would fall in the middle of the range of all alternatives for the VNHR Historic District (1.5 acres). Adverse effects to 14 contributing resources in the VNHR Historic District; acquisitions primarily from noncontributing resources. Severe remaining harm to the northbound Interstate Bridge and Oregon-side resources, which would be demolished.	*De minimis* impact to three parks. Use with greater than *de minimis* impact of 8 historic sites and the Fort Vancouver NHS. Total use of 12.5 acres, falling in the middle of the range of all alternatives. More incorporation of the VNHR Historic District than the Modified LPA with C Street ramps design option (difference of 0.03 acres); Fort Vancouver NHS would have an additional 0.03 acres of incorporation. No change to the use or harm to contributing resources within VNHR Historic District. Same remaining harm to the northbound Interstate Bridge and Oregon-side resources as Column 1, which would be severe.	*De minimis* impact to three parks. Use with greater than *de minimis* impact of 8 historic sites and the Fort Vancouver NHS. Total use of 12.5 acres, falling in the middle of the range of all alternatives. Less harm to the VNHR Historic District than Column 1 due to decreased demolition of Army Road System and reduced vibration risk to NCO Family Quarters Buildings. Less use of the VNHR Historic District than the Modified LPA with C Street ramps design option (difference of 0.28 acres). Same remaining harm to the northbound Interstate Bridge and Oregon-side resources as the Modified LPA, which would be severe. Severe harm to the Normandy Apartments, which would be demolished.	*De minimis* impact to three parks. Use with greater than *de minimis* impact of 8 historic sites and the Fort Vancouver NHS. Total use of 12.4 acres, the least of all alternatives. Less incorporation of the VNHR Historic District than Column 1 (difference of 0.05 acres). Same remaining harm to the northbound Interstate Bridge and Oregon-side resources as Column 1, which would be severe.	*De minimis* impact to three parks. Use with greater than *de minimis* impact of 8 historic sites and the Fort Vancouver NHS. Total use of 12.5 acres, falling near the top of the range of all alternatives. More incorporation of the VNHR Historic than Column 1 (difference of 0.1 acres). Same remaining harm to the northbound Interstate Bridge and Oregon-side resources as Column 1, which would be severe.	*De minimis* impact to three parks. Use with greater than *de minimis* impact of 8 historic sites and the Fort Vancouver NHS. Total use of 12.5 acres, falling near the top of the range of all alternatives. More incorporation of the VNHR Historic District than Column 1 (difference of 0.1 acres). Same remaining harm to the northbound Interstate Bridge and Oregon-side resources as Column 1, which would be severe.
Relative significance of each 4(f) property (addressed in Section 4.6.3)	The VNHR Historic District and Fort Vancouver NHS are nationally significant and are the most significant properties affected. The northbound Interstate Bridge is a regionally significant property. All other properties are locally significant.	Same significance of Section 4(f) properties Column 1.	Same significance of Section 4(f) properties as Column 1. The Normandy Apartments, which is a locally significant resource, would be severely harmed, while harm to the VNHR Historic District, which is nationally significant, would be reduced.	Same significance of Section 4(f) properties as Column 1.	Same significance of Section 4(f) properties as Column 1.	Same significance of Section 4(f) properties as Column 1.

	1	2	3	4	5	6
Views of officials with jurisdiction (addressed in Sections 4.7 and 4.6.4)	At the time of this Draft Section 4(f) Evaluation, discussions with officials with jurisdiction are ongoing. NPS has expressed that the Fort Vancouver NHS has the greatest significance.	Same status as Column 1.	Same status as Column 1.	Same status as Column 1.	Same status as Column 1.	Same status as Column 1.
Degree to which alternative meets the Purpose and Need for the project (addressed in Section 4.6.5)	**Congestion, Safety, and Freight Movement**: Improved mobility and safety and reduces congestion due to design modifications that tie in to recent and planned improvements. Would have 23% fewer total crashes than the No-Build Alternative. **Transit:** Improved connectivity to existing and planned transit facilities **Bicycle and Pedestrian Facilities:** Improved connectivity to local street network **Seismic Vulnerability:** Decreased vulnerability due to replacement of the Interstate Bridge and North Portland Harbor bridge.	**Congestion, Safety, and Freight Movement:** Nine additional study area intersections would operate below LOS agency standards during the AM and/or PM peak hours, negatively affecting congestion and freight movement as compared with all other Modified LPA design options. Similar safety performance. **Transit:** Same as Column 1. **Bicycle and Pedestrian Facilities:** Same as Column 1. **Seismic Vulnerability:** Same as Column 1.	Same status as Column 1.	**Congestion, Safety, and Freight Movement:** Movable-span configuration would require periodic disruptions to all modes using the river crossing during bridge openings. May result in more crashes than fixed-span configurations because of the higher likelihood of crashes associated with bridge openings.	**Congestion, Safety, and Freight Movement:** Would reduce travel demand slightly more than Column 1 with shorter travel times for vehicles (including personal, freight, and bus). Would reduce crashes by up to 6% over the Column 1. A movable span would require periodic disruptions to all modes using the river crossing during bridge openings. **Seismic Vulnerability:** A movable span could be less resilient in returning to full operation after a seismic event.	**Congestion, Safety, and Freight Movement:** Similar to Column 1, except would reduce crashes by up to 6%. **Seismic Vulnerability:** A movable span could be less resilient in returning to full operation after a seismic event.
Magnitude of impacts to non-Section 4(f) resources after mitigation (see Section 4.6.6)	Reduced travel times and congestion, as well as improved traffic safety, multimodalism, freight mobility and access, and pedestrian and bicycle infrastructure. Improved aviation safety. Reduced vertical navigation clearance and relocated Vancouver Upper Turning Basin. Improved water quality through stormwater management. Physical changes in benthic habitat and overwater footprint. Full acquisition of 46 residential and commercial properties, 42 residential and 34 commercial displacements, including some in meaningfully greater and high-priority environmental justice (EJ) areas. New toll would require a higher proportion of income of low-income drivers (ODOT and WSDOT are evaluating a low-income toll program). The Modified LPA would bring new high-capacity transit service to meaningfully greater and high-priority	Similar to Column 1. Removal of C Street ramps would affect local traffic circulation patterns resulting in an additional nine study area intersections that would not meet agency level of service performance standards. It would also increase traffic delay near the Mill Plain Boulevard interchange.	Similar to Column 1, but would result in displacement of an additional 33 residential units (Normandy Apartments). Although the Normandy Apartments are not identified by the U.S. Department of Housing and Urban Development as a low-income housing tax credit property, the 33 displacements would occur within the Esther Short neighborhood, a high-priority EJ area for low-income populations. Also, additional displacement of three businesses (approximately 540) jobs in downtown Vancouver.	Similar to Column 1. A single-level fixed-span configuration would require 0.3 acres additional right-of-way acquisition in Portland and Vancouver and increase overwater shading by 4 acres and impacts to benthic habitat by 0.03 acres. A single-level movable-span configuration would require 0.3 acres additional right-of-way acquisition in Portland and Vancouver and increase overwater shading by 5.6 acres and impacts to benthic habitat by 0.07 acres. The increased width of the single-level configurations would relocate the Vancouver Upper Turning Basin. A single-level movable-span configuration would have a higher vertical navigation clearance for river users but would intrude into protected airspace.	Similar to Column 1. Overwater shading and impervious surfaces increased by 0.8 acres compared to the Modified LPA with single-level, one auxiliary lane design option.	Similar to Column 1. Increased overwater shading and impervious surfaces compared to Column 1. Would require 0.1 acres additional right-of-way acquisition compared to the Modified LPA with double-deck, one auxiliary lane design option.

	1	2	3	4	5	6
	EJ areas such as Esther Short in Vancouver.					
Substantial cost difference among alternatives (see Section 4.6.7)	Program cost: 5 to 7.5 billion (YOE $)	Program cost less than 1% difference from Column 1.	Program cost less than 1% difference from Column 1.	Between 3% less and 7% more than Column 1, depending on bridge type.	Program cost less than 1% difference from Column 1 for the fixed-span. Program cost approximately 7% greater than Column 1 for movable-span configuration.	Program cost less than 1% difference from Column 1.

EJ = environmental justice; I-5 = Interstate 5; LPA = Locally Preferred Alternative; NCO = non-commissioned officer; ODOT = Oregon Department of Transportation; SR = State Route; VNHR = Vancouver National Historic Reserve; WSDOT = Washington State Department of Transportation; YOE = Year of Expenditure

The Modified LPA with all design options would result in remaining harm after mitigation to Section 4(f) historic sites in Oregon and Washington. In Oregon, remaining harm would be the same for all of the Modified LPA design options. In Washington, the remaining harm after mitigation would be the same for all of the Modified LPA design options to all resources except the Normandy Apartments, VNHR Historic District, and Fort Vancouver NHS, which would differ for the Modified LPA without C Street ramps design option and the Modified LPA with I-5 shifted west design option.

Impacts to non-Section 4(f) resources would also generally be similar (Table 4-12) for all Modified LPA design options, with some differences for the Modified LPA with I-5 shifted west design option, the Modified LPA without C Street ramps design option, the Modified LPA single-level fixed-span or movable-span configuration with one or two auxiliary lanes design options, and the Modified LPA with double-deck fixed-span configuration due to displacement impacts. At a Program level, differences in costs would not be substantial.

Key distinguishing factors of the least overall harm analysis between the alternatives include the following:

- Ability to mitigate impacts to 4(f) properties, including any benefits to properties: All design options of the Modified LPA have about the same ability to mitigate impacts, with the exception of the Modified LPA with I-5 shifted west design option, which would remove the NRHP-eligible Normandy Apartments. However, the Modified LPA with I-5 shifted west design option would reduce impacts to the VNHR Historic District relative to other design options, including 0.2 to 0.3 acres less area used from the district than the other design options and less harm to contributing resources, such as the Army Road System, and decreased vibration damage risk to the Post Hospital and NCO Family Quarters Building. The Modified LPA with all design options could mitigate vibration risk by repairing any damage in accordance with the Secretary of the Interior Standards but could not mitigate incorporation of the Army Road System. Overall, the Modified LPA with I-5 shifted west design option has the least ability to mitigate impacts to Section 4(f) properties due to its impact on the Normandy Apartments.
- Severity of remaining harm after mitigation: The Modified LPA with I-5 shifted west design option would acquire and demolish the Normandy Apartments resulting in severe remaining harm, while the other design options would have less severe remaining harm. All alternatives would have similar effects on contributing elements of the VNHR Historic District except for the Modified LPA with I-5 shifted west design option, which would slightly reduce harm to the Army Road System and potential for vibration effects to other contributing elements. The Modified LPA without C Street ramps design option would use less land in the Fort Vancouver NHS and the VNHR Historic District than the other design options, with the exception of the Modified LPA with I-5 shifted west design option, but in an area of the park and historic district that does not contribute to the historic site's significance.
- Degree to which alternative meets the Purpose and Need: The Modified LPA with all design options all meet the Program's Purpose and Need, but some design options meet it better than others. All of the Modified LPA design options would improve congestion, safety, freight movement, transit, bicycle and pedestrian facilities, and seismic vulnerabilities over existing conditions. The Modified LPA with single-level movable-span configuration would require periodic disruptions of all modes during bridge openings. Design options with two auxiliary lanes would reduce travel demand more than one auxiliary lane and would result in marginally shorter travel times.
- Magnitude of impacts to non-Section 4(f) resources after mitigation:
  - The Modified LPA without C Street ramps design option would have the most substantial effects on arterial traffic operations of all of the design options because it would result in LOS standards not being met for an additional nine intersections. There would be delays to all modes during bridge openings for the Modified LPA with single-level movable-span configuration.

  - The fixed-span configurations proposed under the Modified LPA would improve aviation safety by reducing intrusion into the Pearson Field protected airspace.
  - Fixed-span configurations would have greater impacts on river navigation by reducing the vertical clearance under the bridge, requiring adjustments to some vessels or business operations. The Modified LPA with single-level configurations (movable or fixed span) would relocate the Vancouver Upper Turning Basin by an additional 25 feet compared with the double-deck fixed-span configuration.
  - The Modified LPA with I-5 shifted west design option would result in additional impacts to an EJ population from residential displacements. The single-level configurations are wider and would result in more navigation impacts due to reduced vertical clearance, while a single-level movable-span configuration would retain the existing clearance but intrude into protected airspace. Design options with two auxiliary lanes would result in more overwater shading.

- Substantial Cost Difference Among the Alternatives: The most substantial difference in cost would be for the Modified LPA with single-level movable-span configuration, which would increase Program costs by approximately 7% (between 370 and 560 million YOE $) compared to the Modified LPA with double-deck fixed-span configuration.

Balancing the small differences in harm, the Modified LPA with double-deck fixed-span configuration has preliminarily been identified as the alternative with least overall harm, as supported by the comparison of the seven factors considered in Table 4-12 and the discussion above. Overall, the difference in harm across the design options would be small, with the exception of demolition of the Normandy Apartments and additional residential displacements for the Modified LPA with I-5 shifted west design option. FHWA and FTA will consider public comment on this Draft Section 4(f) Evaluation prior to making a final determination on the alternative with least overall harm in the Final Section 4(f) Evaluation.

As the IBR Program continues into final design, the Program team will continue to consider ways to further reduce impacts on Section 4(f) properties, ensuring that the action will include all possible planning to minimize harm.

4.7 Coordination

The IBR Program sponsors and/or the federal co-lead agencies have coordinated with 11 Native American tribes, the Washington DAHP, the Oregon SHPO, the NPS, the City of Vancouver, the Vancouver Public School District, Clark College, the City of Portland, and other interested parties in identifying Section 4(f) properties, evaluating the use of Section 4(f) properties, and identifying measures to minimize harm to these properties. Coordination is in process and will continue with officials with jurisdiction over the park and recreation properties and historic sites regarding *de minimis* impact and temporary occupancy determinations. FHWA and FTA will obtain written concurrence from officials with jurisdiction over park and recreation properties where they intend to make a *de minimis* impact determination subsequent to a 45-day public comment period as required by 23 CFR 774.5(b). For properties where temporary occupancy exceptions are sought, FHWA and FTA will obtain written agreement that the conditions of 23 CFR 774.13(d) are met. Concurrence for *de minimis* impact determinations and agreement for temporary occupancy exceptions will be obtained prior to issuance of the Final SEIS.

During October 2023, the Draft Section 4(f) evaluation was provided to the lead agencies, the Cities of Portland and Vancouver, the Ports of Portland and Vancouver, and consulting parties for review and comment regarding the identification and significance of properties subject to Section 4(f) and evaluation of use of those properties. The IBR Program sponsors met with NPS, PP&R, VPR&C, and the Port of Vancouver regarding parks within their jurisdictions. The analysis in this chapter reflects comments received from these agencies.

The agencies confirmed that they have jurisdiction over the respective park properties identified in this chapter and that the properties are significant public parks. NPS clarified that it manages Waterfront Park as part of the Fort Vancouver NHS, clarified resource and boundary definitions between the park and historic district, and expressed that recreational experience is not separate from that of the historic site. The City of Portland provided comment on project features at East Delta Park regarding active transportation facilities within the city. The IBR Program's features and effect on Old Apple Tree Park and Marshall Park were discussed with the City of Vancouver, including ongoing need for coordination on right-of-way ownership. The City of Vancouver identified a location preference for the trail within Old Apple Tree Park; the Program is continuing to evaluate trail alignment in coordination with VPR&C. The Port of Vancouver confirmed the boundary of the public park area at their recently constructed Vancouver Landing and committed to ongoing coordinated planning of future park development in coordination with the IBR Program to reduce potential for conflicts between the two.

Consultation regarding the identification, significance, and effects on historic sites has occurred through the Section 106 process and documented in the Archaeology Technical Report and the Historic Built Environment Technical Report.

Additional coordination will occur after the Draft SEIS comment period to inform refinement of the Modified LPA during the preparation of the Final SEIS. The U.S. Department of the Interior (DOI) will formally review and comment on the Section 4(f) Evaluation during the Draft SEIS public comment period in 2024 (pending), and the DOI and other agencies will be given an opportunity to review the revised Section 4(f) Evaluation prior to publishing the Final SEIS. The U.S. Department of Transportation will make its Section 4(f) approval, under 23 CFR 774.3(a), as part of the Final SEIS or ROD.

Please see the FOE Concurrence Forms included in the appendices of the IBR Program Historic Built Environment Technical Report for further information regarding coordination with the Oregon SHPO and Washington DAHP.

4.8 Preliminary Section 4(f) Findings

The USDOT has made the preliminary determination that:

- The IBR Program would have:
  - Use with greater than *de minimis* impact of eight Section 4(f) protected historic sites and one public park (Table 4-8),
  - Use with *de minimis* impact on three public parks and four historic sites except for the Modified LPA with I-5 shifted west design option, which would have five (Table 4-3 and Table 4-5), and
  - The temporary occupancy exception would apply to five historic sites (Table 4-5).
- There is no feasible and prudent alternative that completely avoids all Section 4(f) properties;
- The Modified LPA is the alternative that causes the least overall harm; and
- The Modified LPA includes all possible planning to minimize harm.

Appendix A

AGENCY AND TRIBAL COORDINATION

This appendix documents how the Interstate Bridge Replacement (IBR) Program has collaborated with regulatory agencies and tribes as part of the National Environmental Policy Act (NEPA) process. Additionally, the following discussion summarizes the collaboration and coordination implemented to date and how these efforts will continue throughout the duration of the NEPA process. Roles and responsibilities of each agency or tribe, and the coordination that has occurred with each, are included as well.

Agency Coordination

Agency coordination has played a significant role throughout the IBR Program NEPA process, from defining the Purpose and Need to development of the Supplemental Environmental Impact Statement (SEIS). Because the project is located in two states, cities, and counties, it requires coordination and outreach with numerous federal, state, and local agencies. In addition, the project is composed of three major structural components: a bridge, light-rail transit, and a highway. Thus, various agencies have a wide range of expertise and jurisdictional authority.

For the purpose of the following discussion, *regulatory agency* refers to any federal, state, or local agency from which a permit is anticipated or approval is needed for the Modified Locally Preferred Alternative (LPA). The IBR Program team has and continues to communicate with regulatory agencies throughout the NEPA process to identify permits and approvals needed for construction. Previously, during the environmental review stage for the Columbia River Crossing (CRC) project, the project team engaged with regulatory agencies on a regular and ongoing basis. Agency engagement extended throughout the NEPA process for the CRC project, from defining the Purpose and Need to development of the Draft Environmental Impact Statement and Final Environmental Impact Statement (EIS), and it is described in detail in Appendix A of the CRC Final EIS. This effort continues under the IBR Program. The IBR Program team works extensively with regulatory agencies and local jurisdictions, which are organized into the following designated agency groups: lead agencies, cooperating agencies, and participating agencies.

Lead Agencies

A lead agency is the agency carrying out the federal action and is responsible for complying with the requirements of NEPA. In some cases, such as the IBR Program, more than one federal agency is designated as a federal lead agency. Federal agencies, together with state agencies, local agencies, and/or tribes, may act as joint lead agencies. Lead agencies prepare the environmental documentation for a project and oversee the NEPA process.

The federal lead agencies for the IBR Program include the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA). The federal lead agencies for the IBR Program are responsible for:

- Overseeing the coordination process (as codified in 23 USC § 139).
- Determining the level of NEPA documentation required to complete the NEPA process for the IBR Program.
- Providing guidance on the NEPA process, including resolving differences in agency procedures.
- Confirming the sufficiency of NEPA documentation.
- Providing legal sufficiency review of project documents.
- Participating in discussions involving other federal agencies.

- Coordinating with FHWA and FTA headquarters to obtain "prior concurrence" on key NEPA decisions made by the FTA regional and FHWA division office.
- Leading consultation with other federal agencies for compliance with federal statutes (e.g., Endangered Species Act [ESA], National Historic Preservation Act [NHPA]).
- Overseeing tribal consultation.
- Making the final NEPA decision.

The federal lead agencies undertake additional responsibilities in conjunction with other nonfederal joint lead agencies for the IBR Program. Nonfederal joint lead agencies include the Oregon Department of Transportation (ODOT); Washington State Department of Transportation (WSDOT); local transit agencies Tri-County Metropolitan Transportation District (TriMet) and Clark County Public Transportation Benefit Area (C-TRAN); and regional metropolitan planning organizations Oregon Metro (Metro) and the Southwest Washington Regional Transportation Council (RTC). In conjunction with the federal lead agencies, the nonfederal joint lead agencies are responsible for:

- Providing timely, technical review and comments on the impact assessment methodologies, technical analyses, and environmental review documentation.
- Supporting the preparation and distribution of a NEPA coordination plan (including schedule), Draft SEIS, Final SEIS, and Record of Decision in compliance with the requirements of all applicable environmental laws, executive orders, and other related requirements.
- Supporting identification of a preferred alternative to be evaluated in the Final SEIS to the extent practicable.
- Supporting the public involvement activities, notifications of availability and distribution of environmental review documents, and posting of decisions related to the environmental review documents.
- Identifying any issues of concern regarding the Program's environmental impacts and mitigation measures.
- Providing timely input on unresolved issues.
- Coordinating with Program staff to develop and maintain an administrative record for relevant Program decisions.
- Providing timely review of permit applications and authorizations that fall under the agency's jurisdiction.

Lead agencies and their roles and responsibilities for the IBR Program are listed in Table A-1 and Table A-2.

Additional lead agency responsibilities are to be determined.

Table A-1. Federal Lead Agencies

Agency	Permits and Approvals
FHWA FTA	• Federal approval. • Compliance with federal laws and regulations. • Right-of-way permit (interstate) (FHWA).

Table A-2. Joint Lead Agencies

Agency	Permits and Approvals
ODOT WSDOT	• State approval. • Washington State Environmental Policy Act (SEPA) (WSDOT). • Program delivery via funding from the two state legislatures and potential federal funding sources. • Potential grant recipients for FTA (WSDOT) (to be determined). • Design, construction, and operation and maintenance of state and interstate highways according to respective Stewardship and Oversight Agreements. • Right-of-way encroachment permits.
Metro RTC	• Regional approval. • Maintenance of the regional and metropolitan transportation plans that include the IBR Program. • Program funding in Transportation Improvement Program. • Coordination, planning, and approval of investments in the transportation system.
TriMet C-TRAN	• Local approval of transit. • Design, construction, and operation and maintenance of the transit facility. • Potential grant recipients for FTA (TriMet) (to be determined).

Cooperating Agencies

A cooperating agency is any federal agency, other than a lead agency, that has jurisdiction by law (with permitting or land transfer authority) or special expertise with respect to any environmental impact involved in a proposed project or project alternative. A state or local agency of similar qualifications may also become a cooperating agency by agreement with the lead agencies, as may a Native American tribe when the effects are on lands of tribal interest. Lead agencies specially request cooperating agencies to participate during the environmental evaluation process for a project. All cooperating agencies are also considered participating agencies.

Cooperating agencies are specifically requested by the lead agencies to participate during the environmental evaluation process for a project. Cooperating agencies have an elevated status in the NEPA process due to the independent actions these agencies may take that depend on the Program's NEPA analysis; this includes an opportunity to contribute expertise in the development of methodology and analysis of impacts. In addition, it is anticipated that cooperating agencies will use the Final SEIS to support their respective permit or approval decision-making. Cooperating agencies are also invited to be participating agencies.

Each cooperating agency will have the opportunity to participate in Program meetings, open houses, and workshops in addition to reviewing and providing comments on the following Program milestones and activities:

- Consult and concur with the lead agencies concerning the schedule in the *IBR NEPA Coordination Plan*.
- Participate in agency coordination meetings.

- Provide input on the EIS analysis methodology memoranda within the areas of the cooperating agency's expertise during the review period.
- Provide input on the administrative Draft SEIS, Final SEIS, and relevant EIS technical documentation.
- Provide adequate information for the cooperating agency to discharge its NEPA responsibilities and any other requirements regarding jurisdictional approvals, permits, licenses, and/or clearances.

Cooperating agencies for the IBR Program, along with their roles and responsibilities, are summarized in Table A-3.

Table A-3. Cooperating Agencies

Agency Name	Role	Permit and Approval Responsibilities
National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NOAA Fisheries)	Federal permitting; agency with jurisdiction and special expertise on fish and wildlife.	• Endangered Species Act (ESA) Section 7 Consultation • Magnuson-Stevens Fishery Conservation and Management Act • Marine Mammal Protection Act • Biological Opinion
National Park Service (NPS)	Property owner; Agency with jurisdiction and special expertise on historic resources.	• National Historic Preservation Act (NHPA) Section 106 Consultation • Archaeological Resources Protection Act Permit • Fort Vancouver National Historic Site • U.S. Department of Transportation Act Section 4(f) Consultation • Section 6(f) of the Land and Water Conservation Fund Act Consultation • Federal Lands to Parks Concurrence
U.S. Army Corps of Engineers (USACE)	Federal permitting; agency with jurisdiction and special expertise on the Clean Water Act, water quality, and the levee and navigation channel.	• Section 401 of the Clean Water Act Water Quality Certification • Section 404 of the Clean Water Act Permit • Section 408 Authorization for Modification/Alteration of USACE Civil Works Projects (levee and navigation channel)
U.S. Coast Guard (USCG)	Federal permitting; Agency with jurisdiction and special expertise on navigable waterways.	• General Bridge Act of 1946 Permit
U.S. Environmental Protection Agency (EPA)	Federal permitting; Special expertise on the adequacy and the acceptability of the environmental impacts analysis.	• Sole Source Aquifer Protection Act • Clean Air Act
Washington State Department of Archaeology and Historic Preservation (DAHP)	State permitting; Special expertise on archaeology and historic resources.	• NHPA Section 106 Consultation • U.S. Department of Transportation Act Section 4(f) Consultation

Beginning in 2005 as part of the CRC project, the CRC project team met with each of the cooperating agencies to gather information and seek advice on project development and potential build concepts. Each cooperating agency played a key role in developing the build alternatives analyzed in the CRC Final EIS. The IBR Program's approach has been similar in that the Program has either met, or will meet, one-on-one with each of the cooperating agencies prior to publication of the Draft SEIS. Each cooperating agency has the opportunity to provide input on the Modified LPA as it relates to the respective agency's expertise, interest, and mandates.

Participating Agencies

Participating agencies are agencies that have a specific interest in a project. Non-governmental organizations and private entities cannot serve as participating agencies. Pursuant to 23 USC § 139, participating agencies are responsible for identifying, as early as practicable, any issues of concern regarding the IBR Program's potential environmental, social, or economic impacts that could substantially delay or prevent an agency from granting a permit or other approval that is needed for the Program.

Designation as a participating agency does not imply Program support, and if applicable, does not provide an agency with increased oversight or approval authority beyond its statutory limits. Each participating agency will have the opportunity to participate in Program meetings, open houses, and workshops in addition to reviewing and providing comments on the following NEPA milestones and activities:

- Participate in the NEPA process starting at the earliest possible time. Participation includes providing comments and responses on NEPA documents, reviewing studies or methodologies on the areas within the special expertise or jurisdiction of the agency and advising on the level of detail for the analysis of impacts.
- Identify, as early as practicable, environmental issues of concern regarding the IBR Program.
- Provide meaningful and timely input on unresolved issues.
- Comment on the schedule in the *IBR NEPA Coordination Plan*.

Participating agencies may also contribute to other environmental compliance processes (e.g., NHPA Section 106, ESA) that are pertinent to agency interests or area(s) of expertise. Participating agencies and their roles and responsibilities are summarized in Table A-4.

Table A-4. Participating Agencies

Agency	Role	Permits and Approvals
Federal Aviation Administration (FAA)	Agency with jurisdiction, special expertise on aviation impacts.	• 7460-1 Permit for Permanent Obstruction • 7460-1 Permit for Construction Obstruction
U.S. Fish and Wildlife Service (USFWS)	Special expertise on fish and wildlife.	• Endangered Species Act Section 7 Consultation • Letter of Concurrence
U.S. General Services Administration (GSA)	Special expertise on federal lands.	• Federal Lands to Parks Concurrence

Agency	Role	Permits and Approvals
City of Portland	Agency with jurisdiction, property owner, special expertise on city facilities and operations.	• Land Use Review (environmental, adjustment, design) • Historic Demolition Review • Noise Variance • Improvements in Right-of-way • Building Permit – Site Development • Sign Permit • Trade Permits – Electrical; Mechanical; Plumbing • Features on Park Lands • Tree removal permits (12-inches or larger)
City of Vancouver	Agency with jurisdiction, property owner, special expertise on city facilities and operations.	• Regional and local transportation, local land use, and local permits • Public Facilities Master Plan (Hybrid Approach) • Transportation Development Review • Traffic Impact Analysis • Shoreline permit or exemption approval • Critical Areas permit or exemption approval • Noise Permit • Building Permit • Trade Permit – Electrical; Mechanical; Plumbing • Temporary Use Permit • Access Closure • Sign Permit (Temporary) • Features on Park Lands • Tree removal permits
City of Gresham	Agency with jurisdiction	• Right-of-way Permits • Tree Permit • Design Review
Oregon Department of Environmental Quality (DEQ)	Agency with jurisdiction, special expertise on multiple environmental resources (air quality, water quality).	• Clean Water Act Section 401 Water Quality Certification • 1200-C construction stormwater permit • Air Quality Permit • Stationary Source Permit • Voluntary Cleanup Pathway approval
Oregon Department of Fish and Wildlife (ODFW)	Agency with jurisdiction, special expertise on fish and wildlife.	• Fish Passage Act Fish Passage Permit • Habitat Mitigation Policy

Agency	Role	Permits and Approvals
Oregon Department of Land Conservation and Development (DLCD)	Special expertise on statewide planning	• Oregon's Statewide Land Use Planning Goals Compliance
Oregon Department of State Lands (DSL)	Agency with jurisdiction, special expertise on bridge easement and fish passage.	• Removal-Fill Permit • Lease/Bridge Easement Permit • Oregon Fish Passage Act Approval
Oregon State Historic Preservation Office (SHPO)	Special expertise on archaeology and historic resources.	• NHPA Section 106 Consultation • U.S. Department of Transportation Act Section 4(f) Consultation
Port of Portland	Special expertise on freight movement.	• Regional and local transportation, traffic impact analysis, local land use
Port of Vancouver USA	Special expertise on freight movement.	• Regional and local transportation, traffic impact analysis, local land use
Washington State Department of Ecology	Agency with jurisdiction, special expertise on multiple environmental resources (air quality, water quality, wetlands, contaminated sites).	• Clean Water Act Section 401 Water Quality Certification • Construction Stormwater General Permit • Air Quality Permit • Stationary Source Permit • Shoreline Management Act Approval
Washington State Department of Fish and Wildlife (WDFW)	Agency with jurisdiction, special expertise on waters under the state's jurisdiction.	• Hydraulic Project Approval • Mitigation Policy (POL-M5002)
Washington State Department of Natural Resources	Agency with jurisdiction, special expertise on natural resources.	• Aquatic Lands Lease/Easement • Aquatic Use Authorization
Multnomah County Drainage District	Responsible for reducing flood risk by maintaining levee systems, managing drainage, and responding to emergencies.	• Development Review permit • Letter/Statement of No Objection Letter for the Section 408 Process

Note: Two agencies (the Washington State Recreation and Conservation Office and the Oregon Parks and Recreation Department) declined to serve as participating agencies.

The participating agencies identified in Table A-4 may also participate in other environmental compliance processes (e.g., NHPA Section 106, ESA) that are respective to agency interests (or area of expertise).

Ten federally recognized tribes with jurisdiction or other interests in the IBR Program study area will be involved in the IBR Program NEPA process. Each participating tribe will have a participating agency role in the

development of the Program, including the following as it relates to each tribe's area of expertise or environmental issues of concern to their jurisdiction:

1. Provide meaningful and early input on methodologies and level of detail required in the alternatives analysis.
2. Participate in coordination meetings and joint field reviews as appropriate.
3. Provide timely review and comment on the technical reports to reflect the views and concerns of each respective tribe on the adequacy of the document, alternatives considered, and the anticipated impacts and mitigation.

Participating federally recognized tribes in the IBR Program NEPA process include:

- Confederated Tribes and Bands of the Yakama Nation
- Confederated Tribes of Siletz Indians of Oregon
- Confederated Tribes of the Colville Reservation
- Confederated Tribes of the Grand Ronde Community of Oregon
- Confederated Tribes of the Umatilla Indian Reservation
- Confederated Tribes of the Warm Springs Reservation of Oregon
- Cowlitz Indian Tribe
- Nez Perce Tribe
- Nisqually Indian Tribe
- Spokane Tribe of the Spokane Reservation Indians (Spokane Tribe of Indians)

In addition to the above, the Program is coordinating with the Chinook Indian Nation, which is not currently a federally recognized tribe. A tribe's designation as a participating agency does not replace formal government-to-government or Section 106 tribal consultation with federally recognized tribes. The approach to formal tribal consultation and tribal consultation activities to date are discussed below in the Tribal Consultation section of this appendix.

Agency Coordination Points and Responsibilities

Table A-5 identifies the key NEPA coordination points, as well as agency responsibilities, information provided, and anticipated timeframe. The lead agencies will provide reasonable advance notification to cooperating and participating agencies for expected review dates.

The IBR Program will routinely update the schedule and inform agencies and tribes of the timeframes identified below. Timeframes for review and/or comment will be established. Reviewers shall compile comments from their respective agencies and tribes and send a single set of comments to the IBR Program team when more than one staff member reviews a document. Federal permitting agencies will be able to track federal permits and timelines via the federal Permitting Dashboard.

Table A-5. Agency Coordination Points and Responsibilities

Coordination Point	Information or Activity Provided	Agency Responsible for Commenting	Comments Provided or Activity Conducted	Anticipated Timeframe
Cooperating and Participating Invitation Letters	Distribute invitation letters	Cooperating/ Participating	Review and respond	October 2022
NEPA Coordination Plan	Distribute Draft Coordination Plan	Cooperating/ Participating	Review and comment	October 2022
Issue Notice to Supplement (NTS)	Publish NTS in Federal Register	Cooperating	Review and comment	April 2023
Impact assessment methodologies	Distribute draft impact assessment methodologies	Cooperating/ Participating	Review and comment	October–December 2022
Draft SEIS (Administrative Draft)	Distribute Administrative Draft SEIS	Cooperating	Review and comment	July - October 2023
Biological Opinion for Endangered Species Act/Section 7	Distribute Final Biological Assessment	NOAA Fisheries, USFWS	Review and issue biological opinion or letter of concurrence	September 2023–September 2024
Draft SEIS	Distribute Draft SEIS	Participating	Review and comment	August 2024
Mitigation Plan	Included in the SEIS	Cooperating/ Participating	Review and comment	August 2024
Final Supplemental Environmental Impact Statement (Final SEIS) (Administrative Draft)	Distribute Administrative Draft Final SEIS	Cooperating	Review and comment	March 2025
Signing of the Programmatic Agreement for Section 106	Distribute Programmatic Agreement	FHWA, FTA, USACE, Oregon SHPO, Washington State DAHP, WSDOT, ODOT, NPS	Review, comment, and sign	March – April 2025
Concurring Signatures on Programmatic Agreement for Section 106	Distribute Programmatic Agreement	*To be determined*	Review, comment, and sign if concurring party	March – April 2025
Final EIS	Distribute Final EIS	Participating	N/A	July 2025
Record of Decision (ROD)	Publish ROD	Federal Lead	Review and comment	September 2025

DAHP = Department of Archaeology and Historic Preservation; ESA = Endangered Species Act; FHWA= Federal Highway Administration; FTA = Federal Transit Administration; N/A = not applicable; NOAA Fisheries = National Oceanic and Atmospheric Administration National Marine Fisheries Service; NPS = National Park Service; SEIS = Supplemental Environmental Impact Statement; SHPO = State Historic Preservation Office; USACE = U.S. Army Corps of Engineers; USFWS = U.S. Fish and Wildlife

Technical Coordination with Agencies in Development of the Modified LPA

The IBR Program has worked in tandem with partner agency technical staff through focused technical working groups to develop, evaluate, refine, and identify design concepts, transit investments, and modeling and analytical approaches in development of the Modified LPA. Descriptions of these efforts with partner agencies follow.

Executive Steering Group

The IBR Program's design team collaborated with executive leadership and technical staff from local partner planning and transportation agencies to develop, evaluate, refine, and identify design concepts and transit investments for consideration by advisory groups and the community. These meetings served as a venue for developing a shared understanding of local conditions, needs, and planned transportation improvements. The Executive Steering Group identified design options for screening, contributed to desired outcomes, developed screening criteria, considered tradeoffs, and was engaged in the process of developing the Modified LPA.

The Executive Steering Group included executive leadership from the IBR Program and the following 10 partner agencies:

- ODOT
- WSDOT
- Local transit agencies C-TRAN and TriMet
- Regional metropolitan planning organizations Metro and RTC
- Cities of Portland and Vancouver
- Ports of Portland and Vancouver

Travel Demand Modeling Working Group

Representatives from the IBR Program, ODOT, WSDOT, C-TRAN, TriMet, the Cities of Vancouver and Portland, the Ports of Vancouver and Portland, Metro, and RTC met to review and discuss methods and assumptions related to travel demand modeling being used in support of analysis for the IBR Program. This group met approximately monthly starting in June 2021 to discuss many aspects of the demand model process including data collection, land use, travel markets, regional data analysis, tolling (for the IBR Program, as well as modeling assumptions made by the Oregon Toll Program), definition of model assumptions for screening of highway and transit options, and post-processing for traffic analysis. The group also reviewed screening criteria and analysis related to transportation modeling to support the evaluation of design options.

Transit Options Technical Session

Representatives from the IBR Program, C-TRAN, TriMet, the Cities of Vancouver and Portland, Ports of Vancouver and Portland, Metro, and RTC developed and refined an array of transit scenarios (including mode, alignment, stations, and operations) and their varying performance and operating measures. This technical team was convened under the name of the Transit Options Technical Session and met eight times between October 2021 and February 2022.

Climate Technical Working Group

The IBR Program invited climate and planning staff from each of the partner agencies to join ODOT and WSDOT climate specialists for discussions on strategies to support shared climate goals. The climate technical working group meetings are held monthly and cover topics such as methods to assess greenhouse gas emissions associated with the Program, greenhouse gas reduction goals and targets, and the need for mutually supportive policies and programs to support shared climate goals. Future meetings will address design refinements, the environmental study, and construction means and methods, as well as investigate potential mitigation or offsets.

Tribal Consultation

Below is a summary of the IBR Government-to-Government tribal consultation activities. The summary details how this Program team is coordinating with tribal governments.

WSDOT, ODOT, FHWA, and FTA are committed to government-to-government consultation with tribes on projects that may affect tribal rights and resources. The IBR tribal consultation process is designed to encourage early and continued feedback from, and involvement by, tribes potentially affected by the IBR Program and to ensure that their input is incorporated into the decision-making process. Although tribal coordination and government-to-government tribal consultation is being undertaken as a distinct outreach effort, tribal involvement is also occurring concurrently with agency coordination and public involvement.

Goals for Tribal Consultation

The primary goal of tribal consultation within the IBR Program is to achieve meaningful engagement with tribes concerning the IBR Program, and it is supported by numerous federal and state agreements and executive orders, including but not limited to, the following:

- Executive Order 13175, Consultation and Coordination with Indian Tribal Governments
- President Biden's Memorandum on Tribal Consultation and Strengthening Nation-to-Nation Relationships
- Washington State Centennial Accord
- WSDOT Executive Order 1025, Tribal Consultation
- Oregon Revised Statutes 182.162 to 182.168, Relationship of State Agencies with Indian Tribes
- NEPA
- Section 106 of the NHPA

In addition to the federal and state executive orders, memorandums, and mandates for tribal consultation, it is FHWA and FTA's goal to fulfill its Trust responsibilities to tribes. The best and most appropriate manner to learn of these concerns and obligations is through consultation and coordination with federally recognized tribes.

Consultation is an ongoing process that develops a richer and lasting understanding of the area while strengthening the relationship among FHWA, FTA, WSDOT, ODOT, and the consulting tribes. Lessons learned from the CRC project will be incorporated into the IBR Program. FHWA, FTA, and the IBR Program will, to the extent possible, seek to avoid and minimize the effects the IBR Program may have on tribal resources and to mitigate actions for all unavoidable impacts.

Tribal Consultation Approach

The IBR Program has a designated tribal liaison who will facilitate all communications with the consulting tribes. Other WSDOT and ODOT team members may participate in the ongoing government-to-government dialogue. FHWA and FTA have designated a federal tribal liaison who will oversee and participate in all activities and coordination undertaken by the IBR tribal liaison. The federal tribal liaison will review all requests for consultation, be invited to and attend all tribal and intertribal meetings, and coordinate review of consultation and coordination materials with other representatives from FHWA and FTA. At any time, tribes may request government-to-government consultation separately with the federal agencies.

Consultants will assist in preparing for meetings with the tribes, but all contact will be through the IBR tribal liaison, federal tribal liaison, and WSDOT and ODOT staff on the Program. All communication with tribes is coordinated through the IBR tribal liaison and federal tribal liaison to ensure that information is managed internally and integrated into the government-to-government dialogue with the tribes. Tribal consultation activities are documented in the Program's administrative record unless noted as sensitive or confidential.

The general approach to government-to-government consultation for the IBR Program is as follows:

- Meet with representatives of consulting tribes to review broad issues.
- Consult and coordinate with tribal leadership and staff per each tribe's preference. At the request of the tribes, FHWA, FTA, and the IBR Program team will meet with respective tribal representative or entities including, but not limited to, cultural and natural resource staff.
- Incorporate tribal input into Program planning and permitting activities. FHWA, FTA and the IBR Program team will keep the consulting tribes fully informed throughout the Program planning, permitting, and development process. The FHWA, FTA and the IBR Program team recognize and respect that consulting tribes, as sovereign entities, are afforded opportunities for engagement in the planning and permitting process, independent and separate from public outreach and other engagements with the public. FHWA, FTA, and the IBR Program team understand that input, feedback, and comment may be received through a variety of methods, including working groups, on-on-one technical meetings, formal consultation, and via written comment.

The following summarizes the tribal consultation in which the IBR Program has engaged through May 2024. The IBR Program team has conducted extensive consultation with interested tribes since September 2020. The ODOT Tribal Liaison led the consultation effort until the Program arranged to have a tribal liaison dedicated to the project in October 2022 . FHWA and FTA designated a federal tribal liaison in September 2023.

Who are we consulting with and why?

During the environmental review stage for the CRC project, the project team consulted with both the natural and cultural resource offices of each affected tribe. CRC staff periodically met with tribal councils and committees as appropriate. This effort continues under the IBR Program.

In September 2020, government-government consultation was reinitiated when FHWA and FTA extended letters to the 21 tribes and Native Hawaiian Organizations that were contacted originally on the CRC project, four of which have adjudicated treaty fishing access rights along the Columbia River. In February 2022, as a result of consultation with the National Park Service (NPS), outreach was extended to an additional 17 tribes. Through that effort, 10 federally recognized tribes expressed an interest in consultation on the IBR Program.

The IBR Program team initiated formal consultation with the following federally recognized tribes:

- Confederated Tribes of Grand Ronde Community of Oregon

- Confederated Tribes of the Colville Reservation
- Confederated Tribes of the Umatilla Indian Reservation
- Confederated Tribes of Warm Springs Reservation of Oregon
- Cowlitz Indian Tribe
- Nez Perce Tribe
- Confederated Tribes of Siletz Indians of Oregon
- Spokane Tribe of the Spokane Reservation Indians (Spokane Tribe of Indians)
- Confederated Tribes and Bands of the Yakama Nation
- Nisqually Indian Tribe

The Program team is also consulting with the Chinook Indian Nation, which is currently not a federally recognized tribe. The Program team is consulting with technical staff in various departments from each consulting tribe. The IBR Program periodically presents to/meets with tribal councils and committees when requested.

Consulting tribes will have the opportunity to identify issues of concern regarding the IBR Program's potential environmental or socioeconomic impacts; to participate in project meetings, open houses, and workshops; and will have the opportunity to review and provide comments on the project milestones and activities, including but not limited to:

- Design options development and screening report
- Tribal consultation plan
- Draft SEIS methods, data reports, and technical reports
- Section 106 documentation
- Section 4(f) analysis
- Biological assessment

Consultation Activities to Date

- Reinitiated consultation with the tribes in September 2020.
- Conducted face-to-face and virtual meetings with each tribe as well as intertribal meetings.
- Sent invitations to be participating tribes for the NEPA compliance process to 10 federally recognized tribes in November 2022.
- The consulting tribes were given the opportunity to review the following products:
  - Methods and data reports
  - Design options development and screening report
  - Area of Potential Effects for Section 106
  - Tribal consultation plan
  - All Draft SEIS technical reports
  - Draft research designs for archaeological discovery field investigations
  - Historic built environment baseline surveys

- Historic built environment determinations of eligibility
- Historic built environment findings of effects
- IBR programmatic agreement
- Section 4(f) analysis
- Biological assessment

Appendix B

PUBLIC INVOLVEMENT

This appendix describes the overall public involvement activities for the Interstate Bridge Replacement (IBR) Program. It includes a general description of public involvement activities and specific public outreach efforts conducted during preparation of the Draft Supplemental Environmental Impact Statement (SEIS) from January 2021 through September 2023. Extensive public involvement efforts were undertaken as part of the Columbia River Crossing (CRC) Environmental Impact Statement (EIS) process from publication of the Notice of Intent to prepare an EIS in September 2005 through publication of the Final EIS in 2011 (CRC 2011). Public comments on the Draft EIS for the CRC project are described in Chapter 6 of the CRC Final EIS, and the overall public involvement program for the CRC project is summarized in Appendix B of the Final EIS. The IBR public involvement efforts build on the work done during CRC by incorporating the feedback, best practices, and lessons learned from past work with new tools and opportunities. This appendix documents the public involvement conducted for the IBR Program and includes the IBR Program's goals for public involvement, a description of the primary audiences identified for outreach, and the tools used to communicate with these interested parties.

The IBR Program has engaged with partner agencies, tribal governments, and community-based organizations (CBOs) since late 2020 and has been conducting more formal intentional community engagement since January 2021. This engagement has shaped the communications strategy and implementation, the environmental review process, the Modified Locally Preferred Alternative (LPA), and the design options that are part of the Modified LPA.

The IBR Program strives to minimize barriers to engagement and frequently offers ongoing opportunities for input. Engagement includes a range of online, hybrid, and in-person options, as detailed in the Public Involvement Tools section.

The IBR Program is complying with and exceeding National Environmental Policy Act (NEPA) requirements for public involvement and is fully complying with Executive Order (EO) 12898 (as amended by EO 12948), which requires each federal agency to make achieving environmental justice (EJ) part of its mission "by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations" (White House 1995). In compliance with EO 12948, the IBR Program has identified Black, Indigenous, and People of Color (BIPOC), people whose incomes are below the federal poverty threshold, and limited English proficiency (LEP) populations within the study area to inform the outreach and engagement approach. In addition to these groups, the IBR Program has identified people with disabilities, people experiencing houselessness, immigrants and refugees, young people (25 and under) and older adults (65 and older) as equity priority communities. The IBR Program has also established an Equity Advisory Group (EAG) to better solicit feedback and center equity. For more information on the IBR Program's Equity Commitment, see the IBR website.[1]

In 2023, EO 14096, Revitalizing Our Nation's Commitment to Environmental Justice for All, was signed by the Biden administration. EO 14096 directs the federal government to strengthen its commitment to deliver EJ through an updated definition of EJ, a change in the standard for what constitutes as an EJ effect, and an expansion of EJ communities. Although formal guidance on how to apply EO 14096 to NEPA projects has yet to be published, the IBR Program has sought to meet the intent of the rule through a robust EJ analysis, coordinated with an equity analysis completed as part of the Equity Technical Report.

[1] https://www.interstatebridge.org/equity

Outreach efforts have resulted in approximately 40,000 engagements with community members since 2021. Additionally, the IBR Program has significant interaction through a dedicated website and is active on multiple social media channels. The IBR Program has been featured in over 900 media stories, op-eds, and reader stories through the third quarter of 2023. This engagement provides important input that the IBR Program will continue to consider and integrate throughout the planning and design process. Appendix D, Design Option Development and Screening Report, details how feedback shaped the development of the Purpose and Need, Desired Outcomes, and the Modified LPA.

Goals for Public Involvement

Community engagement efforts provide extensive, inclusive, and ongoing opportunities for meaningful communication with community members that prioritize equity, diversity, accessibility, transparency, and inclusion. The goals for public involvement are as follows:

- Seek feedback from a diverse range of partners.
- Engage equity priority communities.
- Embrace innovation.
- Uplift all voices.
- Demonstrate accountability through transparency and feedback.
- Achieve trust among partner agencies and the community.

Primary Audiences

The following groups and organizations have been identified as interested parties in the IBR Program. These parties are the primary focus of outreach:

- Program-defined equity priority communities: people whose incomes are below the federal poverty threshold, individuals and families experiencing houselessness, people with LEP, BIPOC, immigrants and refugees, people with disabilities, young people, and older adults.
- Residents of Clark County, Washington, and Multnomah County, Oregon.
- Property and business owners within and adjacent to the Program area.
- People who drive, use transit, and active transportation users in the Program area.
- Future potential users of the Program area.
- The commuter, business, and freight communities.
- Media.
- Neighborhoods in and adjacent to the Program area.
- CBOs.
- Tribal members.[2]
- Local, state, and federal elected officials in both Oregon and Washington.
- Community leaders.

[2] The IBR Program acknowledges that tribes are sovereign nations. The Program consults with federally recognized tribes through a government-to-government consultation process separate and distinct from public and community outreach and comment. Appendix A to this SEIS details the IBR Program's Tribal Consultation.

Public Involvement Tools

Public involvement tools and methods used by the IBR Program team are summarized below.

Website

An IBR Program website has been created and is regularly updated (https://www.interstatebridge.org/). The website provides Program information, newsletters, fact sheets, advisory group meeting schedules and materials, and schedules of public events. It also gives the public a means to provide the IBR Program team with feedback. The website has been used to offer web-based surveys and online open house efforts at key Program milestones. The website also provides links to videos that have been produced for the IBR Program, including "Bridge Stories," described below.

Accountability Dashboard

The IBR Program's accountability dashboard is a transparency tool designed to share key community engagement metrics, holding the IBR Program accountable to the public. This is a space where the public can learn about what the IBR Program has heard from the community and how the Program is responding. Funding sources, expenditures, and disadvantaged business enterprise (DBE) participation goals are reported within the accountability dashboard. The accountability dashboard is available on the Program website and updated quarterly.

Bridge Stories

"Bridge Stories" is a campaign designed to spotlight diverse community members who live, work, and congregate in the greater Portland-Vancouver region. The campaign consists of a series of short videos showcasing real stories of people who use the Interstate Bridge. Participants share what the bridge means to them, how they use the bridge, and how the bridge replacement impacts them. Links to the videos are provided on the Program's website and are shared on social media.

Monthly Newsletter Monthly emails provide regular Program status updates to all those on the IBR Program email list. The IBR Program's email list, used to encourage participation in public events and involve the broader community, has grown to more than 7,500 contacts. This includes 7,082 subscribers who have signed up to receive monthly newsletters. Interested parties can sign up for monthly email updates through the website (https://www.interstatebridge.org/contact).

Social Media

The IBR Program maintains active accounts across multiple social media platforms to provide Program updates and engage the broader community in a more informal setting. In particular, social media is an important tool to support outreach to young people.

Office Hours

Office hours provide the opportunity for community members to sign up for an appointment to speak directly to IBR Program team members to ask questions and share their feedback. Office hours timeslots are offered at various times and days of the week and include both in-person and virtual options to make them as inclusive and accessible as possible.

Neighborhood Forums and Open House Events

In-person open house style events provide an opportunity for community members and businesses within the Program area to drop in and speak directly with IBR Program staff. Neighborhood forums were held in May and June 2023 to provide an opportunity for the public to learn about the Program's environmental review process, including what is being analyzed in the study area, the financial plan, design work, and community engagement opportunities. Additional events will be considered to support outreach during key Program milestones.

Presentations to Community-Based Organizations, Neighborhood Associations, and Conferences

The IBR Program proactively reaches out to neighborhood associations and CBOs to offer updates on Program activities and respond to requests to provide briefings. The Program also searches for speaking opportunities to engage a broad range of audiences at the national, regional, and local levels to share the Program's story, inform audiences of the Program's progress, and address any questions.

Outreach to Equity Priority Communities

An important component of the public involvement strategy for the IBR Program is outreach and engagement with equity priority communities. To this end, the Program coordinates with local community leaders, liaisons, groups, and CBOs to develop appropriate strategies for outreach to these populations. The EAG and the Community Advisory Group (CAG) have also provided valuable feedback on outreach to equity priority communities. The Program has used an assortment of virtual outlets, including social media, a website translation tool, resources to reach LEP communities, events, and newsletters. The Program has also networked with community leaders, college students, school parent groups, churches and religious institutions, and other organizations.

The Program conducts intentional outreach to equity priority communities and uses a number of tools to improve accessibility and inclusion. Examples of outreach efforts the Program has implemented to minimize barriers to engagement and reach equity priority communities include:

- Providing American Sign Language interpreters and closed-captioning in English and Spanish at advisory group meetings, listening sessions, and upon request.
- Providing accessible materials, website, and meetings and anticipating the needs of equity priority community members so they can fully participate in meaningful engagement and make informed decisions. The website allows translation into eight languages and documents and graphics posted on the website are remediated to Americans with Disabilities Act standards to ensure compatibility with screen reader software.
- Producing three-dimensional physical models to assist blind and low-vision community members.
- Partnering with CBOs serving equity priority communities, including small-scale, low-barrier grants to extend the Program's engagement outreach.
- Providing incentives for participation to equity priority participants.
- Working with multilingual community engagement liaisons who are fluent in languages other than English and deeply connected within their local communities to help spread the word about the Program and connect with those with LEP, immigrants, and refugees.

- Translating selected Program documents to support outreach listening sessions and events into Arabic, Chinese, Chuukese, Korean, Somali, Spanish, Russian, Vietnamese, Thai, and Ukrainian. These translated documents were posted on the Program website and were distributed in hard copy form at strategic community locations.
- Providing verbal language interpreters upon request for affinity listening sessions.
- Hosting youth press conferences for high school and college news/media outlets to give them space to ask questions in an affinity setting.

Written Materials

One of the main components of the communications effort for the IBR Program is a range of written materials that are easily identifiable as IBR Program materials and that can be accessed either in print form or electronically via the website. Individuals who require reasonable accommodations can request written material in alternative formats or sign language interpreters by contacting the Program team. All documents on the IBR Program website are also remediated for accessibility for individuals with visual impairments to comply with Section 508 of the Rehabilitation Act of 1973. Under Section 508, agencies must give disabled employees and members of the public access to information comparable to the access available to others.

The following are examples of the written materials produced:

- **Newsletters**. Monthly newsletters are sent via email and published on the IBR Program website to describe plans and timelines, opportunities for public input, options and alternatives under consideration, and progress. They also serve as part of the notification system for public meetings and other milestones.
- **Fact Sheets**. Fact sheets have been developed that can be used individually or in packets for specialized audiences. A general background document was created that describes Program need, process, timelines, and benefits and is updated as needed. Additional fact sheets provide information about other topics of public interest, such as the Modified LPA, how the Program centers equity, cost and funding information, and tolling.
- **Display Boards**. Display boards are created for open houses, booths at fairs and festivals, and miscellaneous presentations.
- **Postcards**. Postcards are mailed to relevant addresses to notify neighbors and other interested parties of upcoming opportunities to review the Program team's work and provide input.
- **Presentation Materials**. Presentation materials are prepared to support open houses; briefings with neighborhood associations, business groups, and community organizations; and meetings with media and elected officials. Materials are tailored to each group and may consist of a combination of slides, illustrations, display boards, and presentation handouts.

Online Public Meetings, Surveys, Listening Sessions, and Roundtables

Due to the 2019 coronavirus (COVID-19) pandemic, most of the events held during 2021 and in 2022 were conducted online. As the IBR Program begins to offer more in-person events, these in-person events will be held in both Vancouver and Portland for the convenience of the public. The Program will continue to provide virtual and hybrid engagements to provide communities members with several options to connect.

Online public meetings, listening sessions, surveys, and roundtables have been held to share Program information and gather feedback in coordination with key Program milestones. The Program team has provided accessible meeting materials upon request for individuals who require reasonable accommodations, including written materials in alternative formats or sign language interpreters.

Fairs, Festivals, and Community Events

To connect with a broader range of people, the IBR Program focuses on reaching people where they are, on their terms and schedules. These efforts include participation in local and regional community events such as fairs, festivals, and farmers' markets. These outreach opportunities are designed to provide the general public with an informal opportunity to engage with the team, view Program information, and learn about upcoming milestones and public involvement opportunities. This type of outreach provides the public with increased knowledge of the Program, a broad-based understanding of its goals and schedules, and a convenient means of providing feedback directly to Program staff. Team participation in community events typically involves staffing informational tables and booths.

Media Support

A media strategy is used to reach a broad audience with accurate and timely information, increase public awareness of the Program, and encourage participation in public events. It includes methods for gaining media coverage at Program milestones and methods to keep the Program in the public eye between milestones, including the following:

- **News releases**. The Program sends news releases to the media distribution list to alert reporters and blog writers about major milestones and public meetings. News releases are also posted on the Program website.
- **Media outreach**. The Program proactively contacts media outlets to offer briefings at key milestones and updates.
- **Media responses**. The Program strives to provide timely and accurate responses to inquiries received from media outlets.
- **Authored content**. The Program identifies opportunities to provide topic-specific columns and opinion pieces to highlight milestones or key messages.
- **BIPOC and small press**. Minority-owned and neighborhood-based media are included in the distribution of press materials. The Program team has provided translated versions of press releases.
- **Media distribution list**. The Program maintains a media list and distribution systems to ensure that materials are distributed to all relevant and interested news outlets. Neighborhood publications and transportation-related blogs are included on this list.
- **Community calendars**. Dates, times, and locations of community open houses and other public events are submitted to a wide variety of community calendar sections of publications (both inside and outside the Program corridor) to reach a broad regional audience.
- **Media tracking**. All print media stories are collected for reference, distributed via email to key Program team members on a daily basis, and archived.
- **Email messages**. The Program communications team keeps the media informed with monthly emails about the Program.

Comments, Responses, and Tracking

The public can provide the Program team with comments through a variety of methods, including email, the Program website, voicemail, and public meetings. Public and agency comments gathered over the course of the Program are shared with selected Program staff based on phase, issue, and area of responsibility. By attending outreach events, Program staff (including technical staff) also receive comments directly from members of the public.

Each written comment (form, letter, or email), outreach summary, record of telephone conversation with a member of the public, and transcript of testimony at a public hearing is logged into the public comment system so that it may be made available to decision-makers.

After receiving a comment, Program staff determine whether a question or comment requires a response. If a response is required, staff research the answer and respond within approximately one week; complex questions may take additional time to research and respond to. All comments and questions are then categorized by topic. Each comment can address numerous topics. At regular intervals, comments are summarized, along with information about recent outreach events and media coverage, and are distributed internally to help ensure awareness across Program disciplines.

Communications Coordination

The communications team periodically convenes communications staff from the partner agencies for Program progress updates, to introduce and review communications plans and messages, and track the distribution of Program materials. Meetings are typically held around major Program milestones or as needed.

Summary of Public Engagement Events

The IBR Program seeks to provide ongoing, accessible, and inclusive engagement opportunities using a variety of methods to meet people where they are. The Program also conducts additional outreach efforts to gather public feedback to inform Program work around key milestones. Below is a high-level summary of engagement efforts broken out by timeframe.

Public Involvement Efforts

From November 2020 to September 2023, Program staff engaged in over 400 public outreach meetings and events. Table B-1 at the end of this document presents a chronological list of these events. A summary of outreach efforts by timeframe is also included below. Additional public involvement events are currently planned for 2023 and 2024 prior to publication of the Draft SEIS.

Winter and Spring 2021 Public Engagement Efforts

In the first quarter of 2021, the IBR Program conducted intentional community engagement to gather specific public feedback regarding the transportation problems travelers experience with the current Interstate Bridge and to understand the community priorities and values that should shape the Program. This feedback helped the Program to confirm that the previously identified Purpose and Need and Vision and Values for replacing the Interstate Bridge remain valid and identified equity and climate change as key community priorities. A comprehensive Community Engagement Report was prepared that details the feedback received (IBR 2021a).

Engagement activities included the following:

- Launching Program website, social media accounts, and e-newsletter.
- Launching three Program advisory groups and began regularly scheduled public meetings (initial kick-off meetings for Executive Steering Group [ESG] held in November 2020).
- Holding four online public briefings in February 2021, including one conducted in Spanish, to introduce the community to the Program purpose, workplan, ways to get involved
- Holding an online open house and interactive survey from February 16 to 28, 2021 on the IBR website to provide the public with Program information and gather public input to help define priority issues and key

problems in the study area. Materials were translated into eight languages and printed for distribution through multilingual community liaisons.

- Reviewing completed community surveys from over 9,100 individuals with over 14,400 comments submitted.
- Hosting four listening sessions for youth and equity priority communities, including BIPOC, people experiencing houselessness, and people with disabilities in an effort to elevate historically excluded voices and address demographic gaps in survey responses.

Key takeaways included:

- Widespread agreement that the transportation problems previously identified by the CRC project still exist: congestion and travel reliability, safety, earthquake vulnerability, impaired freight movement, inadequate bicycle and pedestrian pathways, and limited public transportation.
- Desire for solutions that consider climate change, minimize impacts to neighboring communities, impacts to equity priority communities.
- Congestion and travel reliability were consistently ranked or expressed as the highest concerns, with safety and earthquake vulnerability both ranked second and mentioned frequently.
- Concerns about transportation safety, including earthquake vulnerability and interstate design.
- Support for an improved public transit connection between Portland and Vancouver.
- Concerns regarding tolling and potential impacts on equity priority communities and distribution of the cost burden.
- Value of a cost-effective Program with funding support that builds on previous work.
- Desire for low-barrier engagement options and the opportunity to have meaningful conversations with the Program.

Summer 2021 Public Engagement Efforts

Community engagement efforts from April through August 2021 were focused on gathering feedback and input to help inform the development of initial design elements and priorities to shape the process.

Engagement opportunities included the following:

- equity-focused communities, with Key Takeaways
- Spring 2021 community engagement demonstrated widespread agreement that the previously identified transportation problems still exist with congestion, seismic resiliency, and safety as top community concerns.
- Equity and climate change considerations were clearly identified as important community priorities.
- The community values low-barrier engagement options and the opportunity to have meaningful conversations with the Program.
- Listening session participants shared their desire to see more investment into the local economy, increased opportunities for equity priority communities to get involved, and continued transparent communication from the Program.
- Significant interest in discussing details of a solution, including the design process. Two video storytelling series launched, “Bridge Stories” and “The Case for IBR,” showcasing how community members use the Interstate Bridge and the benefits a replacement bridge will provide.

- IBR Program summer interns help launch the Program's TikTok account and bolster other digital content efforts to better engage with youth.
- Four community working groups (Active Transportation, Multimodal Commuter, Downtown Vancouver, and Hayden Island/Marine Drive) formed to act as Program focus groups with over 90 community participants involved.
- The EAG adopted a definition of equity specific to the IBR Program, inclusive of both process and outcome equity, and began development of the Equity Framework.
- Advisory groups provided input on the Program's Climate Framework and how climate change goals will be applied to various components of the Program.
- The CAG developed a summary of community values and priorities to inform Program work.
- Eleven CBOs in both Oregon and Washington were awarded small-scale, low-barrier grants to help reach equity priority communities in partnership with the IBR Program.
- Hosted six listening sessions for specific user groups (active transportation, multimodal commuter, freight movement), potential impact concerns (downtown Vancouver, Hayden Island/Marine Drive, and sustainability and climate change), and eight equity-focused communities:
  - Multimodal commuter listening session to gather feedback on issues that are important to automobile, transit, and bicycle commuters who use the Interstate Bridge.
  - Active transportation listening session for community members who bicycle, walk, roll, or use other forms of active transportation to move through the study area (or would like to do so in the future).
  - Downtown Vancouver listening session to gather insights from community members who live, work, play, or represent organizations within downtown Vancouver.
  - Listening session regarding sustainability and climate considerations to gather insights from community members regarding climate change concerns.
  - Listening sessions with people living with disabilities to gather insights from community members with disabilities, whose views have historically been excluded from large transportation programs and projects.
  - BIPOC listening sessions to gather insights BIPOC communities, whose views have historically been excluded from large transportation programs and projects.
  - A listening session with people and families experiencing houselessness and CBOs that work with people experiencing houselessness to gather insights from this community, whose views have historically been excluded from large transportation programs and projects.
  - Listening sessions with older adults, whose views have historically been excluded from large transportation programs and projects.
  - Multilingual listening sessions with individuals with LEP in their respective native languages to provide information and gather insights from those whose views have been historically excluded from large transportation projects and programs.

Key takeaways included:

- Feedback demonstrated widespread agreement that the previously identified transportation problems still exist with congestion, seismic resiliency, and safety as top community concerns.
- Equity and climate change considerations were clearly identified as important community priorities.

- The community values low-barrier engagement options and the opportunity to have meaningful conversations with the Program.
- Listening session participants shared their desire to see more investment into the local economy, increased opportunities for equity priority communities to get involved, and continued transparent communication from the Program.
- Significant interest in discussing details of a solution, including the design process.

Fall and Winter 2021Public Engagement Efforts

From September to December 2021, the IBR Program held a second period of intentional community engagement, including surveys, community briefings, listening sessions, advisory groups, community working groups to gather feedback and input on the design options and weigh in on the priorities that informed elements of the Modified LPA. In addition to public comments provided during briefings, listening sessions, and other events, more than 9,600 survey responses and 1,700 survey comments were received as a result of these efforts. A comprehensive Community Engagement Report for fall and winter of 2021 details feedback received (IBR 2021b).

Engagement opportunities included the following:

- An online open house with detailed information about previous planning efforts, preliminary design options, equity and climate frameworks, the environmental compliance process, and steps to identifying an IBR solution.
- Community input survey with 9,600 participants to gather feedback on preferences and priorities associated with the user experience and design options.
- Two youth press conferences hosted by the Program administrator.
- Four community working groups (Active Transportation, Multimodal Commuter, Downtown Vancouver, and Hayden Island/Marine Drive).
- Four community-specific listening sessions were held in November 2021 in partnership with 10 CBOs that have established deep connections within equity priority communities. CBO partners act as a trusted facilitator, encouraging participation and spreading awareness of listening sessions among their networks through email blasts, social media posts, texts, posters, phone calls, and authored newsletter articles. The purpose of these sessions was for Program staff to share information on design options with equity priority communities and solicit feedback in an affinity space. More than 300 community members participated in this series of listening sessions (see Table B-2), many of whom reported it as being their first time engaging with the Program.
- Four online community briefings were held to provide an update on the IBR Program's progress. Participants were provided with information on preliminary design options, draft equity and climate frameworks, steps to develop a recommended Modified LPA, and ways to stay informed and get involved along the way. Event participants had the opportunity to ask questions and engage with Program staff.

Key takeaways included:

- Design options and Program elements that improve travel times, relieve congestion, improve safety, and mitigate negative impacts to people and the environment are preferred.
- Equity priority communities rely on transit for a diverse range of needs.
- Trip time is the most influential factor when choosing what form of transportation to take. Ease of trip and avoiding a toll were the second and third most influential factors, respectively.

- While preferences for how to access Hayden Island and Marine Drive are heavily influenced by a respondent's geographic location, when asked to identify the priority for a Hayden Island Interchange design, nearly 70% of all survey respondents agreed that congestion relief on I-5 near Hayden Island is most important.
- Washington residents prefer direct access to Hayden Island from I-5, while Oregon residents prefer to access Hayden Island via Marine Drive and a new arterial bridge.
- The top three preferences for transit station locations are (1) the Vancouver waterfront, (2) near Clark College, and (3) the Expo Center.

2022 Public Engagement Efforts

Outreach efforts in 2022 focused on continued engagement to inform the development of the Modified LPA, communicate the elements being recommended by the Program, and seek regional consensus on the Modified LPA and next steps to further analyze it through the SEIS process. Following screening and evaluation of the design options and transit investments, the IBR Program developed recommendations for the key components of the Modified LPA, informed by technical and screening work along with Program partners and community feedback. Together, these key components form a comprehensive multimodal solution that addresses the Program's Purpose and Need, meets equity and climate change objectives, and supports regional and local priorities and desired outcomes. From September through December of 2022, the IBR Program shared updates on the NEPA compliance process and path toward publishing a Draft SEIS.

Highlight of 2022 community engagement efforts:

- Regional consensus to move the Modified LPA into the federal environmental review process in summer 2022. This included endorsement by the board, council or commission of all eight local partner agencies, unanimous consensus from the Program's ESG, and acknowledgment by the Bi-State Legislative Committee to move the Program forward into the next phase of work.
- The Program tabled at six in-person community events, including farmers' markets and festivals, and had direct conversations with nearly 500 people through this engagement effort.
- Direct outreach to over 200 neighborhood associations and CBOs resulted in discussions with a wide variety of community members about the Modified LPA, next steps in the environmental review process, and how to provide meaningful input once the Draft SEIS is released.
- Provided informational presentations to approximately 60 organizations, including local partner agency boards, councils, and commissions, neighborhood associations, and CBOs.
- Participated in over 20 speaking opportunities at the national, regional, and local level to engage various members of the public to share the Program's story, inform audiences of the Program's progress, and address any concerns.
- Hosted three equity roundtable discussions: "Black Communities and their Relationships with Infrastructure," "Why Equity Matters in Infrastructure," and "Accessibility through Infrastructure."
- Hosted 29 public steering and advisory group meetings, including the ESG, EAG, and CAG.
- Coordinated and hosted Program area tours for Program advisory group members

Key public comment themes during this effort included:

- Interest in elements of the Modified LPA and the river crossing design.
- Interest in information about upcoming opportunities for engagement.

- Comments on replacement bridge alternatives (tunnel, third bridge crossing, and retrofitting the current bridge).

2023 Engagement Efforts

The Program's outreach in 2023 was primarily focused on an extended effort to conduct both broad and mindful community engagement prior to the release of the Draft SEIS. The purpose of the engagement during this timeframe was to continue raising awareness about the Program and key milestones, inform community members of the Modified LPA and the elements that are being analyzed in the Draft SEIS, and prepare community members to effectively provide input during the public comment period.

Highlight of community engagement efforts from January to September 2023:

- Held 18 public steering and advisory group meetings.
- Provided Program updates and presentations to over 60 organizations.
- Held two in-person neighborhood forums.
- Hosted a DBE meet-and-greet event.
- Tabled at 17 community events, split between Oregon and Washington, approximately 50% of which were centered on equity priority communities. The Program was able to engage with more than 1,250 individuals at a diverse range of events.
- Participated in 16 regional and national conferences.
- Coordinated and conducted over 16 bridge or Program area tours.
- Completed a cultural resources open house.
- Conducted three equity roundtables: "Women Paving the Way," "The Intersection of Multimodal Transportation and Equity," and "Road to Prosperity: A Conversation About Workforce Diversity and Disadvantaged Business Enterprises."
- Launched office hours beginning in August 2023, offering the opportunity for community members to sign up for an appointment (in person or virtual) to speak directly to IBR Program team members to ask questions and share their feedback.
- Formed the Community Benefits Advisory Group (CBAG) in September to develop recommendations to leverage the Program's work to achieve the greatest positive benefit to the communities in the Program area and broader region, in alignment with the Program's equity framework and community priorities.
- Offered a second round of small-scale, low-barrier grants to CBOs serving equity priority communities to extend the outreach of the Program.

Technical Coordination with Partner Agencies

In developing the Modified LPA, the IBR Program worked with partner agency technical staff through focused technical working groups to develop, evaluate, refine, and identify design concepts and transit investments for consideration by community, steering, and advisory groups. These efforts with partner agencies are briefly described below and are discussed in greater detail in Appendix A, Agency and Tribal Engagement.

Partner Agency Working Groups and Technical Sessions

The IBR Program's design team worked with technical staff from local agency partners through focused working groups and technical sessions. These meetings served as a venue for developing a shared

understanding of local conditions, needs, and planned transportation improvements that could then be used to engage with interested parties in the community. The technical working groups identified design options for screening, contributed to desired outcomes, developed screening criteria, considered tradeoffs, and were engaged in the process of developing the Modified LPA.

The working groups and technical sessions included technical staff from the IBR Program and the following agencies:

- Oregon Department of Transportation (ODOT).
- Washington State Department of Transportation (WSDOT).
- Local transit agencies: Clark County Public Transportation Benefit Area (C-TRAN) and Tri-County Metropolitan Transportation District (TriMet).
- Regional metropolitan planning organizations Oregon Metro (Metro) and Southwest Washington Regional Transportation Council (RTC).
- Cities of Portland and Vancouver.
- Ports of Portland and Vancouver.

During development of the Modified LPA, the IBR Program convened several issue-specific working groups with members from the above local partner agencies. These included a Travel Demand Modeling Working Group, a Transit Options Technical Session, and a Climate Technical Working Group. The Agency Working Group and technical session activities are discussed further in Appendix A, Agency and Tribal Engagement.

Executive Steering Group

The ESG directly supports the IBR Program's progress. ODOT and WSDOT convened the 12-member group to provide regional leadership support and consensus on key Program issues of importance to the community. The ESG provides recommendations on planning, design, operational approach, and funding of the IBR Program.

The following members of the ESG include representatives from the 10 bi-state partner agencies with direct delivery or operational roles in the integrated, multimodal transportation system around the Interstate Bridge, as well as a community representative from each state. The two community representatives serve as co-chairs of the CAG.

- CAG Co-chair (Washington): Lynn Valenter
- CAG Co-chair (Oregon): Ed Washington
- ODOT: Kris Strickler, Director
- WSDOT: Roger Millar, Secretary
- TriMet: Sam Desue, Jr., General Manager
- C-TRAN: Shawn Donaghy, CEO
- Oregon Metro: Lynn Peterson, Council President
- RTC: Matt Ransom, Executive Director
- City of Portland: Mingus Mapps, Commissioner
- City of Vancouver: Anne McEnerny-Ogle, Mayor
- Port of Portland: Curtis Robinhold, Executive Director

- Port of Vancouver USA: Julianna Marler, CEO

Advisory Groups

The Program's advisory groups were created to ensure ongoing engagement with a broad range of community leaders/groups representing a variety of constituencies and priorities throughout the Program development and design process. The EAG and CAG are direct pathways to the community to help ensure that the IBR Program remains centered on equity and that the Program outcomes reflect community needs, issues, and concerns. The Program uses both advisory groups to provide community-informed insight to inform Program work. This includes soliciting input on outreach strategies and regularly providing updates on concerns voiced by the community.

Community Advisory Group

The CAG is composed of community members from both Oregon and Washington. The IBR Program shares information with CAG, which then discusses and provides input in a public forum to help ensure that Program outcomes reflect community needs, issues, and concerns. CAG members and the Program team engage in dialogue with a commitment to meaningful, two-way feedback. The CAG generally meets monthly. Two co-chairs, one representing each state, lead the group's diverse and inclusive membership. These co-chairs also sit on the ESG. For more information on the CAG, see the Program website.[3]

Co-Chairs as of September 2023:

- Lynn Valenter, Vice President of Finance, Reed College (former Vice Chancellor, Washington State University, Vancouver)
- Ed Washington, Director of Outreach and Community Engagement in Global Diversity and Inclusion, Portland State University

Members as of September 2023:

- Jay Clark, Director of Government Affairs, Portland Metro Chamber
- Bill Prows, Director of Business Development / Events, Oregon Association of Minority Entrepreneurs
- Darcy Hoffman, Workforce Southwest Washington
- Dena Horton, Governmental Relations Manager, Pacific Northwest Waterways Association
- Irina Phillips, Community member
- Jana Jarvis, President / CEO, Oregon Trucking Association
- Javier Navarro, Owner, State Farm Insurance; President, League of United Latin American Citizens (LULAC) Southwest Washington
- Jeffery Temple, Director of Corporate Affairs, Fred Meyer
- Julie Doumbia, Community member
- Dr. Karin Edwards, President, Clark College
- Marcus Mundy, Executive Director, Coalition of Communities of Color
- Mark Riker, Executive Secretary, Washington State Building and Construction Trades Council

[3] https://www.interstatebridge.org/advisory-groups/community-advisory-group/.

- Martha Wiley, Public transit representative, Washington
- Michael Kelly, Director of Transportation, Human Services Council
- Michelle Brewer, Vice President, Human Resources + Facilities, Zoominfo, Columbia River Economic Development Council
- Mikaela Williams, Community member
- Randali Desantos-Benromdhane, Community member
- Robert Camarillo, Oregon State Building and Construction Trades Council
- Robin Jay Richardson, Community member
- Ryan Webb, Project Manager, The Confederated Tribes of Grand Ronde
- Sam Kim, Community member
- Sheri Call, Executive Vice President, Washington Trucking Association
- TBD, Tribal Council Representative, Cowlitz Indian Tribe
- Tom Hickey, Bridgeton Neighborhood Association
- Victor Caesar, Public Transit Representative, Oregon
- Yolanda Frazier, President, NAACP – Vancouver
- Zachary Lauritzen, Oregon Walks

Equity Advisory Group

The EAG helps ensure that the IBR Program remains centered on equity. The EAG has been responsible for defining equity and equity priority communities and developing an equity framework to deliver on this commitment. The group refined equity-focused screening criteria and has made recommendations to IBR Program leadership regarding the components of the Modified LPA, evaluating options through an equity lens to advance the Program's equity objectives. They are currently in the process of developing equity key performance indicators for the IBR Program to track its advancement of equitable processes and outcomes. The EAG meets monthly. For more information on the EAG, see the Program website.[4] The members as of September 2023 are listed below:

- Aidan Gronauer, WSDOT
- Albert Lee, NAACP – Portland
- Alicia Sojourner, City of Vancouver
- Barbara Alexander, Port of Portland
- Bianca Kolle, Washington State Department of Services for the Blind
- Erika McCalpine, ODOT
- Hai That Ho Ton, Community member
- Jennifer Campos, RTC
- John Gardner, TriMet

[4] https://www.interstatebridge.org/advisory-groups/equity-advisory-group/

- Jonathan Eder, Port of Vancouver USA
- Karyn Kameroff, Community member
- Megan Marie Johnson, Community member
- Miriam Halliday, Workforce Southwest Washington
- Obie Ford III, Washington State University Vancouver
- Pat Daniels, Constructing Hope
- Sebrina Owens-Wilson, Metro
- Shane Valle, Portland Bureau of Transportation
- Shona Carter, Community member
- Sokho Eath – IRCO
- Vicki Nakashima, Community member

Community Benefits Advisory Group

The CBAG will develop recommendations for community benefit efforts to achieve the greatest positive benefit to the communities in the Program area and broader region from the Program's work, in alignment with the Program's equity framework and community priorities. For more information on the CBAG, see the Program Website.[5] The members as of September 2023 are listed below:

- Greg Johnson, IBR Program Administrator
- Commissioner Mapps, City of Portland
- Mayor McEnerny-Ogle, City of Vancouver
- Darcy Hoffman, Workforce SW Washington
- Kelly Haines, Worksystems, Inc.
- Victor Caesar, Vancouver Housing Authority
- Nate McCoy, National Association of Minority Contractors Oregon
- Marcus Mundy, Coalition for Communities of Color
- Nicole Davison Leon, Hispanic Metropolitan Chamber
- Javier Navarro, President, LULAC, Southwest Washington
- Scott McCallum, Superintendent, Washington School for the Blind
- Peter Fels, Alliance for Community Engagement
- Jessica Green, Portland Parks Foundation
- Holly Williams, Vancouver resident
- Michael Strahs, Kimco Realty
- Corky Collier, Columbia Corridor Association
- Jasmin Tolbert, YWCA Clark County

[5] https://www.interstatebridge.org/get-involved-folder/advisory-groups/community-benefits-advisory-group/

- Farleigh Winters, LSW Architects
- Rian Windsheimer, ODOT
- Carley Francis, Washington Department of Transportation
- Ben Jacobsen, Jane's Forum
- Ernesto Fonseca, Hacienda Community Development Corporation

Engagement with Freight Partners

Freight Movement Public Listening Session

On May 27, 2021, the IBR Program hosted a freight movement listening session with members of the public. There were 46 participants, including representatives of marine and highway freight interests, ports, industry associations, and the Oregon and Washington legislatures. This engagement provided information regarding the IBR Program and the opportunity to hear the freight community's concerns about the bridge. The key themes and takeaways included the following:

- Inability to use the Interstate Bridge due to height and weight limitations.
- Concerns regarding congestion negatively impacting freight operations around Marine Drive.
- Concerns regarding unreliability, narrow turns, safety, and bridge lifts.
- Desire for more freight capacity on and around the bridge.
- Challenges regarding travel path and turning radius.

Freight Leadership Meetings

In partnership with the Ports of Vancouver and Portland, the IBR Program hosted two freight engagement sessions in the fall and winter of 2021 with leaders of the regional freight community and IBR Program leadership. Attendees from the freight community included representatives from regional ports, industry associations, freight retail, and the Oregon and Washington legislatures. The key themes and takeaways included the following:

- Unimpaired freight movement is important to the local, regional, national, and international economies.
- Congestion through the I-5 corridor increases freight operational costs and negatively impacts the ability to attract and retain employees.
- Trucks avoid peak travel times if possible (6 a.m. to 9 a.m. and 3 p.m. to 9 p.m.).
- Suggestions for improvement include:
- Install truck-only lanes.
- Reduce the number of on/off-ramps.
- Remove current height restrictions and bridge lifts.
- It is desirable that road and pathway alignment be designed with consideration for optimal freight movement.
- High, wide, and heavy freight movement, including bridge and overpass heights, should be considered.
- Interest in learning about impacts to freight connectivity, including on/off-ramp locations and east/west access to Terminal 6 in North Portland.

- Interest in future engagement regarding the alignment and number of lanes through the study area.
- Concern that current exponential freight volume growth may increase congestion connected with Interstate 205.

Engagement with Affected Users of the River

For the Navigation Impact Report, the IBR Program conducted outreach with known Columbia River users who travel under the existing Interstate Bridge, fishery management groups, and others with an interest in mitigation discussions. Information on the vessels, such as navigation and dimensional features, was collected through an online survey, marina contacts, and individual vessel owners. In addition, the IBR Program sought information from other river users through the placement of notices and advertisements in the U.S. Coast Guard (USCG) Local Notice to Mariners, in local newspapers and specialty maritime publications, and on the Program website and social media accounts. Presentations were also conducted with industry associations, including the Pacific Northwest Waterways Association and the Lower Columbia River Harbor Safety Committee.

Users included commercial tugs, tows, and barges; marine contractors; federal/emergency/maintenance vessels; passenger cruise vessels; and recreational boats. Forty commercial, marine contractor, fabricator, shipyard owner, federal, and passenger cruise users were contacted, of which approximately half responded confirming the vessel data obtained from prior reports and/or providing updated vessel information. Information on recreational users was obtained from recreational marinas in the project vicinity, as well as through responses to the online river user survey. The online survey received 39 responses: 5 surveys were received for commercial vessels, 3 for cruise vessels, 7 for recreational motor vessels, 23 for sailboats, and 1 for a kayak.

The USCG reviewed and conducted further validation of the Navigation Impact Report by publishing USCG Navigation Only Public Notice (NOPN) 02-22, dated March 23, 2022, seeking comments exclusively related to navigation from maritime partners. The primary goal of the NOPN was to receive comments regarding current or future vertical navigation clearance requirements greater than 116 feet to inform the USCG's issuance of a Preliminary Navigation Clearance Determination. The comment period ended on April 25, 2022, and the USCG received 13 comments. Since the end of the comment period, both the USCG and the IBR Program have continued to coordinate with potentially affected river users.

On July 31, 2023, the IBR Program hosted a Navigation Simulation Workshop in Vancouver, Washington. River pilots and tug captains were invited to provide their thoughts and experiences navigating along the Columbia River. Attendees included pilots and captains from Shaver Transportation, Columbia River Pilots, Foss Maritime Company, Tidewater company, and Combined Forestry and Marine Services, as well as representatives from federal partners and regulatory agencies, such as the USCG and the U.S. Army Corps of Engineers. The workshop included discussions around current navigation conditions and use, such as impacts of the existing bridge on river navigation, and new considerations for navigation with the proposed Columbia River bridges. The feedback provided by the river captains and pilots contributed to the IBR Program's navigation simulation efforts, such as adjusting the simulation inputs including wind factors, visibility, vessel types and characteristics, and possible river system changes.

Incorporating Community Feedback

The IBR Program strives to offer ongoing opportunities to connect with the Program, proactively share updates and information on Program work, and intentionally hold more intensive engagement efforts to seek feedback on specific topics to inform key Program work. Highlighted below are examples of how community

engagement feedback has informed specific elements of Program work. Community feedback described in this appendix was used to:

- Identify themes related to transportation problems and community priorities and values.
  - The IBR Program conducted intentional community engagement to gather specific public feedback regarding the transportation problems travelers experience with the current Interstate Bridge and to understand the community priorities and values that should shape the Program. This feedback helped the Program to confirm that the previously identified Purpose and Need and Vision and Values for replacing the Interstate Bridge remain valid: congestion and travel reliability, safety, earthquake vulnerability, impaired freight movement, inadequate bicycle and pedestrian pathways, and limited public transportation. Community feedback also identified equity and climate change as key community priorities.
- Ensure current community priorities and changes since the previous planning efforts are reflected as Program decisions are made.
  - Planning work has built upon previous planning efforts accomplished as part of the CRC project. Early planning work defined the physical and contextual changes that have occurred in the Program area since 2013. To address these changes, the IBR Program, in coordination with Program partners and the community, developed design options, desired outcomes, and transit investments, to identify a Modified LPA to be further studied through a Draft SEIS in compliance with NEPA.
- Help inform the IBR Program's Modified LPA recommendation.
  - The Modified LPA recommendation is based on work completed since 2019, including climate and equity frameworks; screening results and modeling data; and input and feedback from partner agencies, Program advisory groups, and the broader community. The Modified LPA recommendation identified key components for further evaluation as part of the multimodal Program corridor investments: transit investments, interchange configuration for Hayden Island/Marine Drive, and the number of auxiliary lanes across the bridge. Community engagement efforts to gather feedback on design options to help inform the recommendation included an online survey with over 9,600 responses, 300+ listening session participants across multiple sessions, four community working groups, over two dozen public meetings and a community opinion survey. Details on the community feedback that informed the Modified LPA is available at: https://www.interstatebridge.org/media/0rjf5bda/ibr_lpa_memo_final.pdf.
  - Transit: Connect existing transit systems by extending light-rail from Portland to Vancouver to integrate the transit investments in the region, including C-TRAN's bus rapid transit network and express bus service. Priorities expressed in community feedback included a desire for transit options that improve connectivity across the river and to the regional transit system, ease of access for a variety of users, and transit travel time/reliability. Specific feedback included support for High Capacity Transit options, with many preferring light-rail or a combined light-rail/bus rapid transit option; interest in accessible and dependable transit options expressed by equity priority communities, including a desire for multiple transportation options that are efficient, reliable, and user-friendly; and preferences for transit stations located at (or near) Expo Center, Hayden Island, Vancouver Waterfront, Vancouver Library (Evergreen) and Clark College.
  - Hayden Island/Marine Drive Configuration: Partial interchange at Hayden Island and a full interchange at Marine Drive. A partial interchange on Hayden Island recognizes the desire to balance vehicle and freight access, with a preference expressed by the community to minimize the footprint over Hayden Island. Other community feedback taken into consideration is the need to accommodate active transportation safety and access; the desire to prioritize congestion relief on I-5 near Hayden Island,

  - safe intersections and road improvements, and convenient access to services, shopping, and restaurants; the preference expressed by Washington residents for direct access to Hayden Island; and the preference expressed by Oregon residents for island access via Marine Drive and a local access bridge.
  - Auxiliary lanes: Include one auxiliary lane northbound and one auxiliary lane southbound between Marine Drive and Mill Plain Boulevard. Community engagement feedback has consistently expressed support for the addition of auxiliary lanes, with both travel time and environmental impacts expressed as important considerations. Feedback received from advisory groups and surveys was mixed on the preference for the number of auxiliary lanes.
- Develop the equity and climate frameworks, as well as establishing community values that will be used along with the climate and equity lens.
  - As part of the IBR Program's commitment to centering equity, the EAG helped to develop a definition of equity specific to the Program, inclusive of both process and outcome equity. The EAG also informed the development of an equity framework—the lens through which the Program is grounded in historical context and includes a core set of values focused on diversity, equity, and inclusion.
  - The CAG informed the development of a summary of community values and priorities to help shape design options and guide decision-making. The values and priorities reflect feedback gathered from intentional community engagement efforts.
  - Both advisory groups provided input on the Program's climate framework and how climate change goals will be applied to various components of the Program.
- Inform community engagement efforts and help improve future outreach.
  - Community engagement feedback clearly identified the desire for low-barrier engagement options and the opportunity to have meaningful conversations with the Program.
  - Both the CAG and EAG have provided feedback on community engagement efforts, including suggestions on events to attend, groups to reach out to, and tools to consider. Regular updates and feedback from these groups will continue to help shape outreach efforts.

Public Involvement Efforts: November 2020 through July 2024

Table B-1 presents a chronological list of public involvement efforts from November 2020 through September 2023.

Table B-1. Public Involvement Events Conducted from November 2020 through September 2023

Date	Activity/Organization	Location	State	Number of Public Participants
11/6/2020	ESG Kick-Off Meeting Part 1	Virtual	Both	*
11/30/2020	ESG Kick-Off Meeting Part 2	Virtual	Both	*
12/15/2020	Bi-State Legislative Committee	Virtual	Both	*
1/20/2021	ESG	Virtual	Both	70
1/25/2021	EAG	Virtual	Both	32
1/27/2021	CAG	Virtual	Both	71

Date	Activity/Organization	Location	State	Number of Public Participants
2/10/2021	CAG	Virtual	Both	141
2/15/2021	EAG	Virtual	Both	11
2/16/2021 - 2/28/2021	Open House and Interactive Survey	Virtual	Both	9155 survey respondents
2/17/2021	ESG	Virtual	Both	116
2/18/2021	IBR Community Briefing	Virtual	Both	*
2/23/2021	IBR Community Briefing	Virtual	Both	*
2/24/2021	CAG	Virtual	Both	*
2/25/2021	IBR Community Briefing	Virtual	Both	*
2/25/2021	Oregon Transportation Commission	Salem	OR	*
2/25/2021	Portland Business Alliance	Portland	OR	*
3/2/2021	Professional Business Development Group	Portland	OR	*
3/3/2021	Woodlawn Neighborhood Association	Portland	OR	25
3/8/2021	EAG	Virtual	Both	64
3/8/2021	Oregon Transportation Forum	Portland	OR	*
3/10/2021	Getting There Together	Virtual	OR	*
3/10/2021	CAG	Virtual	OR	88
3/10/2021	Port of Portland Commission Meeting	Virtual	OR	*
3/10/2021	Lower Columbia River Harbor Safety Committee Meeting	Virtual	Both	*
3/11/2021	Hayden Island Resident and Business Community: 2021 Annual Membership Meeting	Virtual	OR	*
3/12/2021	Rogue Valley Area Commission on Transportation	Virtual	OR	*
3/15/2021	SE Uplift Neighborhood Coalition	Virtual	OR	*
3/17/2021	ESG	Virtual	Both	85
3/18/2021	WA House Transportation Committee work session	Virtual	WA	*
3/24/2021	CAG	Virtual	Both	*
3/29/201	EAG	Virtual	Both	*

Date	Activity/Organization	Location	State	Number of Public Participants
4/5/2021	ODOT Region 1/Area Commission on Transportation	Virtual	OR	*
4/13/2021	Cathedral Park Neighborhood Association	Virtual	OR	3
4/19/2021	EAG	Virtual	Both	61
4/21/2021	Bike Loud PDX	Virtual	OR	*
4/22/2021	Multimodal Commuter Listening Session	Virtual	Both	68
4/28/2021	Port of Vancouver	Virtual	WA	*
4/28/2021	CAG	Virtual	Both	72
4/29/2021	ESG	Virtual	Both	88
5/11/2021	Nonprofit Network of Southwest Washington	Virtual	WA	7
5/12/2021	Westside Economic Alliance	Virtual	OR	*
5/12/2021	Cascadia High Speed Rail Co.	Virtual	Both	*
5/17/2021	City of Vancouver Council Meeting	Virtual	WA	*
5/17/2021	EAG	Virtual	Both	58
5/18/2021	Listening Session: Hayden Island	Virtual	Both	37
5/19/2021	East Portland Chamber of Commerce	Virtual	OR	14
5/19/2021	Vernon Neighborhood Association	Virtual	OR	5
5/20/2021	Vancouver Business Journal	Virtual	WA	*
5/20/2021	ESG	Virtual	Both	108
5/21/2021	Bi-State Legislative Committee	Virtual	Both	*
5/24/2021	Southeast Portland Rotary Club	Virtual	OR	13
5/26/2021	Southwest Washington Contractors Association	Virtual	WA	*
5/27/2021	Listening Session: Freight Movement	Virtual	Both	46
5/27/2021	Camas-Washougal Rotary Club	Virtual	WA	33
6/1/2021	Downtown Vancouver Listening Session	Virtual	Both	29
6/2/2021	Society of American Military Engineers	Virtual	OR	25
6/2/2021	Sabin Neighborhood Association (Land Use and Transportation Committee)	Virtual	OR	*

Date	Activity/Organization	Location	State	Number of Public Participants
6/3/2021	CAG	Virtual	OR	50
6/7/2021	North Portland Neighborhood Services	Virtual	OR	*
6/8/2021	Listening Session: Active Transportation	Virtual	Both	16
6/9/2021	Kenton Neighborhood Association	Virtual	OR	*
6/17/2021	Listening Session: Sustainability and Climate	Virtual	-	21
6/21/2021	EAG	Virtual	Both	27
7/1/2021	CAG	Virtual	OR	64
7/15/2021	OPAL Environmental Justice Oregon	Virtual	OR	11
7/15/2021	ESG	Virtual	Both	116
7/19/2021	EAG	Virtual	Both	23
7/20/2021	Portland Pearl Rotary	Virtual	OR	25
8/4/2021	Vancouver Rotary Club	Virtual	WA	*
8/4/2021	Listening Session: People Living with a Disability	Virtual	Both	*
8/5/2021	CAG	Virtual	Both	65
8/9/2021	Listening Session: BIPOC Session 1	Virtual	Both	*
8/11/2021	Listening Session: BIPOC Session 2	Virtual	Both	*
8/16/2021	EAG	Virtual	Both	22
8/17/2021	Listening Session: Houseless Individuals and Families	Virtual	Both	*
8/19/2021	Listening Session: Older Adults	Virtual	Both	*
8/23/2021	Listening Session: Vietnamese Community	Virtual	Both	*
8/24/2021	Listening Session: Chinese Community	Virtual	Both	*
8/26/2021	Listening Session: Somali Community	Virtual	Both	*
8/30/2021	Community Working Group Orientation 1	Virtual	Both	*
8/30/2021	Listening Session: Russian/Ukrainian Community	Virtual	Both	*
9/1/2021	Community Working Group Orientation 2	Virtual	Both	*
9/2/2021	CAG	Virtual	Both	61

Date	Activity/Organization	Location	State	Number of Public Participants
9/15/2021	ESG	Virtual	Both	90
9/17/2021	Bi-State Legislative Committee	Virtual	Both	*
9/20/2021	EAG	Virtual	Both	21
9/23/2021	Active Transportation Working Group	Virtual	Both	19
9/25/2021	Vancouver NAACP	Virtual	WA	23
9/27/2021	Hayden Island/Marine Drive Working Group	Virtual	Both	22
9/28/2021	IBR Event and Tour with FTA	Vancouver	WA	*
9/29/2021	Downtown Vancouver Working Group	Virtual	Both	34
10/4/2021	ODOT Region 1 Area Commission on Transportation	Virtual	OR	*
10/6/2021	BTG National Small Business Leadership Summit	Virtual	OR	*
10/8/2021	Oregon Association of Minority Entrepreneurs	Virtual	OR	*
10/14/2021	Multimodal Commuter Working Group	Virtual	Both	28
10/18/2021	EAG	Virtual	Both	24
10/19/2021	Pacific Northwest Waterways Association	Virtual	Both	*
10/21/2021	ESG	Virtual	Both	105
10/27/2021	Bi-State Legislative Committee	Virtual	Both	*
11/4/2021	CAG	Virtual	Both	46
11/10/2021	IBR Community Briefing	Virtual	Both	*
11/11/2021	Listening Session: Multilingual	Virtual	Both	*
11/12/2021-01/02/2022	Interactive Survey	Virtual	Both	9,600 survey respondents
11/13/2021	IBR Community Briefing	Virtual	Both	*
11/15/2021	EAG	Virtual	Both	*
11/16/2021	Multimodal Commuter Working Group	Virtual	Both	21
11/16/2021	Vancouver Neighborhood Traffic Safety Alliance	Virtual	WA	12
11/17/2021	IBR Community Briefing	Virtual	Both	*

Date	Activity/Organization	Location	State	Number of Public Participants
11/17/2021	Listening Session: BIPOC	Virtual	Both	*
11/18/2021	Downtown Vancouver Working Group	Virtual	Both	28
11/18/2021	ESG	Virtual	Both	*
11/19/2021	Listening Session: People Living with Disabilities	Virtual	Both	*
11/22/2021	IBR Community Briefing	Virtual	Both	*
11/22/2021	Active Transportation Working Group	Virtual	Both	17
11/22/2021	Listening Session: Youth and People with Lower Income	Virtual	Both	*
11/23/2021	Bi-State Legislative Committee	Virtual	Both	*
12/2/2021	CAG	Virtual	Both	37
12/6/2021	Washington County Chamber of Commerce	Virtual	OR	*
12/6/2021	Bi-State Legislative Committee	Virtual	Both	*
12/7/2021	Hayden Island/Marine Drive Working Group	Virtual	Both	15
12/16/2021	ESG	Virtual	Both	*
1/4/2022	RTC	Virtual	WA	*
1/6/2022	CAG	Virtual	Both	74
1/6/2022	Metro Council	Virtual	OR	*
1/10/2022	EAG	Virtual	Both	11
1/12/2022	Oregon Transportation Commission	Virtual	OR	*
1/13/2022	Hayden Island Neighborhood Network (Hi-NooN)	Virtual	OR	4
1/13/2022	Oregon Legislature Joint Committee on Transportation	Virtual	OR	*
1/13/2022	City of Camas	Virtual	WA	*
1/19/2022	Washington State Transportation Commission	Virtual	WA	*
1/20/2022	Oregon Transportation Commission	Virtual	OR	*
1/20/2022	ESG	Virtual	Both	16
1/24/2022	Bi-State Legislative Committee	Virtual	Both	*

Date	Activity/Organization	Location	State	Number of Public Participants
2/3/2022	Portland Freight Committee	Virtual	OR	*
2/8/2022	Seattle Chamber of Commerce	Virtual	WA	*
2/11/2022	Vancouver Sunrise Rotary	Virtual	WA	30
2/16/2022	Portland Metropolitan Association of Realtors	Virtual	OR	*
2/21/2022	EAG	Virtual	Both	13
2/22/2022	Columbia River Economic Development Council I-5 Task Force	Virtual	WA	15
2/24/2022	CAG	Virtual	Both	46
2/25/2022	Equity Roundtable: Black Communities and their Relationships with Infrastructure	Virtual	Both	100
3/2/2022	Washington Highway Users Federation	Virtual	WA	*
3/4/2022	Associated General Contractors/ODOT Conference	Virtual	OR	*
3/8/2022	Metro Council Work Session – Climate	Virtual	OR	*
3/10/2022	CAG	Virtual	Both	*
3/10/2022	Oregon Transportation Commission	Virtual	OR	*
3/14/2022	EAG	Virtual	Both	22
3/15/2022	Greater Portland Inc. Economic Development Professionals	Virtual	OR	*
3/16/2022	Oregon Business and Industry	Virtual	OR	*
3/16/2022	Rotary Club of Longview	Longview	WA	*
3/17/2022	WA State Freight Mobility Strategic Investment Board	Vancouver	WA	*
3/17/2022	ESG	Virtual	Both	*
3/22/2022	NW Carpenters	Virtual	WA	*
3/23/2022	Bi-State Legislative Committee	Virtual	Both	*
3/24/2022	CAG	Virtual	Both	*
4/4/2022	EAG	Virtual	Both	27
4/6/2022	International Right of Way Association	Portland	OR	*
4/7/2022	ESG	Virtual	Both	13

Date	Activity/Organization	Location	State	Number of Public Participants
4/7/2022	Shumway Neighborhood Association	Vancouver	WA	*
4/12/2022	Peninsula Drainage District 2	Portland	OR	*
4/13/2022	IBR Event and Bridge Tour with Sen. Maria Cantwell	Vancouver	WA	*
4/14/2022	Community Advisory Group	Virtual	Both	76
4/14/2022	Arnada Neighborhood Association	Vancouver	WA	12
4/14/2022	Hayden Island Neighborhood Network	Portland	OR	15
4/18/2022	Equity Advisory Group	Virtual	Both	*
4/19/2022	Bridgeton Neighborhood Association	Portland	OR	30
4/19/2022	Neighborhood Briefing at Latte Da Coffee House	Vancouver	WA	30
4/20/2022	Washington State University Vancouver	Vancouver	WA	*
4/21/2022	ESG	Virtual	Both	*
4/21/2022	Bi-State Legislative Committee	Virtual	Both	*
4/27/2022	Lincoln Neighborhood Association	Vancouver	WA	12
4/28/2022	Military Officer's Association of America - Columbia River Chapter	Vancouver	WA	35
4/28/2022	CAG	Virtual	Both	*
5/3/2022	RTC Board of Directors	Vancouver	WA	*
5/4/2022	Oregon State University/American Society of Civil Engineers	Portland	OR	*
5/5/2022	ESG	Virtual	Both	12
5/5/2022	Esther Short Neighborhood Association	Vancouver	WA	30
5/6/2022	Bi-State Legislative Committee	Virtual	Both	*
5/10/2022	City of Portland Council Work Session	Portland	OR	*
5/10/2022	TriMet Transit Equity Advisory Committee	Portland	OR	*
5/12/2022	Metro Council	Portland	OR	*
5/12/2022	CAG	Virtual	Both	54
5/12/2022	Oregon Transportation Commission	Virtual	OR	*

Date	Activity/Organization	Location	State	Number of Public Participants
5/16/2022	EAG	Virtual	Both	*
5/16/2022	Vancouver City Council	Vancouver	WA	*
5/16/2022	WA State Transportation Commission	Vancouver	WA	*
5/17/2022	Vancouver Neighborhood Traffic Safety Alliance	Vancouver	WA	35
5/17/2022	ACEC-ODOT Partner Conference	Portland	OR	*
5/17/2022	City of Portland Bicycle and Pedestrian Advisory Committee Joint Meeting	Portland	OR	*
5/17/2022	Associated General Contractors – WA	Vancouver	WA	56
5/17/2022	Washington County Board Work Session	Hillsboro	OR	*
5/18/2022	C4 Metro Committee Clackamas County	Oregon City	OR	*
5/18/2022	Professional Business Development Group	Portland	OR	*
5/19/2022	Metro Joint Policy Advisory Committee on Transportation	Portland	OR	*
5/19/2022	WorkSystems Inc.	Portland	OR	*
5/20/2022	SW WA RTC Regional Transportation Advisory Committee	Virtual	WA	*
5/20/2022	Bi-State Legislative Committee	Virtual	Both	*
5/23/2022	City of Portland Landmarks Commission	Portland	OR	*
5/24/2022	Metro Council	Portland	OR	*
5/24/2022	City of Portland Planning and Sustainability Commission	Portland	OR	*
5/24/2022	Oregon Transportation Forum	Portland	OR	*
5/25/2022	TriMet Board of Directors	Portland	OR	*
5/31/2022	Washington County Chamber of Commerce	Hillsboro	OR	*
6/1/2022	Multnomah County Technical Advisory Committee	Portland	OR	*
6/2/2022	City of Portland Design Commission	Portland	OR	*
6/2/2022	City of Portland Freight Advisory Committee	Portland	OR	*
6/3/2022	Metro Transportation Policy Alternatives Committee	Portland	OR	*

Date	Activity/Organization	Location	State	Number of Public Participants
6/3/2022	Washington County Coordinating Committee Transportation Advisory Committee	Portland	OR	*
6/6/2022	City of Vancouver Council Workshop	Vancouver	WA	12
6/6/2022	ODOT Region 1 Area Commission on Transportation	Portland	OR	*
6/7/2022	RTC Board of Directors	Vancouver	WA	30
6/8/2022	Kenton Neighborhood Association	Portland	OR	*
6/8/2022	Port of Portland Board of Commissioners	Portland	OR	*
6/9/2022	TriMet Committee on Accessible Transportation	Portland	OR	*
6/9/2022	ACEC-ODOT Partner Conference	Portland	OR	*
6/13/2022	Washington County Coordinating Committee	Portland	OR	*
6/13/2022	East Multnomah County Transportation Committee	Portland	OR	*
6/14/2022	C-TRAN Board of Directors	Vancouver	WA	*
6/14/2022	Oregon Legislature Joint Committee on Transportation	Salem	OR	*
6/14/2022	Port of Vancouver	Vancouver	WA	*
6/15/2022	ESG	Virtual	Both	*
6/16/2022	Metro Joint Policy Advisory Committee on Transportation	Portland	OR	*
6/16/2022	Metro Council Work Session	Portland	OR	*
6/15/2022	ESG	Virtual	Both	12
6/17/2022	Bi-State Legislative Committee	Virtual	Both	*
6/22/2022	TriMet Board of Directors	Portland	OR	*
6/25-6/26/2022	Tabling: Good in the Hood	Portland	OR	65
6/28/2022	American Society of Civil Engineers Oregon Chapter	Portland	OR	46
6/29/2022	Lincoln Neighborhood Association	Vancouver	WA	12

Date	Activity/Organization	Location	State	Number of Public Participants
7/5/2022	City of Portland Parks and Land Use Group	Portland	OR	*
7/5/2022	RTC Board of Directors	Vancouver	WA	*
7/7/2022	Portland Freight Committee	Portland	OR	*
7/9/2023	Vancouver Pride: Saturday in the Park	Vancouver	WA	180
7/11/2022	Vancouver City Council	Vancouver	WA	*
7/12/2022	C-TRAN Board of Directors	Vancouver	WA	*
7/12/2022	Columbia River Economic Development Council I-5 Task Force	Vancouver	WA	12
7/12/2022	Port of Vancouver Board of Commissioners	Vancouver	WA	*
7/13/2022	Port of Portland Board of Commissioners	Portland	OR	10
7/13/2022	Portland City Council	Portland	OR	*
7/14/2022	RTC Board of Directors	Vancouver	WA	*
7/14/2022	CAG	Virtual	Both	24
7/14/2022	Metro	Portland	OR	*
7/14/2022	Oregon Transportation Commission	Online	OR	*
7/18/2022	EAG	Virtual	Both	21
7/21/2022	ESG	Virtual	Both	39
7/21/2022	Bi-State Legislative Committee	Virtual	Both	*
7/26/2022	Rose Village Neighborhood Association	Vancouver	WA	5
7/28/2022	Leadership Clark County	Vancouver	WA	14
7/29/2022	Oregon Association of Minority Entrepreneurs	Portland	OR	*
7/29/2022	Oregon Metropolitan Planning Organization Consortium	Portland	OR	*
8/13/2022	Tabling: Vancouver Farmers' Market	Vancouver	WA	154
8/17/2022	Oregon Trucking Association Convention	Portland	OR	*
8/21/2022	Tabling: King Farmers' Market	Portland	OR	41
9/6/2022	Local Planning Area Group Meeting: Partners In Careers, Washington State Department of Social and Health Services, WorkSource, and Clark College	Vancouver	WA	12

Date	Activity/Organization	Location	State	Number of Public Participants
9/7/2022	Tabling: Kenton Farmers' Market	Vancouver	WA	36
9/8/2022	CAG	Virtual	Both	*
9/14/2022	Swan Island Business Association	Portland	OR	*
9/14/2022	Old Evergreen Highway Neighborhood Association	Vancouver	WA	30
9/14/2022	Oregon Transportation Commission	Salem	OR	*
9/14/2022	Washington State Transportation Commission	Battle Ground	WA	*
9/15/2022	ESG	Virtual	Both	*
9/16/2022	Columbia Corridor Association	Portland	OR	10
9/19/2022	EAG	Virtual	Both	*
9/21/2022	WSDOT 2022 Regional Contracting Forum	Auburn	WA	*
9/23/2022	Oregon Legislature Joint Committee on Transportation	Salem	OR	*
9/28/2022	Equity Roundtable: Why Equity Matters in Infrastructure	Virtual	Both	21
9/29/2022	Freight Leadership Meeting	Portland	OR	*
9/29/2022	Washington Legislative Staff Academy	Olympia	WA	*
10/4/2022	National Active and Retired Federal Employee Association	Vancouver	WA	8
10/8/2022	League of Women Voters – Clark County	Vancouver	WA	50
10/12/2022	Oregon Freight Advisory Committee	Portland	OR	*
10/13/2022	Pacific Northwest Waterways Association Annual Convention	Vancouver	WA	150
10/13/2022	Arnada Neighborhood Association	Vancouver	WA	21
10/17/2022	EAG	Virtual	Both	20
10/19/2022	AgForestry Leadership Program	Vancouver	WA	15
10/25/2022	Bridgeton Neighborhood Association	Portland	OR	45
10/29/2022	NAACP – Vancouver	Vancouver	WA	15
10/31/2022	Bi-State Legislative Committee	Virtual	Both	*
11/10/2022	CAG	Virtual	Both	36

Date	Activity/Organization	Location	State	Number of Public Participants
11/14/2022	St. Johns Neighborhood Association	Portland	OR	22
11/14/2022	Boise Neighborhood Association	Portland	OR	*
11/17/2022	Oregon Transportation Commission	Salem	OR	*
11/18/2022	ACEC-ODOT Liaison Meeting	Portland	OR	6
11/21/2022	EAG	Virtual	Both	20
12/1/2022	Washington Legislature House Transportation Committee	Olympia	WA	*
12/1/2022	Equity Roundtable: Accessibility through Infrastructure	Virtual	Both	14
12/5/2022	Hayden Island Neighborhood Network (Hi-NooN)	Portland	OR	200
12/6/2022	Vancouver Transportation and Mobility Commission	Vancouver	WA	14
12/12/2022	Bi-State Legislative Committee	Virtual	Both	*
12/13/2022	Oregon Transportation Forum	Portland	OR	*
12/15/2022	American Society of Civil Engineers	Portland	OR	*
12/16/2022	ESG	Virtual	Both	50
1/5/2023	AGC –WA	Vancouver	WA	40
1/5/2023	Oregon Business & Industry	Portland	OR	150
1/11/2023	ODOT Legislative Luncheon	Salem	OR	*
1/11/2023	Lower Columbia Region Harbor Safety Committee	Virtual	OR	45
1/12/2023	Oregon Transportation Commission	Virtual	OR	*
1/12/2023	Community Advisory Group	Online	Both	33
1/18/2023	Washington State Transportation Commission	Virtual	WA	*
1/19/2023	First Place Neighborhood Association	Virtual	WA	30
1/23/2023	Equity Advisory Group	Online	Both	24
2/2/2023	Vancouver iTech Preparatory	Vancouver	WA	25
2/9/2023	CAG	Online	Both	30

Date	Activity/Organization	Location	State	Number of Public Participants
2/15/2023	FHWA Winter Conference (Western Federal Lands Highway Division)	Vancouver	WA	150
2/15/2023	Westside Economic Alliance	Wilsonville	OR	*
2/16/2023	West Columbia Gorge Rotary	Virtual	OR	8
2/16/2023	Greater Portland Inc.	Vancouver	WA	100
2/22/2023	Columbia River Economic Development Council	Vancouver	WA	20
3/2/2023	Salem Chamber of Commerce	Salem	OR	*
3/6/2023	North Portland Neighborhood Services	Virtual	OR	13
3/8/2023	Identity Clark County	Vancouver	WA	*
3/9/2023	CAG	Online	Both	28
3/16/2023	Just Crossing Alliance	Portland	OR	*
3/20/2023	Equity Advisory Group	Online	Both	18
3/21/2023	ESG	Online	Both	15
3/22/2023	City of Portland Council	Portland	OR	*
3/23/2023	Equity Roundtable: Women Paving the Way	Online	Both	18
3/29/2023	Oregon AFL-CIO	Portland	OR	*
3/31/2023	League of Oregon Cities-Transportation Policy Committee	Virtual	OR	*
4/5/2023	Oregon Trucking Associations	Salem	OR	*
4/6/2023	Oregon Association of Nurseries	Virtual	OR	*
4/10/2023	Association of Oregon Counties	Virtual	OR	*
4/12/2023	AGC – OR	Portland	OR	*
4/13/2023	Oregon Legislature Joint Committee on Transportation	Salem	OR	*
4/13/2023	CAG	Virtual	Both	25
4/16/2023–5/17/2023	Cultural Resources Open House	Virtual	Both	*
4/17/2023	EAG	Virtual	Both	21
4/18/2023	Vancouver Neighborhood Traffic Safety Alliance	Vancouver	WA	*

Date	Activity/Organization	Location	State	Number of Public Participants
4/20/2023	Oregon Legislature Joint Committee on Transportation	Salem	OR	*
4/27/2023	24th Annual East European Youth Leadership Conference	Clackamas	OR	*
4/27/2023	Oregon Trucking Association	Portland	OR	*
4/28/2023	American Planning Association Conference (Oregon Chapter)	Virtual	OR	*
5/3/2023	Oregon Environmental Council	Portland	OR	10
5/11/2023	CAG	Virtual	Both	25
5/15/2023	EAG	Virtual	Both	20
5/18/2023	Professional Engineers of Oregon	Eagle Crest	OR	150
5/23/2023	ODOT/ACEC Partnering Conference	Salem	OR	150
5/25/2023	ESG	Virtual	Both	20
5/31/2023	IBR Neighborhood Forum	Vancouver	WA	67
6/1/2023	ODOT Surveyors Conference	Virtual	OR	80
6/1/2023	The Columbian Economic Forecast Breakfast	Vancouver	WA	300
6/1/2023	Heritage Study Group	Portland	OR	20
6/3/2023	Tabling: Latino Community Resource Group's Multicultural Resources Fair	Vancouver	WA	104
6/6/2023	IBR Neighborhood Forum	Portland	OR	43
6/7/2023	SAME	Portland	OR	150
6/8/2023	CAG	Virtual	Both	25
6/13/2023	Equity Roundtable: The Intersection of Multimodal Transportation and Equity	Virtual	Both	9
6/14/2023	IBR DBE Meet and Greet	Vancouver	WA	65
6/17/2023–6/18 /2023	Tabling: Juneteenth Festival	Portland	OR	113
6/24–6/25	Tabling: Good in the Hood	Portland	OR	32
6/25/2023	Tabling: Sunday Parkways	Portland	OR	33
6/26/2023	Port of Vancouver Tenant Breakfast	Vancouver	WA	20

Date	Activity/Organization	Location	State	Number of Public Participants
6/26/2023	EAG	Virtual	Both	25
7/8–7/11	Transportation Research Board Transportation Asset Management Conference	Boston	MA	150
7/8/2023	Tabling: Vancouver Pride	Vancouver	WA	144
7/12/2023	East Columbia Neighborhood Association	Portland	OR	19
7/12/2023	Lower Columbia River Harbor Safety Committee	Astoria	OR/WA	45
7/13/2023	NW Industrial Business Association	Portland	OR	15
7/13/2023	OTC	Pendleton	OR	25
7/13/2023	CAG	Virtual	Both	25
7/18/2023	WSTC	Olympia	WA	25
7/18/2023	Downtown Vancouver Stakeholders Forum	Virtual	WA	27
7/22/2023	Tabling: Vancouver Farmers' Market	Vancouver	WA	74
7/23/2023	Tabling: Sunday Concert Series	Vancouver	WA	84
7/24/2023	Washington County Transportation Task Force	Virtual	OR	25
7/28/2023	Bi-State Legislative Committee	Virtual	Both	*
7/28/2023	Tabling: Rae Gordon	Portland	OR	45
7/30/2023	Tabling: We Outside	Portland	OR	9
7/31/2023	IBR Workshop with Maritime Users	Vancouver	WA	*
8/1/2023	Tabling: Eastside Community Picnic, Fircrest Neighborhood Association	Vancouver	WA	67
8/1/2023	Vancouver Transportation and Mobility Commission	Vancouver	WA	20
8/2/2023	Tabling: Kenton Farmers' Market	Portland	OR	37
8/2/2023	IBR Office Hours	Vancouver, Hybrid	WA	*
8/3/2023	Esther Short Neighborhood Association	Vancouver	WA	26
8/7/2023	North Portland Neighborhood Association Chairs Meeting	Portland, Hybrid	OR	26

Date	Activity/Organization	Location	State	Number of Public Participants
8/8/2023	Bridgeton Neighborhood Association	Virtual	OR	11
8/9/2023	East Columbia Neighborhood Association	Portland	OR	5
8/9/2023	Kenton Neighborhood Association	Portland, Hybrid	OR	27
8/10/2023	CAG	Virtual	Both	25
8/10/2023	Hayden Island Neighborhood Network	Portland	OR	25
8/10/2023	Tabling: Vancouver Waterfront Concert Series	Vancouver	WA	95
8/12/2023	Tabling: Bridgeton Neighborhood Association Annual Summer Picnic	Portland	OR	30
8/13/2023	Tabling: Sunday Concert Series	Vancouver	WA	12
8/13/2023	Tabling: Providence Bridge Pedal	Portland	OR	71
8/14/2023	Washington State Transit Association	Vancouver	WA	25
8/14-8/16	Tabling: Oregon Trucking Association Annual Convention	Bend	OR	26
8/15/2023	Institute of Transportation Engineers	Portland	OR	150
8/16/2023	Old Evergreen Highway Neighborhood Association	Vancouver	WA	37
8/21/2023	EAG	Virtual	Both	20
8/26/2023	IBR Office Hours	Virtual	Both	*
9/6/2023	East Portland Chamber of Commerce	Portland	OR	27
9/6/2023	Western Bridge Engineers Seminar	Phoenix	AZ	150
9/7/2023	Shumway Neighborhood Association	Virtual	WA	16
9/8/2023	Oregon Association Minority Entrepreneurs	Portland	OR	53
9/9/2023	Tabling: Vancouver Peace & Justice Fair	Vancouver	WA	120
9/11/2023	IBR Office Hours	Vancouver, Hybrid	WA	*
9/13/2023	Hazel Dell / Salmon Creek Business Association	Vancouver	WA	26
9/13/2023	Kenton Neighborhood Association	Portland, Hybrid	OR	16
9/14/2023	WA Transportation Commission Program Area and Bridge Tour	Vancouver, Portland	WA, OR	20

Date	Activity/Organization	Location	State	Number of Public Participants
9/14/2023	Arnada Neighborhood Association	Vancouver	WA	19
9/16/2023	Tabling: MLK Dream Run	Portland	OR	11
9/19/2023	Vancouver Neighborhood Traffic Safety Alliance	Vancouver	WA	35
9/25/2023	Tabling: Vancouver Community Forum	Vancouver	WA	22
9/26/2023	Oregon State Building and Construction Trades Convention	Klamath Falls	OR	150
9/26/2023	Clark Communities Bicycle and Pedestrian Committee	Virtual	WA	17
9/27/2023	Community Benefits Advisory Committee	Vancouver, Hybrid	WA	*
9/28/2023	WA Legislature Joint Transportation Committee Briefing and Tour	Vancouver	WA	35
9/28/2023	Oregon State Board of Examiners for Engineering & Land Surveying	Virtual	OR	863
9/28/2023	Annual Oregon Construction Law Seminar	Portland	OR	150
9/30/2023	IBR Office Hours	Virtual	Both	*
10/2/2023	ODOT Region 1 ACT	Virtual	OR	50
10/3/2023	Vancouver Transportation & Mobility Commission	Vancouver	WA	22
10/4/2023	AGC	Portland	OR	150
10/5/2023	CoP Freight Advisory Committee	Portland	OR	*
10/5/2023	Office Hours	Virtual	OR, WA	0
10/5/2023	Equity Roundtable: Road to Prosperity	Virtual	OR, WA	*
10/10/2023	IBR Office Hours	Virtual	OR, WA	0
10/11/2023	East Columbia NA	Portland	OR	20
10/12/2023	Pacific NW Waterways Association	Vancouver	WA	125
10/12/2023	CAG	Virtual	OR, WA	*
10/12/2023	HiNooN	Portland	OR	27
10/16/2023	COMTO	Virtual	OR, WA	*
10/16/2023	EAG	Virtual	OR, WA	*

Date	Activity/Organization	Location	State	Number of Public Participants
10/17/2023	Bridgeton NA	Portland	OR	39
10/18/2023	ESG	Virtual	OR, WA	*
10/19/2023	IBR Office Hours	Virtual	OR, WA	*
10/19/2023	CoP Historic Landmarks and Design Committee	Portland	OR	*
10/21/2023	Tabling: Vancouver Farmer's Market	Vancouver	WA	59
10/26/2023	CBAG	Vancouver, Hybrid	WA	*
10/28/2023	IBR Office Hours	Virtual	OR, WA	0
11/2/2023	IBR Office Hours	Virtual	OR, WA	1
11/2/2023	PSU Traffic & Transportation Class	Portland	OR	*
11/2/2023	Shumway NA	Virtual	WA	21
11/3/2023	Bi State Legislative Committee	Virtual	OR, WA	*
11/6/2023	IBR Office Hours	Virtual	OR, WA	*
11/6/2023	North Portland Neighborhood Chairs	Portland, Hybrid	OR	*
11/8/2023	AgForestry Leadership	Vancouver, Hybrid	WA	25
11/8/2023	DBE Meet & Greet	Portland, Hybrid	OR	55
11/9/2023	CAG	Virtual	OR, WA	*
11/9/2023	Arnada NA	Vancouver	WA	31
11/14/2023	CoP Bike Advisory Committee	Portland	OR	*
11/16/2024	CBAG	Vancouver, Hybrid	WA	*
11/16/2023	Metropolitan Mayor's Consortium	Portland	OR	*
11/16/2023	Office Hours	Virtual	OR, WA	3
11/16/2023	C-TRAN's Citizen Advisory Committee	Vancouver	WA	*
11/18/2023	IBR Office Hours	Virtual	OR, WA	1
11/20/2023	EAG	Virtual	Both	*
11/21/2023	Urban Design Panel	Virtual	OR	60
11/27/2023	Tabling: Vancouver City Council Forum	Vancouver	WA	42

Date	Activity/Organization	Location	State	Number of Public Participants
11/28/2023	Bi State Legislative Committee	Virtual	OR, WA	*
12/4/2023	ODOT Region 1 ACT	Portland	OR	*
12/6/2023	Washington Public Ports Association Annual Meeting	Vancouver	WA	*
12/6/2023	IBR Office Hours	Virtual	OR, WA	3
12/7/2023	IBR Virtual Public Briefing	Virtual	OR, WA	*
12/11/2023	IBR Office Hours	Virtual	OR, WA	4
12/13/2023	CBO Listening Session - Multilingual	Virtual	OR, WA	43
12/14/2023	CBAG	Vancouver, Hybrid	OR, WA	*
12/14/2023	CAG	Virtual	OR, WA	*
12/15/2023	Bi State Legislative Committee	Virtual	OR, WA	*
12/18/2023	EAG	Virtual	OR, WA	*
12/21/2023	IBR Office Hours	Virtual	OR, WA	0
1/3/2024	Yakama Tribal Council	Vancouver	WA	*
1/4/2024	East Portland Rotary	Portland	OR	45
1/9/2024	CBO Listening Session - People Living with Disabilities	Virtual	OR, WA	45
1/10/2024	CBO Listening Session - BIPOC & Economic Opportunities (PIC)	Vancouver	WA	21
1/10/2024	CBO Listening Session - BIPOC & Economic Opportunities (SDBA)	Portland	OR	12
1/11/2024	CAG	Virtual	OR, WA	*
1/11/2024	CBO Listening Session - Youth	Virtual	OR, WA	46
1/16/2024	Vancouver NTSA	Virtual	WA	*
1/18/2024	City Center Redevelopment Authority	Vancouver	WA	12
1/18/2024	IBR Office Hours	Virtual	OR, WA	2
1/22/2024	IBR Office Hours	Vancouver	WA	2
1/23/2024	Small Business Roundtable Event	Virtual	OR, WA	*
1/23/2024	Clark College Executive Cabinet	Vancouver	WA	*

Date	Activity/Organization	Location	State	Number of Public Participants
1/23/2024	Apex/CREDC	Vancouver, Hybrid	WA	56
1/24/2024	WSDOT DBE Training & Construction Open House	Vancouver	WA	50
1/25/2023	AGC Tour	Vancouver	WA	*
1/25/2024	CBAG	Vancouver, Hybrid	WA	*
1/27/2024	Office Hours	Virtual	OR, WA	*
1/29/2024	Office Hours	Vancouver	WA	0
1/30/2024	Vancouver Innovation, Technology, and Art (VITA) School	Vancouver	WA	46
2/6/2024	IBR Office Hours	Vancouver	WA	0
2/7/2024	Equity Roundtable	Virtual	OR, WA	103
2/8/2024	COMTO	Virtual	OR, WA	*
2/8/2024	CAG	Virtual	OR, WA	*
2/9/2024	AGC/ODOT Annual Meeting	Portland	OR	*
2/10/2024	Office Hours	Vancouver	WA	*
2/15/2024	Youth Press Tour	Portland, Vancouver	OR, WA	*
2/15/2024	IBR Office Hours	Vancouver	WA	0
2/20/2024	Youth Press Conference	Virtual	Both	*
2/20/2024	IBR Office Hours	Vancouver	WA	1
2/21/2024	TriMet Committee on Accessible Transportation	Virtual	OR, WA	33
2/21/2024	SCCNW Community Forum	Portland	OR	40
2/22/2024	CBAG	Vancouver, Hybrid	WA	*
2/22/2024	Freight Forum	Virtual	OR, WA	*
2/22/2024	Odyssey Community Forum	Vancouver	WA	27
2/23/2024	Bi-State Tolling Subcommittee	Virtual	OR, WA	*
2/26/2024	EAG	Virtual	OR, WA	*

Date	Activity/Organization	Location	State	Number of Public Participants
2/27/2024	Odyssey Listening Session	Vancouver	WA	23
2/28/2024	SWR Design Construction Conference	Virtual	OR, WA	*
2/28/2024	SCCNW Listening Session	Portland	OR	13
2/29/2024	SWCA Executive Summit	Vancouver	WA	39
3/1/2024	Young Contractor Forum - Lunch with Contractors	Vancouver	WA	*
3/5/2024	ESG	Virtual	OR, WA	*
3/5/2024	RTC	Vancouver	WA	*
3/6/2024	NW Transportation Conference	Corvallis	OR	*
3/7/2024	Vancouver Execs Meeting	Vancouver	WA	*
3/8/2034	IBR Office Hours	Virtual	OR, WA	0
3/12/2024	Multilingual Press Conference	Virtual	OR, WA	*
3/12/2024	IBR Office Hours	Virtual	OR, WA	0
3/14/2024	CAG	Virtual	OR, WA	*
3/15/2024	Bi-State Tolling Subcommittee	Virtual	OR, WA	*
3/18/2024	Office Hours	Virtual	OR, WA	0
3/18/2024	EAG	Virtual	OR, WA	*
3/20/2024	TriMet Committee on Accessible Transportation (TBD)	Virtual	OR, WA	12
3/20/2024	CoV Parks & Rec Advisory Commission	Vancouver	WA	19
3/23/2024	IBR Office Hours	Virtual	OR, WA	0
3/28/2024	CBAG	Vancouver, Hybrid	WA	*
4/2/2024	IBR Office Hours	Virtual	OR, WA	0
4/10/2024	PoV Spring Tenant Event	Vancouver	WA	28
4/12/2024	IBR Office Hours	Virtual	OR, WA	5
4/15/2024	EAG	Virtual	OR, WA	*
4/18/2024	HINOON	Portland	OR	30
4/19/2024	Bi-State Tolling Subcommittee	Virtual	OR, WA	*

Date	Activity/Organization	Location	State	Number of Public Participants
4/20/2024	IBR Office Hours	Virtual	OR, WA	0
4/23/2024	Rose Village NA	Vancouver	WA	22
4/25/2024	CBAG	Vancouver, Hybrid	OR, WA	*
4/25/2024	IBR Office Hours	Virtual	OR, WA	5
4/25/2024	Bridgeton NA	Portland	OR	53
4/25/2024	Vancouver Heights NA	Vancouver	WA	16
5/2/2024	IBR Office Hours	Virtual	OR, WA	0
5/3/2024	Vancouver iTech Prep	Vancouver	WA	250
5/9/2024	CAG	Virtual	OR, WA	*
5/10/2024	IBR Office Hours	Virtual	OR, WA	5
5/15/2024	Washington State Transportation Commission	Vancouver	WA	*
5/16/2024	Arbor Lodge NA	Portland, Hybrid	WA	*
5/18/2024	IBR Office Hours	Virtual	OR, WA	*
5/20/2024	EAG	Virtual	OR, WA	*
5/21/2024	ACEC/ODOT Partnering Conference	Salem	OR	*
5/21/2024	Equity Roundtable	Salem	OR	*
5/22/2024	IBR Office Hours	Virtual	OR, WA	*
5/23/2024	CBAG	Vancouver, Hybrid	OR, WA	*
5/23/2024	Bi-State Tolling Subcommittee	Vancouver	WA	*
6/1/2024	Tabling: LCRG Multicultural Resource Fair	Vancouver	WA	52
6/4/2024	Office Hours	Virtual	OR+WA	4
6/5/2024	Office Hours	Virtual	OR+WA	*
6/10/2024	Bi-State Legislative Committee	Virtual	OR+WA	*
6/13/2024	Westside Economic Alliance	Virtual	OR	*
6/13/2024	CAG	Virtual	OR+WA	*
6/13/2024	SMPS-Oregon Market Mixer	Portland	OR	*

Date	Activity/Organization	Location	State	Number of Public Participants
6/14/2024	Office Hours	Virtual	OR+WA	3
6/15/2024	Tabling: Juneteenth (Vancouver)	Vancouver	WA	108
6/16/2024	Tabling: Portland Sunday Parkways - NE Cully	Portland	OR	63
6/16/2024	ASCE ICTD 2024 Conference	Atlanta	GA	*
6/17/2024	Business Leaders Regional Transportation Summit (Presenting & Tabling)	Portland	OR	*
6/17/2024	EAG	Virtual	OR+WA	*
6/20/2024	AWC Tour	Vancouver	WA	*
6/21/2024	Bi-State Tolling Subcommittee	Virtual	OR+WA	*
6/22/2024	Office Hours	Virtual	OR+WA	0
6/25/2024	Esther Short NA	Vancouver	WA	42
6/27/2024	CBAG	Virtual	OR+WA	*
7/2/2024	Office Hours	Virtual	OR+WA	*
7/10/2024	IBR Walking Tour	Vancouver	WA	*
7/10/2024	Association of Women & Minority Businesses (WA)	Virtual	WA	*
7/12/2024	Tabling: Picante	Portland	OR	*
7/13/2024	Tabling: Saturday in the Park (Vancouver USA Pride)	Vancouver	WA	109
7/13/2024	Tabling: Mississippi Street Fair	Portland	OR+WA	*
7/15/2024	EAG	Virtual	OR+WA	*
7/17/2024	CoV Urban Forestry Commission	Vancouver	WA	*
7/18/2024	CoV Downtown Redevelopment Authority	Vancouver	WA	*
7/18/2024	Hough NA	Vancouver	WA	*
7/19/2024	Bi-State Tolling Subcommittee	Virtual	OR+WA	*
7/19/2024	Office Hours	Virtual	OR+WA	*
7/22/2024	Office Hours	Virtual	OR+WA	*
7/23/2024	CoV Planning Commission	Vancouver	WA	*

Date	Activity/Organization	Location	State	Number of Public Participants
7/23/2024	Cycle Vancouver	Vancouver	WA	*
7/24/2024	Office Hours	Virtual	OR+WA	*
7/25/2024	CBAG	Virtual	OR+WA	*
7/28/2024	Tabling: Vancouver Farmers Market	Vancouver	WA	*

* Attendance was not officially documented.
ACEC = American Council of Engineering Companies; AFL-CIO = American Federation of Labor and Congress of Industrial Organizations; AGC = Associated General Contractors; BIPOC = Black, Indigenous, and People of Color; BTG = Business Transformation Group; C4 = Clackamas County Coordinating Committee; CBAG = Community Benefits Advisory Group; CBO = Community Benefits Organization; COMTO = Conference of Minority Transportation Officials; CREDC = Columbia River Economic Development Council C-TRAN = Clark County Public Transit Benefit Area; CAG = Community Advisory Group; EAG = Equity Advisory Group; ESG = Executive Steering Committee; FHWA = Federal Highway Administration; I-5 = Interstate 5; Metro = Oregon Metro; NAACP = National Association for the Advancement of Colored People; NW = northwest; ODOT = Oregon Department of Transportation; OPAL = Organizing People Activating Leaders; OR = Oregon; Oregon Association Minority Entrepreneurs = OAME; OTC = Oregon Transportation Commission; PDX = Portland; RTC = Southwest Washington Regional Transportation Council; SAME = Society of American Miliary Engineers; SCCNW = Slavic Community Center of Northwest; SWCA = Southwest Washington Contractors Association; SWR = Southwest Region; TriMet = Tri-County Metropolitan Transportation District of Oregon; WA = Washington; WSDOT = Washington State Department of Transportation; WSTC = Washington State Transportation Commission

Appendix C

CONCEPTUAL DESIGN DRAWINGS

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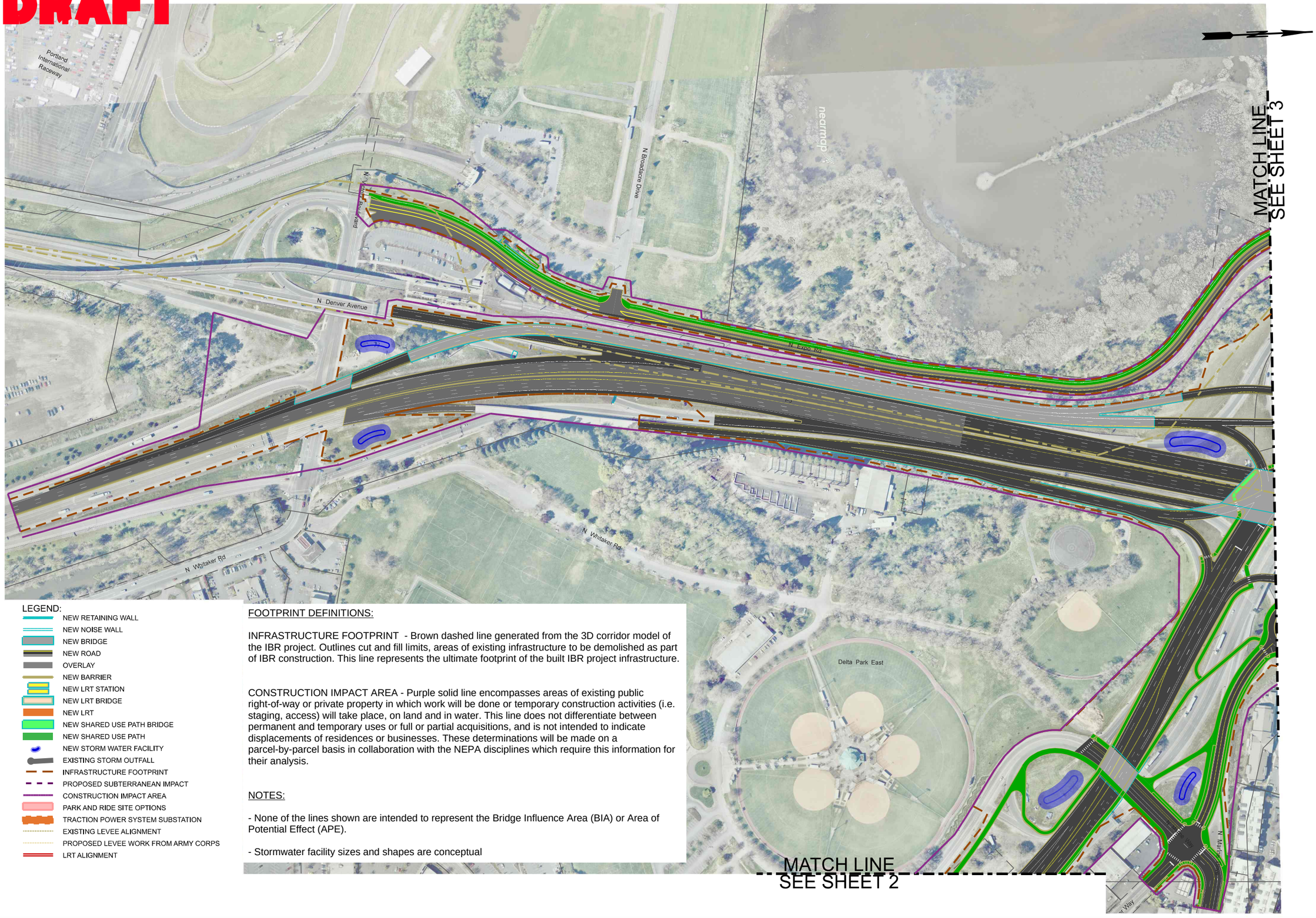

LEGEND:

- NEW RETAINING WALL
- NEW NOISE WALL
- NEW BRIDGE
- NEW ROAD
- OVERLAY
- NEW BARRIER
- NEW LRT STATION
- NEW LRT BRIDGE
- NEW LRT
- NEW SHARED USE PATH BRIDGE
- NEW SHARED USE PATH
- NEW STORM WATER FACILITY
- EXISTING STORM OUTFALL
- INFRASTRUCTURE FOOTPRINT
- PROPOSED SUBTERRANEAN IMPACT
- CONSTRUCTION IMPACT AREA
- PARK AND RIDE SITE OPTIONS
- TRACTION POWER SYSTEM SUBSTATION
- EXISTING LEVEE ALIGNMENT
- PROPOSED LEVEE WORK FROM ARMY CORPS
- LRT ALIGNMENT

FOOTPRINT DEFINITIONS:

INFRASTRUCTURE FOOTPRINT - Brown dashed line generated from the 3D corridor model of the IBR project. Outlines cut and fill limits, areas of existing infrastructure to be demolished as part of IBR construction. This line represents the ultimate footprint of the built IBR project infrastructure.

CONSTRUCTION IMPACT AREA - Purple solid line encompasses areas of existing public right-of-way or private property in which work will be done or temporary construction activities (i.e. staging, access) will take place, on land and in water. This line does not differentiate between permanent and temporary uses or full or partial acquisitions, and is not intended to indicate displacements of residences or businesses. These determinations will be made on a parcel-by-parcel basis in collaboration with the NEPA disciplines which require this information for their analysis.

NOTES:

- None of the lines shown are intended to represent the Bridge Influence Area (BIA) or Area of Potential Effect (APE).

- Stormwater facility sizes and shapes are conceptual

Interstate BRIDGE Replacement Program

INTERSTATE BRIDGE REPLACEMENT PROGRAM
1 AUX, DOUBLE DECK BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 1 OF 8

SCALE IN FEET
0 100 200 300 400 500

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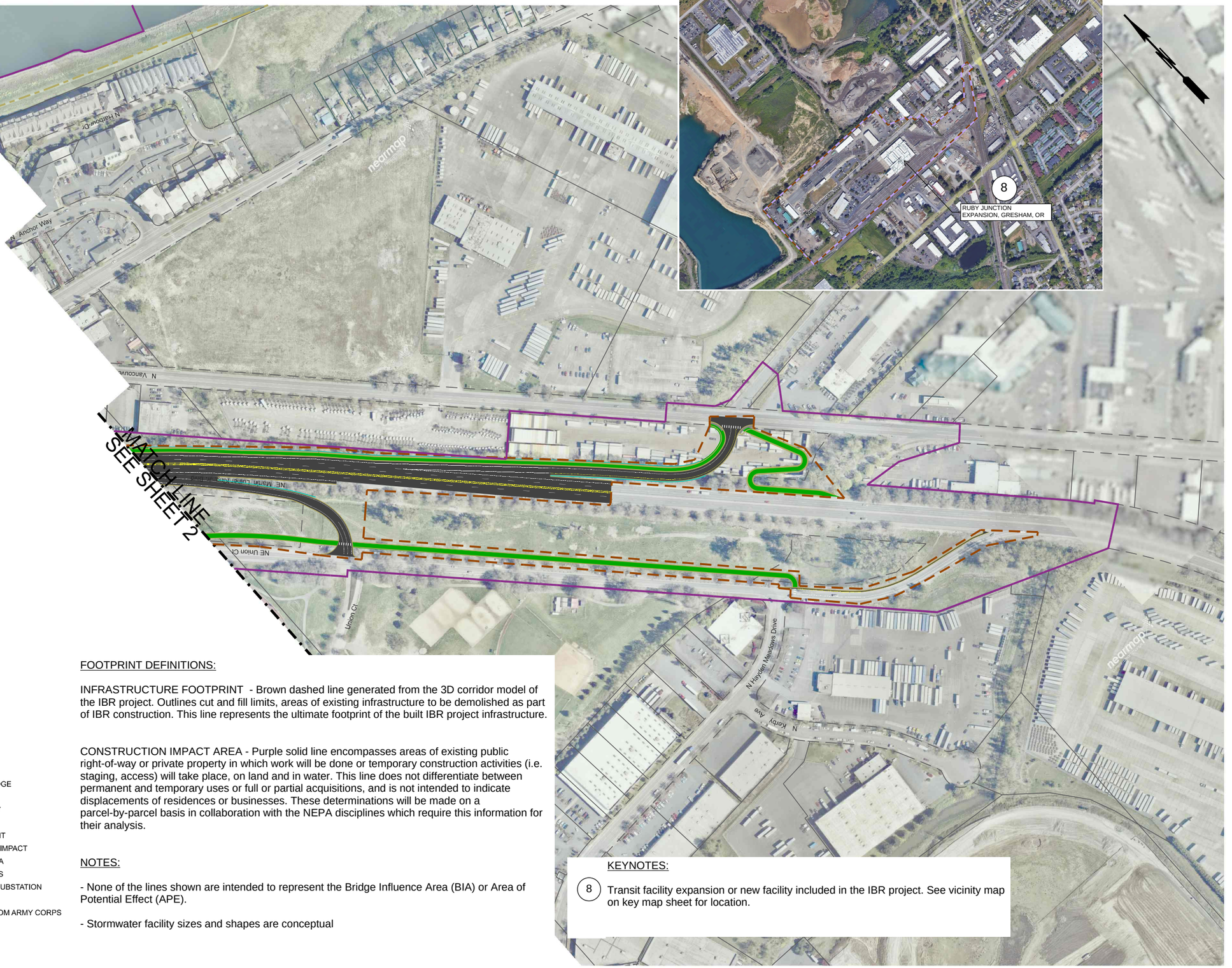

LEGEND:

- NEW RETAINING WALL
- NEW NOISE WALL
- NEW BRIDGE
- NEW ROAD
- OVERLAY
- NEW BARRIER
- NEW LRT STATION
- NEW LRT BRIDGE
- NEW LRT
- NEW SHARED USE PATH BRIDGE
- NEW SHARED USE PATH
- NEW STORM WATER FACILITY
- EXISTING STORM OUTFALL
- INFRASTRUCTURE FOOTPRINT
- PROPOSED SUBTERRANEAN IMPACT
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NOTES:

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- Stormwater facility sizes and shapes are conceptual

KEYNOTES:

(8) Transit facility expansion or new facility included in the IBR project. See vicinity map on key map sheet for location.

Interstate BRIDGE Replacement Program

SCALE IN FEET: 0 100 200 300 400 500

INTERSTATE BRIDGE REPLACEMENT PROGRAM
1 AUX, DOUBLE DECK BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 2 OF 8

DRAFT

Project footprint encopasses all of expo center parcel

8

TRIMET LRV OVERNIGHT FACILITY SITE, NO ANTICIPATED IMPACT TO EXPO CENTER BUILDINGS

11

Project footprint extends 2000' from existing river crossing

FOOTPRINT DEFINITIONS:

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- Stormwater facility sizes and shapes are conceptual

6

11

6

LEGEND:

- NEW RETAINING WALL
- NEW NOISE WALL
- NEW BRIDGE
- NEW ROAD
- OVERLAY
- NEW BARRIER
- NEW LRT STATION
- NEW LRT BRIDGE
- NEW LRT
- NEW SHARED USE PATH BRIDGE
- NEW SHARED USE PATH
- NEW STORM WATER FACILITY
- EXISTING STORM OUTFALL
- INFRASTRUCTURE FOOTPRINT
- PROPOSED SUBTERRANEAN IMPACT
- CONSTRUCTION IMPACT AREA
- PARK AND RIDE SITE OPTIONS
- TRACTION POWER SYSTEM SUBSTATION
- EXISTING LEVEE ALIGNMENT
- PROPOSED LEVEE WORK FROM ARMY CORPS
- LRT ALIGNMENT

KEYNOTES:

6 Potential enhancements to traffic and pedestrian access.

8 Transit facility expansion or new facility included in the IBR project.

11 TPSS Building Location

Project footprint extends 2000' from existing river crossing

MATCH LINE SEE SHEET 2

MATCH LINE SEE SHEET 4

Expo Center

Marine Drive

North Portland Harbor

N Hayden Island Drive

N Jantzen Beach Center

N Jantzen Beach Ave

Interstate BRIDGE Replacement Program

0 100 200 300 400 500 SCALE IN FEET

INTERSTATE BRIDGE REPLACEMENT PROGRAM
1 AUX, DOUBLE DECK BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 3 OF 8

DRAFT

FOOTPRINT DEFINITIONS:

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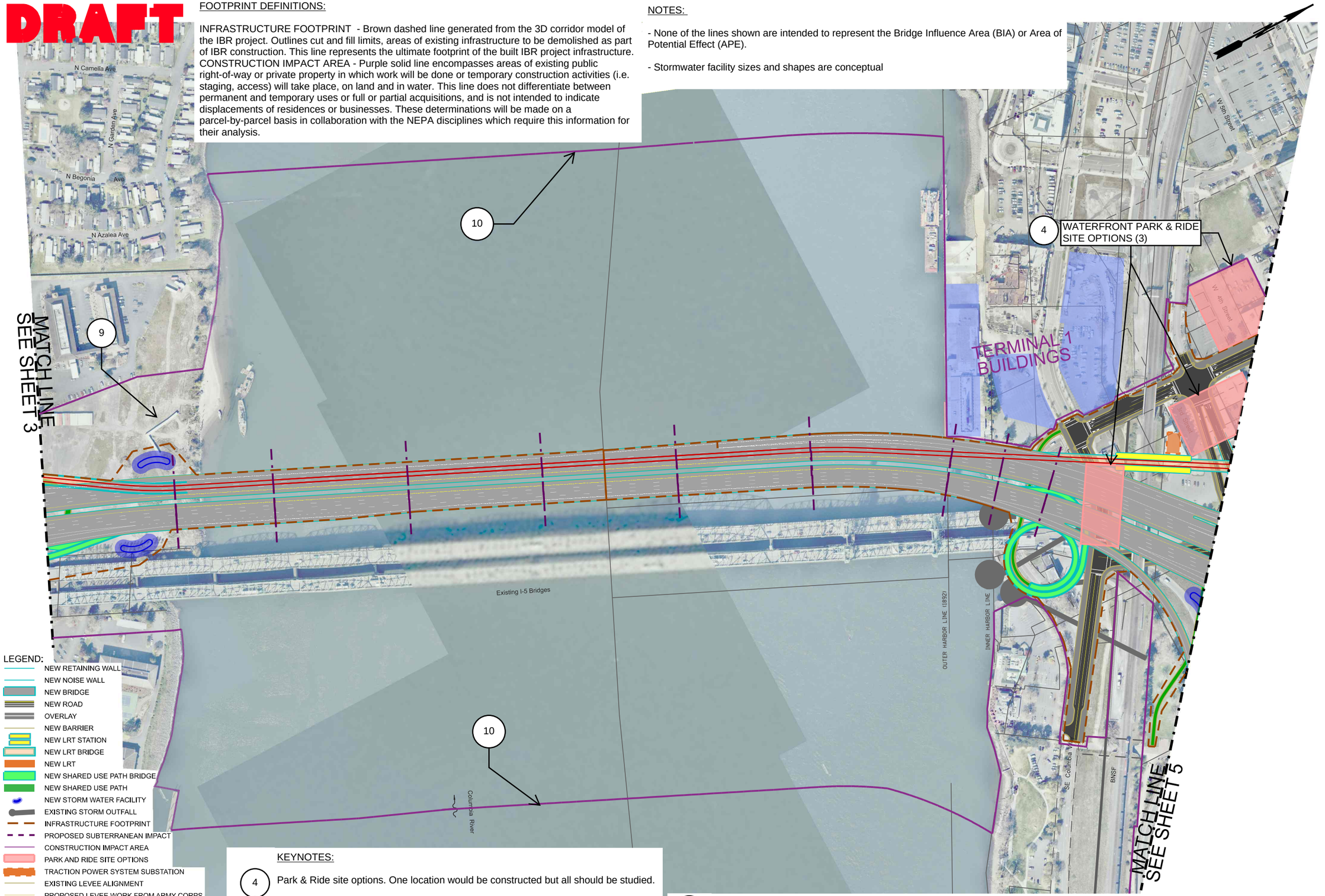
- Stormwater facility sizes and shapes are conceptual



LEGEND:
- NEW RETAINING WALL
- NEW NOISE WALL
- NEW BRIDGE
- NEW ROAD
- OVERLAY
- NEW BARRIER
- NEW LRT STATION
- NEW LRT BRIDGE
- NEW LRT
- NEW SHARED USE PATH BRIDGE
- NEW SHARED USE PATH
- NEW STORM WATER FACILITY
- EXISTING STORM OUTFALL
- INFRASTRUCTURE FOOTPRINT
- PROPOSED SUBTERRANEAN IMPACT
- CONSTRUCTION IMPACT AREA
- PARK AND RIDE SITE OPTIONS
- TRACTION POWER SYSTEM SUBSTATION
- EXISTING LEVEE ALIGNMENT
- PROPOSED LEVEE WORK FROM ARMY CORPS
- LRT ALIGNMENT

KEYNOTES:

(4) Park & Ride site options. One location would be constructed but all should be studied.

(9) Potential staging area. Not all potential staging areas are identified.

(10) In-water staging/work areas.
~1000' upstream of existing Interstate Bridge and ~1000' downstream of new Interstate Bridge.
~2000' upstream and downstream of new North Portland Harbor Bridges.

Interstate BRIDGE Replacement Program

SCALE IN FEET 0 100 200 300 400 500

INTERSTATE BRIDGE REPLACEMENT PROGRAM
1 AUX, DOUBLE DECK BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 4 OF 8

DRAFT

FOOTPRINT DEFINITIONS:

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NOTES:

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- Stormwater facility sizes and shapes are conceptual

LEGEND:

- NEW RETAINING WALL
- NEW NOISE WALL
- NEW BRIDGE
- NEW ROAD
- OVERLAY
- NEW BARRIER
- NEW LRT STATION
- NEW LRT BRIDGE
- NEW LRT
- NEW SHARED USE PATH BRIDGE
- NEW SHARED USE PATH
- NEW STORM WATER FACILITY
- EXISTING STORM OUTFALL
- INFRASTRUCTURE FOOTPRINT
- PROPOSED SUBTERRANEAN IMPACT
- CONSTRUCTION IMPACT AREA
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- TRACTION POWER SYSTEM SUBSTATION
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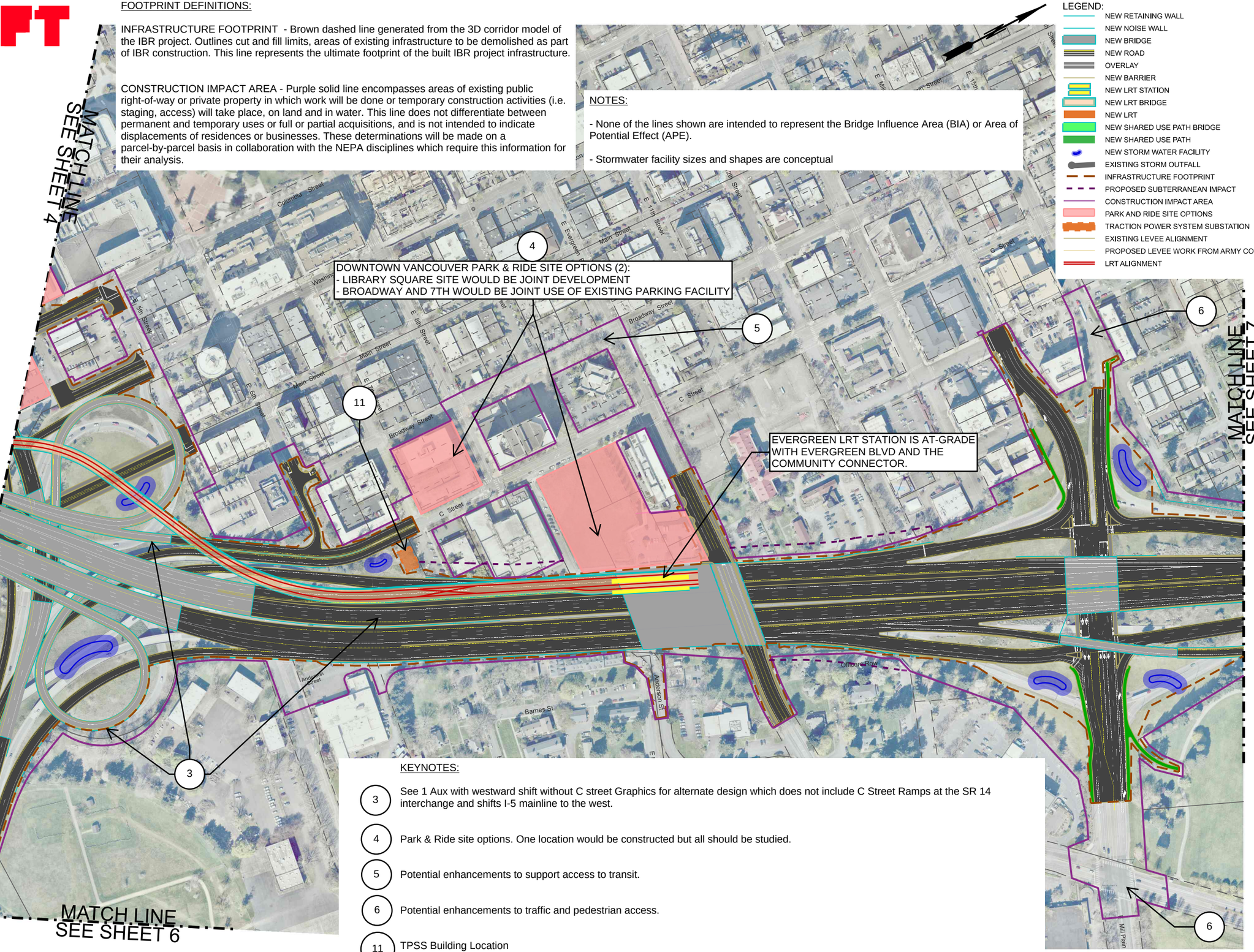
- PROPOSED LEVEE WORK FROM ARMY CORPS
- LRT ALIGNMENT



KEYNOTES:

3 See 1 Aux with westward shift without C street Graphics for alternate design which does not include C Street Ramps at the SR 14 interchange and shifts I-5 mainline to the west.

4 Park & Ride site options. One location would be constructed but all should be studied.

5 Potential enhancements to support access to transit.

6 Potential enhancements to traffic and pedestrian access.

11 TPSS Building Location

Interstate BRIDGE Replacement Program

SCALE IN FEET 0 100 200 300 400 500

INTERSTATE BRIDGE REPLACEMENT PROGRAM
1 AUX, DOUBLE DECK BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 5 OF 8

DRAFT

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NOTES:

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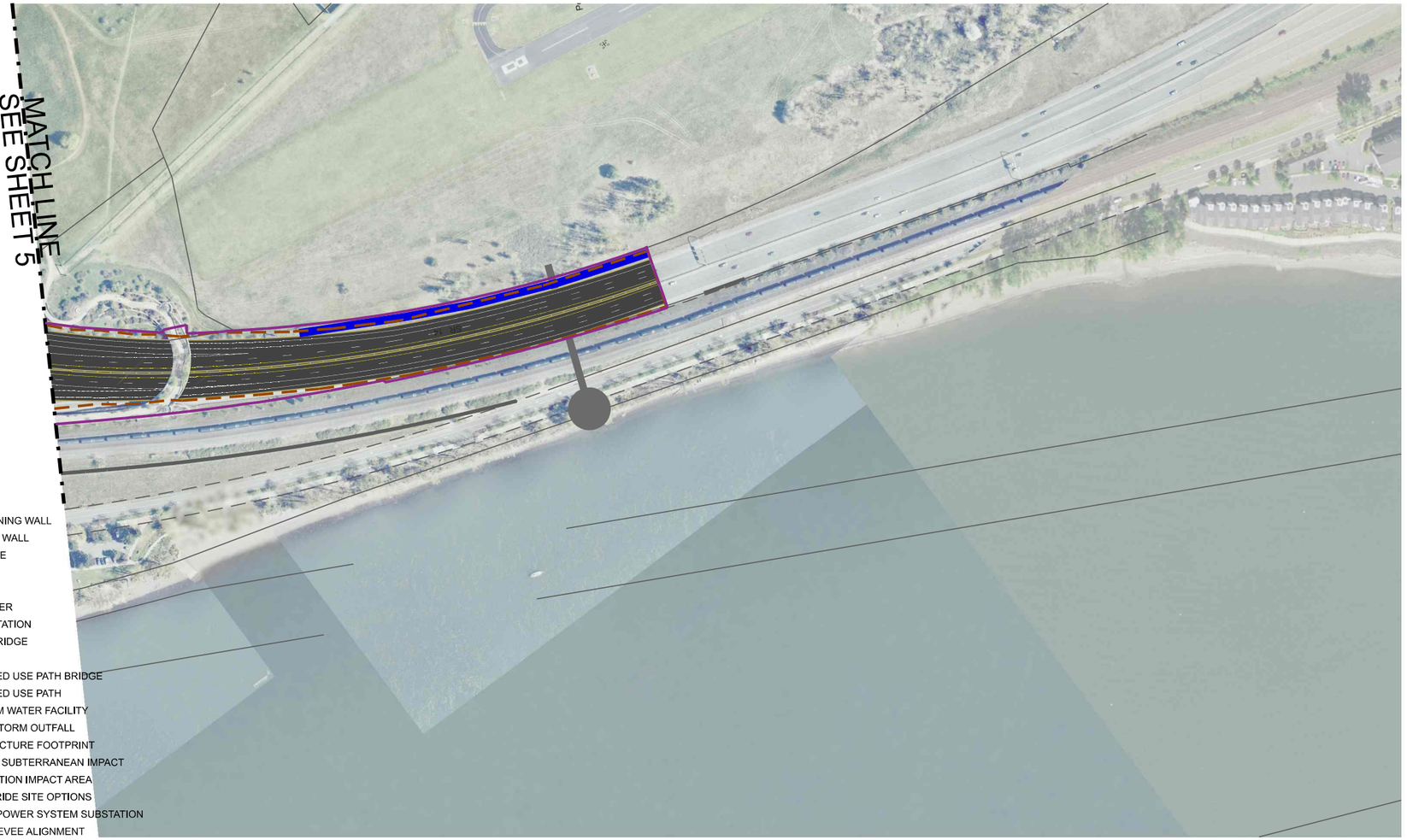

Interstate BRIDGE Replacement Program

0 100 200 300 400 500 SCALE IN FEET

INTERSTATE BRIDGE REPLACEMENT PROGRAM
1 AUX, DOUBLE DECK BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 6 OF 8

DRAFT

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NOTES:

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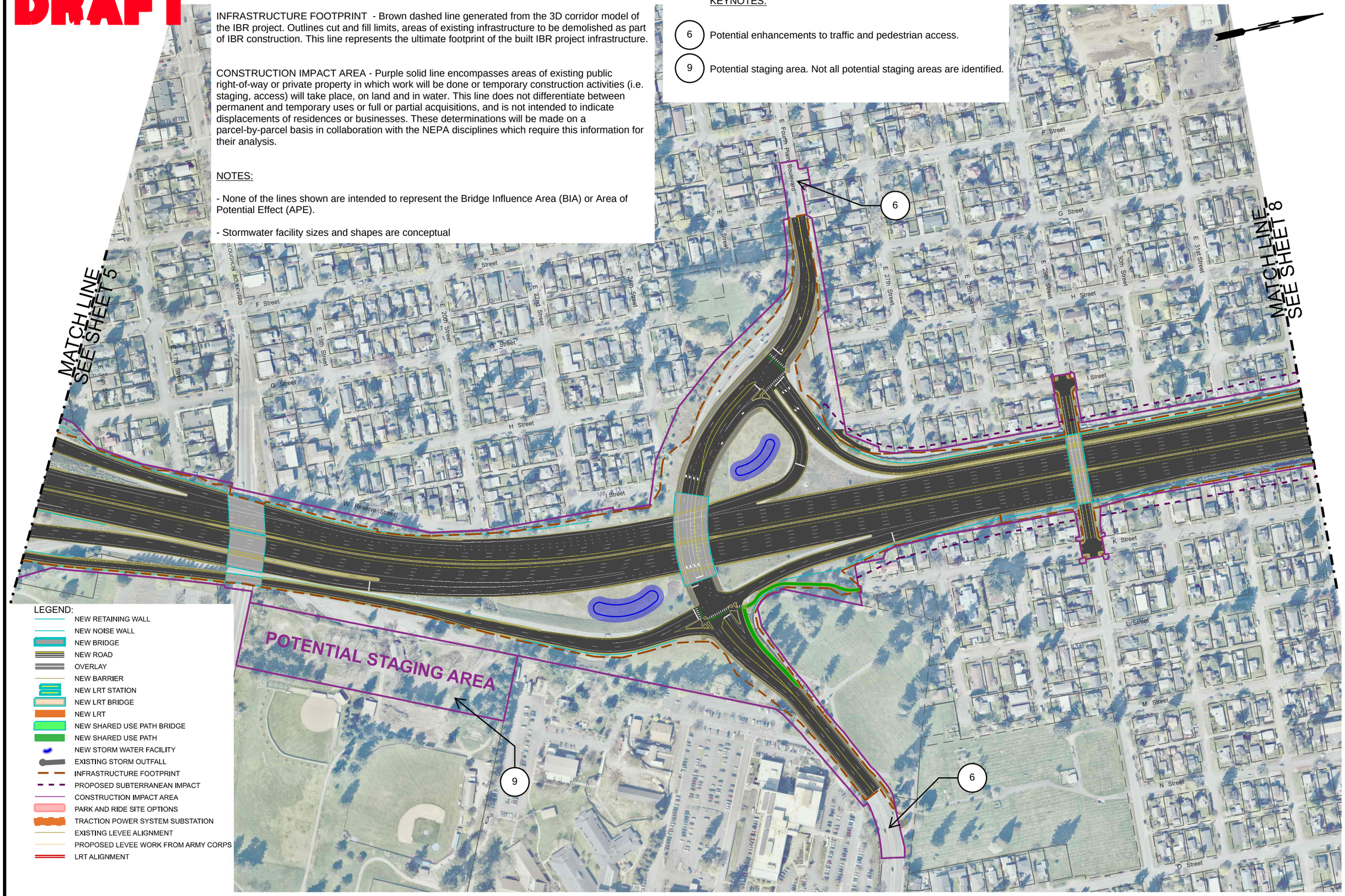
- Stormwater facility sizes and shapes are conceptual

KEYNOTES:

6 Potential enhancements to traffic and pedestrian access.

9 Potential staging area. Not all potential staging areas are identified.



LEGEND:

- NEW RETAINING WALL
- NEW NOISE WALL
- NEW BRIDGE
- NEW ROAD
- OVERLAY
- NEW BARRIER
- NEW LRT STATION
- NEW LRT BRIDGE
- NEW LRT
- NEW SHARED USE PATH BRIDGE
- NEW SHARED USE PATH
- NEW STORM WATER FACILITY
- EXISTING STORM OUTFALL
- INFRASTRUCTURE FOOTPRINT
- PROPOSED SUBTERRANEAN IMPACT
- CONSTRUCTION IMPACT AREA
- PARK AND RIDE SITE OPTIONS
- TRACTION POWER SYSTEM SUBSTATION
- EXISTING LEVEE ALIGNMENT
- PROPOSED LEVEE WORK FROM ARMY CORPS
- LRT ALIGNMENT

Interstate BRIDGE Replacement Program

INTERSTATE BRIDGE REPLACEMENT PROGRAM
1 AUX, DOUBLE DECK BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 7 OF 8

0 100 200 300 400 500
SCALE IN FEET

DRAFT

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- Stormwater facility sizes and shapes are conceptual

KEYNOTES:

6 Potential enhancements to traffic and pedestrian access.

MATCH LINE
SEE SHEET 7

F Street
G Street
H Street
I Street
K Street
L Street
M Street
N Street
E 33rd Street
E 34th Street
E 35th Street
E 36th Street
E 37th Street
E 38th Street
E 39th Street
E 40th Street
NE Pacific Avenue
Kiggins Bowl
I-5
NE Leverich Park Way
Leverich Park
NE 12th Avenue
NE 14th Ave
NE 42nd St
NE 43rd St
NE 44th St
NE 45th Street
NE 45th St
NE Leverich Pkwy
Leverich Ct
NE

6

LEGEND:
- NEW RETAINING WALL
- NEW NOISE WALL
- NEW BRIDGE
- NEW ROAD
- OVERLAY
- NEW BARRIER
- NEW LRT STATION
- NEW LRT BRIDGE
- NEW LRT
- NEW SHARED USE PATH BRIDGE
- NEW SHARED USE PATH
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Interstate BRIDGE Replacement Program

SCALE IN FEET
0 100 200 300 400 500

INTERSTATE BRIDGE REPLACEMENT PROGRAM
1 AUX, DOUBLE DECK BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 8 OF 8

DRAFT

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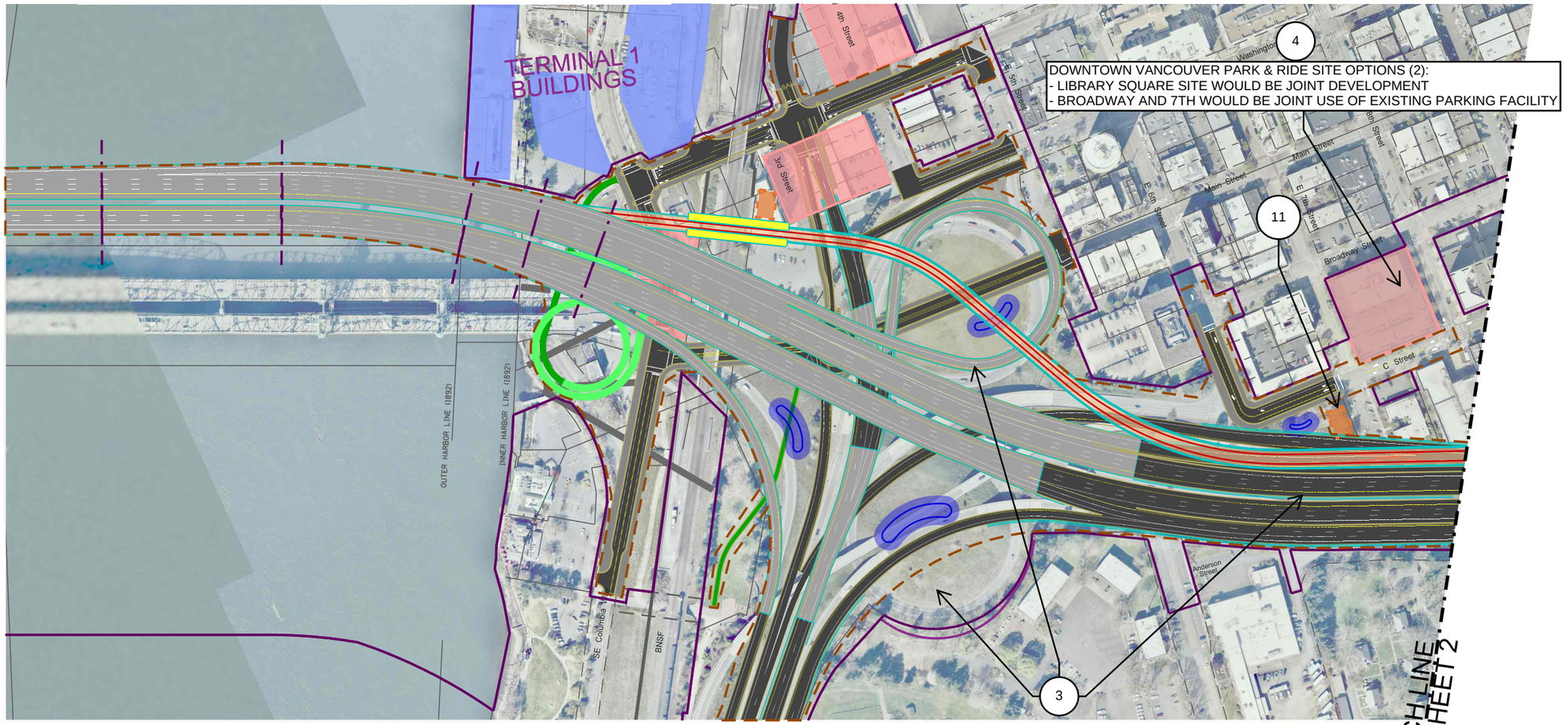

LEGEND:

- NEW RETAINING WALL
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- NEW BRIDGE
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- LRT ALIGNMENT

KEYNOTES:

3 See 2 Aux, Double Deck With C Street Graphics for alternate design

4 Park & Ride site options. One location would be constructed but all should be studied.

11 TPSS Building Location

Interstate BRIDGE Replacement Program

0 100 200 300 400 500 SCALE IN FEET

INTERSTATE BRIDGE REPLACEMENT PROGRAM
1 AUX, DOUBLE DECK, WITHOUT C STREET, WITH WESTWARD SHIFT
JULY 10 2023
SHEET 1 OF 2

DRAFT

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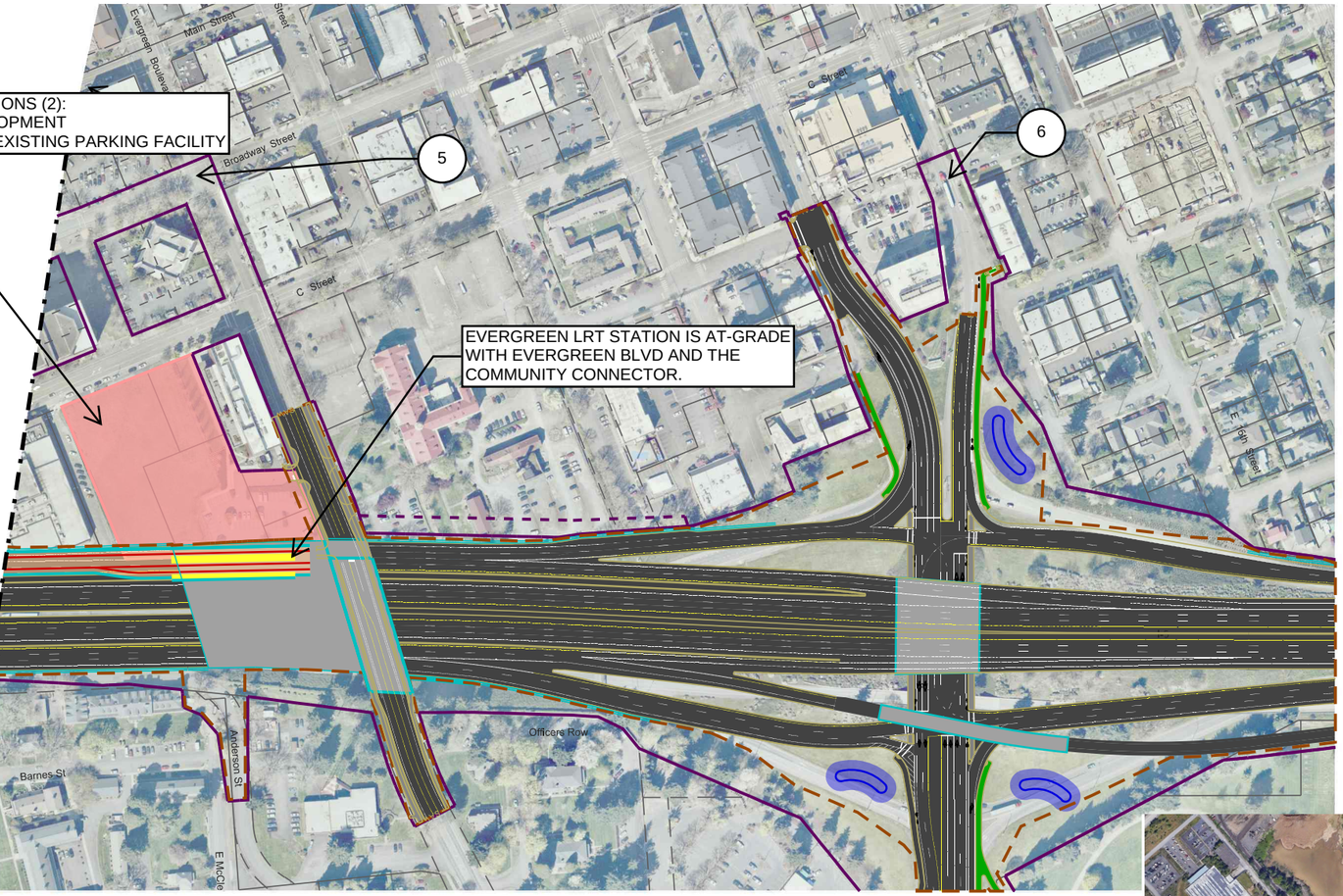

LEGEND:

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- LRT ALIGNMENT

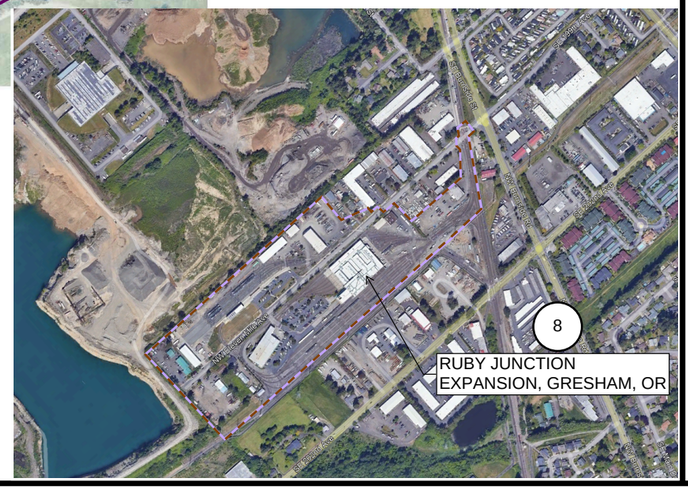
KEYNOTES:

4 Park & Ride site options. One location would be constructed but all should be studied.

5 Potential enhancements to support access to transit.

6 Potential enhancements to traffic and pedestrian access.

8 Transit facility expansion or new facility included in the IBR project. See vicinity map on key map sheet for location.

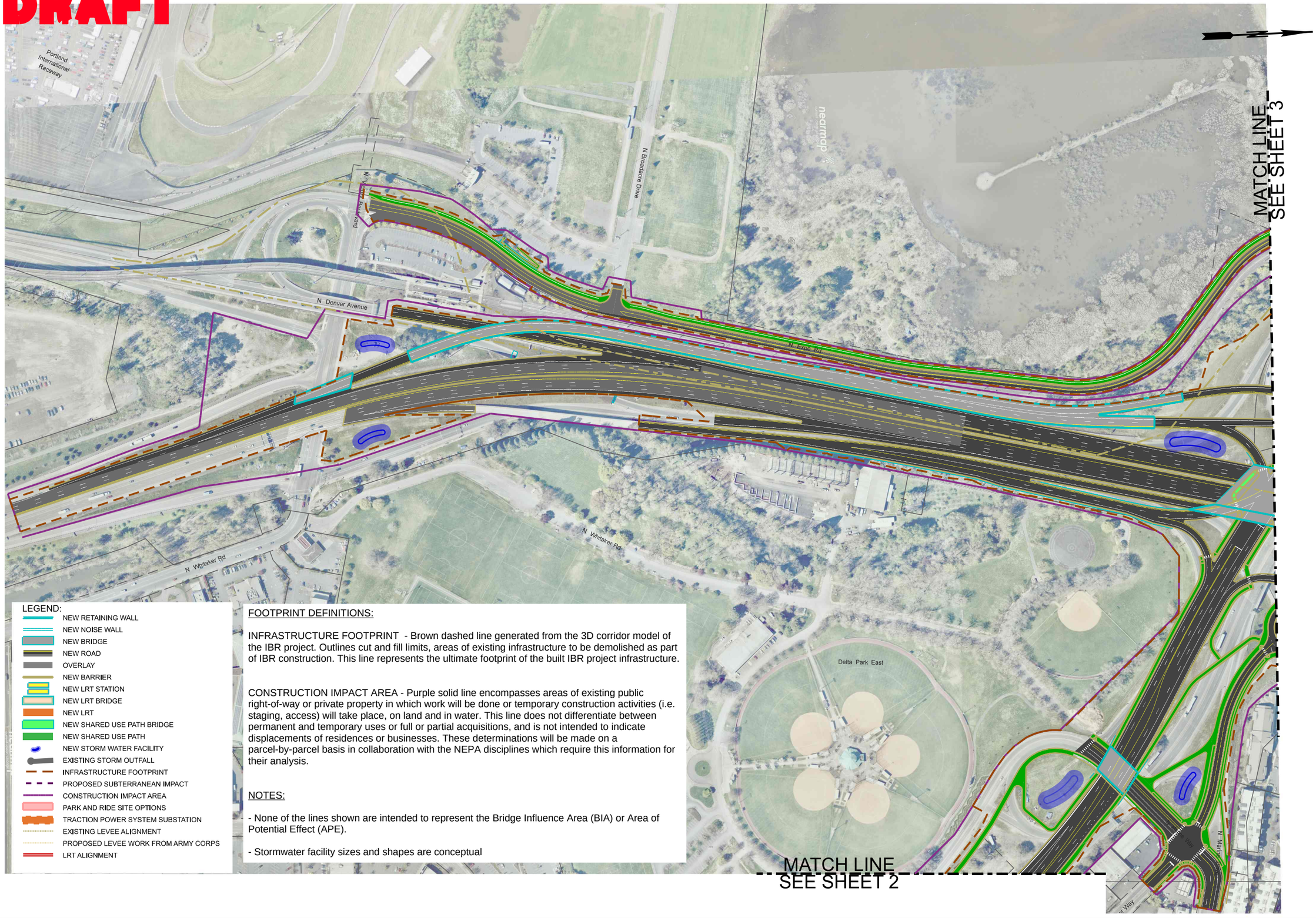


Interstate BRIDGE Replacement Program

SCALE IN FEET 0 100 200 300 400 500

INTERSTATE BRIDGE REPLACEMENT PROGRAM
1 AUX, DOUBLE DECK, WITHOUT C STREET, WITH WESTWARD SHIFT
JULY 10 2023
SHEET 2 OF 2

DRAFT



LEGEND:

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- NEW ROAD
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- NEW LRT STATION
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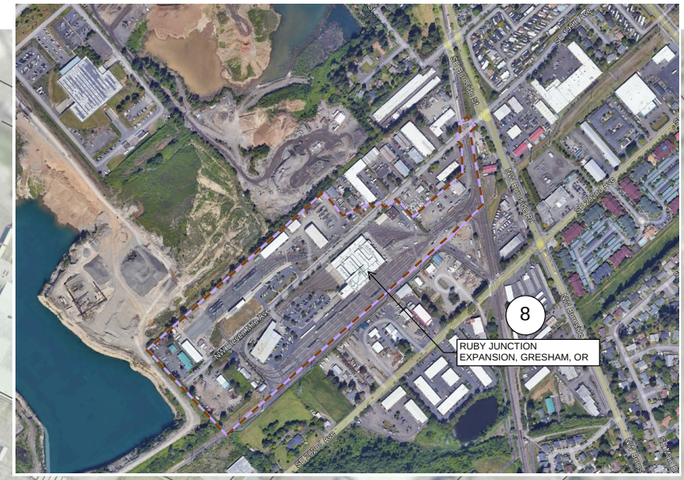
- Stormwater facility sizes and shapes are conceptual

Interstate BRIDGE Replacement Program

SCALE IN FEET: 0 100 200 300 400 500

INTERSTATE BRIDGE REPLACEMENT PROGRAM
2 AUX, DOUBLE DECK BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 1 OF 8

DRAFT



LEGEND:

- NEW RETAINING WALL
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- NEW ROAD
- OVERLAY
- NEW BARRIER
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- Stormwater facility sizes and shapes are conceptual

KEYNOTES:

(8) Transit facility expansion or new facility included in the IBR project. See vicinity map on key map sheet for location.

Interstate BRIDGE Replacement Program

0 100 200 300 400 500
SCALE IN FEET

INTERSTATE BRIDGE REPLACEMENT PROGRAM
2 AUX, DOUBLE DECK BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 2 OF 8

DRAFT

Project footprint encompasses all of expo center parcel

8

TRIMET LRV OVERNIGHT FACILITY SITE, NO ANTICIPATED IMPACT TO EXPO CENTER BUILDINGS

11

Project footprint extends 2000' from existing river crossing

Expo Center

Marine Drive

N Hayden Island Drive

N Jantzen Beach Center

6

11

N Jantzen Beach Ave

North Portland Harbor

Project footprint extends 2000' from existing river crossing

MATCH LINE SEE SHEET 2

MATCH LINE SEE SHEET 4

FOOTPRINT DEFINITIONS:

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LEGEND:

- NEW RETAINING WALL
- NEW NOISE WALL
- NEW BRIDGE
- NEW ROAD
- OVERLAY
- NEW BARRIER
- NEW LRT STATION
- NEW LRT BRIDGE
- NEW LRT
- NEW SHARED USE PATH BRIDGE
- NEW SHARED USE PATH
- NEW STORM WATER FACILITY
- EXISTING STORM OUTFALL
- INFRASTRUCTURE FOOTPRINT
- PROPOSED SUBTERRANEAN IMPACT
- CONSTRUCTION IMPACT AREA
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- TRACTION POWER SYSTEM SUBSTATION
- EXISTING LEVEE ALIGNMENT
- PROPOSED LEVEE WORK FROM ARMY CORPS
- LRT ALIGNMENT

KEYNOTES:

6 Potential enhancements to traffic and pedestrian access.

8 Transit facility expansion or new facility included in the IBR project.

11 TPSS Building Location

Interstate BRIDGE Replacement Program

0 100 200 300 400 500 SCALE IN FEET

INTERSTATE BRIDGE REPLACEMENT PROGRAM
2 AUX, DOUBLE DECK BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 3 OF 8

DRAFT

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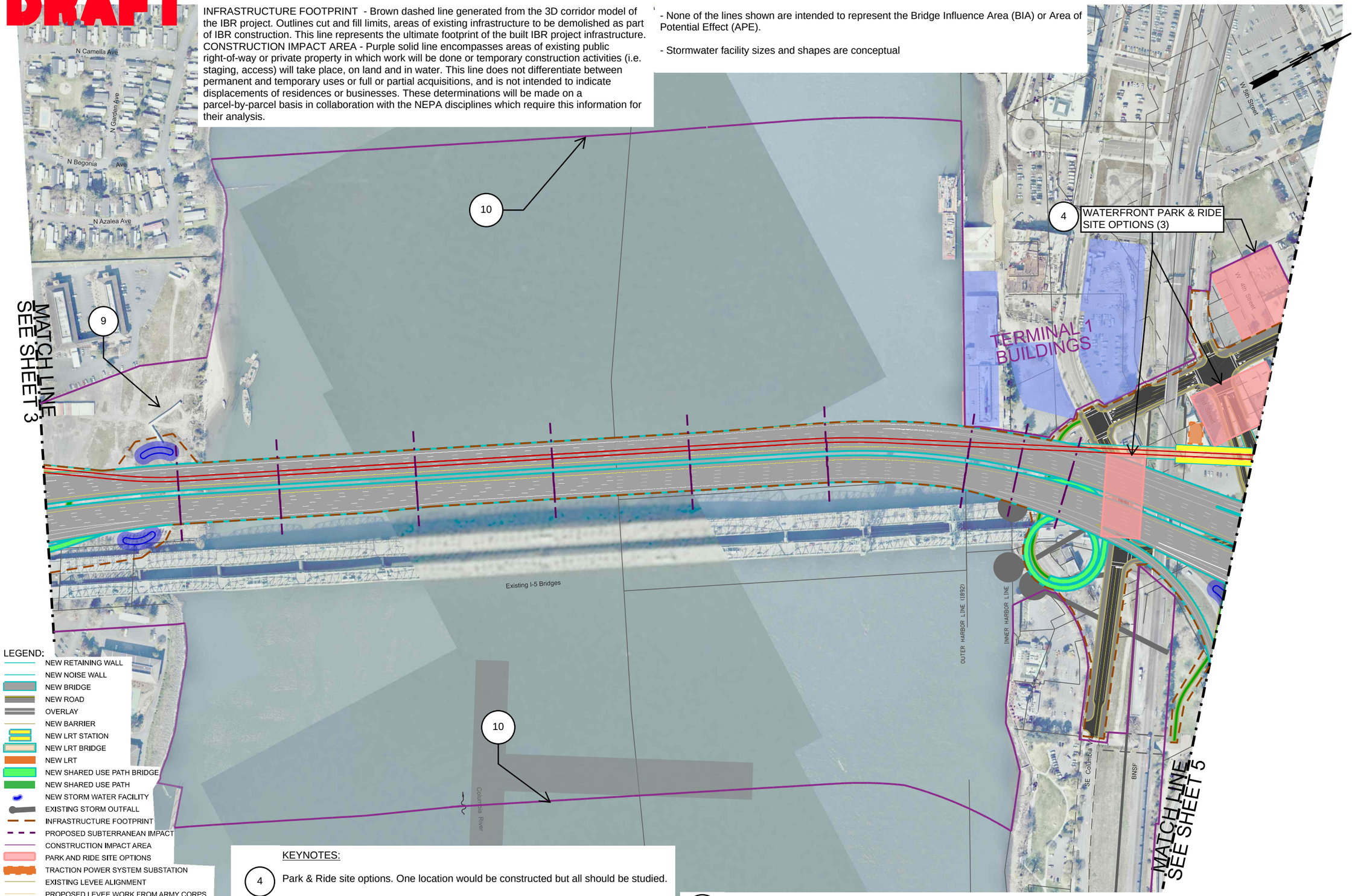

LEGEND:

- NEW RETAINING WALL
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- NEW BRIDGE
- NEW ROAD
- OVERLAY
- NEW BARRIER
- NEW LRT STATION
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- NEW SHARED USE PATH BRIDGE
- NEW SHARED USE PATH
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- EXISTING STORM OUTFALL
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- CONSTRUCTION IMPACT AREA
- PARK AND RIDE SITE OPTIONS
- TRACTION POWER SYSTEM SUBSTATION
- EXISTING LEVEE ALIGNMENT
- PROPOSED LEVEE WORK FROM ARMY CORPS
- LRT ALIGNMENT

KEYNOTES:

4 Park & Ride site options. One location would be constructed but all should be studied.

9 Potential staging area. Not all potential staging areas are identified.

10 In-water staging/work areas.
~1000' upstream of existing Interstate Bridge and ~1000' downstream of new Interstate Bridge.
~2000' upstream and downstream of new North Portland Harbor Bridges.

Interstate BRIDGE Replacement Program

SCALE IN FEET 0 100 200 300 400 500

INTERSTATE BRIDGE REPLACEMENT PROGRAM
2 AUX, DOUBLE DECK BRIDGE, WITH C STREET
SHEET 4 OF 8 - JULY 10th 2023

DRAFT

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MATCH LINE SEE SHEET 4

MATCH LINE SEE SHEET 7

MATCH LINE SEE SHEET 6

DOWNTOWN VANCOUVER PARK & RIDE SITE OPTIONS (2):
- LIBRARY SQUARE SITE WOULD BE JOINT DEVELOPMENT
- BROADWAY AND 7TH WOULD BE JOINT USE OF EXISTING PARKING FACILITY

EVERGREEN LRT STATION IS AT-GRADE WITH EVERGREEN BLVD AND THE COMMUNITY CONNECTOR.

KEYNOTES:

3 See 2 Aux Double Deck Without C Street W Westward Shift Graphics for alternate design which does not include C Street Ramps at the SR 14 interchange and shifts I-5 mainline to the west.

4 Park & Ride site options. One location would be constructed but all should be studied.

5 Potential enhancements to support access to transit.

6 Potential enhancements to traffic and pedestrian access.

11 TPSS Building Location

Interstate BRIDGE Replacement Program

SCALE IN FEET 0 100 200 300 400 500

INTERSTATE BRIDGE REPLACEMENT PROGRAM
2 AUX, DOUBLE DECK BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 5 OF 8

DRAFT

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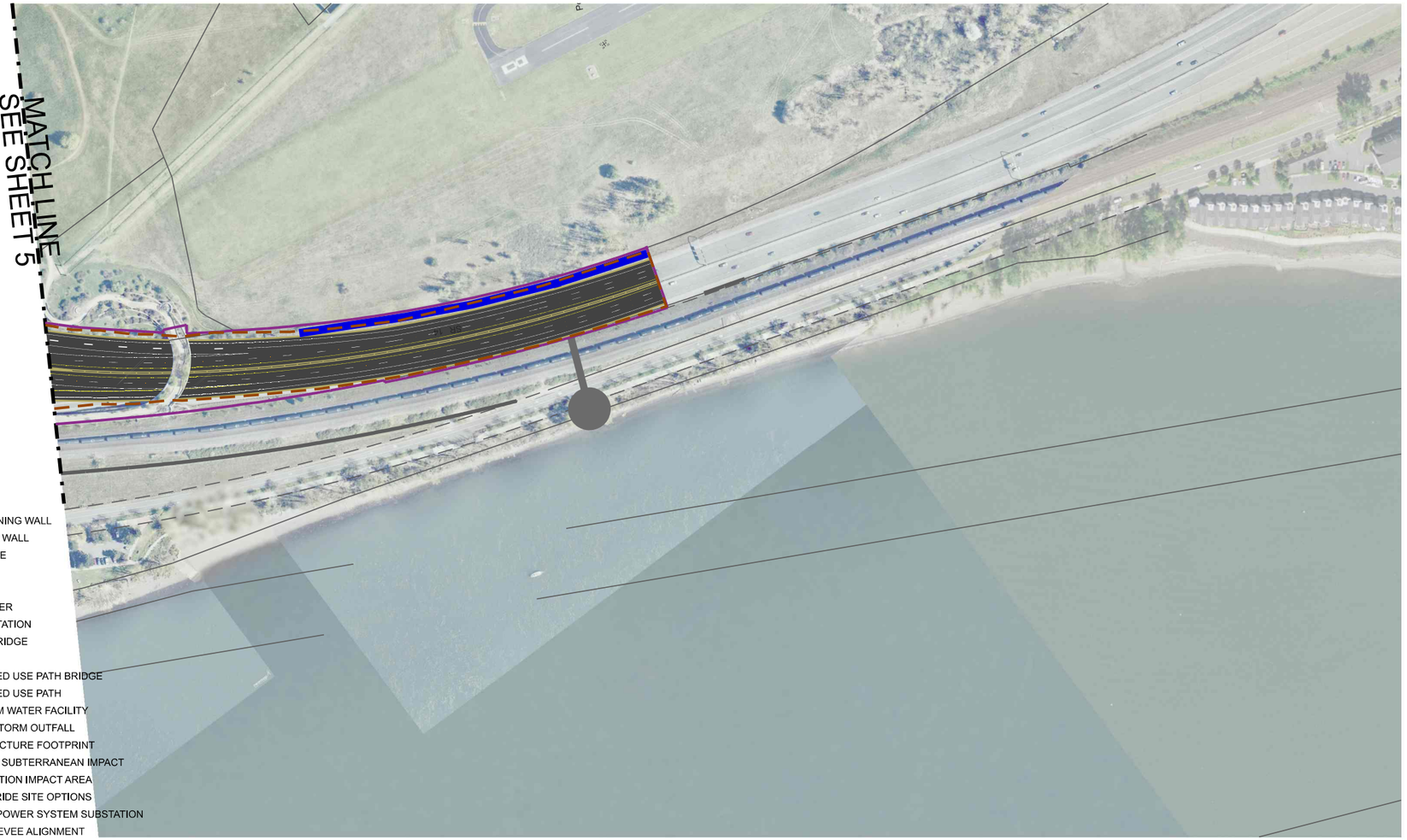

Interstate BRIDGE Replacement Program

0 100 200 300 400 500 SCALE IN FEET

INTERSTATE BRIDGE REPLACEMENT PROGRAM
2 AUX, DOUBLE DECK BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 6 OF 8

DRAFT

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KEYNOTES:

6 Potential enhancements to traffic and pedestrian access.

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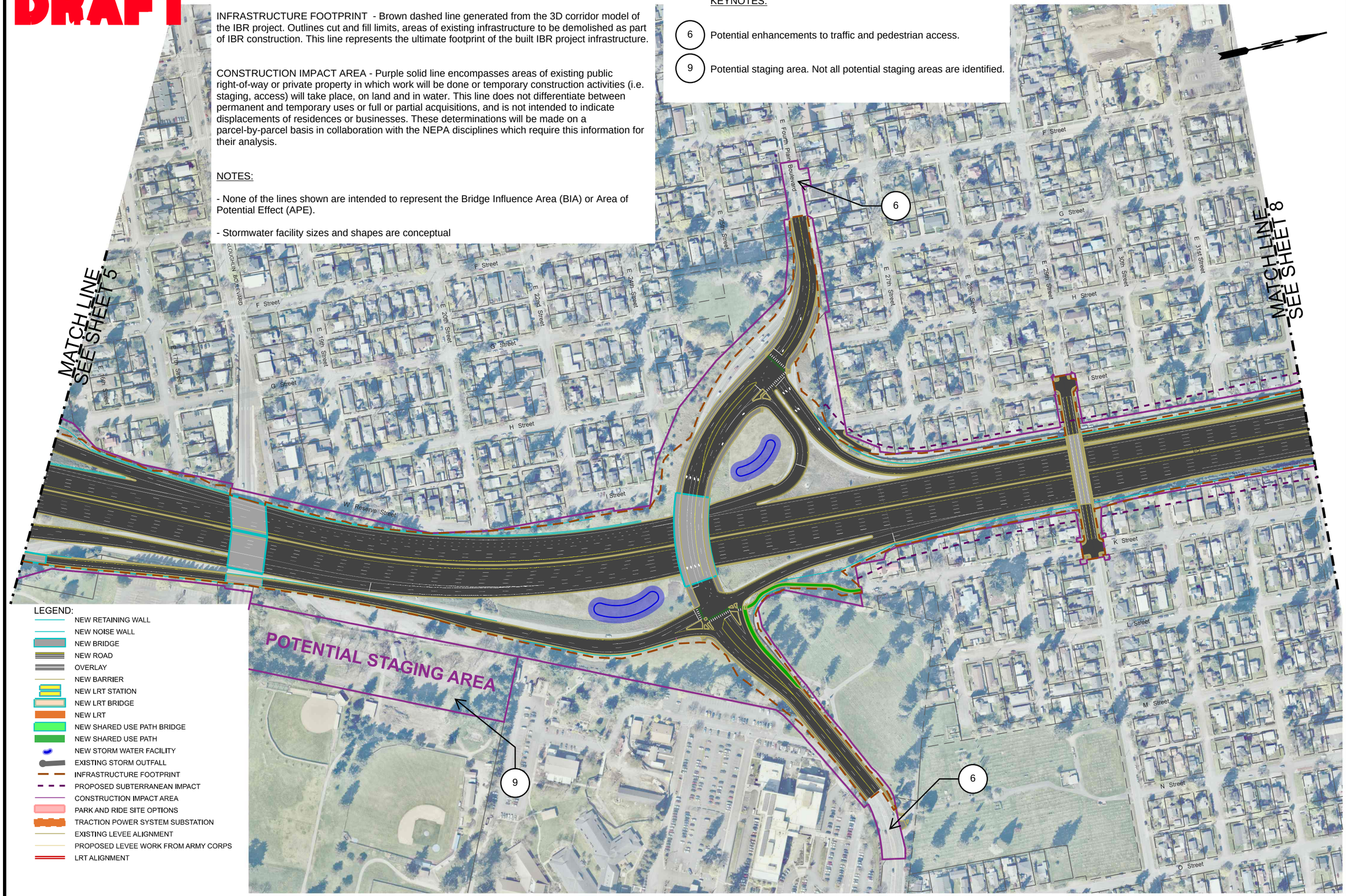

LEGEND:

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Interstate BRIDGE Replacement Program

0 100 200 300 400 500
SCALE IN FEET

INTERSTATE BRIDGE REPLACEMENT PROGRAM
2 AUX, DOUBLE DECK BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 7 OF 8

DRAFT

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KEYNOTES:

6 Potential enhancements to traffic and pedestrian access.

MATCH LINE
SEE SHEET 7

LEGEND:

- NEW RETAINING WALL
- NEW NOISE WALL
- NEW BRIDGE
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Interstate BRIDGE Replacement Program

INTERSTATE BRIDGE REPLACEMENT PROGRAM
2 AUX, DOUBLE DECK BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 8 OF 8

SCALE IN FEET
0 100 200 300 400 500

DRAFT

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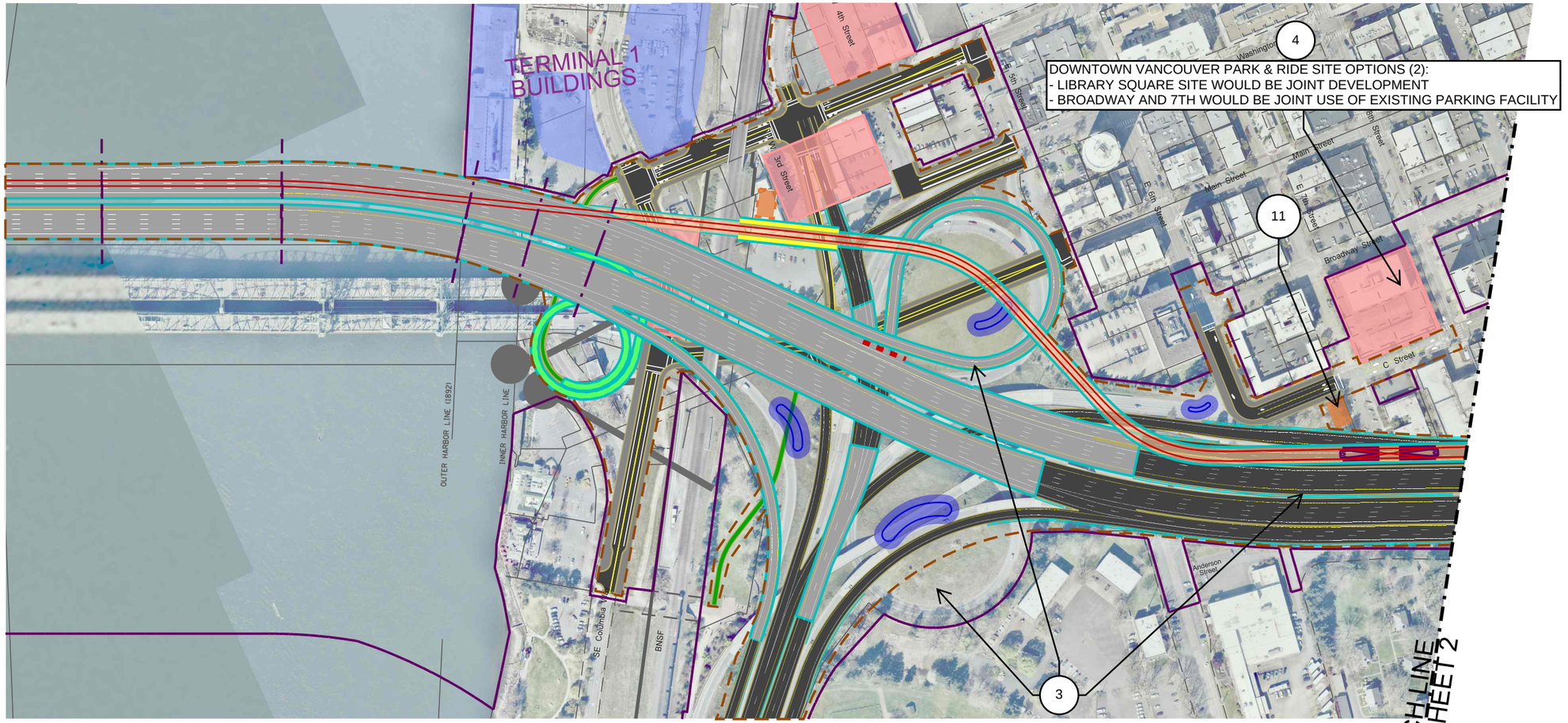

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KEYNOTES:

3 See 2 Aux, Double Deck With C Street Graphics for alternate design

4 Park & Ride site options. One location would be constructed but all should be studied.

11 TPSS Building Location

Interstate BRIDGE Replacement Program

INTERSTATE BRIDGE REPLACEMENT PROGRAM
2 AUX, DOUBLE DECK BRIDGE, WITHOUT C STREET, WITH WESTWARD SHIFT
JULY 10th 2023
SHEET 1 OF 2

DRAFT

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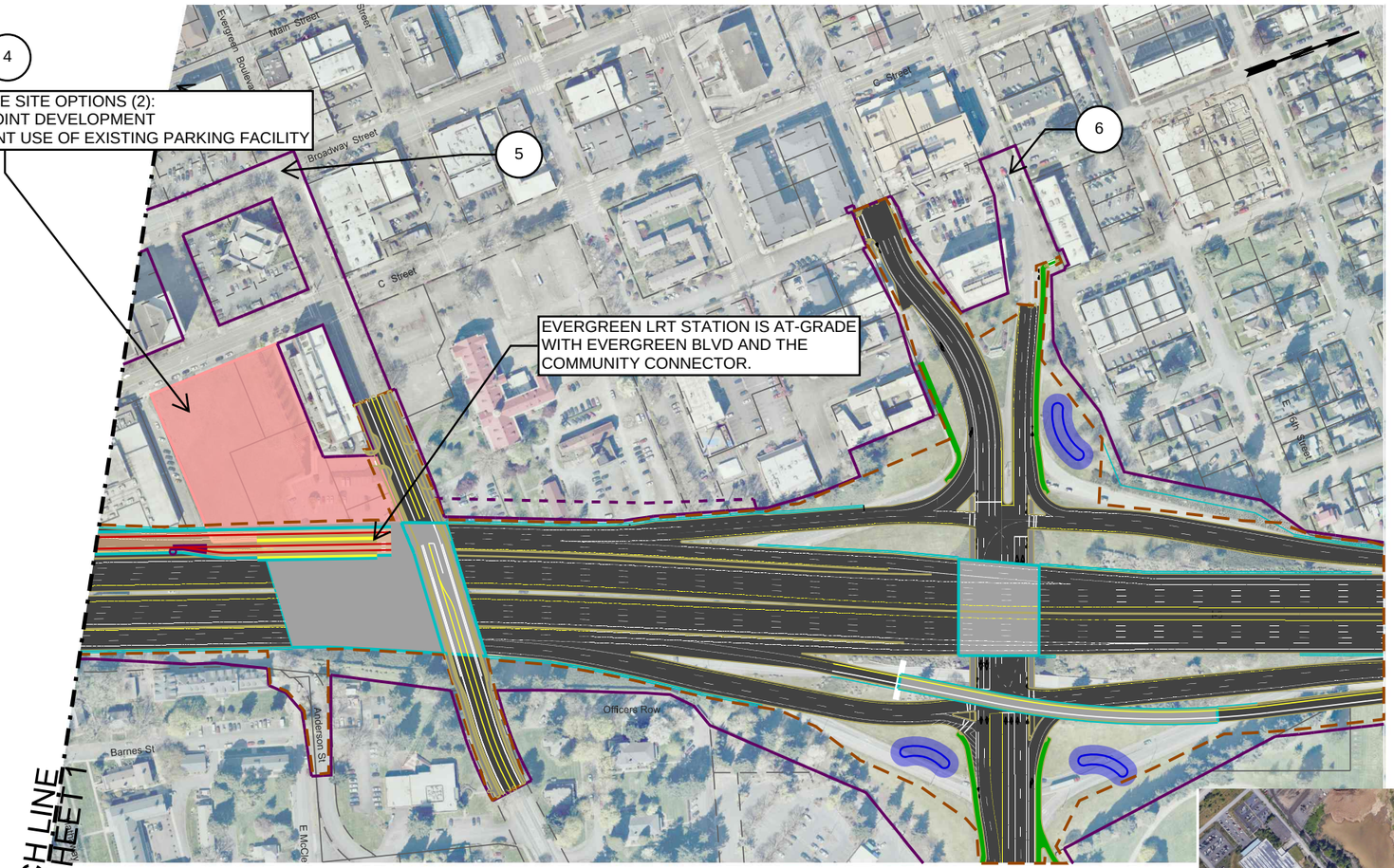

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KEYNOTES:

4 Park & Ride site options. One location would be constructed but all should be studied.

5 Potential enhancements to support access to transit.

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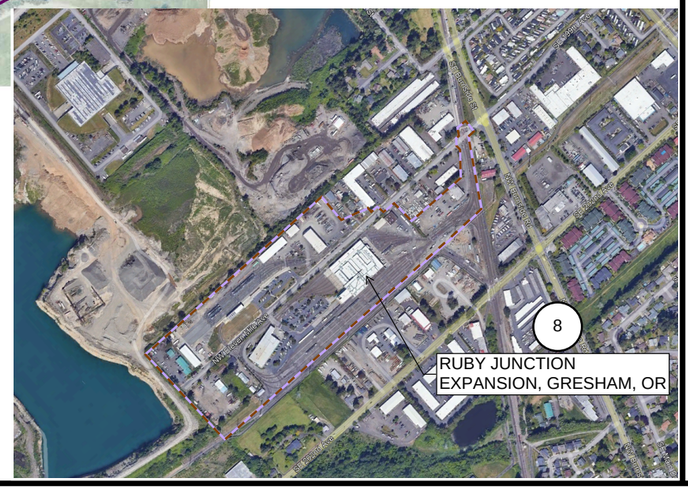
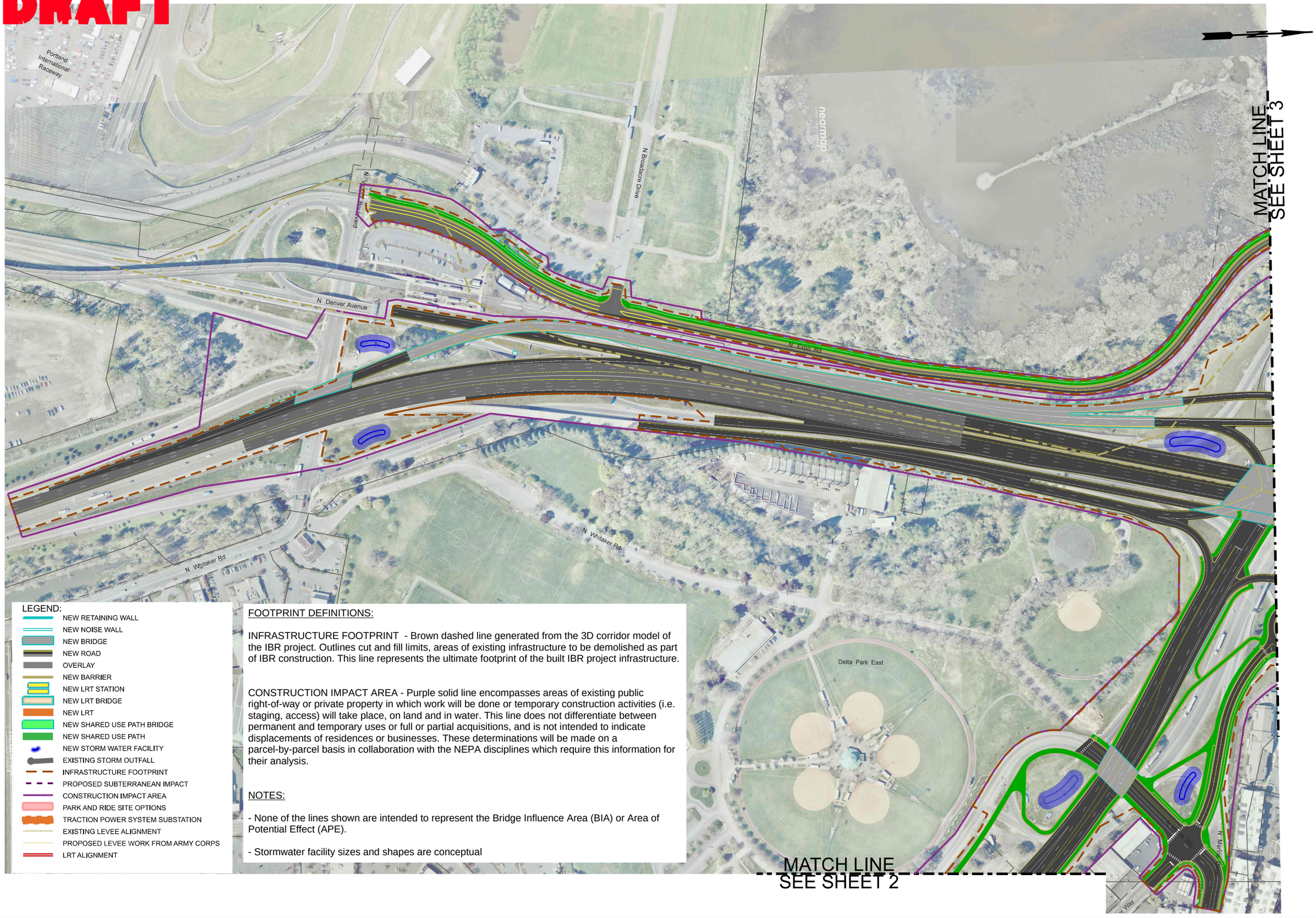


Interstate BRIDGE Replacement Program

SCALE IN FEET 0 100 200 300 400 500

INTERSTATE BRIDGE REPLACEMENT PROGRAM
2 AUX, DOUBLE DECK BRIDGE, WITHOUT C STREET, WITH WESTWARD SHIFT
JULY 10th 2023
SHEET 2 OF 2

DRAFT



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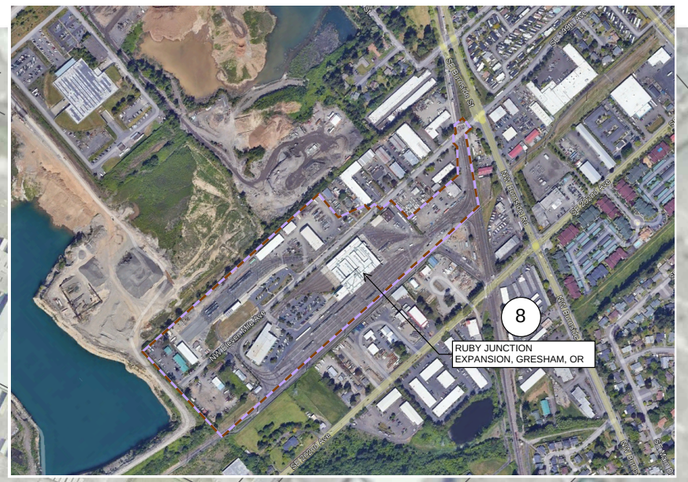
Interstate BRIDGE Replacement Program

SCALE IN FEET
0 100 200 300 400 500

INTERSTATE BRIDGE REPLACEMENT PROGRAM
1 AUX, SINGLE LEVEL BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 1 OF 8

DRAFT



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KEYNOTES:

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Interstate BRIDGE Replacement Program

0 100 200 300 400 500
SCALE IN FEET

INTERSTATE BRIDGE REPLACEMENT PROGRAM
1 AUX, SINGLE LEVEL BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 2 OF 8

DRAFT

Project footprint encopasses all of expo center parcel

8

TRIMET LRV OVERNIGHT FACILITY SITE, NO ANTICIPATED IMPACT TO EXPO CENTER BUILDINGS

Project footprint extends 2000' from existing river crossing

11

6

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Expo Center

Marine Drive

N Hayden Island Drive

N Jantzen Beach Center

N Jantzen Beach Ave

Floor & Decor

North Portland Harbor

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KEYNOTES:

6 Potential enhancements to traffic and pedestrian access.

8 Transit facility expansion or new facility included in the IBR project.

11 TPSS Building Location

MATCH LINE SEE SHEET 2

MATCH LINE SEE SHEET 4

Interstate BRIDGE Replacement Program

SCALE IN FEET 0 100 200 300 400 500

INTERSTATE BRIDGE REPLACEMENT PROGRAM
1 AUX, SINGLE LEVEL BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 3 OF 8

DRAFT

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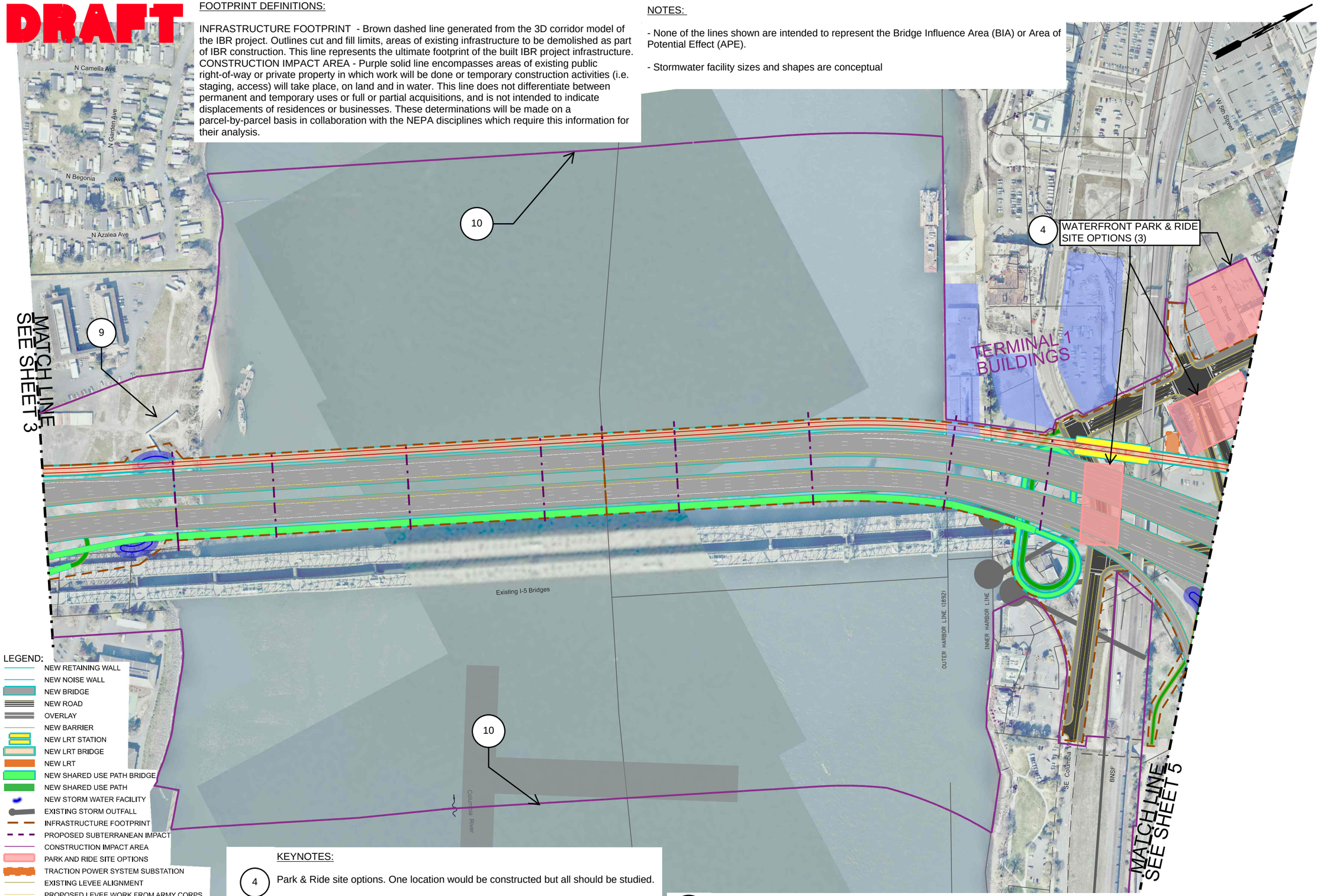

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Interstate BRIDGE Replacement Program

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INTERSTATE BRIDGE REPLACEMENT PROGRAM
1 AUX, SINGLE LEVEL BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 4 OF 8

DRAFT

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MATCH LINE SEE SHEET 4

MATCH LINE SEE SHEET 7

MATCH LINE SEE SHEET 6

4

DOWNTOWN VANCOUVER PARK & RIDE SITE OPTIONS (2):
- LIBRARY SQUARE SITE WOULD BE JOINT DEVELOPMENT
- BROADWAY AND 7TH WOULD BE JOINT USE OF EXISTING PARKING FACILITY

5

6

11

EVERGREEN LRT STATION IS AT-GRADE WITH EVERGREEN BLVD AND THE COMMUNITY CONNECTOR.

KEYNOTES:

4 Park & Ride site options. One location would be constructed but all should be studied.

5 Potential enhancements to support access to transit.

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11 TPSS Building Location

Interstate BRIDGE Replacement Program

SCALE IN FEET 0 100 200 300 400 500

INTERSTATE BRIDGE REPLACEMENT PROGRAM
1 AUX, SINGLE LEVEL BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 5 OF 8

DRAFT

FOOTPRINT DEFINITIONS:

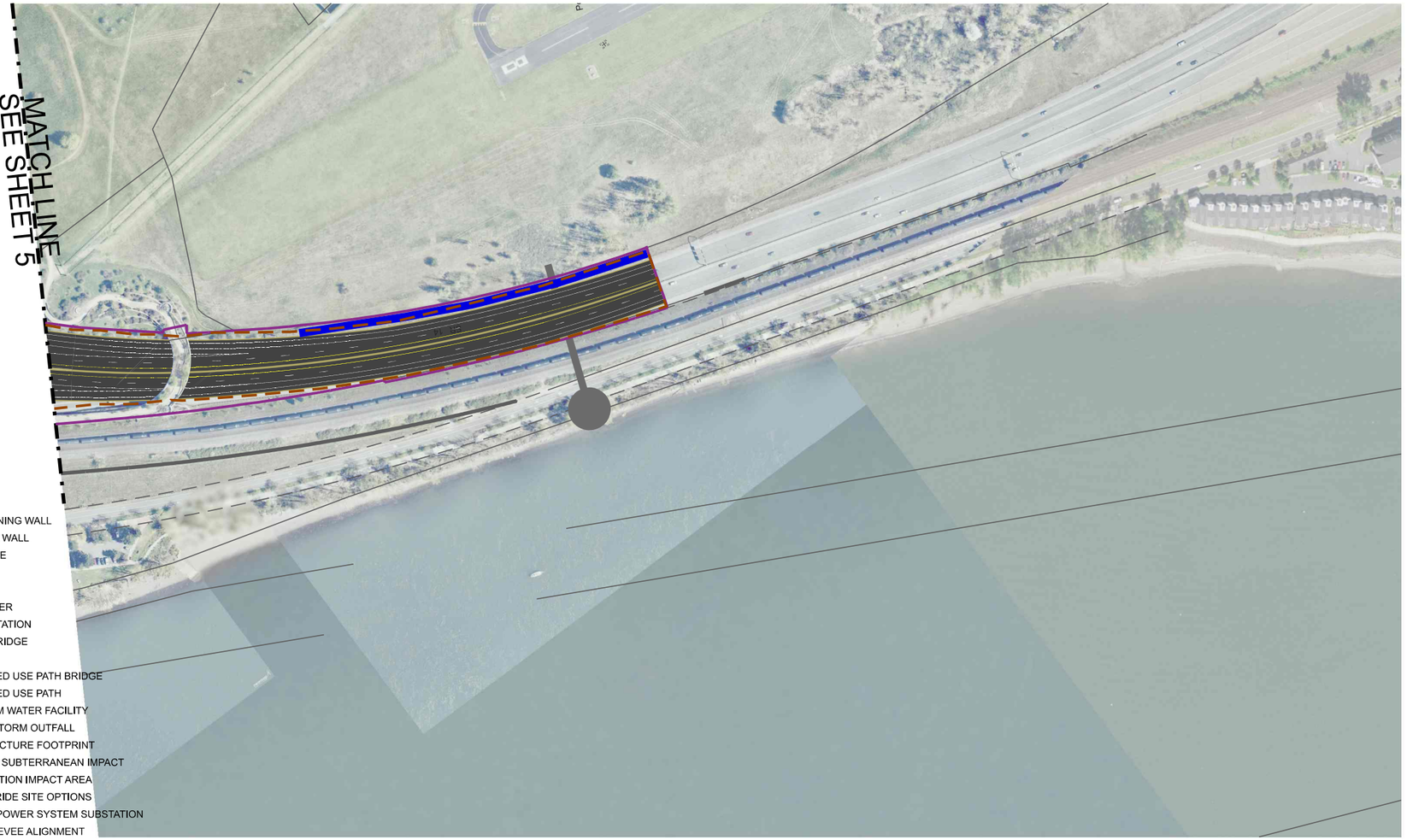
INFRASTRUCTURE FOOTPRINT - Brown dashed line generated from the 3D corridor model of the IBR project. Outlines cut and fill limits, areas of existing infrastructure to be demolished as part of IBR construction. This line represents the ultimate footprint of the built IBR project infrastructure.

CONSTRUCTION IMPACT AREA - Purple solid line encompasses areas of existing public right-of-way or private property in which work will be done or temporary construction activities (i.e. staging, access) will take place, on land and in water. This line does not differentiate between permanent and temporary uses or full or partial acquisitions, and is not intended to indicate displacements of residences or businesses. These determinations will be made on a parcel-by-parcel basis in collaboration with the NEPA disciplines which require this information for their analysis.

NOTES:

- None of the lines shown are intended to represent the Bridge Influence Area (BIA) or Area of Potential Effect (APE).

- Stormwater facility sizes and shapes are conceptual



LEGEND:
- NEW RETAINING WALL
- NEW NOISE WALL
- NEW BRIDGE
- NEW ROAD
- OVERLAY
- NEW BARRIER
- NEW LRT STATION
- NEW LRT BRIDGE
- NEW LRT
- NEW SHARED USE PATH BRIDGE
- NEW SHARED USE PATH
- NEW STORM WATER FACILITY
- EXISTING STORM OUTFALL
- INFRASTRUCTURE FOOTPRINT
- PROPOSED SUBTERRANEAN IMPACT
- CONSTRUCTION IMPACT AREA
- PARK AND RIDE SITE OPTIONS
- TRACTION POWER SYSTEM SUBSTATION
- EXISTING LEVEE ALIGNMENT
- PROPOSED LEVEE WORK FROM ARMY CORPS
- LRT ALIGNMENT

Interstate BRIDGE Replacement Program

0 100 200 300 400 500 SCALE IN FEET

INTERSTATE BRIDGE REPLACEMENT PROGRAM
1 AUX, SINGLE LEVEL BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 6 OF 8

DRAFT

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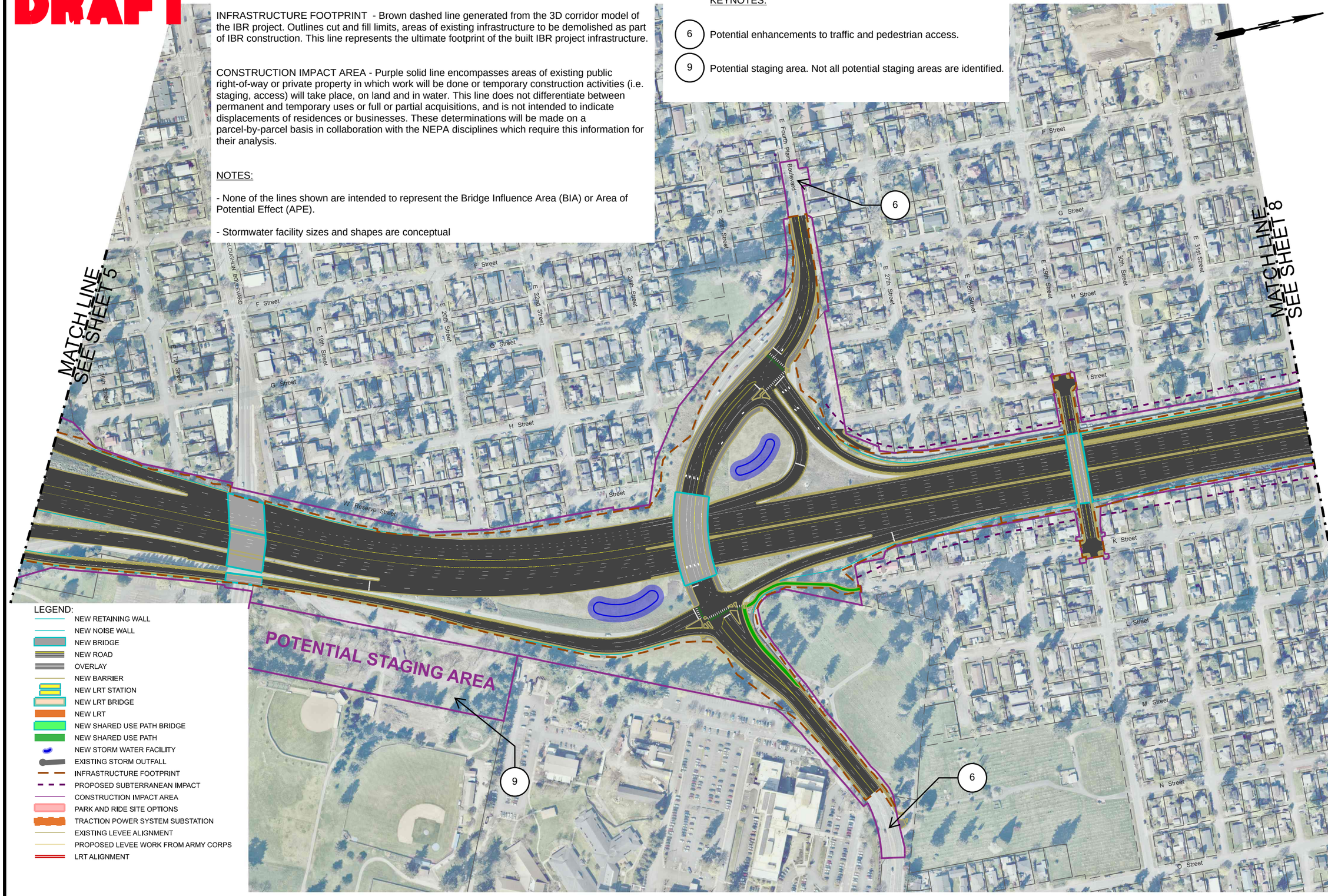
- Stormwater facility sizes and shapes are conceptual

KEYNOTES:

6 Potential enhancements to traffic and pedestrian access.

9 Potential staging area. Not all potential staging areas are identified.



LEGEND:

- NEW RETAINING WALL
- NEW NOISE WALL
- NEW BRIDGE
- NEW ROAD
- OVERLAY
- NEW BARRIER
- NEW LRT STATION
- NEW LRT BRIDGE
- NEW LRT
- NEW SHARED USE PATH BRIDGE
- NEW SHARED USE PATH
- NEW STORM WATER FACILITY
- EXISTING STORM OUTFALL
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- PROPOSED SUBTERRANEAN IMPACT
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- PARK AND RIDE SITE OPTIONS
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- EXISTING LEVEE ALIGNMENT
- PROPOSED LEVEE WORK FROM ARMY CORPS
- LRT ALIGNMENT

Interstate BRIDGE Replacement Program

SCALE IN FEET 0 100 200 300 400 500

INTERSTATE BRIDGE REPLACEMENT PROGRAM
1 AUX, SINGLE LEVEL BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 7 OF 8

DRAFT

FOOTPRINT DEFINITIONS:

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- Stormwater facility sizes and shapes are conceptual

KEYNOTES:

6 Potential enhancements to traffic and pedestrian access.

MATCH LINE
SEE SHEET 7

LEGEND:

- NEW RETAINING WALL
- NEW NOISE WALL
- NEW BRIDGE
- NEW ROAD
- OVERLAY
- NEW BARRIER
- NEW LRT STATION
- NEW LRT BRIDGE
- NEW LRT
- NEW SHARED USE PATH BRIDGE
- NEW SHARED USE PATH
- NEW STORM WATER FACILITY
- EXISTING STORM OUTFALL
- INFRASTRUCTURE FOOTPRINT
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- PROPOSED LEVEE WORK FROM ARMY CORPS
- LRT ALIGNMENT

Interstate BRIDGE Replacement Program

SCALE IN FEET 0 100 200 300 400 500

INTERSTATE BRIDGE REPLACEMENT PROGRAM
1 AUX, SINGLE LEVEL BRIDGE, WITH C STREET - JULY 10th 2023
SHEET 8 OF 8

Interstate BRIDGE Replacement Program

Design Option Development, Screening, and Evaluation

November 2022

Attachments updated September 2023

Oregon

For Americans with Disabilities Act (ADA) or Civil Rights Title VI accommodations, translation/interpretation services, or more information call 503-731-4128, TTY 800-735-2900 or Oregon Relay Service 7-1-1.

Washington

Accommodation requests for people with disabilities in Washington can be made by contacting the Washington State Department of Transportation (WSDOT) Diversity/ADA Affairs team at wsdotada@wsdot.wa.gov or by calling toll-free, 855-362-4ADA (4232). Persons who are deaf or hard of hearing may make a request by calling the Washington State Relay at 711. Any person who believes his/her Title VI protection has been violated, may file a complaint with WSDOT's Office of Equity and Civil Rights Title VI Coordinator by contacting (360) 705-7090.

Design Option Development, Screening, and Evaluation

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ACRONYMS, ABBREVIATIONS, AND TERMS

Item	Definition
2013 LPA	Columbia River Crossing Locally Preferred Alternative
AC	Advisory Circular
Active transportation	Human-powered modes of transportation, such as walking, biking, or using a wheelchair.
Auxiliary lanes	Ramp-to-ramp connections adjoining through lanes that allow for better access to and from on-/off-ramps. This improves speed changes, turning, weaving, and truck climbing, resulting in better safety and congestion relief.
BIPOC	Black, Indigenous, and People of Color
BRT	Bus rapid transit - a term for bus-based transit systems that deliver fast and efficient service that may include dedicated lanes, busways, traffic signal priority, off-board fare collection, elevated platforms and enhanced stations. They are usually larger and can carry more riders per vehicles than standard busses. BRT currently runs in several corridors throughout Clark County and is operated by C-TRAN.
CAG	Community Advisory Group
CFR	Code of Federal Regulations
CIG	Capital Investment Grant – The FTA discretionary funding program for funding transit capital investments, including heavy rail, commuter rail, light rail, streetcars and bus rapid transit.
CRC	Columbia River Crossing
C-TRAN	Clark County Public Transportation Benefit Area Authority
Diamond interchange	A type of interchange that is used where a controlled-access highway crosses a local road. The highway is grade-separated from the local road, with one route crossing over the other on a bridge.
EAG	Equity Advisory Group
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESG	Executive Steering Group

Item	Definition
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
Folded diamond interchange	A type of diamond interchange, with two entrance ramps and two exit ramps, where one or more of the ramps are "folded" into a loop.
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
Half diamond interchange	A type of diamond interchange, where one travel direction does not extend past the interchange, limiting access to three directions.
HCT	High-capacity transit – HCT encompasses different transit options, such as bus rapid transit and light rail transit.
I-205	Interstate 205
I-5	Interstate 5
IAMP	Interchange Area Management Plan
IBR	Interstate Bridge Replacement
Interchange	An interchange is a roadway junction that uses grade separations to accommodate the movement of traffic between two or more routes, allowing some of the traffic to pass through the junction without interruption. Common types of interchanges include diamond and cloverleaf interchanges. A full interchange uses four left and right exits and on-ramps, and a partial interchange uses less than four.
LPA	Locally Preferred Alternative
LRT	Light rail transit – LRT is a form of high-capacity transit that operates in its own fixed guideway and is powered by overhead electrical current. Currently, light rail connects Portland City Center with Beaverton, Clackamas, Gresham, Hillsboro, Milwaukie, North/Northeast Portland and Portland International Airport and is operated by TriMet.
MCDD	Multnomah County Drainage District
Metro	Oregon Metro
MLK	Martin Luther King, Jr.
Modified LPA	A subset of three components in the preliminary preferred alternative that are considered foundational to the Program and were vetted and approved

Item	Definition
	by partner agencies. The Modified LPA components include interchange configuration for Hayden Island/Marine Drive, transit investments, and the number of auxiliary lanes across the bridge.
MPO	Metropolitan Planning Organization
NEPA	National Environmental Policy Act
NOAA Fisheries	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NOI	Notice of Intent
ODOT	Oregon Department of Transportation
ORS	Oregon Revised Statutes
Preliminary preferred alternative	The proposed solution that will be studied in the NEPA document for the IBR Program. The preliminary preferred alternative consists of a replacement bridge over the Columbia River as well as other components such as transit improvements, the types of interchanges at various locations throughout the corridor, and active transportation improvements.
RCW	Revised Code of Washington
ROD	Record of Decision
RTC	Southwest Washington Regional Transportation Council
SEIS	Supplemental Environmental Impact Statement
SPUI	Single-point urban interchange - a type of diamond interchange which has a large overpass or underpass that provides space for a signalized intersection for the ramps and the cross streets.
SR	State Route
TAZ	Transportation Analysis Zones
Tight diamond interchange	A type of diamond interchange, where the highway ramps are split between two crossroads, with an entry ramp and an exit ramp serving each of the crossroads.
TOTS	Transit Options Technical Session
TriMet	Tri-County Metropolitan Transportation District of Oregon
USACE	U.S. Army Corps of Engineers

Item	Definition
USC	U.S. Code
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
WSDOT	Washington State Department of Transportation

1. INTRODUCTION

The Interstate Bridge Replacement (IBR) Program is a continuation of the Columbia River Crossing (CRC) Project and will replace the aging Interstate Bridge across the Columbia River with a modern, seismically resilient, multimodal structure. During early efforts for the IBR Program, feedback from partner agencies, tribes, organizations and the public identified changes within the Program area that had occurred since the selection of the Locally Preferred Alternative (LPA) studied in the CRC project's Environmental Impact Statement (EIS), selected in the 2011 Record of Decision (ROD), and updated in two National Environmental Policy Act (NEPA) re-evaluations prepared in 2012-2013. To respond to these changes and provide a bridge replacement solution that better fits the current and future needs of the region, the IBR Program identified several components of the CRC LPA that would benefit from design modifications.

The purpose of this report is to document the screening and evaluation process used to select the modifications that were included in the preliminary preferred alternative for the IBR Program. The screening process took place prior to issuance of a Notice to Supplement to prepare a Supplemental EIS (SEIS) for the IBR Program in order to address changes that have occurred since the ROD. The Notice to Supplement will formally reopen the NEPA process that was closed with the ROD and re-evaluations, and the preliminary preferred alternative will be studied in the SEIS. The following components were selected through the screening process:

- The type(s) of interchanges for Hayden Island and Marine Drive
- The main river crossing (the structure and alignment of the replacement bridges over the Columbia River)
- Transit mode, general alignment and termini
- Auxiliary lanes

The modifications were selected through the development of high-level design options, which were then screened to identify tradeoffs and benefits among the options. In conjunction with Program partners and the community, these design options and transit investments were then screened against criteria to evaluate their ability to meet the Program's Purpose and Need statement and achieve other desired outcomes, including equity and climate objectives. The highest performing

design options were then combined to create the preliminary preferred alternative for the IBR Program.

This report identifies how design options were developed for these components, the screening process, and how the most promising design options were selected and advanced for further study.

2. GETTING TO THE PRELIMINARY PREFERRED ALTERNATIVE

This section provides an overview of how the IBR Program arrived at the preliminary preferred alternative and identifies the components that comprise the preliminary preferred alternative.

2.1 CRC Project Alternatives Analysis and Screening

Because the IBR Program is a continuation of the CRC project, the Program builds on much of the previous project's NEPA documentation while conducting additional analysis and environmental review, as needed, to comply with NEPA. Based on a re-evaluation signed in December 2021, the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) (the federal leads for this NEPA process) determined that the IBR Program requires a SEIS due to the potential for new adverse environmental impacts.

Under the CRC project, multiple alternatives were developed and screened based on their ability to meet the six needs in the Purpose and Need statement and accomplish the performance measures in the Vision and Values statement. For any project going through the NEPA process, an alternative must meet all aspects of the Purpose and Need statement to advance to more detailed screening.

Throughout the CRC's development, the project team worked in tandem with the CRC Task Force, which was a 39-member group composed of leaders representing a broad cross section of Washington and Oregon communities.[1] The Task Force met regularly to advise the CRC project team and provide guidance and recommendations at key decision points.

During the initial component screening process, the CRC Task Force and project team reviewed various types of river crossing components and transit components to narrow the range of alternatives. The initial Step A screening effort in April 2006 evaluated a wide variety of river crossing and transit components using a pass/fail test designed to eliminate ideas well outside the scope of the project and/or that clearly could not address the relevant elements of the project's Purpose and Need.

River crossing and transit components that passed the Step A screening process were recommended to advance to Step B screening for further consideration and screening, while components that failed were recommended to be dropped from further consideration. During Step B, components were

[1] Public agencies, businesses, civic organizations, neighborhoods, and freight, commuter, and environmental groups were represented on the Task Force.

scored on project values, which were developed and formalized by the CRC Task Force in October 2005.[2] Additional screening efforts took place during and after the Step B screening, with the subsequent dismissal or revision of various components. Later in the screening process, the river crossing and transit options were combined into multimodal alternatives that represented a reasonable range of combinations to be advanced to the Draft EIS for detailed evaluation. Additional details on the CRC project screening process are available on the Washington Department of Transportation's (WSDOT's) Alternative Development webpage for the CRC project.[3] Through these screenings and other planning work, the CRC project LPA was selected in 2011, evaluated in the 2011 Final EIS, and documented in the 2011 ROD. Figure 1 shows the CRC project LPA.

In 2012, the LPA was modified to raise the maximum vertical clearance of the bridge from 95 feet to 116 feet. The LPA was modified again in 2013 to evaluate building the project in a phased approach. Both of these modifications were approved under NEPA and became the CRC project LPA (also referred to as the "2013 LPA" or "2013 Design"). The 2013 LPA was used as a starting point for the IBR Program's identification and development of design options.

[2] The adopted values are Community livability and human resources; Mobility, reliability, accessibility, congestion reduction, and efficiency; Safety; Regional economy, freight mobility; Stewardship of natural resources; Distribution of benefits and impacts.

[3] https://www.wsdot.wa.gov/accountability/ssb5806/alternative-development.htm

Figure 1. 2013 Locally Preferred Alternative

Source: CRC 2011

2.2 IBR Program Design Option Screening and Evaluation

As previously noted, the IBR Program identified several components of the 2013 LPA that would benefit from design modifications. The IBR team used a five-step process, identified below, to identify changes, develop design options, and screen design options, resulting in the development of the preliminary preferred alternative. Throughout these steps, the IBR Program worked in tandem with partner agency technical staff, the Program's advisory groups, tribes, the public, and other partners. These engagement avenues are highlighted in Section 3.

1. **Review and Validate the Purpose and Need statement and Vision and Values.** First, the IBR Program worked with partner agencies and the public to review the Purpose and Need statement and Vision and Values that were adopted during the CRC project. In early to mid-2021, the IBR

Program brought the Purpose and Need statement and Vision and Values to partner agencies and the advisory groups to discuss the identified transportation problems (the "needs"). These foundational statements were also brought to the public for comment during an open house. The outcome of these efforts was the confirmation that the six transportation problems identified in the statement still exist today, and the values identified in the Vision and Values document remain community values. Feedback from agencies and the public led to the elevation of equity and climate resiliency as key Program values, and these were elevated and incorporated into the subsequent steps of the screening process.

2. **Identify Desired Outcomes.** Following confirmation of the Purpose and Need and Vision and Values, the IBR Program worked with the three advisory groups (the Community Advisory Group (CAG), Equity Advisory Group (EAG), and the Executive Steering Group (ESG)) to develop "desired outcomes" for the Program. Desired outcomes are observable and measurable accomplishments that the IBR Program aspires to achieve at a Program level. In addition to desired outcomes tied to the Purpose and Need statement, the IBR Program developed desired outcomes for equity and climate resiliency, to reflect the input received during step 1. The desired outcomes are detailed in Section 4.
3. **Identify and Document Changes.** The IBR Program worked with Program partners to identify physical and contextual changes that have occurred in the Program area since 2013. The purpose of identifying changes was to determine which, if any, components of the Program would need to be modified in response to the changes. The key changes identified are detailed in Section 5.
4. **Develop Screening and Evaluation Methods and Metrics:** The IBR Program worked with agency partners and the advisory groups to develop methodologies and metrics to evaluate the extent to which a design option achieves the Program's desired outcomes. The metrics were used in step 5 to help identify the differentiators among design options. Screening metric development is detailed in Section 6.
5. **Develop, Screen and Evaluate Design Options:** The IBR Program worked with agency partners to identify potential high-level design options for the four foundational components affected by the changes since 2013 (identified in step 3): Hayden Island/Marine Drive, the main river crossing, transit (mode, general alignment, and terminus), and auxiliary lanes. The IBR Program then worked with agency partners to screen and evaluate the design options using the methods and metrics developed in step 4. The screening and evaluation process is detailed in Section 6. Design option development and the results of the screening and evaluation are detailed in Section 7.

2.3 Description of the Preliminary Preferred Alternative

The list below identifies all of the components that constitute the preliminary preferred alternative for the IBR Program, which includes the four components that went through the design option evaluation and screening process. The "Modified LPA" is a term used by the IBR Program for a subset of the components listed below that are considered foundational to the Program and were vetted and approved by partner agencies. Components with an asterisk below denote that the component is part of the Modified LPA.

Preliminary Preferred Alternative Components:

- River Crossing Structures:
  - Main River Crossing (over the Columbia River)
    - Replaced with seismically sound structure*
    - Bridge Type
  - North Portland Harbor Bridge*
- Highway, Interchanges, and Local Streets:
  - Auxiliary Lanes*
  - Victory Boulevard Interchange
  - Marine Drive Interchange*
  - Hayden Island Interchange*
  - State Route (SR) 14 Interchange
  - Fourth Plain Interchange
  - SR 500 Interchange
- Transit:
  - Operating Characteristics:
    - Mode*
    - Termini*
    - Headways
  - Portland Alignment and Station Locations*
  - Vancouver Alignment and Station Locations*
  - Park & Rides
  - Operations and Maintenance Facility
  - Potential off-site improvements
- Active Transportation Improvements
- Tolling

3. COMMUNITY AND AGENCY ENGAGEMENT

The IBR Program has been engaging with partner agencies, tribal governments, and the community. This engagement has helped shape communications strategy and implementation, the environmental review process, and the development of design options—all of which are critical to identifying a multimodal bridge replacement solution that meets the needs and priorities of the region. The IBR Program has solicited input and exchanged information with the public, as agency and tribal representatives. This section briefly lists the different groups that have been engaged and have contributed to the advancement of the IBR Program, as well as the substantial community engagement efforts that have ensured that public voices are heard and incorporated into the Program.

3.1 Technical Coordination with Partner Agencies

The IBR Program worked in tandem with partner agency technical staff through focused technical working groups to develop, evaluate, refine, and identify design concepts, transit investments, and modeling and analytical approaches. Descriptions of these efforts with partner agencies follow.

3.1.1 Task Forces

The IBR Program's design team worked in tandem with partner agency technical staff through focused technical task forces to develop, evaluate, refine, and identify design concepts and transit investments for consideration by community, steering and advisory groups. These meetings served as a venue for developing a shared understanding of local conditions, needs, and planned transportation improvements. The task forces identified design options for screening, contributed to desired outcomes, developed screening criteria, considered tradeoffs, and were engaged in the process of developing the Modified LPA.

The task forces included technical staff from the IBR Program and the following agencies:

- Oregon Department of Transportation (ODOT).
- Washington Department of Transportation (WSDOT).
- Local transit agencies: Clark County Public Transportation Benefit Area (C-TRAN) and Tri-County Metropolitan Transportation District (TriMet).
- Regional metropolitan planning organizations Oregon Metro (Metro) and Southwest Washington Regional Transportation Council (RTC).
- Cities of Portland and Vancouver.
- Ports of Portland and Vancouver.

3.1.2 Travel Demand Modeling Working Group

Representatives from the IBR Program, ODOT, WSDOT, C-TRAN, TriMet, the Cities of Vancouver and Portland, the Ports of Vancouver and Portland, Metro, and RTC met to review and discuss methods

and assumptions related to travel demand modeling being used in support of analysis for the IBR Program. This group met approximately monthly starting in June 2021 to discuss many aspects of the demand model process, including data collection, land use, travel markets, big data analysis, tolling (for the IBR Program, as well as modeling coordination with the Oregon Toll Program), definition of model assumptions for screening of highway and transit options, and post-processing for traffic analysis. The group also reviewed screening criteria and analysis related to modeling to support the evaluation of options.

3.1.3 Transit Options Technical Session

Representatives from the IBR Program, C-TRAN, TriMet, the Cities of Vancouver and Portland, Ports of Vancovuer and Portland, Metro, and RTC developed and refined an array of transit scenarios (including mode, alignment, stations, and operations) and their varying performance and operating measures. This technical team was convened under the name of the Transit Options Technical Session (TOTS) and met eight times between October 2021 and February 2022.

3.1.4 Climate Technical Working Group

The IBR Program invited climate and planning staff from each of the partner agencies to join ODOT and WSDOT climate specialists to convene for discussions and strategies to support shared climate goals. The climate technical work group meetings are held monthly and cover topics such as methods to assess greenhouse gas emissions associated with the Program, greenhouse gas reduction goals and targets, and the need for mutually supportive policies and programs to support shared climate goals. Future meetings will address design refinements, the environmental study, and construction means and methods, and investigate potential mitigation or offsets.

3.2 Community and Equity Advisory Groups

The CAG is composed of community members from both Oregon and Washington. The IBR Program shares information with the CAG, which then discusses and provides input in a public forum to help ensure that Program outcomes reflect community needs, issues, and concerns. CAG members and the Program team engage in dialogue with a commitment to meaningful, two-way feedback. The CAG generally meets monthly. Two co-chairs, one representing each state, lead the group's diverse and inclusive membership. These co-chairs also sit on the ESG. For more information on the CAG, see https://www.interstatebridge.org/advisory-groups/community-advisory-group/.

The EAG helps ensure that the IBR Program remains centered on equity. The group refined equity-focused screening criteria and has made recommendations to IBR Program leadership on the components of the Modified LPA, evaluating options through an equity lens to advance the Program's equity objectives. The EAG developed multiple screening criteria for the different design components (see Section 6). The EAG meets monthly. For more information on the EAG, see https://www.interstatebridge.org/advisory-groups/equity-advisory-group/.

3.3 Executive Steering Group

The ESG directly supports IBR Program progress. ODOT and WSDOT convened the 12-member group to provide regional leadership support on key Program issues. Members of the ESG include representatives from the 10 bi-state partner agencies with direct delivery or operational roles in the integrated, multimodal transportation system around the Interstate Bridge, as well as a community representative from each state. The two community representatives serve as the co-chairs of the CAG.

3.4 Federal Agencies

Coordination between the IBR Program and federal agencies is formalized through the environmental review process. Federal statute 23 United States Code (USC) 139 requires that agencies that have jurisdiction by law or a special interest in a project are provided an opportunity to formally participate in a program's environmental review process. The NEPA Coordination Plan is in development and will outline the roles and responsibilities of federal and other agency partners for the duration of the NEPA process.

3.5 Tribes

The IBR tribal consultation process is designed to encourage early and continuous feedback from, and involvement by, tribes potentially affected by the IBR Program, and to ensure that their input is incorporated into the decision-making process. Although tribal coordination and government-to-government tribal consultation is being undertaken as a distinct outreach effort, tribal involvement is also occurring during agency coordination. A tribal consultation plan is currently in development and will outline consultation milestones and strategy. To date, tribal concerns are similar to those expressed on the CRC project—impacts to natural and cultural resources, in particular fisheries and habitat loss and mitigation, as well cultural sites in and around the Fort Vancouver area. Tribes have asked to be deeply engaged throughout the Program lifecycle, and the IBR Program is committed to that engagement.

3.6 Community Engagement

The IBR Program offers continual opportunities for the community at large to provide input and feedback. Methods used to share information and solicit feedback include online open houses, digital surveys, equity priority listening sessions, community briefings, community working groups, and public comment submission via email and phone. These opportunities are advertised via the Program website, social media, mailed postcards, media advisories, in-person canvassing, multilingual community liaison outreach, Program newsletters, and partnerships with local community-based organizations. Engagement efforts have resulted in nearly 30,000 touch points with the community in 2021 alone, including receiving more than 18,000 online survey responses and 16,000 comments. The Program's spring 2021 community engagement efforts were recognized with a national TransComm 2021 Skills Award for Public Involvement Approach (with a consultant).

Between early February and mid-March 2021, the IBR Program held a targeted period of community engagement to gather specific feedback from the public regarding the transportation problems they experience with the current Interstate Bridge and to understand the community priorities and values that should help shape the Program. A comprehensive community engagement report details all feedback received. Key takeaways included:

- Widespread agreement that the six previously identified transportation problems still exist: congestion and travel reliability, safety, earthquake vulnerability, impaired freight movement, inadequate bicycle and pedestrian pathways, and limited public transportation.
- Solutions that address climate change, minimize impacts on neighboring communities, and address transportation needs of low-income travelers, people with disabilities, and non-drivers are valued.
- Congestion and travel reliability consistently ranked or expressed as the highest concern, with safety and earthquake vulnerability both ranked second and mentioned frequently.
- Concerns about transportation safety, including earthquake vulnerability and the impacts of substandard interstate design on drivers.
- Strong desire for an improved public transit connection between Portland and Vancouver.
- Concerns regarding tolling, including potential impacts on equity priority communities and the distribution of the cost burden.
- Value of a cost-effective Program with funding support that builds on previous work.

In the fall and winter of 2021–2022, the IBR Program held a second period of targeted community engagement to gather feedback and input on the design options and weigh in on the priorities that inform elements of the Modified LPA. A comprehensive community engagement report details all feedback. Key takeaways included:

- Design options and Program elements that improve travel times, relieve congestion, improve safety, and mitigate negative impacts to people and the environment are preferred.
- Equity priority communities rely on transit for a diverse range of needs.
- Trip time is the most influential factor when choosing how to make trips in the future. Ease of trip and avoiding a toll were the second and third most influential factors, respectively.
- While preferences for how to access Hayden Island and Marine Drive is heavily influenced by a respondent's geographic location, when asked to identify the priority for any Hayden Island Interchange design, nearly 70 percent of all survey respondents agreed that congestion relief on I-5 near Hayden Island is most important.
- Survey results indicate Washington residents prefer direct access to Hayden Island from I-5, while Oregon residents prefer to access Hayden Island via Marine Drive and new arterial bridges.
- The top three preferences for transit station locations are: (1) Vancouver waterfront, (2) near Clark College, and (3) Expo Center.

The IBR Program offers real-time engagement in online and in-person community meetings to address specific geographic areas, issues of concern, and Program priorities. Since February 2022, the

Program has hosted or attended more than a dozen community engagement events, including an online Black History Month Roundtable, multiple virtual and in-person meetings with the freight community, and presentations to and discussions with Program area neighborhood associations, including Bridgeton, Shumway, Hi-Noon, Arnada, and Rose Village, among others.

This feedback is important input that the IBR Program will continue to consider and integrate throughout the planning and design process.

3.7 Engagement with Freight Community

3.7.1 Freight Movement Public Listening Session

On May 27, 2021, the IBR Program hosted a Freight Movement Listening Session with members of the public. There were 46 participants, including representatives of marine and freight interests, ports, industry associations, and the Oregon and Washington legislatures. The purpose of this engagement was to provide information regarding the IBR Program and to hear from the freight community regarding their issues and concerns regarding the bridge. The key themes and takeaways included the following:

- Inability to use the Interstate Bridge due to height and weight limitations
- Concerns regarding congestion negatively impacting freight operations around Marine Drive
- Concerns regarding unreliability, narrow turns, safety, and bridge lifts
- Desire for more freight capacity on and around the bridge
- Challenges regarding travel path and turning radius

3.7.2 Freight Leadership Meetings

In partnership with the Ports of Vancouver and Portland, the IBR Program hosted two freight engagement sessions in the fall of 2021 and winter of 2021 with leaders of the regional freight community and IBR Program leadership. Attendees from the freight community included representatives from regional ports, industry associations, freight retail, and the Oregon and Washington legislatures. The key themes and takeaways included the following:

- Unimpaired freight movement is important to the local, regional, national, and international economies.
- Congestion through the I-5 corridor increases freight operational costs and negatively impacts the ability to attract and retain employees.
- Trucks avoid peak travel times if possible (6 to 9 AM and 3 to 9 PM).
- Suggestions for improvement include:
  - Install truck-only lanes
  - Reduce the number of on/off-ramps
  - Remove current height restrictions and bridge lifts

- It is desirable that road and pathway alignment be designed with consideration for optimal freight movement.
- High, wide, and heavy freight movement, including bridge and overpass heights should be considered.
- There is interest in learning about impacts to freight connectivity, including on/off-ramp locations and east/west access to Terminal 6 in North Portland.
- There is interest in future engagement regarding alignment and number of lanes through the Program area.
- There is concern that current exponential freight volume growth may increase congestion connected with Interstate 205 (I-205).

4. DESIRED OUTCOMES

Desired outcomes are observable and measurable accomplishments that the IBR Program aspires to achieve at a Program level. Input from partners,[4] the public, and the CAG and EAG was used to identify the Program's desired outcomes. The desired outcomes align with the Program's Purpose and Need statement, as well as with the community priorities and values adopted by the CAG, the equity objectives adopted by the EAG, and the IBR Program's climate objectives.

Table 1 identifies desired outcomes that are associated with the Program's Purpose and Need statement, and Table 2 identifies additional desired outcomes in alignment with the Program values, including desired outcomes specific to equity and climate resiliency. Desired outcomes were only developed for Program values that are applicable to the screening of high-level design options, (e.g., "foster leadership and cooperation" does not apply).

Table 1. Desired Outcomes Associated with the Purpose and Need Statement

Purpose and Need for the Program	Desired Outcomes
Growing travel demand and congestion	More people can move through the Program area.
	People of all ages, abilities, and incomes have access to move through the Program area, regardless of mode.
	Regional trips stay on I-5.
	Travel times through the Program area are faster and more predictable.
	Increase transportation choices and efficient travel patterns through coordinated land use and transportation planning.
Impaired freight movement	Freight travel through the Program area is more reliable.
	Freight travel times through the Program area are faster.
	Accommodate high, wide, and heavy cargo in existing and future routes.

[4] ODOT's and WSDOT's local partner agencies include Metro, the RTC, TriMet, C-TRAN, the City of Portland, the City of Vancouver, the Port of Portland, and the Port of Vancouver.

Purpose and Need for the Program	Desired Outcomes
Limited public transportation operations, connectivity, and reliability	More people have access to high-quality, affordable, and reliable transit.
	Transit connects people to their origins and destinations.
	Travel by transit is competitive with other modes.
	More people use transit.
	Travel by transit is predictable, reliable, and consistent.
Safety and vulnerability to accidents	Reduce overall crashes on I-5, including severe injury and fatal crashes.
	Reduce overall crashes, including severe injury and fatal crashes, on I-5 ramps, local streets, and active transportation networks in the Program area.
	Safety is reflected in the design of all modes.
	Fewer diverted trips from I-5 to local streets.
Substandard bicycle and pedestrian facilities	Active transportation is an attractive mode, and more people walk and cycle, both to access transit and instead of traveling by autos.
	More people have access to high-quality active transportation facilities.
	Traveling by walking, biking, and rolling feels safe because facilities are separated from moving vehicles and the shared-use path environment is visible and connected.
	The high-quality networks for walking/biking/rolling are convenient and connect destinations that are important for most trips.
Seismic	Bridges will be designed and constructed so that they will not collapse and will remain operable in a Cascadia subduction zone earthquake.

Table 2. Additional Desired Outcomes

Additional Desired Outcome Category	Desired Outcomes
Climate change and resiliency	Reduce greenhouse gas emissions in support of state climate goals.
	Minimize operational and embodied carbon during construction.
	All structures are resilient to and operable following anticipated climate disruptions (e.g., heat events, flooding, sea level rise).
	Program limits other environmental impacts that exacerbate effects of climate change (e.g., heat island, runoff).
Equity	Improved mobility, accessibility, and connectivity, especially for lower income travelers, people with disabilities, and communities who experience transportation barriers.
	Fewer identity-based disparities in travel time, access, transportation costs, and exposure to air pollution, road noise, and traffic crashes.
	Local community improvements are implemented in addition to required mitigations.
	Economic opportunities generated by the Program benefit minority- and women-owned firms, BIPOC workers, workers with disabilities, and young people.
	Equity priority communities have access, influence, and decision-making power throughout the Program in establishing objectives, design, implementation, and evaluation of success.
	Disproportionate impacts on equity priority communities are avoided rather than simply mitigated.
Cost effectiveness and financial resources	Pursue and leverage any and all federal, state, and other funding sources that support all modes and address long-term needs.
	Identify equitable tolling and pricing strategies supporting multimodal construction costs and improved operations and access, in coordination with statewide tolling program and in support of each state's climate goals.
	Ensure fiscal responsibility across the Program and into the future, including new technology to solve future problems.

The draft desired outcomes were presented to the ESG on October 21, 2021, and to the Bi-State Legislative Committee on October 27, 2021. The list above reflects the suggestions and discussion from those groups. The ESG concurred on the process for developing desired outcomes.

5. CHANGES SINCE THE CRC PROJECT

The existing conditions, regulatory and policy context, and community priorities have changed since the CRC project. These changes required revision of specific components of the 2013 LPA and the corresponding modification of design options. Section 5 summarizes the broader changes that apply to the entire IBR Program area, including equity and climate considerations. Section 7 identifies changes specific to a Program component (e.g., the river crossing).

Since the issuance of the CRC ROD and subsequent re-evaluations, there have been changes in existing environmental conditions ranging from physical changes in the environment within the Program footprint to regulatory changes to societal changes in community priorities and interests. The IBR Program prepared a NEPA re-evaluation in 2021 that identified some of those changes, which are summarized below.

- **Demographic changes.** The Portland-Vancouver metropolitan area added more than a quarter of a million residents between 2010 and 2020, with the majority being Black, Indigenous or People of Color (BIPOC) and/or Hispanic/Latino (U.S. Census Bureau 2010, 2020).
- **Housing costs.** The cost of housing has increased significantly, forcing many households with lower incomes to move to neighborhoods where housing is more affordable but that may be farther from job and activity centers (Metro 2015). The combination of longer distances traveled and limited public transit service in these areas places an added transportation cost burden on these community members, including many who moved from Portland to Clark County but still need to travel to Portland for work, medical appointments, family, or other needs (Metro 2018). Related to rising housing costs is a growing houseless population throughout the region (Clark County Council for the Homeless 2022; Multnomah County Joint Office of Homeless Services 2022). The number of encampments has increased, including in the highway right of way and throughout the study area.
- **Climate change.** In the past decade, there has been growing awareness and acceptance of the implications and impacts of climate change. Many communities, agencies, and businesses are reassessing their behavior and operations to identify how they might be contributing to global warming and resultant climate change, and they are examining how their environment is changing due to climate change. Both Washington and Oregon, as well as local governments in the study area, have established new climate policies since 2011. Additionally, recent exceptional weather events are driving changes in considerations and assumptions about climatic conditions and related community needs.
- **Traffic.** Changes have occurred since 2013 in traffic volumes and activities (RTC n.d.). The IBR Program has updated traffic models to extend the forecast to 2045 (CRC used 2035).
- **Transit service.** Changes in existing transit services and activities include C-TRAN's Fourth Plain Vine bus rapid transit route, which began service in 2017, and bus-on-shoulder operations on I-5

north of the Interstate Bridge, which began in 2020. TriMet has also expanded operations and planning for additional bus rapid transit service in the region.

- **Tolling.** Tolling programs are being studied and planned in Oregon (ODOT n.d.). Tolling on the Interstate Bbridge was included in the CRC analysis and is included in the IBR analysis.
- **Land use.** Localized development includes limited construction and buildings developed since issuance of the CRC ROD or building permit applications.
- **Historic resources.** A new group of historic-aged structures potentially eligible for listing on the National Register of Historic Places has been identified since the previous historic period survey, which considered structures dating back to 1967. Assuming that construction of the Modified LPA will begin in 2025, the historic resources period has been extended 15 years to consider buildings built in or prior to 1982.
- **Endangered Species Act.** ESA listings and critical habitat designations have changed since the 2013 consultations with the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries) and the U.S. Fish and Wildlife Service (USFWS) (NOAA n.d.; USFWS 2021). The IBR Program has consulted with NOAA Fisheries and USFWS to determine the Section 7 consultation approach and bring the consultations up to date with current species listings and critical habitat designations and to reflect changes in best available science.
- **Changes in other regulations.** Many environmental regulations, procedures, and permits, including the U.S. Coast Guard's Section 9 Bridge Permit process, have changed or been updated since the issuance of the CRC ROD and re-evaluations. The technical reports prepared to support this Draft SEIS include additional detail on regulations specific to each technical discipline that have changed since 2013.

As noted above, to evaluate the effect of changes in conditions and regulations since 2013, as well as potential design changes, the IBR Program prepared a NEPA re-evaluation in 2021. Based on the information presented in the re-evaluation, FHWA and FTA concluded that the IBR Program could include project design changes or refinements to the CRC Selected Alternative that would result in new or changed significant adverse impacts that were not evaluated in the CRC Final EIS and ROD. In addition, they concluded that new information or circumstances (due to changes in the physical environment, community priorities, and regulations) since the CRC ROD could result in new or changed significant adverse impacts not previously evaluated. Therefore, in compliance with 23 CFR 771.130(a), FHWA and FTA determined that an SEIS would be necessary to identify and disclose new adverse impacts and mitigation associated with the IBR Program.

6. SCREENING AND EVALUATION PROCESS

The proposed design modifications were selected through the five-step process described in Section 2.2, which began with (1) validating the Purpose and Need, (2) identifying desired outcomes, and (3) documenting changes in the Program area. The last two steps were to develop screening methods and metrics, and to screen and evaluate the design options. The methods and metrics were tailored for each component to provide a meaningful evaluation that reflected the key considerations for each component (i.e., the screening methods and metrics for the main river crossing were not the same as those for the auxiliary lanes). The following sections describe the screening and evaluation processes for each component.

6.1 Screening and Evaluation Process for Hayden Island/Marine Drive Interchanges and Main River Crossing

The following sections summarize the screening process used to arrive at recommendations for the interchange configurations on Hayden Island and Marine Drive, and for the general design of the replacement bridges across the Columbia River.

6.1.1 Process Overview

Screening metrics that reflect the Program's Purpose and Need and other desired outcomes were developed in fall 2021. Screening metrics are specific, measurable metrics that provide differentiating data between the design options for a given Program component (e.g., the river crossing). The metrics were used during screening to identify the benefits and tradeoffs between the design options and ultimately assessed how well a design option met the desired outcomes (see Table 1 and Table 2 in Section 4).

Working in collaboration with partners and the task forces, the IBR design and environmental teams developed a menu of potential screening metrics for design components through an iterative process, including input from the EAG, who reviewed and identified screening metrics that could be used to advance the Program's equity objectives. See Section 6.1.2 for a description of how equity and climate were embedded in the screening process.

To align with the desired outcomes tied to the Purpose and Need, the metrics were organized into the following categories:

- Active Transportation
- Transit Access
- Vehicles
- Freight
- Seismic issues

The following categories were also included to reflect other desired outcomes:

- Climate Impacts/Adaptation
- Natural Environment
- Built Environment
- Cost

As screening metrics were developed, IBR staff, partner agencies, and the EAG identified whether a metric was representative of a desired outcome; in many cases, a metric was representative of more than one desired outcome or objective. Additional metrics were identified to help assess a design option's effects on the natural and built environment. Metrics were modified during the evaluation process if it became apparent that additional differentiators were needed or if the selected metrics were not highlighting differences among the options.

During screening, the task force for each component used a three-point Harvey balls system (○ = good, ◑= better, ● = best) to score each metric in the matrix for a given design option. Some metrics were considered for informational purposes only and did not receive a score. The task forces reviewed the data and the scoring to understand a design option's ability to meet the Purpose and Need statement and desired outcomes, its benefits and tradeoffs, and its success in meeting the equity and climate objectives.

Detailed screening summaries were developed for each of the design options that the task force ultimately recommended to advance. For the screening summaries, the original three-point Harvey balls system was converted to a five-point Harvey balls system (five scores from good to best: ○◔◑◕●) to help further differentiate each of the design options. A single Harvey balls score summarized all of the data for a given category.

The screening results were also considered through an equity lens and a climate lens (described below). A design option's performance in meeting the equity objectives and climate objectives was determined by evaluating the option's performance under all metrics identified as upholding an equity and/or climate objective. Each design option was then scored from low to high for equity and climate.

6.1.2 Incorporating Equity and Climate

During screening, each design option received a rating under the "equity lens" and "climate lens." These ratings range from low to high and are based on how a design option scored on all metrics that support an equity objective or climate objective. The task forces and EAG developed the equity and

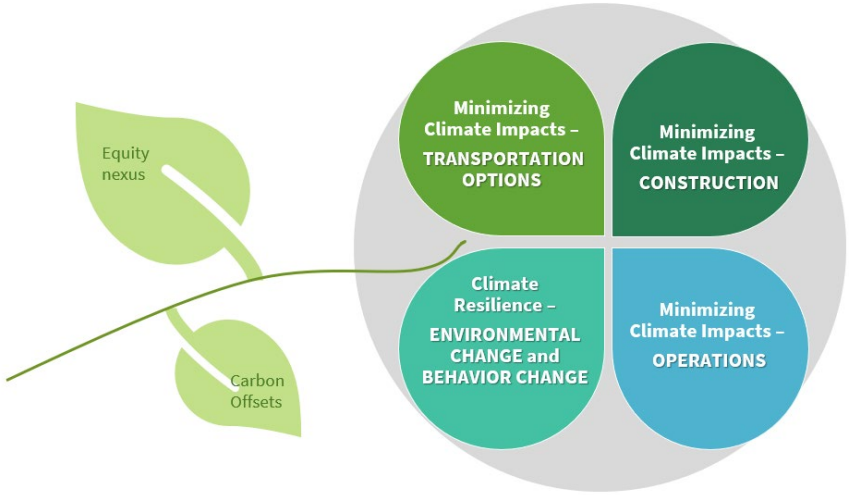
climate objectives and provided input on which metrics could be used to measure the extent to which a design option met an objective.

The equity objectives were developed by the EAG and adopted as part of the IBR Program's Equity Framework. The following equity objectives apply to the screening of high-level design options and were subsequently included in the screening process:

- **Avoid further harm.** Avoid rather than simply mitigate disproportionate impacts on equity priority groups.
- **Community benefits.** Find opportunities for and implement local community improvements in addition to required mitigations.
- **Economic opportunity.** Ensure that economic opportunities generated by the Program benefit minority- and women-owned firms, BIPOC workers, workers with disabilities, and young people.
- **Mobility and accessibility.** Improve mobility, accessibility, and connectivity, especially for lower income travelers, people with disabilities, and communities that experience transportation barriers.
- **Physical design.** Integrate equity, area history, and culture into the physical design elements of the Program, including bridge aesthetics, artwork, amenities, and impacts on adjacent land uses.

The IBR Program's climate objectives were developed in collaboration with agency partners, advisory groups, and the community. Attachment A provides a summary of the climate planning, policies and goals of agency partners and shows where and how the IBR Program climate framework and desired outcomes (as well as other Program initiatives, efforts and goals – such as equity and public engagement) are aligned. The IBR Program's climate framework consists of a four-pillar approach, as illustrated on Figure 2, that focuses on improving climate resilience through changes in the environment and behavior, and minimizing climate impacts through transportation options, construction methods, and long-term operations. Given the equity focus of the Program, climate considerations will also be evaluated for disproportionate impacts to communities of concern and equity priority groups (as defined by the EAG); this is referred to as the "equity nexus". Offsets, while not part of the framework, are acknowledged as a potential tool in further achieving climate objectives.

Figure 2. IBR Program Climate Framework



The following climate objectives were included in the screening process for consideration of design options:

- Supports complete communities.
- Compatible with low carbon construction.
- Supports intelligent transportation systems.
- Supports multimodal environmental factors.
- Supports low emission operations and maintenance.
- Improves **resilience** to uncertain climatic conditions.
- **Reduces idling** of vehicles (freight, single-occupancy vehicles, transit).

6.2 Screening and Evaluation Process for Transit Options

6.2.1 Process Overview

An initial range of potential transit investments was developed by the IBR Program and the partner agency transit technical teams to better understand how different combinations of mode (bus rapid transit [BRT], light rail transit [LRT]), alignment, station locations, termini (end points), and park-and-ride locations could perform relative to each other. To arrive at forecasts for the year 2045, each of the representative transit investments was modeled through the Metro/RTC regional travel demand model. Through TOTS, partners and the IBR team developed measures to better understand how the

representative transit investments would perform relative to each other (see Attachment D). The measures included:

- Multiple measures of ridership demand in 2045
  - River crossings by mode
  - Ridership by time of day
  - Mode of access
    - Walk
    - Transfer from other transit (bus/rail)
    - Park and ride
- Access for equity priority communities
- Relative costs
  - Capital cost
  - Operations and maintenance cost
- Potential impacts

6.2.2 Incorporating Equity and Climate

The equity and climate objectives identified in Section 6.1.2 were used to evaluate transit options. Input from the EAG was collected to identify specific considerations that should be taken into account during the evaluation of transit options. To evaluate the transit investments through an equity lens, the IBR Program Equity Team applied a methodology to estimate access to jobs - and, by proxy, services - by transit for different demographics. To evaluate the transit investments through a climate lens, the IBR Climate Team evaluated how the design options could support climate initiatives and local and regional policies to reduce greenhouse gas emissions. For example, one metric looked at how a design option could improve transit demand, thereby supporting a mode shift away from personal vehicles. Additional details on equity and climate considerations for the transit evaluation are identified in Section 7.3.3.

6.3 Screening and Evaluation Process for Auxiliary Lanes

6.3.1 Process Overview

Based on the desired outcomes, a series of metrics were developed with input from technical partner agency staff. These metrics included anticipated travel time during morning and evening peak travel periods, the anticipated congestion index (a measure of vehicle density and congestion levels), and the estimated daily mode share (i.e., what percentage of travelers would be personal vehicles, freight vehicles, transit, and active transportation). The analysis was completed by modeling 2045 forecast traffic volumes in order to obtain estimates for the identified metrics. The analysis also included close coordination with partner agencies in order to balance regional needs and priorities, including safe, efficient, and reliable travel, as well as equity and climate goals.

6.3.2 Incorporating Equity and Climate

The equity and climate objectives identified in Section 6.1.2 were used to evaluate auxiliary lanes. The EAG provided input on specific considerations that the Program should take into account when evaluating auxiliary lanes and selecting a design option. To evaluate the auxiliary lanes through an equity and climate lens, metrics were identified that could help address equity objectives (e.g., improve travel times) and support goals and policies to reduce greenhouse gas emissions (e.g., encourage a mode shift to transit or active transportation). Additional details on equity and climate considerations for the transit evaluation are identified in Section 7.4.3.

7. DESIGN OPTION DEVELOPMENT AND SCREENING

This section identifies the Program components proposed for refinement through design options, the changes that have occurred since 2013, and provides an overview of agency input and public feedback to date for each Program component proposed for refinement through design options. To address the changes identified in Section 5, and to evaluate the components through an equity lens and a climate lens, the IBR Program collaborated with agency partners to develop high-level design options to respond to changes while incorporating current regional values and priorities. There are four components, or design areas, for which the IBR Program, partners, and community identified the need for design changes:

- Hayden Island and Marine Drive
- Main river crossing
- Transit mode, general alignment and termini
- Auxiliary lanes

7.1 Hayden Island and Marine Drive

The primary design considerations for Hayden Island and Marine Drive were the interchange type on Hayden Island and resulting multimodal connections with Marine Drive and I-5. The IBR Program evaluated multiple concepts, ultimately advancing full, partial, and no-interchange options for Hayden Island into the screening process. All design options included a full interchange at I-5/Marine Drive; an arterial bridge across North Portland Harbor to serve local traffic; a shared-use path for active transportation connecting North Portland, Hayden Island and the 40-Mile Loop Trail; and the realignment of N Tomahawk Island Drive[5] to provide an additional east-west local street connection on Hayden Island.

Supporting materials for the Hayden Island and Marine Drive design options are provided in Attachment B, including the screening matrices and screening summaries. The IBR Program will ensure that information in the SEIS is consistent with and supports the Interchange Access Modification Request process, as it collaborates with and seeks approval from FHWA for the Program's proposed access revisions.

7.1.1 Changes since 2013

The IBR Program identified the following changes in conditions since 2013 related to Marine Drive and Hayden Island through advisory group input, community feedback, and input from agency partners serving on the Hayden Island/Marine Drive task force. These changes necessitated the development of design options for the Marine Drive and Hayden Island interchanges.

[5] In response to a government-to-government request, the IBR Program is pursuing conversations with the City of Portland for consideration of a street name change to N Tomahawk Island Drive.

- **Land use.** Planned land uses at the west end of Hayden Island have changed (e.g., a marine terminal is no longer planned).
- **Freight.** Freight movements have changed, with less freight anticipated on Hayden Island but increased freight in the North Portland area. The Port of Portland is no longer planning to develop West Hayden Island into a port facility. Meanwhile, freight-related development in North Portland industrial areas has grown.
- **Traffic.** Auto and freight volumes in the Program area have increased, and the design year for the Program has been updated from 2030 to 2045.
- **North Portland Harbor Bridge.** Over the past decade, the need to replace this seismically deficient structure has increased. The IBR Program will replace the North Portland Harbor bridge to improve seismic resiliency in the corridor.
- **Project Footprint.** During the CRC project's public engagement, community feedback suggested that the project's footprint on Hayden Island was too large under the 2013 Design.
- **Portland Transportation Hierarchy.** The City of Portland uses a transportation hierarchy to prioritize modes when making transportation investment and design decisions. Variations of this hierarchy existed during the CRC project, but it was last updated with the City of Portland's 2035 Comprehensive Plan (policy 9.6). The prioritization of modes has changed since the CRC project, including the elevation of transit to the third priority, following walking and biking.
- **Levee.** The USACE, in partnership with the Multnomah County Drainage District (MCDD), is planning improvements to the existing levee along the south side of the harbor (the Levee Ready Project). It is anticipated that the new levee design will require any improvements associated with the IBR Program to stay above a 38-foot elevation (North American Vertical Datum of 1988). Alterations to I-5 will require review by the USACE, MCDD, and the City of Portland for compliance with levee requirements associated with the Levee Ready Project.

7.1.2 Community Input

Community input on the Hayden Island/Marine Drive interchanges came from a variety of events and sources. An online survey in the winter of 2021 was held to understand the community's values and priorities around various improvements, including interchange options for Hayden Island/Marine Drive. Survey participants identified congestion relief on I-5 near Hayden Island as the top priority for interchange design. Additional input on the interchanges was collected from the Hayden Island/Marine Drive Community Working Group (meetings were held in September and December 2021), CAG meetings (Hayden Island/Marine Drive discussions were held in March 2022 to May 2022), and other outreach efforts detailed in the community engagement report (see Section 3.6). Feedback from the community on the Hayden Island and Marine Drive interchange area included:

- Congestion relief and safety are priorities.
- There is a community desire for a local connection between North Portland and Hayden Island.
- There is a need for active transportation facilities and multimodal connections in the Program area between North Portland and Hayden Island and the I-5 bridge over the Columbia River.
- There is a community desire to maintain and/or improve east-west connectivity across Hayden Island.
- The Program should address the bottlenecks that affect access to Hayden Island.
- Prioritize the option with smallest footprint over Hayden Island.
- Consider freight needs, as well as active transportation safety and access.
- Prioritize congestion relief on I-5 near Hayden Island, safe intersections and road improvements, and convenient access to services, shopping, and restaurants.
- Washington residents preferred direct access to Hayden Island and Oregon residents preferred island access via Marine Drive and local access bridge.

7.1.3 Equity and Climate Considerations

See Section 6.1.2 for a discussion on how equity and climate were incorporated into the screening process. Equity considerations for the interchanges screening were identified through coordination with the EAG (discussions on the Hayden Island/Marine Drive interchanges were held winter 2021 – spring 2022), two equity-focused listening sessions (held in March 2021), the winter 2021 community survey, and input from partner agencies on their equity programs and policies. To evaluate the IBR Program through an equity lens, the following considerations, applicable to the Hayden Island/Marine Drive interchanges, were incorporated during development of the design options:

- There is a need to provide access to the significant number of retail and service industry jobs located in the area.
- There are a high proportion of older adults and people with disabilities living on Hayden Island.
- The Program should consider the relationship between the Program's footprint and opportunities for ancillary development.
- Minimize impacts to property, including displacement of businesses and residences.

Climate considerations for the interchanges screening were identified through input from the CAG and partner agencies on their climate initiatives and policies. See Section 6.1.2 for a discussion of these planning policies and goals. To evaluate the IBR Program through a climate lens, the following considerations were incorporated during development of the design options:

- The design options should raise the I-5 mainline and local streets above the 100-year flood elevation to protect them from sea-level and water rise associated with climate change.
- The North Portland Harbor bridge has aged beyond the point that seismic retrofitting is feasible, as was proposed in the 2013 Design. Replacing this bridge would improve the community's resiliency to sea level rise.
- The design options should improve multimodal connectivity to, from, and through Hayden Island and encourage a shift from vehicle trips to low or no emissions travel (e.g., transit, bike, walk).

The following Program elements, which are related to the equity and climate considerations, were incorporated into all design options:

- Separated shared-use path for active transportation.
- Replacement of the North Portland Harbor bridge.

7.1.4 Hayden Island/Marine Drive Task Force

The purpose of the Hayden Island/Marine Drive task force was to have focused, detailed technical discussions on what transportation improvements the IBR Program could make to Hayden Island and Marine Drive and to understand local conditions, needs, and planned transportation improvements.

The Hayden Island/Marine Drive task force met 18 times between late spring 2021 and early winter 2022. There was an average of 50 participants per meeting, with staff from 10 local partner agencies and technical staff from the IBR Program. The task force discussions covered a wide variety of topics, including the interchange compatibility and function, integration of active transportation improvements, connections to the local street network, and reducing environmental impacts. These discussions assisted in the identification of site-specific needs and refining metrics for screening design options.

The IBR design team developed eight preliminary design concepts based on numerous design iterations and, in fall 2021, completed a tradeoffs matrix with the task force to identify design options to be advanced into screening.

The IBR team developed the pre-screening tradeoffs matrix with the goal of advancing one full interchange design option, one partial interchange design option, and one no-interchange design option at Hayden Island through screening. The purpose of the pre-screening was to find the best performing, lowest impact design option for each type of interchange to advance into the screening where it could be evaluated against the screening criteria.

The tradeoffs matrix listed features and challenges based on design work for task forces in summer/fall 2021. Features and challenges included the following:

- Footprint
- Safety
- Mobility
- Access and connectivity for auto, freight, transit, and active transportation
- Constructability
- Seismic resiliency
- Compatibility with other project components

Each of the four full interchange design options (including the 2013 Design) received a plus or minus for each feature/challenge relative to other full interchange design options (but not relative to partial and no-interchange design options). This was also completed for each of the three partial interchange design options, and for the single no-interchange option. Based on the features and challenges, the IBR team prepared a draft recommendation on whether to advance or not advance each design option into screening and provided explanatory documentation to support each recommendation.

The IBR team received feedback from the task force on the tradeoff matrix features/challenges, pluses/minuses, and recommendation/rationale.

7.1.5 Design Options Selected for Screening

Following agency and public input, the Hayden Island/Marine Drive task force identified five design options, in addition to the 2013 Design, to advance for screening:

- Design Option 1: Full Interchange
- Design Option 2: Partial Interchange 1
- Design Option 3: Partial Interchange 2
- Design Option 4: No Interchange
- Design Option 5: Partial Interchange 3

The 2013 Design (Design Option 0) was included in the screening and compared to the design options.

Each design option is described and illustrated below. All design options incorporate the following elements:

- Replacement of the North Portland Harbor bridge
- An arterial roadway connection between North Portland and Hayden Island
- An additional east-west local connection on Hayden Island
- Separated multi-use pathway for active transportation
- A high-capacity transit (HCT) station on Hayden Island
- A full interchange at I-5/Marine Drive.

High-level line drawings are provided below for the design options, which show roadway networks beyond the anticipated project limits; the extended network is provided for illustrative purposes. Section 7.1.6 details the results of the screening process, including why a design option was (or was not) advanced.

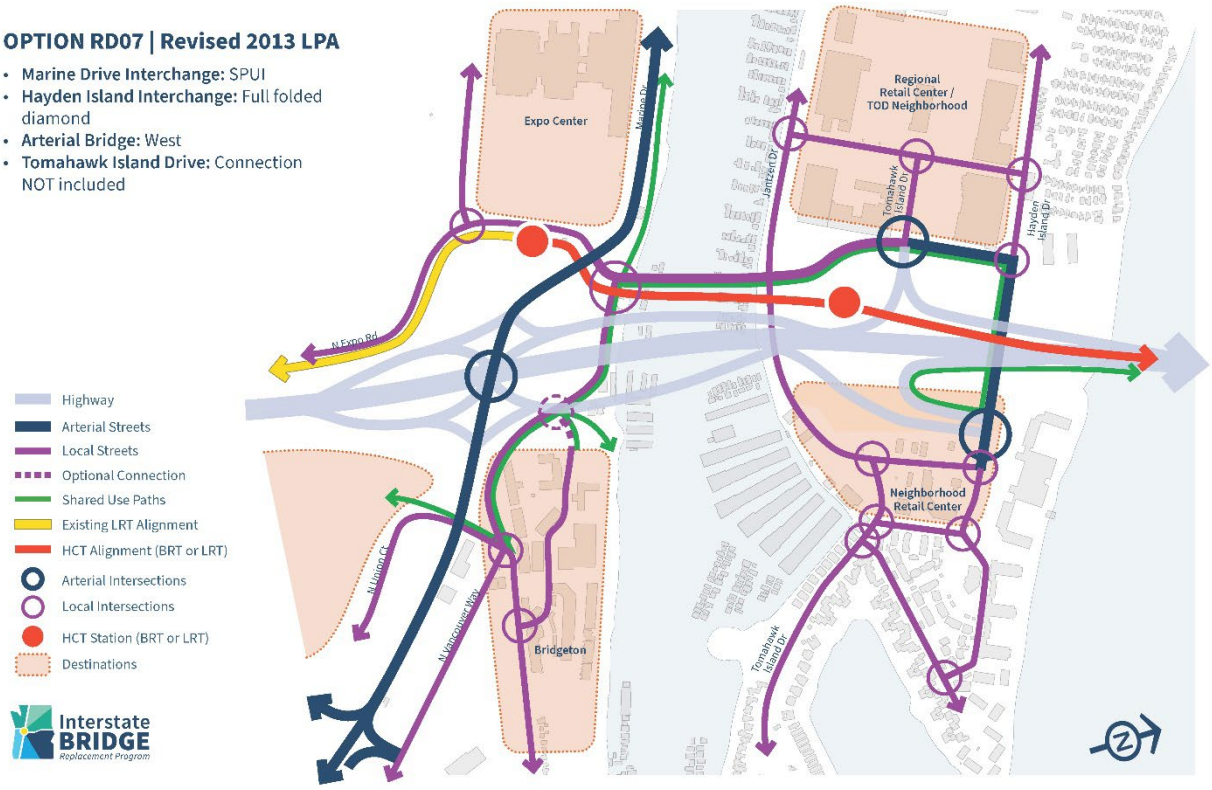
7.1.5.1 Hayden Island/Marine Drive Design Option 0: 2013 Design

The 2013 Design includes full interchanges on both Hayden Island and Marine Drive (Figure 3). The design includes local vehicular access between Marine Drive and Hayden Island on a local multimodal bridge.

The proposed configuration at Marine Drive was a single-point urban interchange (SPUI). With this configuration, the four ramps of the interchange would converge at a single signal-controlled intersection on Marine Drive over the I-5 mainline. Local traffic between Martin Luther King Jr. Boulevard/Marine Drive and Hayden Island would travel via a local multimodal bridge over North Portland Harbor, located to the west of I-5. A shared-use path west of I-5 would connect the river crossing bridge to the 40-Mile Loop Trail, with connections on Hayden Island. Improvements would include realignment of Expo Road.

The Hayden Island interchange would be reconfigured to improve safety for traffic merging on I-5 by providing sufficient ramp lengths parallel to I-5. Improvements would be included for Jantzen Drive and Hayden Island Drive; the roadways would be improved from a three-lane to a five-lane configuration to facilitate traffic using the interchange.

Figure 3. Hayden Island/Marine Drive Design Option 0: 2013 Design



7.1.5.2 Hayden Island/Marine Drive Design Option 1: Full Interchange

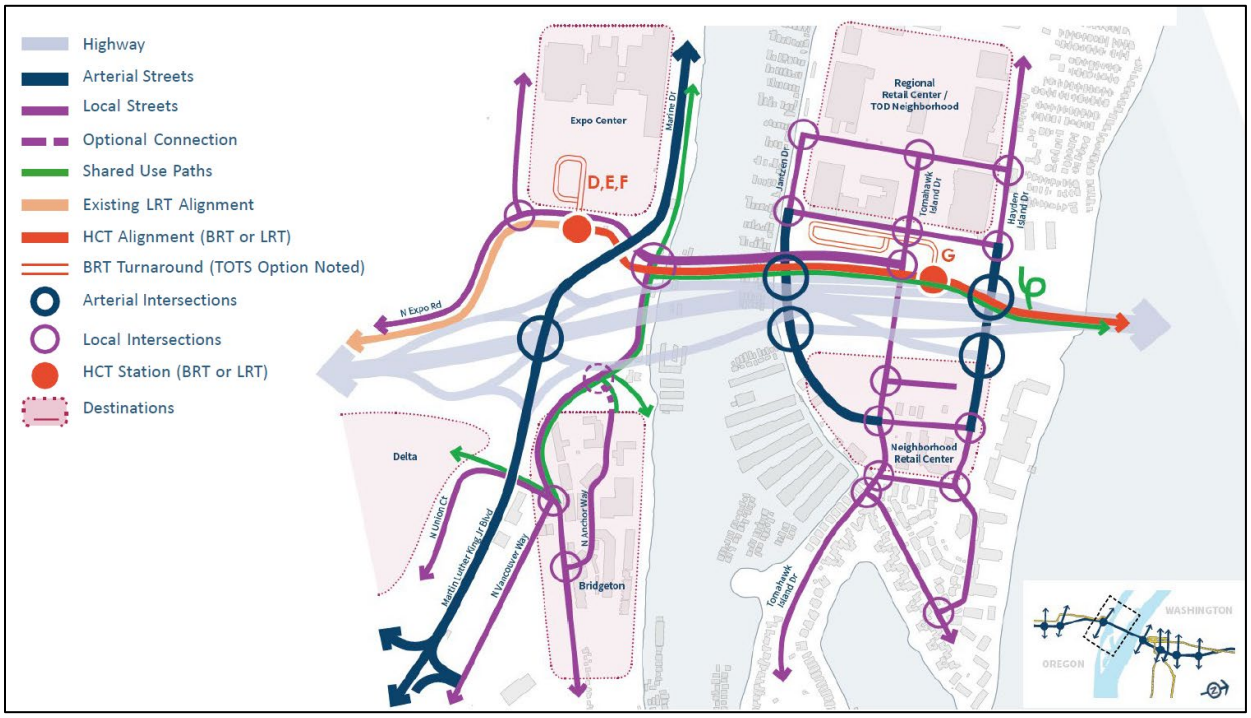
Like the 2013 LPA, Design Option 1 includes full interchanges on both Hayden Island and Marine Drive (Figure 4). This option would have a full, split tight diamond interchange at Hayden Island and a SPUI at Marine Drive. A shared-use path west of I-5 would connect the river crossing bridge to the 40-Mile Loop Trail, with connections on Hayden Island.

Local street connections on Hayden Island would be maintained under I-5 with some variations, including a third crossing under I-5 for Tomahawk Island Drive. An arterial bridge would connect Hayden Island to Expo Road (west of I-5) and Pier 99 Street. Roadway infrastructure would be farther west than in the 2013 LPA to accommodate the replacement of the North Portland Harbor bridge.

The following elements of Design Option 1 were studied in the CRC draft and/or final EIS.

- Full access SPUI at Marine Drive
- Full interchange on Hayden Island
- Tomahawk Island Drive extension under I-5
- Vancouver Way extension to Expo Road
- Arterial bridge to west of existing I-5 North Portland Harbor bridge
- New bike/pedestrian paths
- Martin Luther King Jr. (MLK) Boulevard gull wing interchange east of I-5

Figure 4. Hayden Island/Marine Drive Design Option 1: Full Interchange



7.1.5.3 Hayden Island/Marine Drive Design Option 2: Partial Interchange 1

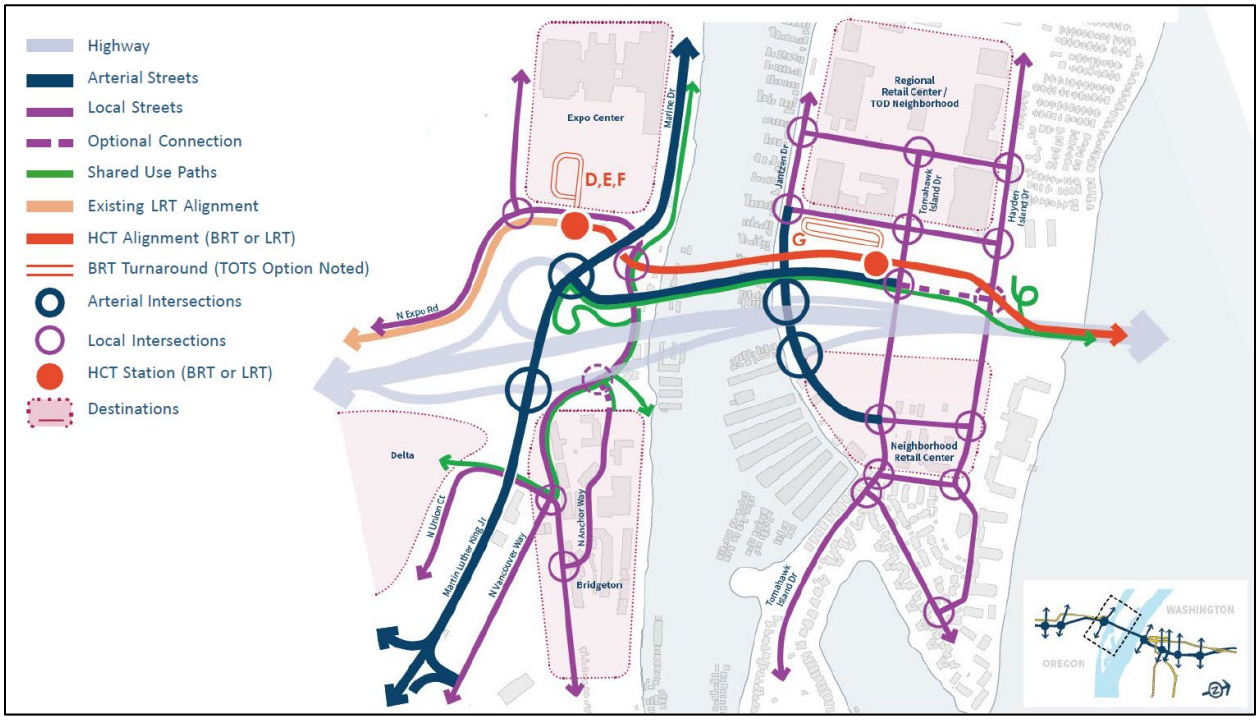
Design Option 2 would include a full access folded diamond interchange at Marine Drive and a half diamond interchange on Hayden Island (Figure 5). The partial interchange on Hayden Island would provide direct ramp connections between Jantzen Drive and I-5 north of Hayden Island. Hayden Island traffic traveling to/from the south would access I-5 by at the Marine Drive interchange through an arterial bridge that connects Tomahawk Island Drive and Marine Drive across the North Portland Harbor. A shared-use path west of I-5 would connect to the 40-Mile Loop Trail, with connections to other active transportation facilities on Hayden Island.

Local street connections on Hayden Island would be maintained under I-5 with some variations, including a third crossing under I-5 for Tomahawk Island Drive. Roadway infrastructure would be farther west than in the 2013 LPA to accommodate the replacement of the North Portland Harbor bridge.

The following elements of Design Option 2 were studied in the CRC draft and/or final EIS.

- Tomahawk Island Drive extension under I-5
- Vancouver Way extension to Expo Road
- Phased I-5 braided on- and off-ramps at Victory Boulevard
- New bike/pedestrian paths
- MLK Boulevard gull wing interchange east of I-5

Figure 5. Hayden Island/Marine Drive Design Option 2: Partial Interchange 1



7.1.5.4 Hayden Island/Marine Drive Design Option 3: Partial Interchange 2

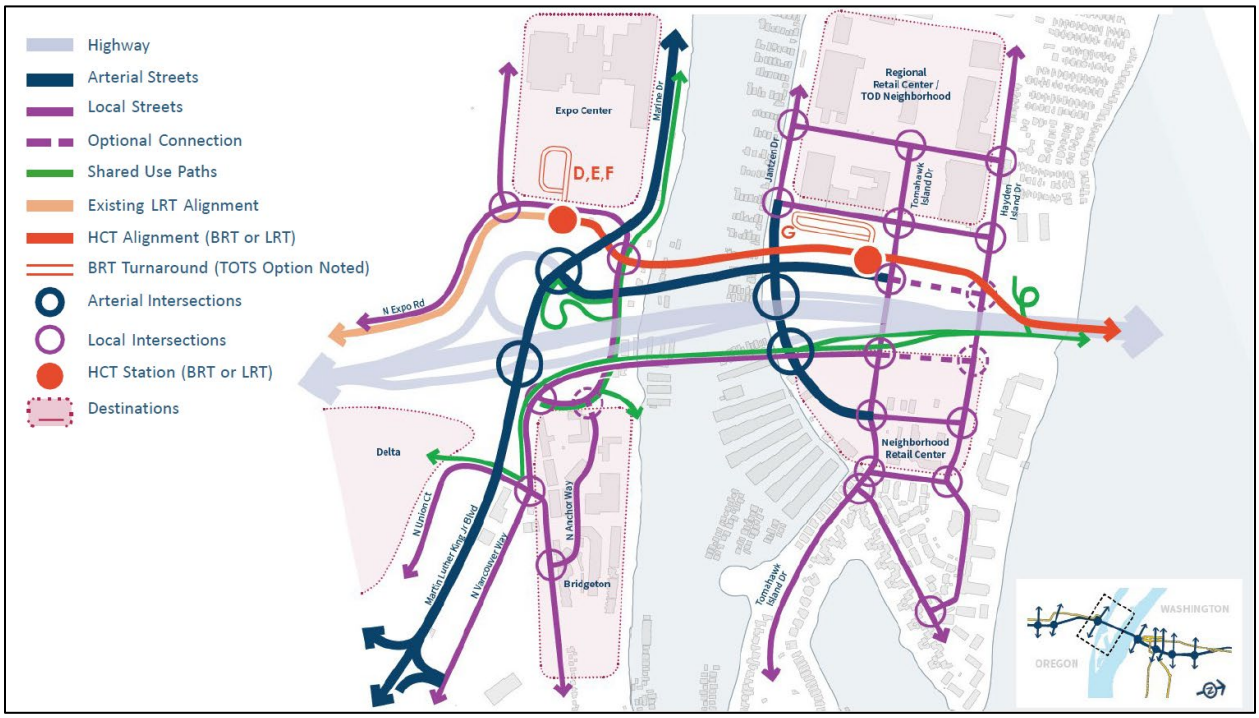
Design Option 3 would also have a full access folded diamond interchange at Marine Drive and a half diamond interchange on Hayden Island (Figure 6). Design Option 3 would have the same west arterial bridge configuration as Design Option 2 but would also add a local street bridge east of I-5. The local street bridge east of I-5 would provide a connection between Tomahawk Island Drive and Vancouver Way. A shared-use path would connect the river crossing bridge to the 40-Mile Loop Trail via the east arterial bridge, with connections on Hayden Island.

Local street connections on Hayden Island would be maintained under I-5 with some variations, including a third crossing under I-5 for Tomahawk Island Drive. Roadway infrastructure would extend farther west than in the 2013 LPA to accommodate the replacement of the North Portland Harbor bridge.

The following elements of Design Option 3 were studied in the CRC draft and/or final EIS.

- Tomahawk Island Drive extension under I-5
- Vancouver Way extension to Expo Road
- Phased I-5 braided on- and off-ramps at Victory Boulevard
- New bike/pedestrian paths
- MLK Boulevard gull wing interchange east of I-5

Figure 6. Hayden Island/Marine Drive Design Option 3: Partial Interchange 2



7.1.5.5 Hayden Island/Marine Drive Design Option 4: No Interchange

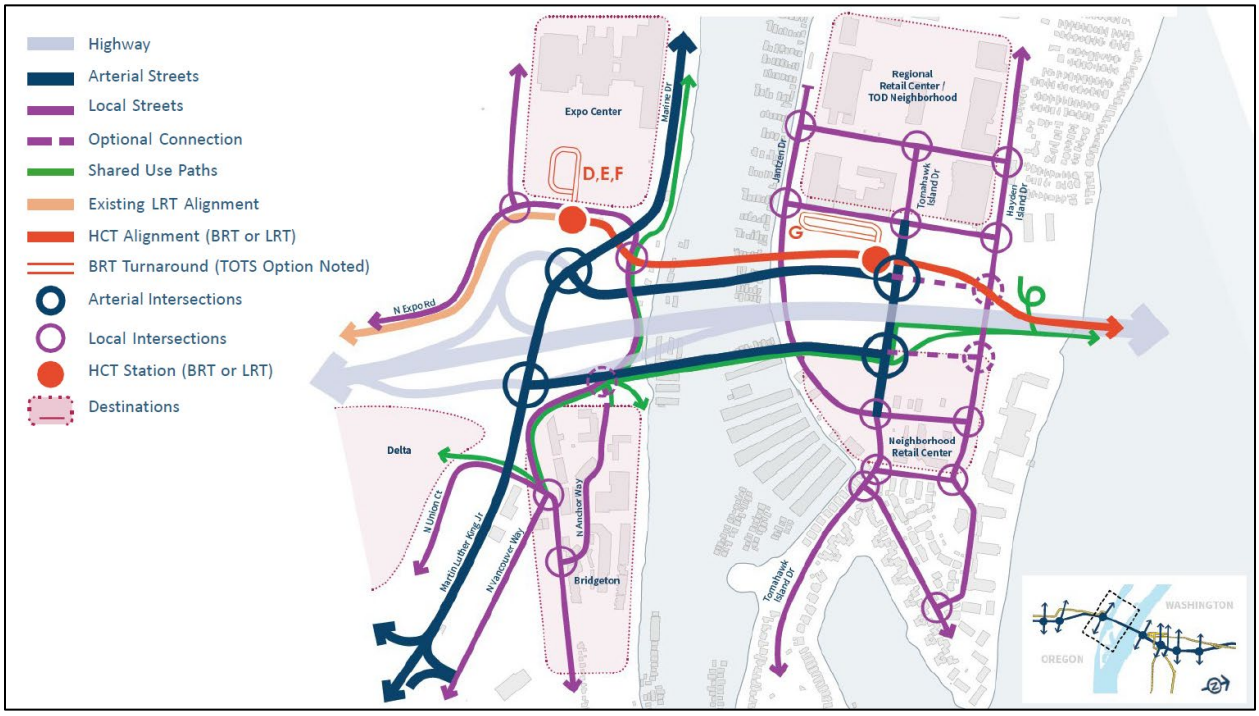
Under this design option, there would be no interchange on Hayden Island (Figure 7). Similar to Design Options 2 and 3, a full access folded diamond interchange would be located be at Marine Drive. All access to/from Hayden Island would be provided through the Marine Drive interchange with two arterial bridges that connect Tomahawk Island Drive to Marine Drive. A shared-use path would connect to the 40-Mile Loop Trail via the local street bridge, with connections on Hayden Island.

Local street connections on Hayden Island would be maintained under I-5 with some variations, including a third crossing under I-5 for Tomahawk Island Drive. Roadway infrastructure would extend farther west than in the 2013 LPA to accommodate the replacement of the North Portland Harbor bridge.

The following elements of Design Option 4 were studied in the CRC draft and/or final EIS.

- Tomahawk Island Drive extension under I-5
- Vancouver Way extension to Expo Road
- New bike/pedestrian paths
- MLK Boulevard gull wing interchange east of I-5

Figure 7. Hayden Island/Marine Drive Design Option 4: No Interchange



7.1.5.6 Hayden Island/Marine Drive Design Option 5: Partial Interchange 3

During the screening process, the Hayden Island/Marine Drive task force identified design and operational flaws in Design Options 2 and 3 that made them infeasible. In particular, routing all Hayden Island traffic to/from the south through the Marine Drive folded diamond interchange resulted in heavy traffic volumes on Marine Drive ramps that could not be accommodated in a safe manner. As a result, the task force developed a new partial interchange option (Design Option 5) that would address the issues identified in Design Options 2 and 3.

Similar to Design Options 2 and 3, the partial interchange configuration under Design Option 5 would provide I-5 ramps to/from the north to Hayden Island via Jantzen Drive (Figure 8). However, Design Option 5 would use a full access SPUI at Marine Drive, similar to Design Option 1, to resolve some of the challenges posed by the folded diamond interchange configuration.

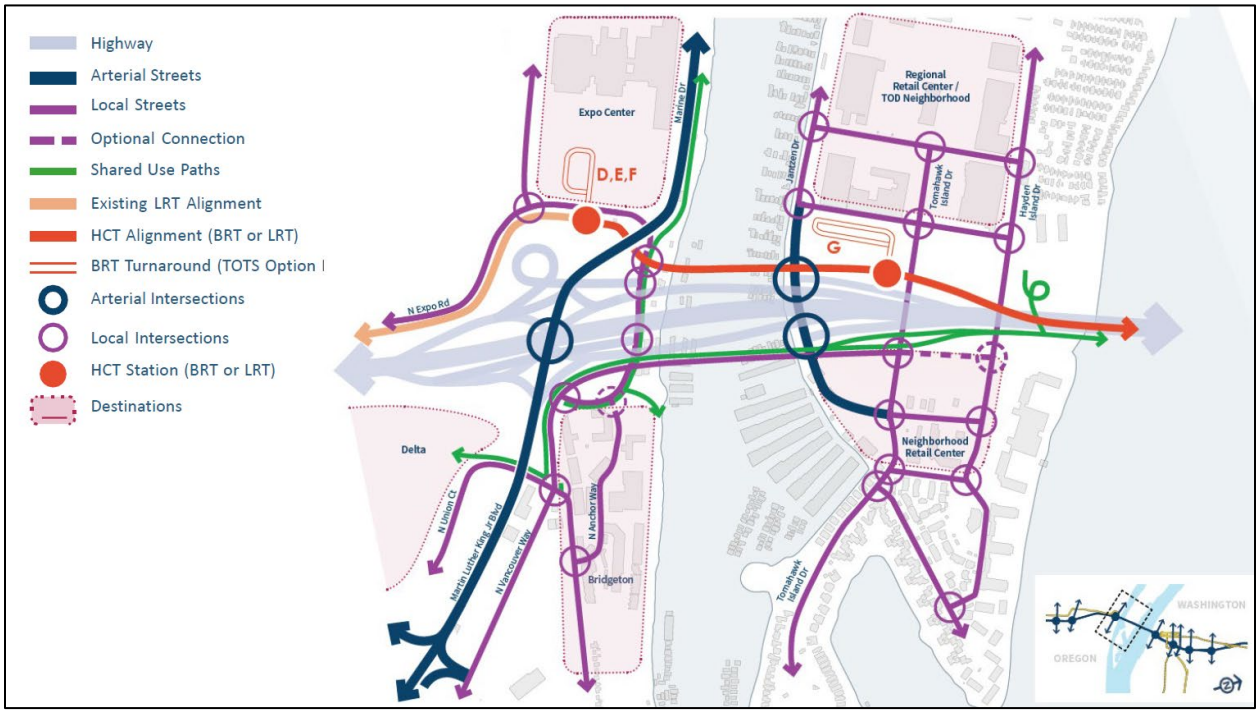
Hayden Island traffic to/from the south would use an arterial bridge east of I-5 between Tomahawk Island Drive and Vancouver Way to connect to two new I-5 ramps. The new I-5 ramps would cross under Marine Drive and connect to the arterial bridge through new interchange ramp terminals on Pier 99 Street. Similar to Design Option 3, a shared-use path would connect to the 40-Mile Loop Trail via the east arterial bridge, with connections to other active transportation facilities on Hayden Island.

Local street connections on Hayden Island would be maintained under I-5 with some variations, including a third crossing under I-5 for Tomahawk Island Drive. Roadway infrastructure would extend farther west than in the 2013 LPA to accommodate the replacement of the North Portland Harbor bridge.

The following elements of Design Option 5 were studied in the CRC draft or final EIS.

- Full access SPUI at Marine Drive
- Tomahawk Island Drive extension under I-5
- Vancouver Way extension to Expo Road
- Phased I-5 braided on- and off-ramps at Victory Boulevard
- New bike/pedestrian paths
- MLK Boulevard gull wing interchange east of I-5

Figure 8. Hayden Island/Marine Drive Design Option 5: Partial Interchange 3



7.1.6 Screening Results

The five design options described in Section 7.1.5, in addition to the 2013 Design, advanced from initial task force discussions to screening. During screening, the task force collected data for approximately 90 metrics and scored each design option against each other for a given metric. As described below, the task force recommended two design options for further consideration. The results are based on conceptual design and intended for a high-level screening effort; more precise estimates of impacts will be developed as the design is refined further and documented in the Draft SEIS.

Based on the screening results, the task force did **not recommend** advancing three design options, for the following reasons.

- Design Option 2 (Partial Interchange 1) and Design Option 3 (Partial Interchange 2) were dismissed due to the following key considerations and screening results:
  - High off-ramp volumes (1,600 to 2,000 vehicles per hour during the AM peak in 2045, 18 percent of which are trucks) would exceed the southbound I-5 loop ramp capacity.
  - The location of the loop ramp would not provide sufficient room for the distance required to navigate multiple lanes on a steep curve in a safe manner.
  - The steep grade from I-5 to Marine Drive is also not preferable for freight traffic.

  - The curve of the loop ramp, the steep grade, and limited sight distance for vehicles precluded the design from providing sufficient storage length for the high traffic volumes accessing the intersection on Marine Drive.
- Design Option 4 (No Interchange) was dismissed due to the following key considerations and results of the screening:
  - Based on preliminary traffic data, this design option was expected to have issues similar to Design Options 2 and 3; however, the magnitude of these traffic impacts would be greater because all Hayden Island traffic would have to use the Marine Drive Interchange. This would result in substantial traffic/freight impacts on Marine Drive and the ramp terminal intersections.
  - During peak times in the morning, the southbound off-ramp from I-5 to Marine Drive (which would also serve traffic destined for Hayden Island) would need to carry up to 2,500 vehicles per hour through a loop ramp. The geometric constraints of the loop ramp limit the amount of storage that can be provided at the intersection, resulting in queues at the off-ramp that would create unsafe conditions related to speed differences between the I-5 mainline and the off-ramp.
  - During peak times in the evening, the Marine Drive on-ramp to northbound I-5 (which would also serve traffic Hayden Island traffic accessing northbound I-5) would need to carry over 2,600 vehicles per hour through a ramp meter. This level of traffic could not be processed through the ramp meter and queues would back up from the meter, potentially constraining access to Hayden Island and impeding freight traffic on Marine Drive.
  - The only access from Hayden Island to northbound I-5 would require out of direction travel, south across the west arterial bridge, through the Marine Drive interchange, and then north across the west arterial bridge to the on-ramp to northbound I-5.

The 2013 LPA (Design Option 0) was included in the screening for comparison to Design Options 1 and 5, but it was not recommended to be advanced for inclusion in the Modified LPA. The 2013 LPA was not recommended for several reasons, including that it would retain the aging North Portland Harbor bridge, which does not meet the seismic resiliency desired across the Columbia River. Furthermore, it does not include a Tomahawk Island Drive or Vancouver Way extension and results in a larger footprint on Hayden Island.

Figure 10 shows the screening summaries side by side for each of the three design options. Table 3, Table 4, and Table 5 provide additional detail on the tradeoffs and benefits associated with Design Options 0, 1, and 5, respectively. The task force recommended Design Options 1 and 5 for Hayden Island/Marine Drive.

Figure 9. Hayden Island/Marine Drive – Relative Design Option Comparison

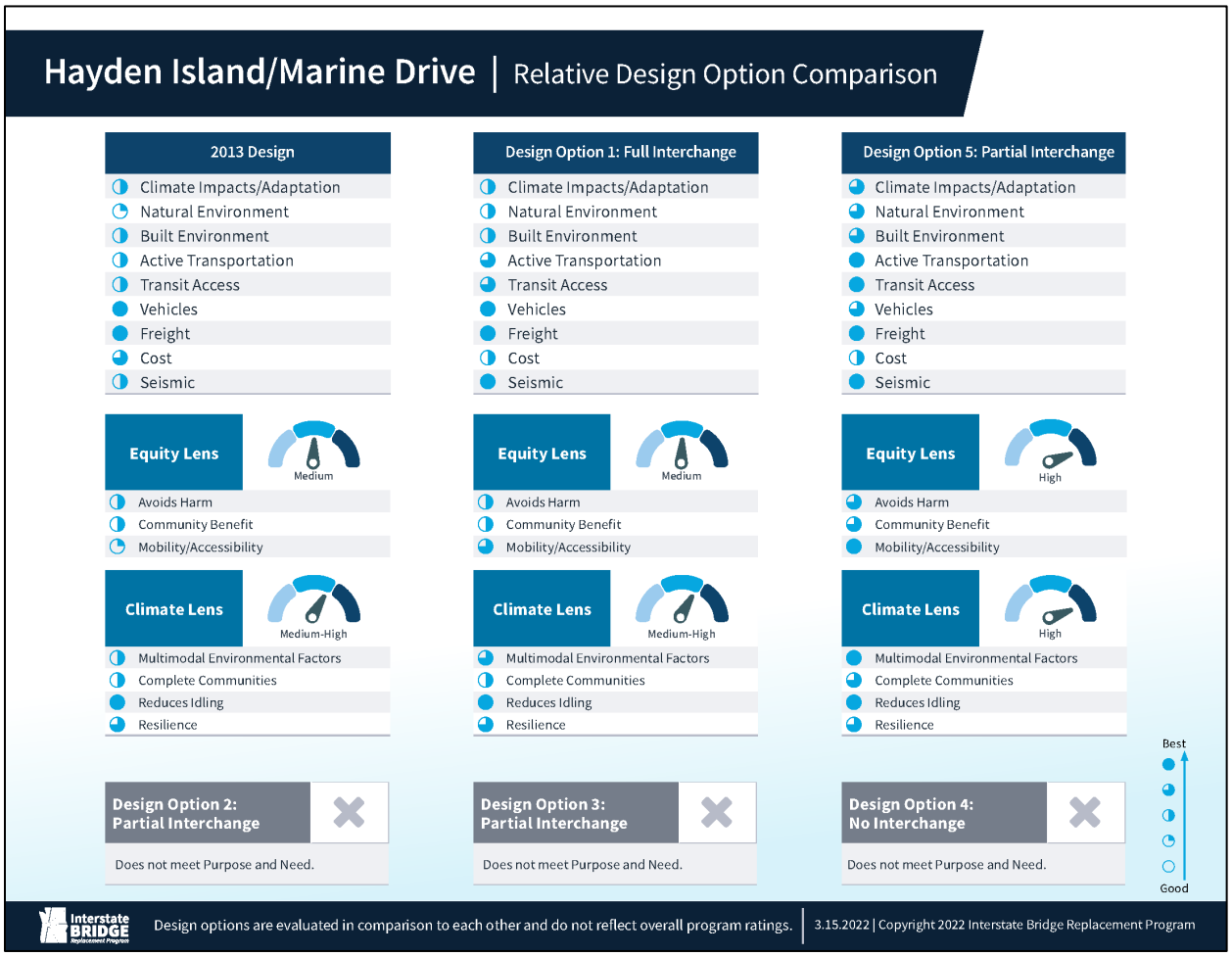


Table 3. Hayden Island/Marine Drive Design Option 0 – Screening Summary

Screening Category	Score	Design Option 0 Tradeoffs/Benefits
Climate Impacts/ Adaptation	◑	• Larger construction footprint (comparison is not based on expected user emissions) • Addresses future river elevation and integrates with new Levee Ready Columbia flood protection improvements (RES)
Natural Environment	◔	• Larger footprint over aquatic habitat • Larger footprint over terrestrial habitat
Built Environment	◑	• Most non-residential building impacts (AH) • More floating home displacements (AH) • Large scale and complexity of I-5 structures over Hayden Island challenge for local placemaking opportunities (AH, CB, CC) • Greater extent of local streets subject to Interchange Area Management Plan (IAMP) restrictions (CC) • Does not include Tomahawk Island Drive crossing (CC)
Active Transportation	◑	• Less direct north-south shared-use path (MA, ME) • Lower quality of active transportation experience on east-west streets (MA, ME) • Higher number of SUP road/transit crossings (MA)
Transit Access	◑	• Less east-west island connectivity because it does not include Tomahawk Island Drive (MA, ME) • Wider highway footprint (ME)
Vehicles	●	• Intersection traffic operations meet ODOT and City of Portland performance standards at Hayden Island and Marine Drive study area intersections (RID)
Freight	●	• Freight to/from Marine Drive area operates acceptably with minimal delay through the interchange (RID)
Cost	◕	• Lower construction cost • Higher estimated operations and maintenance cost
Seismic	◑	• Seismic retrofits North Portland Harbor bridge; does not replace

Equity Objectives
AH = Avoid further harm
CB = Community benefits
MA = Mobility and accessibility

Climate Objectives
CC = Supports complete communities
ME = Multimodal environmental
RES = Resilience
RID = Reduces idling

Scoring System
Good → Best
○ ◔ ◑ ◕ ●

Table 4. Hayden Island/Marine Drive Design Option 1 – Full Interchange Screening Summary

Screening Category	Score	Design Option 1 Tradeoffs/Benefits
Climate Impacts/ Adaptation	◑	• Larger construction footprint (comparison is not based on expected user emissions) ▪ Addresses future river elevation and integrates with new Levee Ready Columbia flood protection improvements (RES)
Natural Environment	◑	• Larger footprint over aquatic habitat ▪ Larger footprint over terrestrial habitat
Built Environment	◑	• Fewer non-residential building impacts (AH) • Most floating home displacements (AH) • Large scale and complexity of I-5 structures over Hayden Island challenge for local placemaking opportunities (AH, CB, CC) • Greater extent of local streets subject to IAMP restrictions (CC) ▪ Includes Tomahawk Island Drive crossing (CC)
Active Transportation	◕	• More direct north-south shared-use path (MA, ME) • Lower quality of active transportation experience on east-west streets (MA, ME) ▪ Higher number of shared-use path (SUP) road/transit crossings (MA)
Transit Access	◕	• Inclusion of Tomahawk Island Drive improves east-west island connectivity (MA, ME) ▪ Wider highway footprint (ME)
Vehicles	●	▪ Intersection traffic operations meet ODOT and City of Portland performance standards at Hayden Island and Marine Drive study area intersections (RID)
Freight	●	▪ Freight to/from Marine Drive area operates acceptably with minimal delay through the interchange (RID)
Cost	◑	▪ Higher construction cost
Seismic	●	▪ Replaces North Portland Harbor bridge

Equity Objectives
AH = Avoid further harm
CB = Community benefits
MA = Mobility and accessibility

Climate Objectives
CC = Supports complete communities
ME = Multimodal environmental
RES = Resilience
RID = Reduces idling

Scoring System
Good → Best
○ ◔ ◑ ◕ ●

Table 5. Hayden Island/Marine Drive Design Option 5 – Partial Interchange Screening Summary

Screening Category	Score	Design Option 5 Tradeoffs/Benefits
Climate Impacts/Adaptation	◕	• Smaller construction footprint (comparison is not based on expected user emissions) • Addresses future river elevation and integrates with new Levee Ready Columbia flood protection improvements (RES)
Natural Environment	◕	• Smaller footprint over aquatic habitat • Smaller footprint over terrestrial habitat • Levee closure structure part of freeway interchange ramps
Built Environment	◕	• Fewer non-residential building impacts (AH) • Least floating home displacements (AH) • Smaller scale and complexity of I-5 structures over Hayden Island is less challenging for local placemaking opportunities (AH, CB, CC) • Lesser extent of local streets subject to IAMP restrictions (CC) • Includes Tomahawk Island Drive crossing (CC)
Active Transportation	●	• Most direct north-south shared-use path (MA, ME) • Higher quality of active transportation experience on east-west streets (MA, ME) • Lower number of shared-use path (SUP) road/transit crossings (MA)
Transit Access	●	• Inclusion of Tomahawk Island Drive improves east-west island connectivity (MA, ME) • Narrower highway footprint (ME)
Vehicles	◕	• Intersection traffic operations meet ODOT and City of Portland performance standards at Hayden Island and Marine Drive study area intersections (RID) • Longer routing and more challenging wayfinding for Hayden Island traffic to/from Portland via I-5 and/or Interstate Ave.
Freight	●	• Freight to/from Marine Drive area operates acceptably with minimal delay through the interchange (RID)
Cost	◑	• Higher construction cost
Seismic	●	• Replaces North Portland Harbor bridge

Equity Objectives
AH = Avoid further harm
CB = Community benefits
MA = Mobility and accessibility

Climate Objectives
CC = Supports complete communities
ME = Multimodal environmental
RES = Resilience
RID = Reduces idling

Scoring System
Good → Best
○ ◔ ◑ ◕ ●

Design Options 1 and 5 performed best out of all design options. They have a similar freight/vehicle traffic performance on Marine Drive, including at ramp terminal intersections, and are both compatible with all transit investments currently under consideration.

To further differentiate between these two options, the task force compiled a list of tradeoffs and benefits between Design Options 1 and 5 (Table 6).

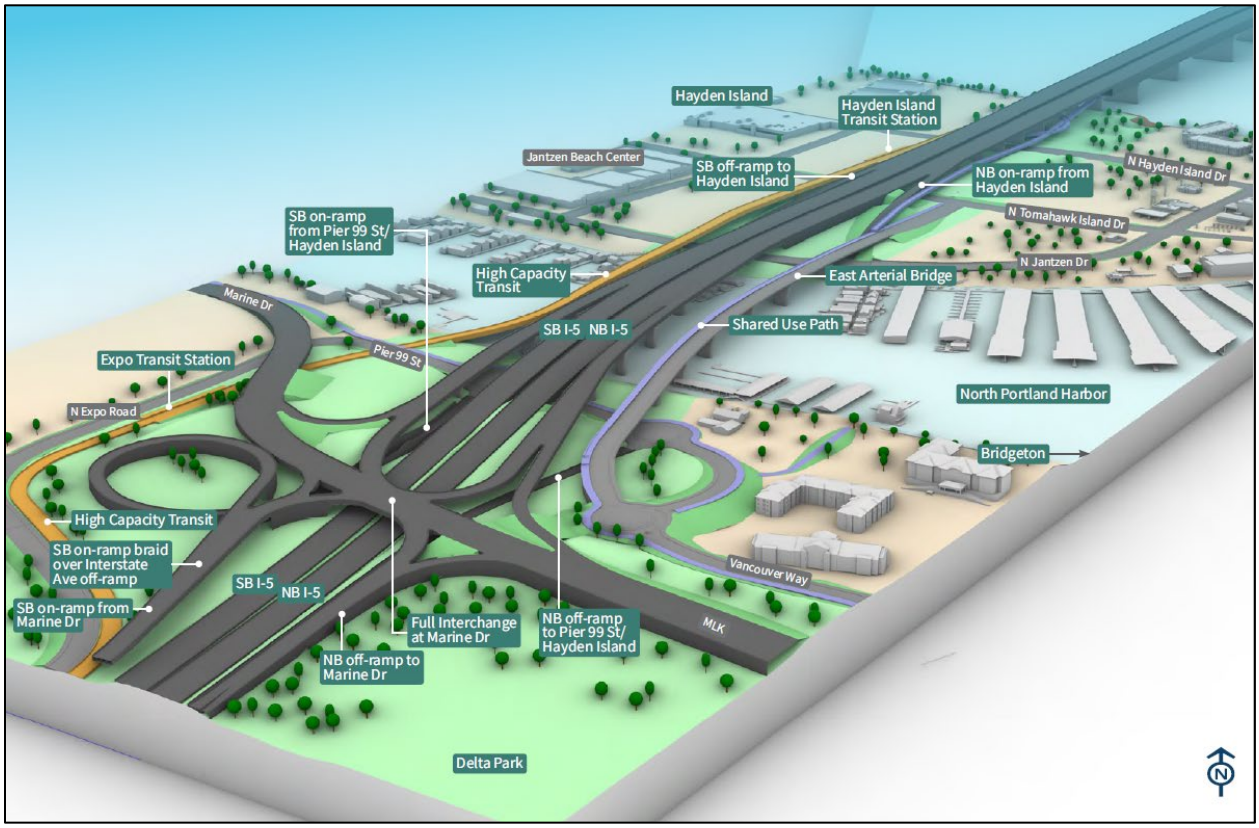
Table 6. Tradeoffs and Benefits Between Hayden Island/Marine Drive Design Options 1 and 5

Design Option 1: Full Interchange	Design Option 5: Partial Interchange
Larger footprint over North Portland Harbor	**Smaller** footprint over North Portland Harbor
More floating home impacts	**Fewer** floating home impacts
Larger scale/complexity of I-5 over Hayden Island provides **lower** quality experience for active transportation and transit access on east-west streets	**Smaller** scale/complexity of I-5 over Hayden Island provides **higher** quality experience for active transportation and transit access on east-west streets
Hayden Island vehicle/freight access to/from Portland **via Hayden Island Drive I-5 ramps**	Hayden Island vehicle/freight access to/from Portland **via local roads and I-5 ramps that cross under Marine Drive**
Hayden Island vehicle/freight access to/from Vancouver via Jantzen Drive I-5 ramps	Hayden Island vehicle/freight access to/from Vancouver via Jantzen Drive I-5 ramps
Scores **medium-high** from a **climate** perspective	Scores **high** from a **climate** perspective
Scores **medium** from an **equity** perspective	Scores **medium** from an **equity** perspective

Based on the findings in Table 6, the task force **recommended advancing** Design Option 5 (Partial Interchange) for further study and refinement (Figure 10). Because the design options were at a conceptual level of design detail during the screening process, the IBR Program will advance the design of Design Option 5 to explore opportunities to improve performance and reduce impacts. Specific areas for further study and design refinement include, but are not limited to:

- Optimize ramp terminal designs and associated access standards implications.
- Consider the integration of the levee and the interchange design, and how the levee would affect the operations of the Pier 99 Street ramp terminals.
- Consider including a southbound braided ramp between Marine Drive on-ramp and Interstate Blvd off-ramp, due to increased traffic volume and closely spaced ramps.
- Consider the lack of separation between local and interstate traffic on the proposed arterial bridge.
- Avoid wayfinding that is contrary to drive expectations (unconventional interchange splits and multiple turns).
- Evaluate additional traffic from Hayden Island on Expo Road (vehicle access, potential improvements, the lack of interstate connection between Hayden Island and Victory Boulevard).
- Consider potential impacts to the Vanport wetlands from the proposed loop ramp/braid at Marine Drive.
- Consider potential impacts to Delta Park from the proposed I-5 northbound off-ramp.

Figure 10. Hayden Island/Marine Drive Design Option 5: Partial Interchange 3 – Model Graphic



7.2 Main River Crossing

The river crossing area covers the main span of the Interstate Bridge over the Columbia River. This component extends from where the bridge begins on Hayden Island to where the bridge touches down in Vancouver. The Program was engaged in two separate but related discussions regarding the main crossing: the height and span of the crossing, which was a discussion with several agencies (see Section 7.2.2), and the general design of the crossing structure, which went through the design option screening process (see Section 7.2.3 through Section 7.2.7).

Supporting materials for the river crossing design options are provided in Attachment C, including the screening matrices and screening summaries.

7.2.1 Changes since 2013

The IBR Program identified the following changes in conditions since 2013 related to the main river crossing through advisory group input, community feedback, and input from agency partners serving on the River Crossing task force. These changes necessitated the development of design options for the river crossing.

- **Hayden Island/Marine Drive Design Options.** Design options for the river crossing are needed to accommodate the potential design changes identified for Hayden Island/Marine Drive (described in Section 7.1).
- **Bridge Permit.** The USCG bridge permit has expired, and the height and span of the replacement bridges need to be re-vetted with input from the USCG to ensure the replacement bridge design is viable and can obtain the required permits (see Section 7.2.2).
- **Vancouver Development**. Development has occurred in downtown Vancouver and the Vancouver waterfront. Design options are needed to minimize property impacts and improve access.
- **Multimodal Connections**. There have been changes in both existing and planned transit services and active transportation in Portland and Vancouver. Consideration is needed for how to best integrate the IBR Program with transit and active transportation systems.
- **Endangered Species Act.** New listed species and their critical habitat have been added to the threatened and endangered species list since 2013. This requires consideration of how to best avoid and minimize impacts to species and their habitat, including the timing of the in-water work and updating run timing for salmon species.

7.2.2 Height and Span Discussions

The IBR Program continues to coordinate discussions on the vertical height of the river crossing with the USCG in accordance with the Memorandum of Agreement (MOA) between the USCG and FHWA and the Memorandum of Understanding (MOU) between the USCG and FHWA, FTA and FRA. The IBR Program considered several options for the main river crossing, including tunnels, movable-span bridges, and fixed-span bridges. The Program dismissed tunnels for a number of design, structural, environmental, and cost reasons (see Attachment C-1 for details). As a result of the analysis, the IBR

Program recommended a mid-level fixed-span bridge with 116 feet of vertical clearance for the Modified LPA and completed a Navigation Impact Report based on this height.

The USCG issued a Preliminary Navigation Clearance Determination in June 2022 that set a requirement for a vertical clearance of 178 feet in order to provide for the reasonable needs of navigation. The IBR Program evaluated options to meet the horizontal and vertical clearance requirements established by the USCG consistent with the MOA and MOU. The IBR Program will continue to coordinate with the USCG during the NEPA process to develop design options that meet the USCG identified needs for reasonable navigation while still addressing the Purpose and Need.

7.2.3 Community Input

The community discussions and screening process focused on the general design of a mid-level fixed-span bridge. Community input came from a variety of events and sources. An online survey in the winter of 2021 was held to understand the community's values and priorities around various improvements, including the main river crossing. Most survey respondents (72 percent) identified improving travel times as a top priority.

Additional input on the main river crossing was collected from the Active Transportation Community Working Group (meetings held in September and November 2021), the Multimodal Commuter Community Working Group (meetings held in October and November 2021), and other outreach efforts detailed in the community engagement report (see Section 3.6). Feedback from the community on the main river crossing prioritized congestion relief and safety. Other priorities include improved accessibility, wayfinding, and protection from noise for active transportation users, plus improved connectivity between HCT and active transportation facilities.

7.2.4 Equity and Climate Considerations

See Section 6.1.2 for a discussion on how equity and climate were incorporated into the screening process. Equity considerations for the main river crossing screening were identified through coordination with the EAG, two equity-focused listening sessions (held in March 2021), and input from partner agencies on their equity programs and policies. To evaluate the IBR Program through an equity lens, the following considerations specific to the main river crossing structure were incorporated during development of the design options:

- Minimize impacts to property, including displacement of businesses and residences.
- Consider and minimize pedestrian and community exposure to noise and pollutants based on proximity of the shared-use path to vehicle lanes.

Climate considerations for the main river crossing screening were identified through input from the partner agencies during screening (See Section 6.1.2). To evaluate the IBR Program through a climate lens, the following considerations specific to the main river crossing structure were incorporated during development of the design options:

- Improve multimodal connectivity across the bridge and encourage a shift from vehicle trips to low or no emissions travel (e.g., transit, bike, walk, roll).
- Consider the bridge width and number of piers/foundations, which indicates the relative amount of construction material and embodied carbon.

The following project elements, which are related to the equity and climate considerations, were incorporated into all design options:

- Designed for dedicated HCT on the river crossing.
- Separated shared-use path for active transportation.

7.2.5 Task Force

The River Crossing task force met 11 times between summer 2021 and winter 2022. There was an average of 50 participants per meeting, with staff from nine partner agencies and technical staff from the IBR Program. The task force's discussions covered a wide variety of topics, including the bridge alignment and design, active transportation needs, integration with downtown Vancouver, urban design, and reduction of environmental impacts. These discussions assisted in the identification of site-specific needs and refining metrics for screening design options.

7.2.6 Mid-Level Fixed-Span Design Options Selected for Screening

The design options consider ways to move all modes across the river, as well as the configuration of these modes in relation to each other (e.g., the location of the shared-use path in relation to vehicle lanes and transit lines). The design options include variations designed for a two-bridge or one-bridge river crossing option, and they assume a mid-level fixed-span bridge that provides 116 feet of vertical clearance. Each of the design options has the same proposed horizontal navigation channel locations (shown in Figure 16) and 400-foot clearances (300-foot congressionally or USACE-authorized channel plus a 50-foot channel maintenance buffer on each side). A movable span could be accommodated on the bridge, depending upon further definition of the USCG bridge permit process.

Following agency and public input, the task force identified three design options to advance for screening, in addition to the 2013 Design:

- Design Option 1: Two Straight Bridges (Refined 2013 Design)
- Design Option 2: One Bridge (Double Stacked)
- Design Option 3: One Bridge (Hybrid Stacked)

The 2013 Design (Design Option 0) was included in the screening to provide a baseline for comparing the design options. Each design option is described and illustrated in the following sections.

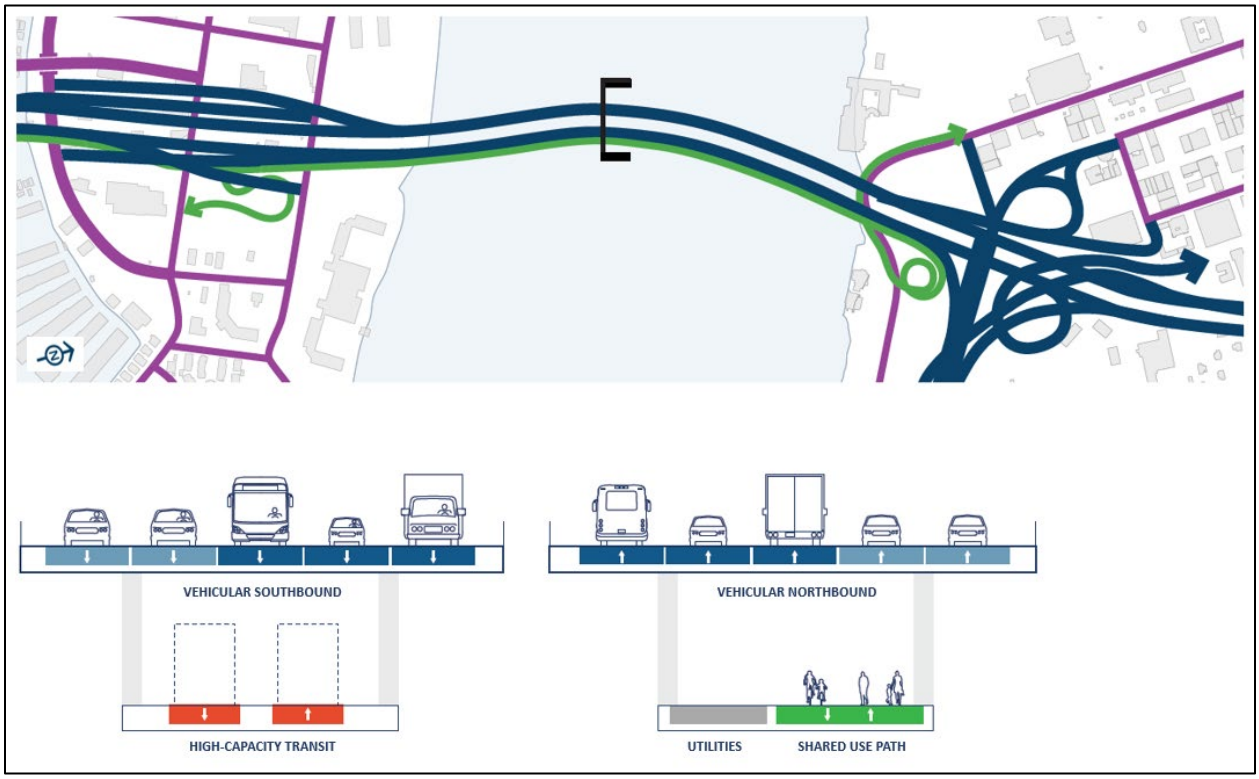
Section 7.2.7 details the results of the screening process, including why a design option was (or was not) advanced.

7.2.6.1 River Crossing Design Option 0: 2013 Design

The 2013 Design included construction of two new bridges across the main channel of the Columbia River (Figure 11). The parallel bridges that form the existing Interstate Bridge over the Columbia River would be replaced by two new parallel bridges. The eastern structure would accommodate northbound highway traffic on the upper bridge deck, with a bicycle and pedestrian path underneath; the western structure would carry southbound traffic on the upper bridge deck, with two-way transit below.

Figure 11. River Crossing Design Option 0: 2013 Design

Alignment (top) and cross section (bottom)



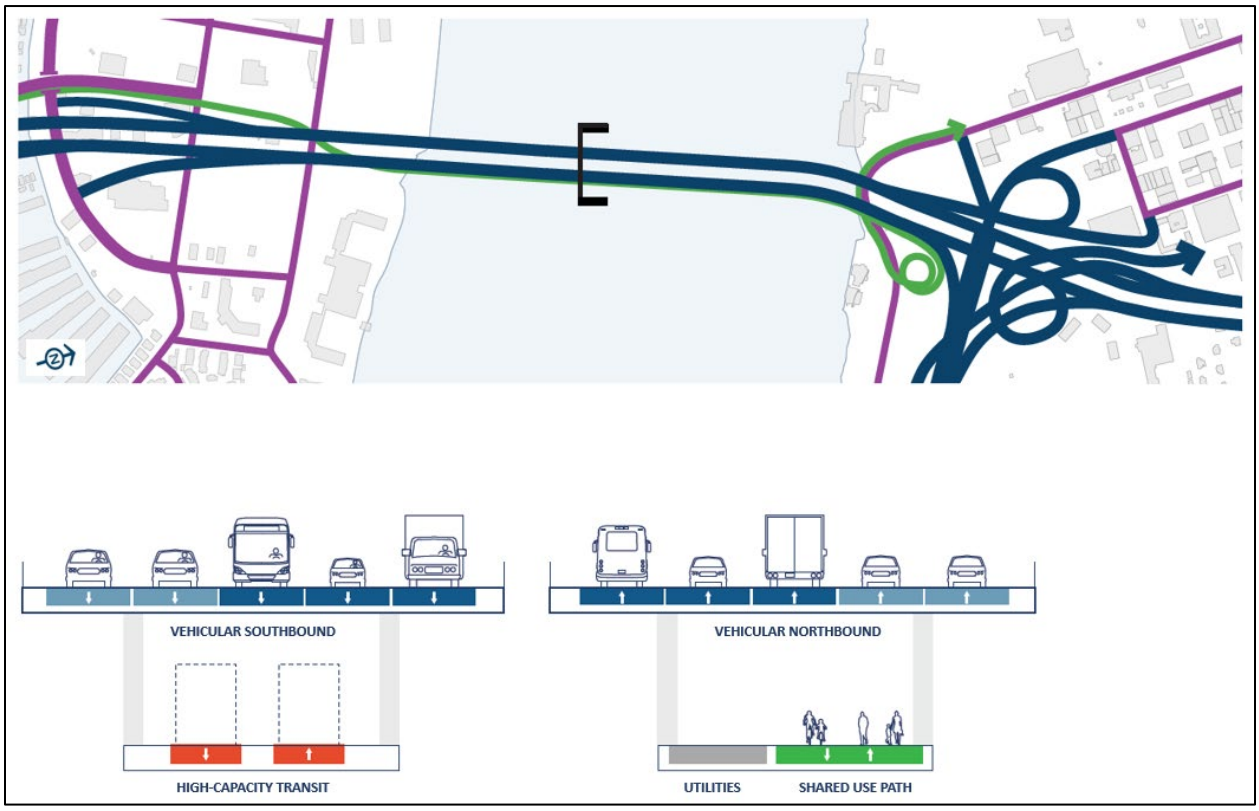
7.2.6.2 River Crossing Design Option 1: Two Straight Bridges

Design Option 1 was developed to address concerns over the complex bridge design (and associated costs) of the 2013 Design. Like the 2013 Design, this option would have two bridges; however, in this option the alignment for most of both bridges would be straight. This reduces the complexity of the bridge design and would be expected to reduce cost. This option would remove the curve as much as

possible while maintaining the two-bridge configuration with highway over the transit alignment and the shared-use path (Figure 12).

Figure 12. River Crossing Design Option 1: Two Straight Bridges

Alignment (top) and cross section (bottom)



7.2.6.3 River Crossing Design Option 2: One Bridge (Double Stacked)

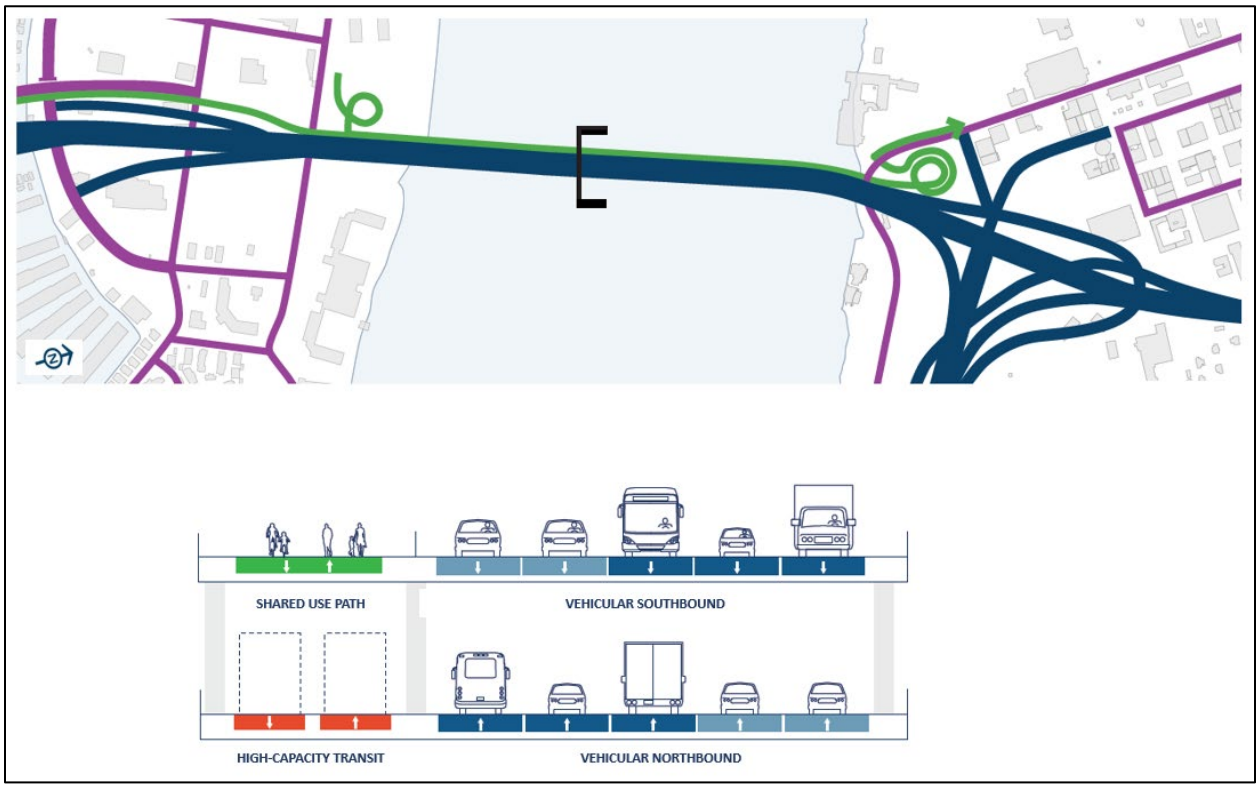
One-bridge options were developed to reduce the in-water footprint and associated construction timeline of the river crossing. One-bridge options would use a stacked highway alignment to consolidate all elements into one bridge, with southbound highway lanes on top of northbound highway lanes. North and south of the Columbia River, the southbound highway would remain higher for a longer distance than the two bridge options. This would be necessary to maintain vertical clearance over the northbound highway until it is no longer underneath the southbound highway. In comparison, both the southbound and the northbound highways in the two-bridge options can immediately start to descend north and south of the Columbia River.

In the Double Stacked Alignment Option, transit would be on the lower level just west of the northbound highway lanes, and the shared-use path would be on the upper level just west of the southbound highway lanes (Figure 13). This higher shared-use path would require longer ramps north and south of the Columbia River to connect to Hayden Island and downtown Vancouver.

The Double Stacked Alignment Option's bridge design would require a consistent highway width across most of the Columbia River, which changes the location of the southbound I-5 ramp connection from westbound SR 14. Whereas this ramp connects to southbound I-5 partially over the river in the two-bridge options, it would need to slide farther north in the Double Stacked Alignment Option. This would change this ramp's configuration from a loop west of I-5 to a hook-shaped ramp farther north and east of I-5. This would also prohibit the existing off-ramp connection from northbound I-5 to C Street, and the existing on-ramp connection from Washington Street to southbound I-5.

Figure 13. River Crossing Design Option 2: One Bridge (Double Stacked)

Alignment (top) and cross section (bottom)



7.2.6.4 River Crossing Design Option 3: One Bridge (Hybrid Stacked)

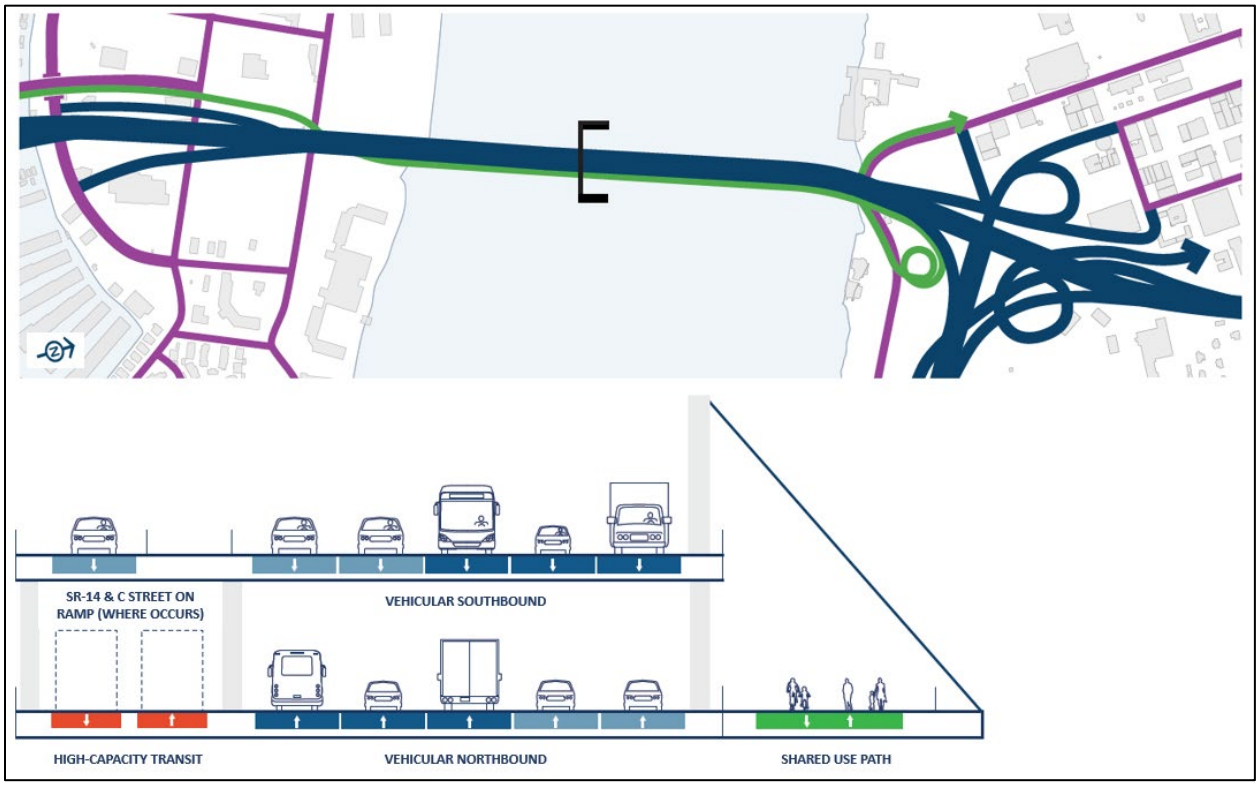
Like Design Option 2: One Bridge (Double Stacked), the Hybrid Stacked option would consist of a stacked highway alignment that would consolidate all elements into one bridge, with southbound highway lanes on top of northbound highway lanes (Figure 14). The shared-use path would be cantilevered from the lower level on the east side of the bridge. Transit would remain on the lower level of the west side of the bridge.

At the north end of the bridge, the area directly above transit on the upper level would be used to accommodate the ramp connection from westbound SR 14. This would allow the westbound SR 14

ramp to be a loop west of I-5, similar to the two-bridge options, which would also mean that the Hybrid Stacked option could include ramp connections to/from C Street. Because the one-bridge options need a consistent bridge width across the river, the area above the transit level would need to be included for the entire bridge, even though it is only needed for the SR 14 ramp connection on the north end of the bridge. No other use has been designated for this space for the rest of the bridge.

Figure 14. River Crossing Design Option 3: One Bridge (Hybrid Stacked)

Alignment (top) and cross section (bottom)



7.2.7 Screening Results

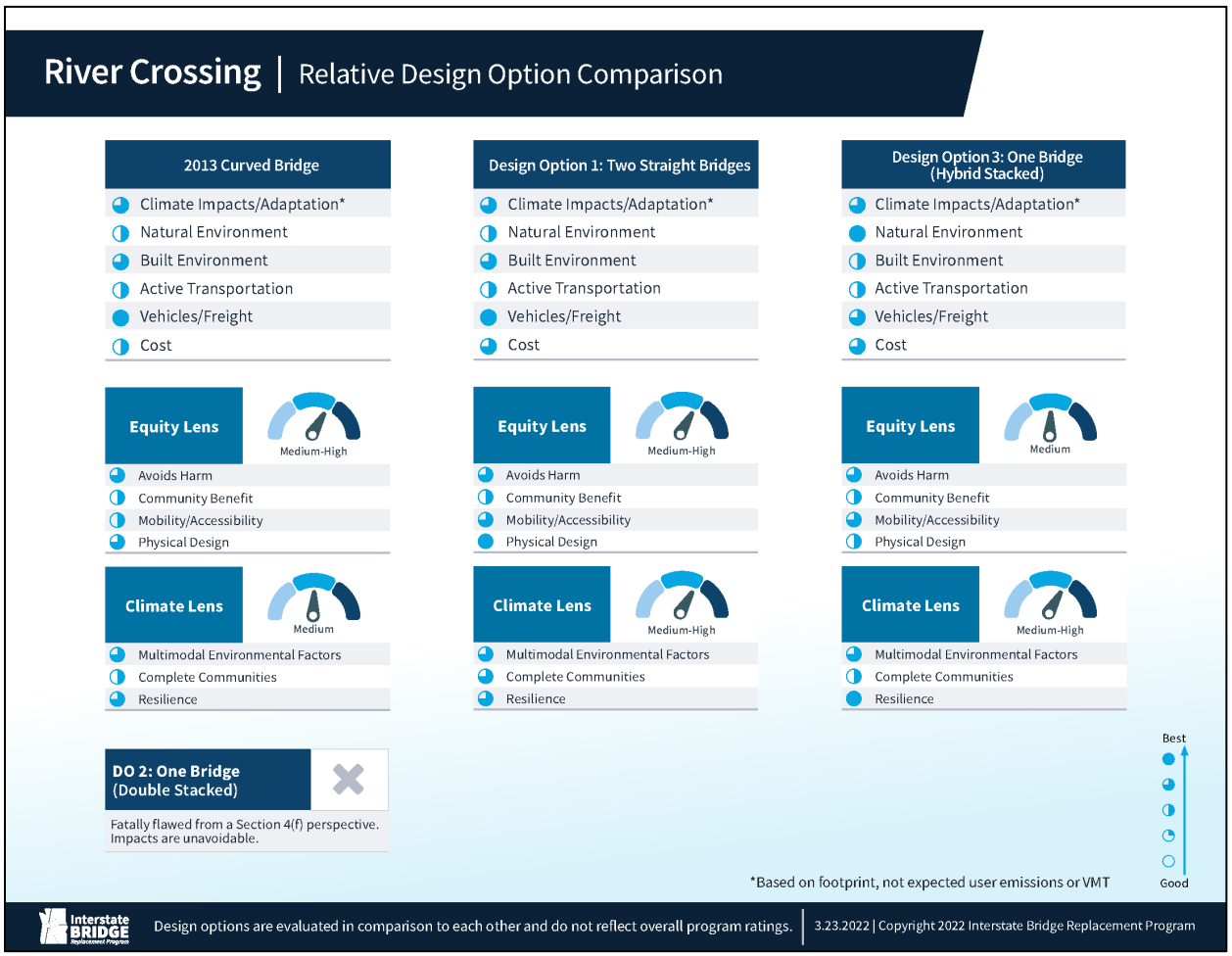
Three design options, described in Section 7.2.6, were advanced from initial task force discussions to screening. During screening, the task force collected data for approximately 90 metrics and scored each design option against each other for a given metric. As described below, the task force recommended two design options be advanced for further consideration and did not recommend the third design option.

During the screening process, the IBR team concluded that Design Option 2 would result in significant impacts to cultural and recreational resources. The bridge design would require the westbound SR 14 to southbound I-5 ramp to connect farther north on I-5, which would result in a hook-shaped ramp that would push the I-5 footprint farther east. This option would increase the amount of land

acquisition required from significant cultural and recreational resources, including Section 4(f) resources, and would likely result in additional adverse effects to cultural resources due to acquisitions. These anticipated impacts rendered Design Option 2 fatally flawed. In addition, the task force determined that there was insufficient space to maintain the existing ramp connections to and from C Street/Washington Street in downtown Vancouver. Based on the results of the screening, the task force decided **not to recommend** advancing Design Option 2.

The 2013 LPA (Design Option 0) was included in the screening for comparison to Design Options 1 and 3, but it was not recommended to be advanced for further consideration. Replacing the North Portland Harbor bridge (as proposed under the IBR Program) allows the I-5 alignment to shift to the west, which eliminates the need for a curved alignment (as proposed in the 2013 LPA). A straight alignment has several benefits, including potential cost savings and construction advantages. Figure 15 shows the screening summaries side by side for each of the three design options.

Figure 15. River Crossing – Relative Design Option Comparison



Each design option also has a more detailed summary that lists the tradeoffs and benefits behind each category to provide the rationale for each Harvey ball system score. Table 7, Table 8, and Table 9 show the screening summaries for Design Options 0, 1, and 3, respectively.

Table 7. River Crossing Design Option 0 Screening Summary

Screening Category	Score	Tradeoffs/Benefits
Climate Impacts/ Adaptation	◕	• Likely uses more construction materials (based on the footprint, not expected tailpipe emissions) • Improves transit and active transportation to draw mode shift (ME) • Design considers future climate disruption from flooding, extreme heat, storms and wind (RES) • Bridge elevation accounts for potential river elevation changes due to climate change (RES)
Natural Environment	◑	• More in-water piers and a larger footprint over aquatic habitat • Generates more in-water obstructions
Built Environment	◕	• Creates visually uncluttered structures on Hayden Island and scales them to surroundings (CB, PD) • Lowers Tomahawk Island Drive, if accommodated (MA) • Reduces shared-use path's exposure to traffic noise (MA) • Main Street extension provides new downtown connection to waterfront (CB, CC) • Zero displaced residences (AH) • More non-residential buildings impacts (AH) • Some cultural resources in footprint (AH) • Some high sensitivity noise receptors within 500 feet (AH)
Active Transportation	◑	• Creates a generously wide and accessible shared-use path (MA, ME) • Shelters shared-use path from elements (MA) • Lower deck shared-use path not visible to vehicular traffic, so does not benefit from "eyes on the path" (MA, ME) • Curved bridge makes for a longer crossing (MA, ME)
Vehicles/Freight	◑	• Maintains access to local streets and SR 14 • Compatible with Hayden Island full interchange design
Cost	◑	• Two bridges with complex bridge geometry results in high construction cost

Equity Objectives
AH = Avoid further harm
CB = Community benefits
MA = Mobility and accessibility
PD = Physical design

Climate Objectives
CC = Supports complete communities
ME = Multimodal environmental
RES = Resilience

Scoring System
Good → Best
○ ◔ ◑ ◕ ●

Table 8. River Crossing Design Option 1 Screening Summary

Screening Category	Score	Tradeoffs/Benefits
Climate Impacts/ Adaptation	◕	• Likely uses more construction materials (based on the footprint, not expected tailpipe emissions) • Improves transit and active transportation to draw mode shift (ME) • Design considers future climate disruption from flooding, extreme heat, storms and wind (RES) • Bridge elevation accounts for potential river elevation changes due to climate change (RES)
Natural Environment	◑	• More in-water piers and a larger footprint over aquatic habitat • Generates more in-water obstructions
Built Environment	◕	• Creates visually uncluttered structures on Hayden Island and scales them to surroundings (CB, PD) • Reduces shared-use path's exposure to traffic noise (MA) • Tomahawk Island Drive crosses straight across island (MA) • Main Street extension provides new downtown connection to waterfront (CB, CC) • Zero displaced residences (AH) • Fewer non-residential building impacts (AH) • Some cultural resources in footprint (AH) • Some high sensitivity noise receptors within 500 feet (AH)
Active Transportation	◑	• Creates a generously wide and accessible shared-use path (MA, ME) • Shelters shared-use path from elements (MA) • Lower deck shared-use path not visible to vehicular traffic, so does not benefit from "eyes on the path" (MA, ME)
Vehicles/Freight	●	• Maintains access to local streets and SR 14 • Compatible with Hayden Island full interchange design
Cost	◕	• Straight bridge design improves constructability • Two-bridge design results in high construction cost

Equity Objectives
AH = Avoid further harm
CB = Community benefits
MA = Mobility and accessibility
PD = Physical design

Climate Objectives
CC = Supports complete communities
ME = Multimodal environmental
RES = Resilience

Scoring System
Good → Best
○ ◔ ◑ ◕ ●

Table 9. River Crossing Design Option 3 Screening Summary

Screening Category	Score	Tradeoffs/Benefits
Climate Impacts/ Adaptation	◕	• Uses marginally fewer construction materials (based on the footprint, not expected tailpipe emissions) • Improves transit and active transportation to draw mode shift (ME) • Design considers future climate disruption from flooding, extreme heat, storms and wind (RES) • Bridge elevation accounts for potential river elevation changes due to climate change (RES)
Natural Environment	●	• Fewest in-water piers and footprint over aquatic habitat • Creates fewer in-water obstructions
Built Environment	◑	• Provides open views from the shared-use path and for river users (CB, PD) • Results in complex bridge approaches on Hayden Island and in Vancouver (CB, PD) • Creates undesignated space on upper deck • Tomahawk Island Drive crosses straight across island (MA) • Increases shared-use path's exposure to traffic noise (MA) • Main Street extension provides new downtown connection to waterfront (CB, CC) • Zero displaced residences (AH) • Fewer non-residential building impacts (AH) • Some cultural resources in footprint (AH) • Some high sensitivity noise receptors within 500 feet (AH)
Active Transportation	◑	• Creates a generously wide and accessible shared-use path (MA, ME) • Allows some visibility between shared-use path and vehicular traffic on lower deck (MA, ME) • Exposes shared-use path to elements (MA) • Generates a higher proportion of space (openness above) (MA)
Vehicles/Freight	◕	• Maintains access to local streets and SR14 • Overhead structure complicates wayfinding • Compatible with Hayden Island full interchange design with design exceptions
Cost	◕	• Requires additional bridge width to accommodate shared-use path • Single straight bridge design results in straightforward manufacturing and construction

Equity Objectives
AH = Avoid further harm
CB = Community benefits
MA = Mobility and accessibility
PD = Physical design

Climate Objectives
CC = Supports complete communities
ME = Multimodal environmental
RES = Resilience

Scoring System
Good → Best
○ ◔ ◑ ◕ ●

Design Options 1 and 3 performed the best out of all the design options during the screening. They would each:

- Have a Main Street extension that provides a new downtown connection to the Vancouver waterfront.
- Allow Tomahawk Island Drive to cross straight across Hayden Island.
- Have fewer non-residential building impacts than the 2013 LPA.
- Maintain access to local streets and SR 14.
- Create a generously wide and accessible shared-use path.
- Improve transit and active transportation to draw mode shift.
- Consider future climate disruption from flooding, extreme heat, storms and wind.
- Their bridge elevations would account for potential river elevation changes due to climate change.
- Involve straightforward manufacturing and construction.

Design Options 1 and 3 are also compatible with a partial or full interchange on Hayden Island, making them compatible with the recommended design options for Hayden Island/Marine Drive (see Section 7.1.6).

To further differentiate between these two options, the task force compiled a list of tradeoffs and benefits between Design Options 1 and 3 (Table 10).

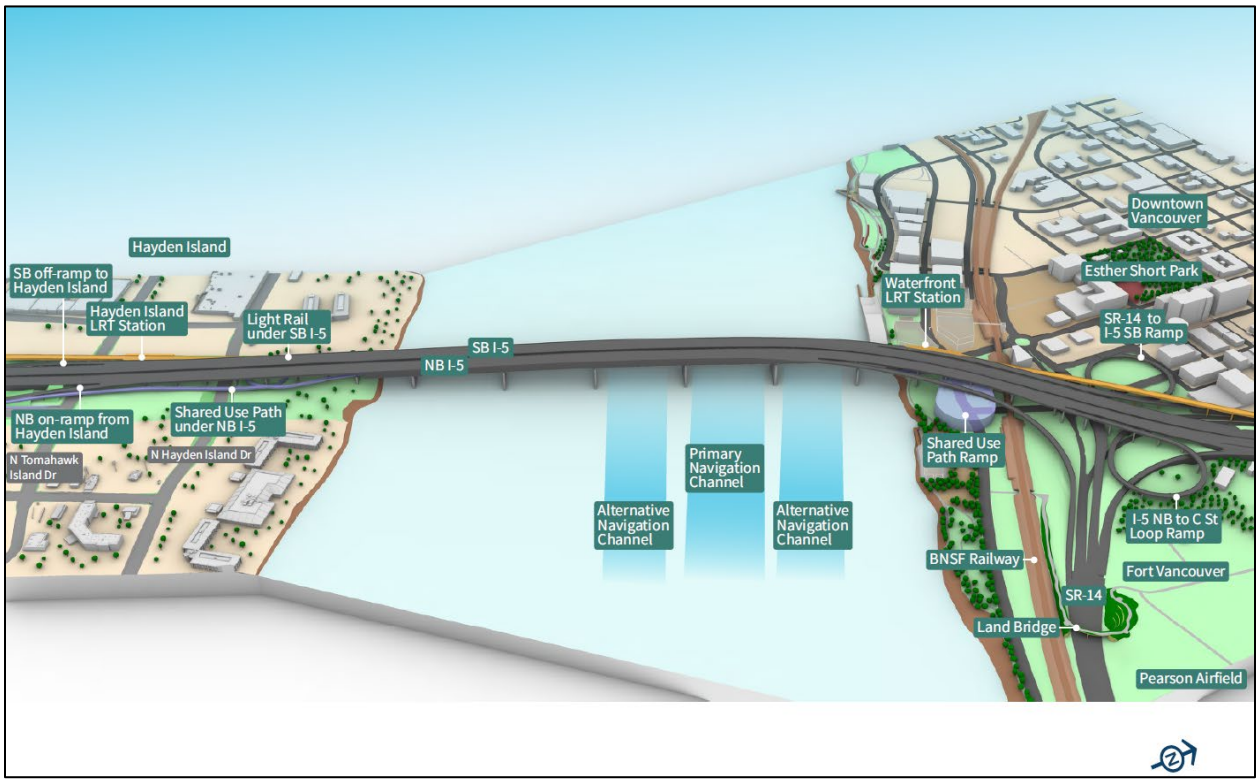
Table 10. Tradeoffs and Benefits Between River Crossing Design Options 1 and 3

Design Option 1: Two Straight Bridges	Design Option 3: One Bridge (Hybrid Stacked)
Reduces shared-use path users' exposure to noise/elements	**Increases** shared-use path users' exposure to noise/elements
Creates **visually uncluttered** structures on Hayden Island and scales them to surroundings	Results in **complex** bridge approaches on Hayden Island and in Vancouver
Easier to fund river crossing bridge because I-5 could be constructed and operational between Hayden Island and Evergreen Blvd.	**Harder** to fund river crossing bridge because I-5 must be constructed and operational between Marine Drive and Evergreen Blvd.
No undesignated space on upper deck	**Creates undesignated** space on upper deck
Fewer right-of-way acquisitions and impacts to Fort Vancouver	**More** right-of-way acquisitions and impacts to Fort Vancouver
Smaller footprint over land	**Larger** footprint over land

Design Option 1: Two Straight Bridges	Design Option 3: One Bridge (Hybrid Stacked)
Simpler wayfinding on northbound I-5	Overhead structure **complicates** wayfinding on northbound I-5 (requires approvals for signage smaller than standards)
Can maintain traffic on existing Interstate Bridge during construction	**Cannot maintain** traffic on existing Interstate Bridge during construction
Scores **medium-high** from an **equity** perspective	Scores **medium** from an **equity** perspective
Scores **medium-high** from a **climate** perspective	Scores **medium-high** from a **climate** perspective
Longer construction period	**Shorter** construction period
Emergency vehicles access shared-use path via **shared-use path ramps** on Hayden Island and downtown Vancouver	Emergency vehicles access shared-use path via **northbound I-5 or shared-use path ramps** on Hayden Island and downtown Vancouver
Likely uses **more** construction materials (based on the footprint, not expected tailpipe emissions)	Uses marginally **fewer** construction materials (based on the footprint, not expected tailpipe emissions)
More in-water piers/obstructions: • 12 in-water piers (each pair of piers measures ~200 feet combined in direction of river channel)	**Fewer** in-water piers/obstructions: • 6 in-water piers (each pier measures ~175 feet in direction of river channel)
Larger footprint over aquatic habitat (~12 acres)	**Smaller** footprint over aquatic habitat (~10 acres)
Lower deck shared-use path **not visible** to vehicular traffic, does not benefit from "eyes on the path" (a safety concern for active transportation users)	**Allows some visibility** between shared-use path and vehicular traffic on lower deck

Based on the benefits and tradeoffs, the task force **recommended advancing** Design Option 1 (Two Straight Bridges), which is illustrated on Figure 16.

Figure 16. River Crossing Design Option 1 (Two Straight Bridges) – Model Graphic



7.3 Transit – Mode, General Alignment, and Termini under Alignment

C-TRAN and TriMet both operate transit service in the Program area. A factor contributing to the overall transit component of the multimodal Program is the benefit gained by integrating established transit modes from both C-TRAN and TriMet. C-TRAN has designed their overall operations as a feeder-system to TriMet's expanded light rail service, which allows for the integration of a light rail terminus to provide effective reach into the transit services operated by C-TRAN.

Design options were developed and evaluated for thee transit components: mode, general alignment, and termini locations. Other components of the transit system will be studied further in the SEIS, including station locations, park-and-ride locations and sizes, operations and maintenance facilities, transit integration between TriMet and C-TRAN service and system improvements to transit speed and reliability. All design options (except bus on shoulder) included the assumption of dedicated right of way across the river for the transit investment to connect with TriMet's existing MAX Yellow Line.

Supporting materials for the transit design options are provided in Attachment D.

7.3.1 Changes since 2013

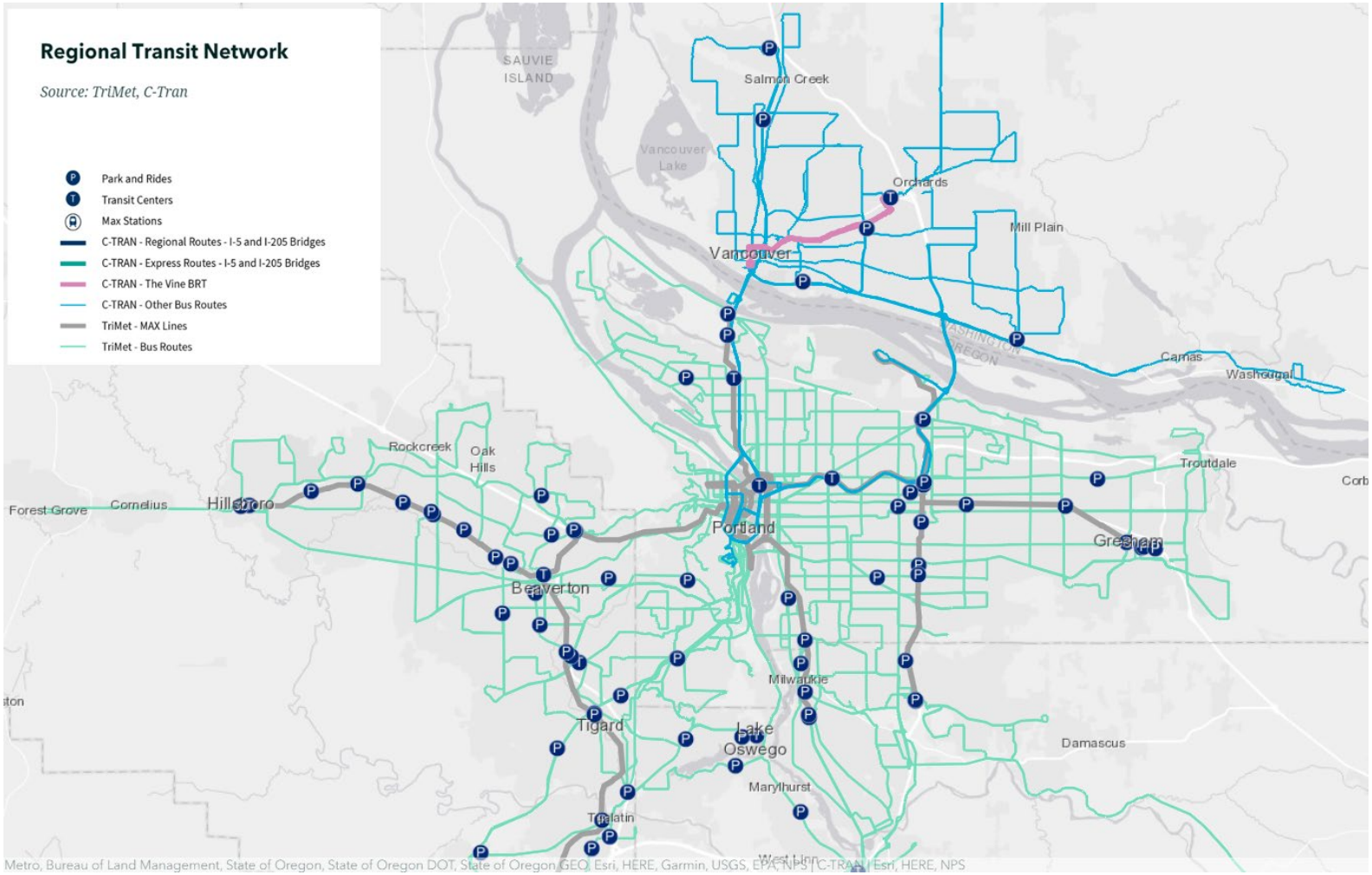
The IBR Program identified the following changes in conditions since 2013 related to transit through advisory group input, community feedback, and input from agency partners serving on TOTS. These changes led to the development of transit options that were analyzed.

- **Transit system.** In the years since the suspension of the CRC project, transit system enhancements have been advanced in both Oregon and Washington. Notably, C-TRAN has implemented BRT service, The Vine, in Clark County that provides service from downtown Vancouver east to the Vancouver Mall along Fourth Plain Boulevard. A second BRT line is currently under construction that will also serve downtown Vancouver and extend east along Mill Plain Boulevard, and a third BRT line extending north from downtown Vancouver along Highway 99 is in the planning stage. Figure 17 shows the regional transit network today.
- **Vancouver Development**. Development has occurred in downtown Vancouver and the Vancouver waterfront consistent with local development plans, including the Vancouver City Center Vision, Waterfront Master Plan, and Terminal 1 Concept Development Plan. Design modifications are necessary to minimize property impacts and improve access to the representative transit investment.

7.3.2 Community Input

Community feedback was collected in an online survey in the fall of 2021 to understand the community's values and priorities around transit improvements, and specific preferences and travel patterns of transit users. Survey participants prioritized improved travel time as the top priority for any new transit connection across the river. Reliability, safety, and ease of use were also noted as important considerations. Survey responses also indicated that most people would choose to access transit by car via park and ride, followed by walking, biking, or rolling directly to a station. When survey participants were asked what potential transit station locations they would use most often in the future, transit stations near the Vancouver waterfront, Clark College, Expo Center Transit Station, Hayden Island, and the Vancouver Library (C Street and E Evergreen Boulevard) were the five most noted locations, with the Vancouver waterfront ranked most often. Participants showed noted interest in the topic of transit by commenting in the open-ended comment section of the survey. Of the more than 1,700 open-ended comments received, almost half mentioned public transit, and 67 percent expressed support for expanded transit options across the bridge.

Figure 17. Regional Transit Network



Source: TriMet, C-TRAN

In addition to the survey, community input on transit was collected from a variety of events and sources. These include the Downtown Vancouver Community Working Group (meetings held in September and November 2021), the Multimodal Commuter Community Working Group (meetings held in October and November 2021), CAG meetings (transit-focused discussions were held in February, March and April of 2022), and other outreach efforts detailed in the community engagement report (see Section 3.6). Community feedback included:

- Desire for greater connectivity from Clark County into Portland and the regional transit system.
- Support for HCT options, with many preferring light rail or a combined light rail/BRT option.
- Strong support among residents in the entire region and solid majority support throughout Clark County for the concept of extending the MAX Yellow Line from Expo Station to Vancouver in a dedicated space across the new Columbia River bridges.
  - 79% of total community opinion survey respondents strongly or somewhat support light rail across the bridge, including 84% of Portland Metro area respondents and 61% of Clark County respondents.
- Reliability and travel time of mode expressed as the most important transit priorities.
- Equity priority communities expressed high interest in accessible and dependable transit options, including a desire for multiple transportation options that are efficient, reliable, and user-friendly and infrastructure that promotes HCT.
- Highest preferences for transit stations located at (or near) Expo Center, Hayden Island, Vancouver Waterfront, Vancouver Library (Evergreen) and Clark College.

Feedback from the CAG and EAG on the transit analysis included:

- Decisions should rely on data, especially potential rider demographics.
  - A 'one-seat ride' is desirable, and the fewer transfers riders need to make the better, especially considering impacts on people with disabilities.
  - The IBR Program's Equity Framework needs to be front and center in evaluating options.
  - Gentrification and displacement are major concerns.
  - There needs to be strong coordination between TriMet and C-TRAN to ensure the functionality of the overall transit system.
- Improving travel time and reducing congestion is a priority.
- Bicycle and active transportation improvements are important.
- Seismic resiliency (of the transit mode) is important.
- More options to cross the river are needed.
- Climate considerations are important.
- Reliability of mode is important.
- Crime statistics on different transit modes would be good to see.
- Bi-state cooperation should be considered when deciding on a mode.

- Protect and honor cultural history when looking at impacts and design.
- Including The Vine in all transit options is a good idea.
- BRT less is desirable, especially if ending at Delta Park.
- LRT is most dependable and has greater ridership capacity.
- LRT is an indicator of where transit-oriented development should be focused.
- From a freight perspective, the investment that leads to less traffic is best, which points to LRT.
- Predictive modeling for ridership is needed.
- Consensus for LRT is desirable.
- Having park and rides is important.
- For LRT, the terminus location is important.
- Equity perspective is needed – extend the terminus farther than Evergreen Boulevard.
- Appreciation for retaining the express bus service.

7.3.3 Equity and Climate Considerations

Section 6.2.2 provides background on how equity and climate were incorporated into the transit option screening process. Equity considerations for the transit screening were identified through coordination with the EAG (discussions on the transit options and screening were held in February and March 2022), two equity-focused listening sessions (held in March 2021), and input from partner agencies on their equity programs and policies. To evaluate the IBR Program through an equity lens, the following considerations were incorporated during development and screening of the design options:

- Minimizing gentrification and displacement.
- Prioritizing improved travel times and reduced congestion.
- Protecting and honoring cultural history when looking at impacts and design.

Climate considerations were identified through input from the CAG and partner agencies on their climate initiatives and policies (Section 6.2.2). To evaluate the IBR Program through a climate lens, the following considerations specific to transit were incorporated during development of the design options:

- Improving multimodal connectivity across the bridge and encouraging a shift from vehicle trips to low or no emissions travel (e.g., transit, bike, walk, roll).

7.3.4 Agency Input

Partner agency input on the transit design options and evaluation came from the TOTS group along with coordination and communication through the Travel Demand Modeling Working Group and other general coordination meetings with partner agency staff during the screening process. These groups are described in Section 3.1 and included participation by all Program partners.

7.3.5 Transit Options Evaluated

Table 11 lists the 13 representative transit investments considered to help evaluate the tradeoffs associated with choices around mode, alignment, and terminus. Attachment D includes results from the modeled representative transit investments.

Table 11. Representative Transit Investment Descriptions

Representative Transit Investment	General Description
A – No-Build	The No-Build scenario reflects planned systemwide increases in background transit service by both TriMet and C-TRAN as adopted by both Metro and the RTC in their Regional Transportation Plans but reflects no replacement of the current Interstate Bridge, no reconstructed interchanges, no tolls on the Interstate Bridge, and no extension of additional high-capacity transit service north from the existing MAX Yellow Line alignment into Vancouver.
B – 2045 CRC ROD	2013 CRC project LPA assuming fully dedicated LRT guideway extending from the MAX Expo Center Station to a terminus near McLoughlin/I-5 via the Vancouver central business district. Includes five new stations and three park and rides.
C – Bus on Shoulder	Express bus operating as bus on shoulder in Program area (both directions). Route 60 operating in auxiliary lanes between the Vancouver central business district and Hayden Island, Delta Park. No new stations or park and rides.
D – BRT Turtle Place to Expo	Dedicated BRT guideway between the MAX Expo Center Station and a terminus at Turtle Place in downtown Vancouver. Includes three initial stations: Expo Center, Hayden Island, and Turtle Place.
E – BRT I-5 to Kiggins Bowl	Fully dedicated BRT guideway between the MAX Expo Center Station and a terminus near McLoughlin Blvd./I-5. Dedicated guideway on Vancouver segment assumed to be adjacent to I-5, with a dedicated connection to Hayden Island and Expo Center Station similar to the 2013 LPA. Includes six initial stations: Kiggins Bowl, E 33rd, McLoughlin Blvd., Evergreen Blvd., Hayden Island, and Expo Center.
F – BRT in ROD Alignment	Fully dedicated BRT guideway between MAX Expo Center Station and a terminus near McLoughlin Blvd./I-5 to Expo Center station with alignment and station locations similar to 2013 ROD project. Includes six initial stations: I-5/McLoughlin, McLoughlin and Washington St. (southbound)/ 16th and Broadway (northbound), 12th and Washington (southbound)/13th and Broadway (northbound), Turtle Place, Hayden Island, and Expo Center.
G – Hybrid	Fully dedicated LRT guideway between MAX Expo Center Station and a new station at Hayden Island and fully dedicated BRT guideway between Hayden Island and Turtle Place. Includes two initial stations: Hayden Island and Expo Center.

Representative Transit Investment	General Description
H – LRT One Station in Vancouver	Fully dedicated LRT guideway between the MAX Expo Center Station and a terminus near Turtle Place in downtown Vancouver. Includes two initial stations: Hayden Island and Turtle Place.
I – LRT I-5 to McLoughlin	Fully dedicated LRT guideway between the MAX Expo Center Station and a terminus near McLoughlin Blvd./I-5. Dedicated guideway on Vancouver segment assumed to be adjacent to I-5 with a dedicated connection to Hayden Island and Expo Center Station similar to 2013 LPA. Includes three initial stations: I-5/McLoughlin, Evergreen, and Hayden Island.
J – LRT I-5 to Kiggins Bowl	Fully dedicated LRT guideway from MAX Expo Center Station to a terminus near I-5/Kiggins Bowl. Dedicated guideway on Vancouver segment assumed to be adjacent to I-5 with a dedicated connection to Hayden Island and Expo Center Station similar to 2013 LPA. Includes five initial stations: Kiggins Bowl, 33rd, I-5/McLoughlin, Evergreen, and Hayden Island.
K – LRT Delta Park to McLoughlin	Fully dedicated LRT Extension from Delta Park (joint Hayden Island / Expo Center station) to a terminus near McLoughlin / I-5 on an I-5 Adjacent Alignment (Center/West Side of I-5). This option was infeasible and removed from consideration early in the decision process.
L – LRT I-5 to McLoughlin with Columbia	Fully dedicated LRT guideway between MAX Expo Center Station to a terminus near McLoughlin Blvd./I-5. Dedicated guideway on Vancouver segment assumed to be adjacent to I-5 with a dedicated connection to Hayden Island and Expo Center Station similar to 2013 LPA. Includes four initial stations: I-5/McLoughlin, Evergreen, Waterfront, and Hayden Island.
M – LRT I-5 to Evergreen with Columbia	Fully dedicated LRT guideway between MAX Expo Center Station to a terminus near I-5/Evergreen. Dedicated guideway on Vancouver segment assumed to be adjacent to I-5 with a dedicated connection to Hayden Island and Expo Center Station similar to 2013 LPA. Includes three initial stations: Evergreen, Waterfront, and Hayden Island.

7.3.6 Evaluation Results

The IBR team found that all transit investments would substantially improve transit demand over the No-Build option. The modeling results indicated that there is strong demand for cross-river transit service, and therefore transit vehicle capacity is an important consideration for the Program for both the representative transit investment and other routes in the Program corridor. To accommodate the high level of transit demand, it is suggested that the Program include a combination of LRT and express bus across the Columbia River. Any option considered would include the intent to provide bus-on-shoulder capability through the Program area. The high transit demand and mode diversification needed to meet the level of transit demand would require efficient and comfortable

connections in the C-TRAN and TriMet systems. When comparing the same representative alignments, LRT options would have higher ridership, higher capital cost, and lower operating cost per rider than BRT options.

The analysis of model results showed that park-and-ride demand is robust in all of the representative transit investment scenarios, with park-and-ride lots that were at capacity for all locations added as part of the investment. This means representative transit investments that include more park-and-ride capacity will likely contribute more ridership to the HCT investment.

Because FTA Capital Investment Grant (CIG) funding is likely going to be important for the Program, the IBR team, in coordination with TriMet and C-TRAN, worked to develop a high-level assessment for screening. Using information available regarding cost (capital and operating) and ridership for the representative transit investments, the IBR team identified options that would rate medium or better for project justification criteria. The IBR Program along with its transit partners will continue to brief FTA and consider how any project change might impact CIG ratings.

To evaluate the transit investments through an equity lens, the IBR Program Equity Team applied a methodology to estimate access to jobs - and, by proxy, services - by transit for different demographics. The IBR Program worked with Metro to pull data from the regional travel demand model that showed how many jobs one could get to by transit assuming 30, 45, and 60 minute travel times using the Transportation Analysis Zones (TAZs). Transit travel times included all walk, wait (initial wait time as well as transfer wait time, if applicable) and in-vehicle time for travel between all TAZs. The IBR Program found that representative transit investments that include more stations would serve a higher number of residents, including BIPOC and low-income populations, within walking distance of transit stations. All transit investments would improve access to jobs for many residents, including BIPOC and low-income populations. LRT investments would improve access to jobs to a greater degree than BRT investments. Part of the reason for this is the travel time benefit LRT would experience as an extension that provides a one-seat ride as compared to BRT, which would include a transfer to the Yellow Line. All of the BRT investments included additional time for transferring between BRT and LRT at either Expo Center or Hayden Island, depending on the investment option being studied.

Moving forward, the Program will work with C-TRAN and TriMet on how to optimize transit service, considering decisions on mode, alignment and terminus that serves passengers to, from and through the Program area.

7.3.6.1 Mode

The Program considered three transit modes to meet transit demand: express bus operating in bus on shoulder, BRT, and LRT. As stated above, a transit investment that serves the identified markets and attempts to serve demand, would need to include a combination of modes. Bus-on-shoulder capability in the Program area was included in all representative transit investments and was removed from consideration as a standalone transit option.

Based on the analysis and coordination with partner agencies, the advantages and disadvantages listed in Table 12 were identified for BRT and LRT.

Table 12. Summary of Transit Mode Evaluation

Light Rail Transit (LRT)	Bus Rapid Transit (BRT)
• Higher vehicle capacity allows the Program to carry more people across the river. (MA, ME) • Compared to existing conditions and BRT, would improve access to jobs and services for many residents, including BIPOC and low-income populations. (MA, EO) • Allows for preservation of the current and future C-TRAN Vine and express bus system while providing convenient connections to new LRT stations. (MA, ME) • Offers a more competitive travel time compared with trips that require a transfer at the Expo Center. (MA, ME) • Extension of the MAX Yellow Line from the Expo Center into Vancouver best integrates existing transit investment in the region in a manner that maintains both C-TRAN's and TriMet's approaches to operations of their transit systems. • Based on initial estimates of how investments might perform if submitted to the FTA CIG Program, LRT is more competitive for FTA discretionary funding.	• Lower vehicle capacity than LRT and would require a transfer. • Less competitive travel time compared to LRT due to a required transfer at Expo Center. • Compared to existing conditions, would improve access to jobs for many residents including BIPOC and low-income populations. (MA, EO). • Allows for preservation of the current and future C-TRAN Vine and express bus system (ME). • Less competitive for FTA discretionary funding than LRT.

Equity Objectives
AH = Avoid further harm
EO = Economic Opportunity
MA = Mobility and accessibility

Climate Objectives
ME = Multimodal environmental

Based on the above findings, and when considering the specific needs of the HCT investment for the IBR Program, the Program **recommends LRT as the locally preferred mode**.

7.3.6.2 Alignment

As described in Section 7.3.5, twelve potential alignments were evaluated by the Program and partner agencies. These potential alignments fell into two categories: accessing Downtown Vancouver or aligning with the existing I-5 corridor. Detailed conceptual design work on the potential alignments (and their impacts) was brought to the advisory groups, community groups, and partner agencies.

When selecting an alignment, a key consideration for the Program is the need to integrate new transit investments while considering the existing and planned transit networks of TriMet and C-TRAN. Since the CRC project, C-TRAN has developed a BRT system, The Vine, with one BRT line in operation, one under construction, and one in planning. The Vine and C-TRAN express bus service provide frequent and reliable service within Clark County and to downtown Portland, respectively. Any transit investment should be made with a desire to complement The Vine system, including existing and planned service.

The City of Vancouver has worked with C-TRAN to design station environments for The Vine system on Broadway and Washington Streets in the Central Business District. With these investments in mind, it is desirable to coordinate design elements of the alignment to provide more efficient functionality within the larger transit network and respective operating environments. The downtown Vancouver alignment (which was part of the CRC LPA) would impact C-TRAN's BRT alignments in the downtown area. In addition to the existing and planned transit networks, there is existing development in the Program area that potential alignments could impact. In comparison to the I-5 alignment, the downtown Vancouver alignment would require additional property and streetscape impacts.

Based on conversations with the community and partners, **the Program and advisory committees recommended the I-5 general alignment** be advanced for further study (see the Recommended General Alignment in Figure 18).

7.3.6.3 Terminus

The Program evaluated terminus options for each alignment and mode (described above), including Hayden Island in Portland and Waterfront, Turtle Place, Evergreen/I-5, McLoughlin/I-5 and Kiggins Bowl in Vancouver.

The evaluation of Hayden Island as a terminus was a hybrid option that saw the extension of LRT north from Expo Center to Hayden Island and the extension of BRT from Turtle Place south to Hayden Island. It was an exploratory option that did not perform as well in the evaluation process from a ridership standpoint and ultimately was removed from consideration in combination with the decision on mode.

On the Vancouver side the five terminus options included two that would result in a single station just across the Columbia River (Waterfront and Turtle Place) and three that would extend farther north including one additional station (Evergreen/I-5), two additional stations (McLoughlin/I-5) or four additional stations (Kiggins Bowl). The single station terminus options were evaluated and did not perform as well as others that extended farther into Vancouver from a ridership standpoint regardless of which mode was considered. Alignments with stations north of Evergreen Boulevard offered more ridership, but with greater impacts to properties and increased costs.

Through analysis and conversations with partners, it was determined that an **Evergreen Boulevard terminus** would:[6]

- Have fewer potential property impacts compared to other locations. (AH)
- Have lower operating and capital costs compared to other locations.
- Avoid impacts to Clark Community College as a result of station, alignment and park and ride that were included as part of options that assumed McLoughlin/I-5 as a terminus.
- Avoid impacts to C-TRAN network and Vine service.
- Avoid impacts to the City of Vancouver's vision and downtown development.
- Provide increased transfer options to additional C-TRAN routes.
- Connect directly to downtown library, jobs, services and amenities. (CB)
- Support transit-oriented development opportunities at Library Square and on nearby City-owned parcels. (CB)
- Maximize transfer opportunities given planned direct connections to several local routes, as well as existing and planned BRT routes. (MA, ME)
- Provide convenient access to Evergreen Boulevard, which connects east over I-5 to the Historic Reserve, and west through downtown to Main Street and Esther Short Park via planned 9th Street pedestrian way. (CB)

Based on evaluation during screening along with feedback from partner agencies, the IBR Program and partner agencies **recommended advancing the terminus at Evergreen Boulevard** for further study and refinement.

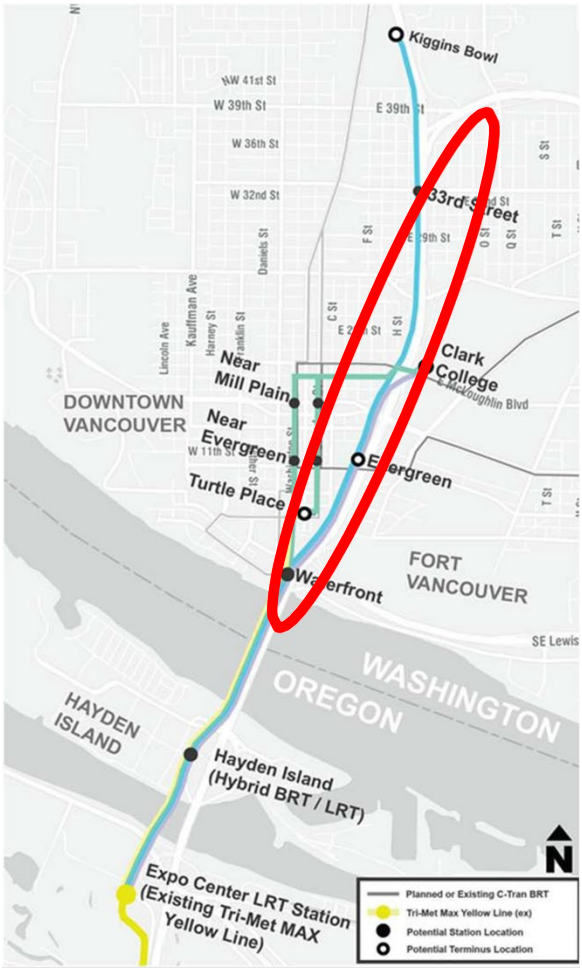
Figure 19 shows the proposed alignment of the LRT with the planned transit system connections. Stations and park-and-ride locations will be refined moving into the SEIS.

[6] Equity Objectives: AH = Avoid further harm, CB = Community benefits, MA = Mobility and accessibility. Climate Objectives: ME = Multimodal environmental

Figure 18. Representative Alignments Considered and Recommended General Alignment for the IBR Program

Representative Alignments Considered

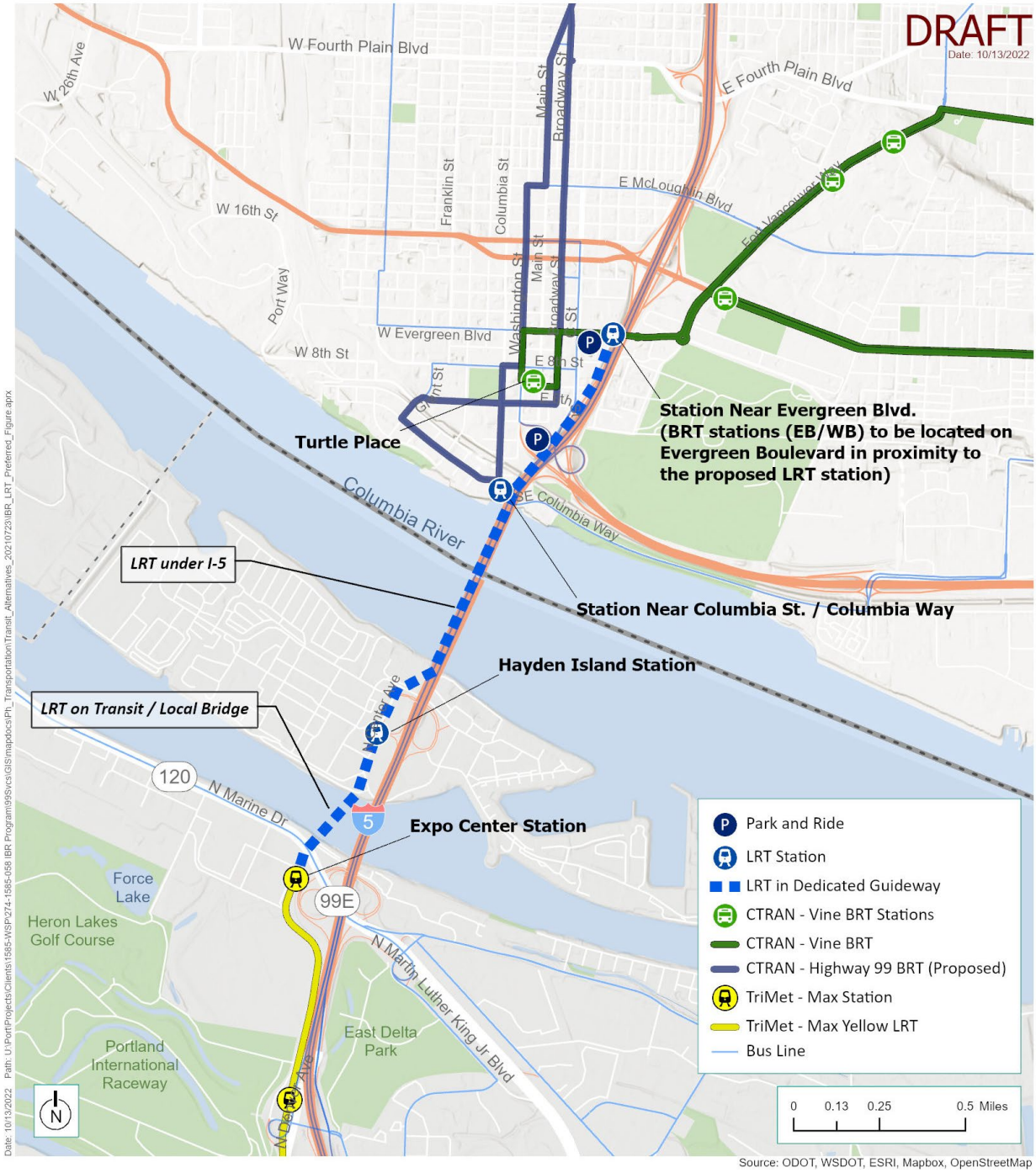
Recommended General Alignment



To/Through Broadway/Washington Transit Couplet	I-5 Running/Adjacent
Expo to Turtle Place	Expo to Evergreen
2013 LPA (Expo to Clark College)	Expo to I-5 McLoughlin
	Expo to Kiggins Bowl

I-5 Running/Adjacent
Expo to Evergreen
Expo to I-5 McLoughlin
Expo to Kiggins Bowl

Figure 19. Proposed LRT Alignment with Planned Transit System Connections

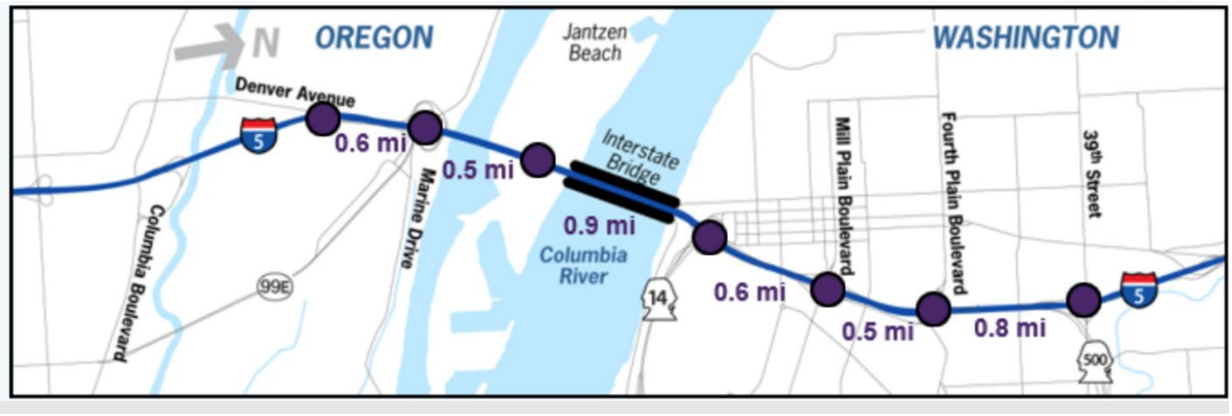


7.4 Auxiliary Lanes

Auxiliary lanes are ramp-to-ramp connections that allow vehicles to enter and exit the roadway outside of through-traffic lanes. While these ramp-to-ramp connections currently exist on I-5 in the Program area and various other locations in the Portland Metro region (e.g., Highway 217 off-ramp to the Lower Boones Ferry Road off-ramp near Tualatin, Oregon) they do not exist across the Interstate Bridge. Supporting materials for the auxiliary lanes design options are provided in Attachment E.

The use of auxiliary lanes improves traffic safety and reliability by providing sufficient merge, diverge, and weaving lengths for vehicles entering and exiting the freeway while allowing the through-traffic to maintain fuel-efficient driving speeds in the adjacent through lanes. Vehicles entering and exiting the highway have space to accelerate and decelerate without impeding traffic flow. A best practice is to space interchanges at least 1 mile apart in urban areas. As shown in Figure 20, all seven of the interchanges within the IBR Program area are spaced below minimum standards of 1 mile between interchanges.

Figure 20. Existing Interchange Spacing



Standard spacing – Desirable = 2 miles, Minimum = 1 mile

7.4.1 Changes since 2013

The IBR Program identified the following changes in conditions since 2013 related to auxiliary lanes through advisory group input, community feedback, and input from agency partners. These changes necessitated the development of design options for auxiliary lanes.

- **Traffic volumes**. Changes in traffic volumes and land use/development resulted in the need to update existing volumes to 2019 and future volumes to 2045 (the CRC project used 2030).

7.4.2 Community Input

Community input on auxiliary lanes came from the CAG and EAG (discussions on the auxiliary lanes design options and screening were held in April 2022) as well as public surveys. Feedback on the auxiliary lanes analysis included:

- Support for the addition of auxiliary lanes was consistently expressed
- Feedback received from advisory groups and surveys was mixed on the preference for the number of auxiliary lanes:
  - Prioritize the option that maximizes capacity and minimizes congestion
  - Both travel time and environmental impacts are important from an equity standpoint
  - Prioritize the option that is most environmentally friendly, including a reduction in greenhouse gas emissions
  - Combined with transit considerations, one auxiliary lane is appropriate
  - Two auxiliary lanes meet community values of congestion and safety issues
  - Clark County residents were more likely to select the two auxiliary lane option
  - Oregon residents were split between one and two auxiliary lane options

7.4.3 Equity and Climate Considerations

See Section 6.3.2 for a discussion on how equity and climate were incorporated into the screening process. Equity considerations for the auxiliary lanes analysis were identified through coordination with the EAG (discussions on the auxiliary lanes design options and screening were held in April 2022), two equity-focused listening sessions (held in March 2021), and input from partner agencies on their equity programs and policies. To evaluate the IBR Program through an equity lens, the following considerations were incorporated during development and screening of the design options:

- Understand the differences between one and two auxiliary lanes in terms of potential impacts, including to property, culture, and displacements.
- Both travel time and environmental impacts are important from an equity standpoint.
- Consider projected demographic changes (e.g., increasing number of seniors and people with disabilities means fewer and fewer people driving).

Climate considerations for the auxiliary lanes analysis were identified through input from the CAG and partner agencies on their climate initiatives and policies. To evaluate the IBR Program through a climate lens, the following consideration was incorporated during development of the design options:

- Consider how design options would support goals and policies to reduce greenhouse gas emissions.

7.4.4 Agency Input

Agency input on the auxuliary lane options and analysis came from coordination and communication through the Travel Demand Modeling Working Group and other general coordination meetings with partner agency staff during the screening process. These groups are described in Section 3.1 and included participation by all Program partners.

7.4.5 Design Options

Like the CRC project, the IBR Program would maintain the existing three through lanes in each direction across the bridge to match the context of the roadway on either side of the Program area, which also has three through lanes. The 2013 Design included two northbound and two southbound auxiliary lanes over the existing bridge, with one to two auxiliary lanes on I-5 extending throughout the corridor, depending on the location. The Program evaluated the addition of one or two auxiliary lanes in each direction across the bridge. Future analysis will occur around possible auxiliary lanes to the north and south of the bridge and will be documented in the SEIS. The IBR Program will ensure that information in the SEIS is consistent with and supports the Interchange Access Modification Request process, as it collaborates with and seeks approval from FHWA for the Program's proposed access revisions.

The IBR Program investigated ways to implement auxiliary lanes to accommodate the close interchange spacing, short merges, weaves and diverges, freight needs, and through-traffic vs. high on-ramp and off-ramp traffic volumes. These improvements would result in improved safety, a decrease in vehicle crashes, and more balanced travel lanes.

Auxiliary lane analysis was completed by modeling 2045 forecast traffic volumes for the following scenarios:

- No-Build in 2045.
- Three through lanes and one auxiliary lane in 2045.
- Three through lanes and two auxiliary lanes in 2045.

7.4.6 Evaluation Results

As described above, two design options were advanced for additional analysis and consideration by the partner agencies. A No-Build alternative was also included to serve as a baseline for the two design options. The results of the auxiliary lane evaluation are summarized in Table 13 and illustrated on Figure 21 through Figure 24.

Table 13. Summary of Auxiliary Lanes Evaluation Results

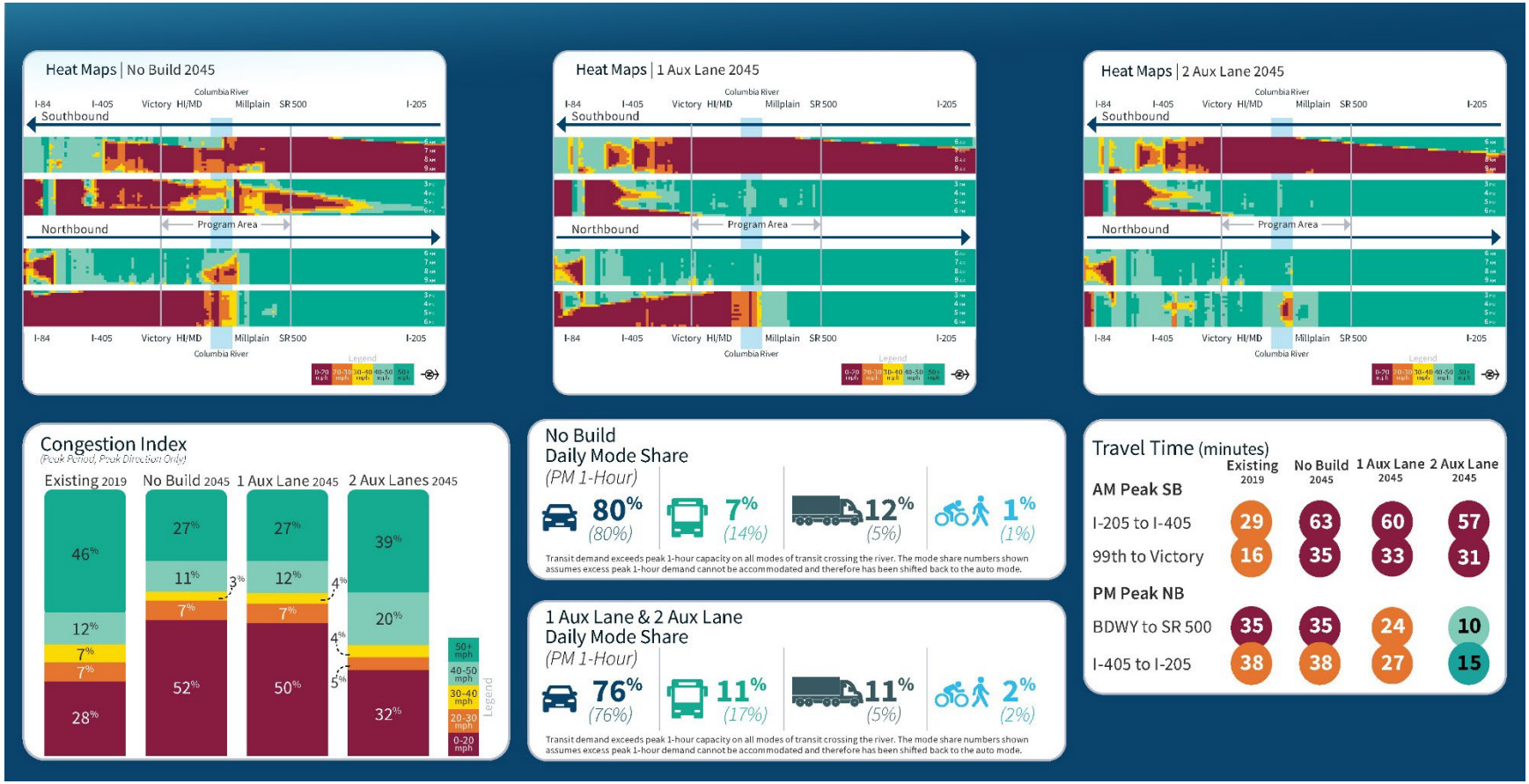
Benefits of one or two auxiliary lanes (compared to No-Build)	Supplemental benefits of one auxiliary lane	Supplemental benefits of two auxiliary lanes
• Mode choice benefits (HCT, bus on shoulder and active transportation) (MA, ME) • Mode shift: the daily transit share is expected to increase from 7% to 11% (ME) • Reduced overall congestion (MA, RID) • Off-peak benefits, including weekends • Less diversion to local streets (AH) • Faster congestion recovery from crashes and incidents (RID) • Fewer lane changes required (i.e., lane balance) • Safety improvements realized due to fewer sideswipe crashes and improved visibility • Lane widths to allow for current vehicle widths, turning, and comfort • Anticipated greenhouse gas reduction due to less congestion (RID)	• Travel time improvements compared to No-Build (MA, RID) – Southbound AM travel time would be reduced by 3 minutes (5 percent faster) between I-5/I-205 split and I-405 – Northbound PM travel time would be reduced by 11 minutes (30 percent faster) between Broadway Avenue and SR 500	• Travel time improvements compared to No-Build (MA, RID) – Southbound AM travel time would be reduced by 6 minutes (10 percent faster) between I-5/I-205 split and I-405 – Northbound PM travel time would be reduced by 25 minutes (70 percent faster) between Broadway Avenue and SR 500 • Reduced congestion compared to No-Build (RID) – Congestion would be reduced by 20 percent during the 8-hour AM/PM peak period

Equity Objectives
MA = Mobility and accessibility
PD = Physical design

Climate Objectives
ME = Multimodal environmental
RID = Reduces idling

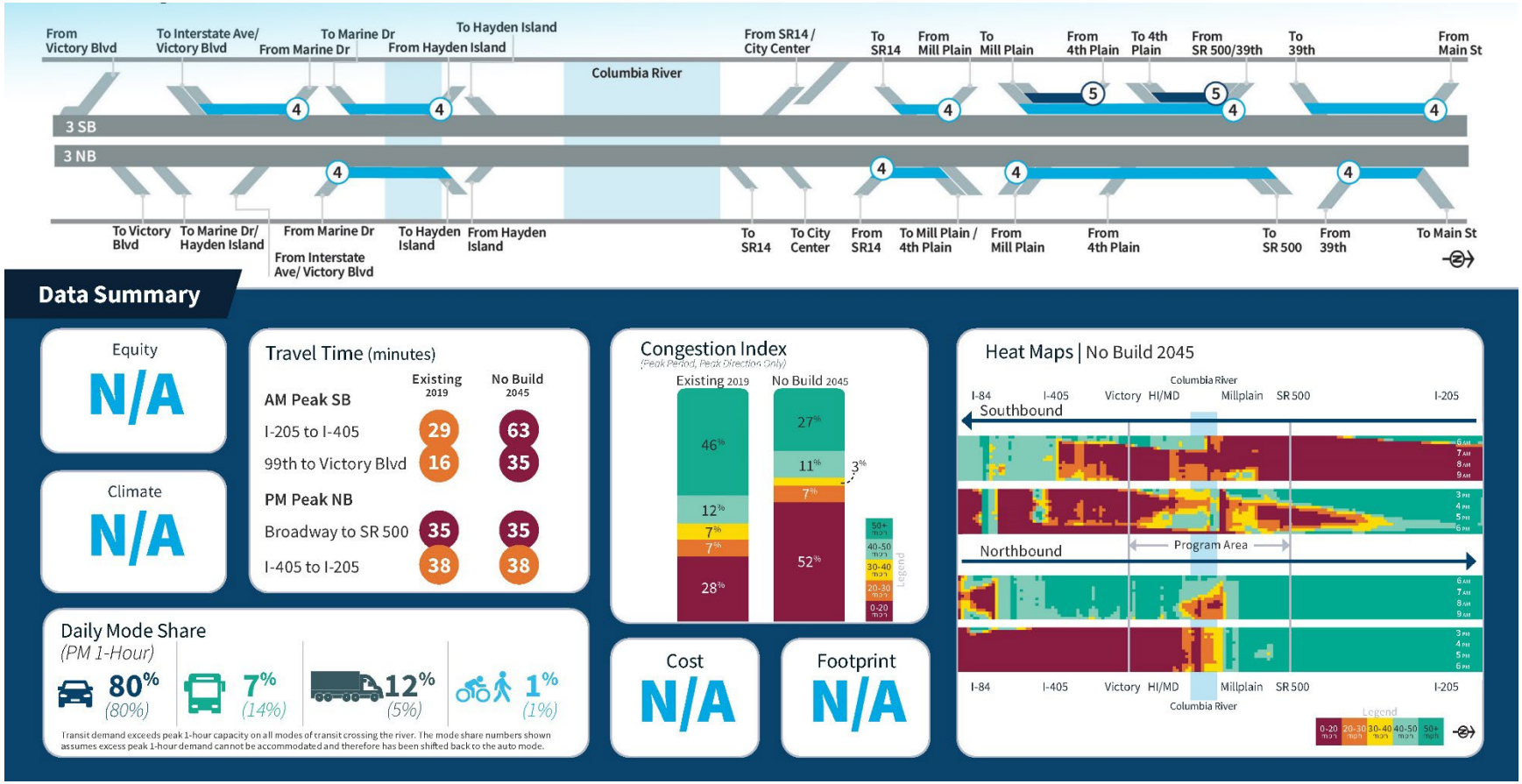
Based on initial results and feedback from the partner agencies, **one auxiliary lane northbound and one auxiliary lane southbound between Marine Drive and Mill Plain Boulevard was recommended** to be advanced in the Draft SEIS process. An addition of auxiliary lanes can help optimize the existing three through lanes and allow for more efficient movement through the corridor – improving safety, helping to relieve congestion with better traffic flow, and reducing emissions from vehicles idling in congestion. Studying one auxiliary lane in each direction during the environmental process recognizes the desire to balance all of the regional needs and priorities, including safe, efficient, and reliable travel, as well as equity and climate goals.

Figure 21. Auxiliary Lanes – Traffic Summary



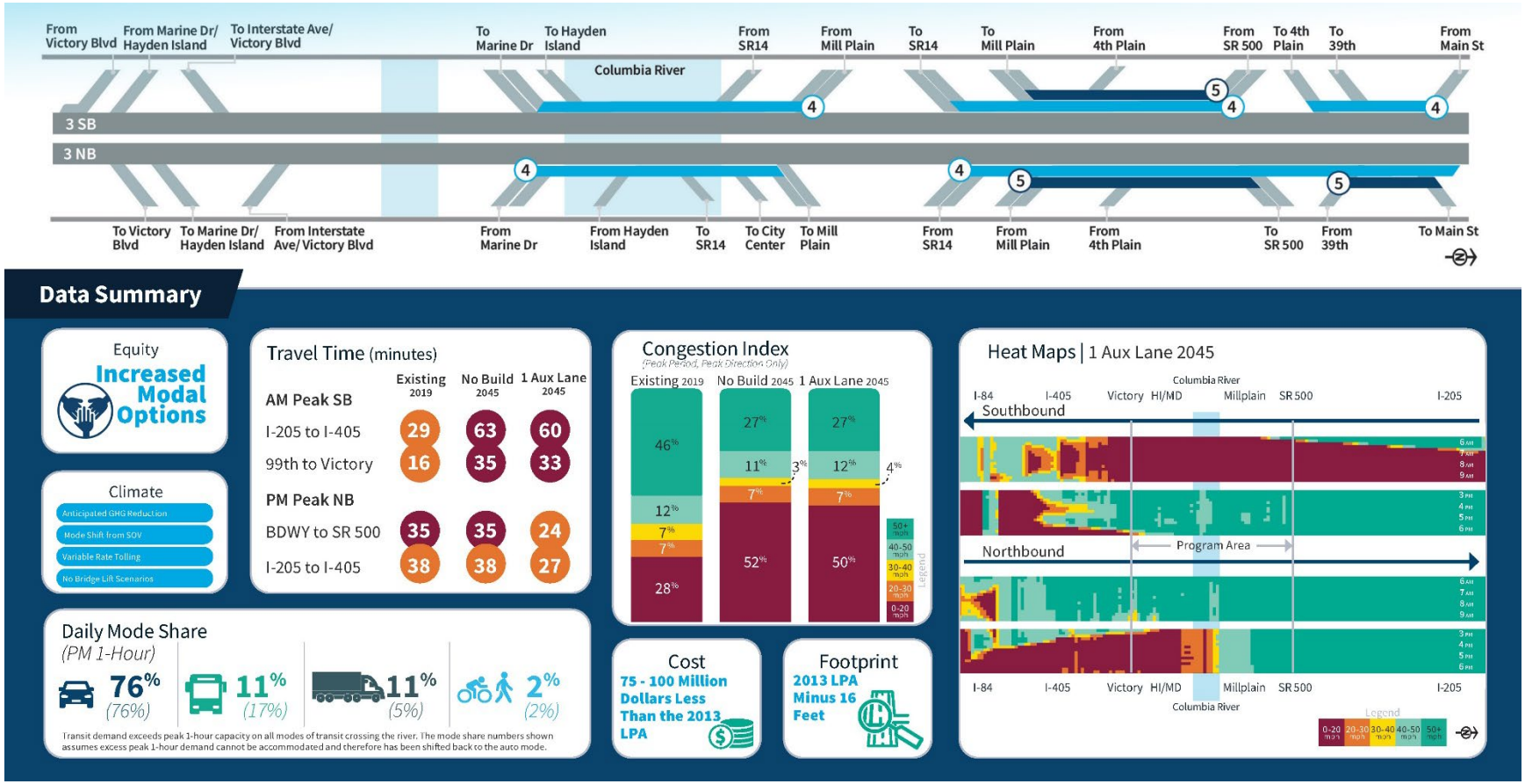
Note: Transit demand exceeds peak 1-hour capacity on all modes of transit crossing the river. The mode share numbers shown assume excess peak 1-hour demand cannot be accommodated and therefore has been shifted back to the auto mode.

Figure 22. Auxiliary Lanes – No-Build



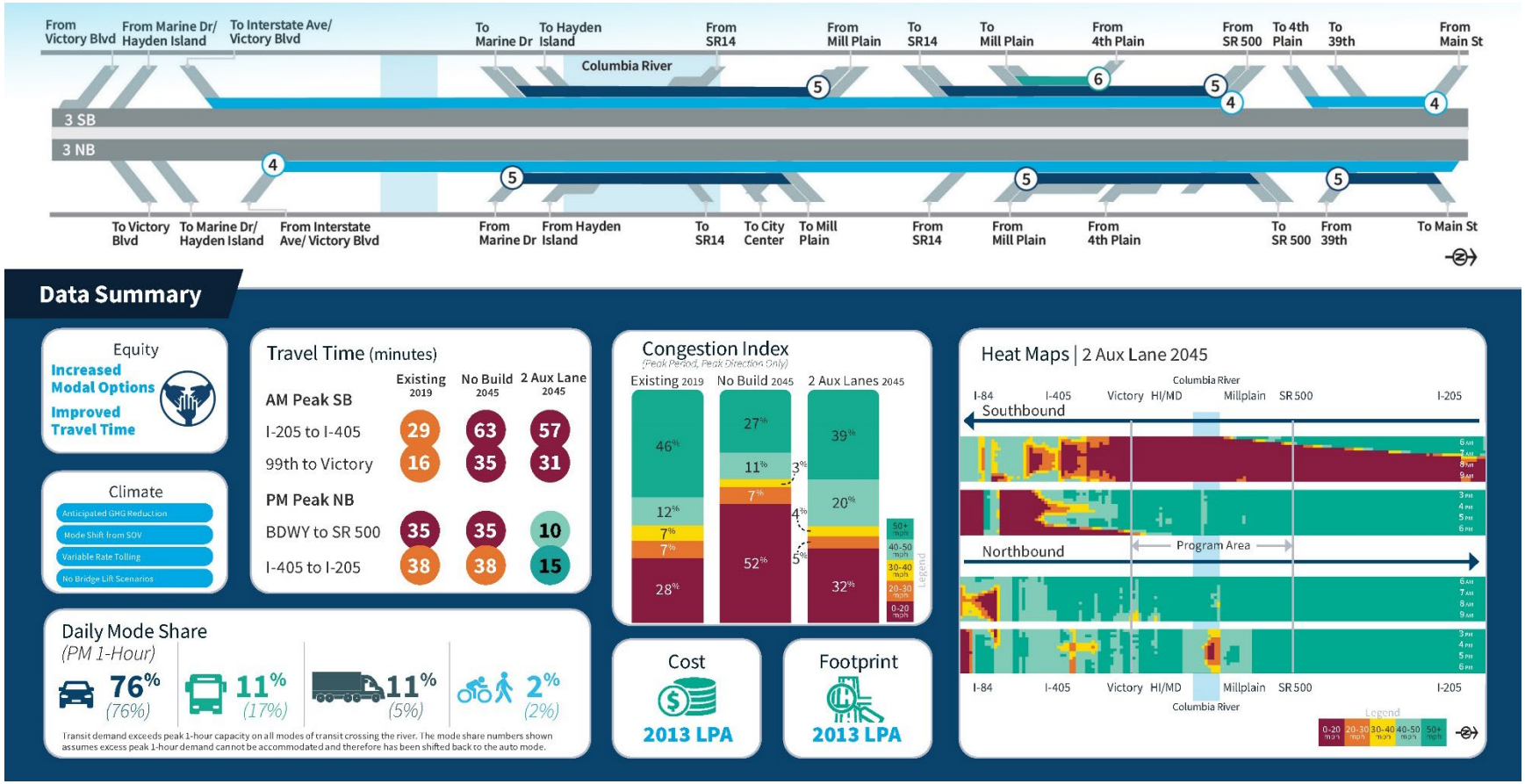
Note: Transit demand exceeds peak 1-hour capacity on all modes of transit crossing the river. The mode share numbers shown assume excess peak 1-hour demand cannot be accommodated and therefore has been shifted back to the auto mode. Travel time pairs coincide with express bus routing providing comparable locations for travel time analysis.

Figure 23. Auxiliary Lanes – One Auxiliary Lane



Note: Transit demand exceeds peak 1-hour capacity on all modes of transit crossing the river. The mode share numbers shown assume excess peak 1-hour demand cannot be accommodated and therefore has been shifted back to the auto mode. Travel time pairs coincide with express bus routing providing comparable locations for travel time analysis.

Figure 24. Auxiliary Lanes – Two Auxiliary Lanes



Note: Transit demand exceeds peak 1-hour capacity on all modes of transit crossing the river. The mode share numbers shown assume excess peak 1-hour demand cannot be accommodated and therefore has been shifted back to the auto mode. Travel time pairs coincide with express bus routing providing comparable locations for travel time analysis.

8. SUMMARY AND NEXT STEPS

This report summarizes how the IBR Program developed the preliminary preferred alternative, which will be advanced for study in an SEIS. The preliminary preferred alternative was developed through a year-long process that began with a multi-step, multi-agency alternatives screening process during the CRC project to arrive at a reasonable range of alternatives. These alternatives were evaluated in detail in the CRC project's EIS, with an LPA selected in the 2011 ROD and updated in two NEPA re-evaluations prepared in 2012-2013.

As detailed in this report, the IBR Program worked with agency partners to develop and screen a series of design options to update and modify the 2013 LPA, in order to better address physical and contextual changes since the CRC project.

Based on the results of the screening and evaluations detailed in this report, the IBR Program recommended the design options identified in Table 14 be advanced as part of the preliminary preferred alternative.

Table 14. Design Options Advanced for Study in the SEIS

Foundational Component	Design Option Advanced for Study in the SEIS
Interchanges for Hayden Island and Marine Drive	Construct a partial interchange at Hayden Island and a full interchange at Marine Drive, designed to minimize impacts while making improvement to freight and workforce traffic and active transportation on Hayden Island and Marine Drive.
Main river crossing	Construct two bridges from Hayden Island to Vancouver on a straight alignment. The eastern structure would accommodate northbound highway traffic on the upper bridge deck, with a bicycle and pedestrian path underneath; the western structure would carry southbound traffic on the upper bridge deck, with a two-way transit below.
Transit mode, general alignment and termini	Extend light rail from the Expo Center in Portland, Oregon north to a new station on Hayden Island, continuing across the Columbia River on the new bridges, following I-5 to multiple stations in the City of Vancouver, including a northern terminus at Evergreen Station in Vancouver, Washington.
Auxiliary lanes	Include one auxiliary lane northbound and one auxiliary lane southbound between Marine Drive and Mill Plain Boulevard to accommodate the safe movement of vehicles and freight.

These design options will be studied as part of the preliminary preferred alternative in the NEPA process for the IBR Program, along with the other components identified in Section 2.3.

As previously noted, the Modified LPA consists of recommendations for three key Program components (the interchanges on Hayden Island and Marine Drive; transit mode, general alignment and termini; and the number of auxiliary lanes). The guiding bodies of each of the eight Program partners, including the regional transit agencies, cities, MPOs and Ports, met between June 22 and July 14, 2022, to consider the Program's recommendation for the Modified LPA. These boards, councils, and commissions each voted in support of endorsing the Program's Modified LPA through their own agency's resolution. In addition to the Modified LPA resolutions, many partners included conditions reflecting their priorities and requests for additional work, considerations, and analysis. The Program acknowledges that additional work and/or analysis beyond what is reflected in the Modified LPA is necessary as the Program continues to develop a multimodal corridor solution. The Program will develop a workplan that identifies how each request made in the conditions might be addressed, including the timing most appropriate to the overall Program schedule.

Environmental analyses for the SEIS will be conducted to evaluate benefits and impacts to environmental and community resources (e.g., air quality, climate, land use, transportation) and to identify potential mitigation for adverse impacts. Additional opportunities will be provided to agencies, partners, advisory groups, and the public to provide input and feedback on the Modified LPA, preliminary preferred alternative, environmental analyses, and proposed mitigation. This will include a public comment period and a public hearing(s) held for the Draft SEIS, and other opportunities to be identified.

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Attachment A. IBR Alignment with Partner Climate Goals and Policies

Interstate Bridge Replacement (IBR) Program Climate Goals – Alignment with Partner Climate Goals and Policies

Note for Reviewers: This document provides a summary of the partners' climate planning, policies and goals and shows where and how the IBR program climate framework and desired outcomes (as well as other program initiatives, efforts and goals – such as equity and public engagement) are aligned.

Aligned: IBR program goals are in alignment and in some cases directly contributes to achieving this partner goal. (Full circle)

Partial: IBR program goals may not directly relate but are not in conflict. (Half circle)

No: IBR program goals are not aligned with this partner goal. (Empty circle)

Not Applicable: Partner goal does not apply to IBR program; however, IBR program is not in conflict with this goal. (N/A)

To Be Decided (TBD): IBR program has not arrived at a decision, commitment, or goal for this topic yet.

Partner Climate Plans and Policies Referenced

Sources		Jump Link
WSDOT	• WSDOT Secretary's Executive Order 1113: Sustainability https://wsdot.wa.gov/sites/default/files/2020/11/05/WSDOT-EO-1113.pdf • Washington State Legislature RCW 70A.45.020: Greenhouse gas emissions reductions – Reporting requirements https://app.leg.wa.gov/rcw/default.aspx?cite=70A.45.020	Page 4 **WSDOT**
ODOT	• Strategic Action Plan https://www.oregon.gov/odot/Pages/SAP.aspx • Climate Action Plan 2021-2026 https://www.oregon.gov/odot/Programs/Documents/Climate_Action_Plan_2021-2026.pdf • Statewide Transportation Strategy (STS) https://www.oregon.gov/odot/Planning/Pages/STS.aspx • State GHG Emission Reduction Goals https://www.oregon.gov/gov/Pages/carbonpolicy_climatechange.aspx • DRAFT: Oregon Dept of Land Conservation and Development (DLCD) -- Updated Transportation Planning Rules (Draft March 2022) https://www.oregon.gov/lcd/LAR/Pages/CFEC.aspx	Page 6 **ODOT**

Sources		Jump Link
City of Portland	• Climate Action Plan (2015) https://www.portland.gov/bps/climateaction • https://www.portland.gov/sites/default/files/2020-06/2015-climate-action-plan-final-progress-report-single-pages-v8.pdf • Climate Emergency Declaration (2020) https://www.portland.gov/sites/default/files/2021/climate-emergency-declaration-resolution-37494-june-30-2020.pdf • Transportation System Plan: Goals and Policies (2020) https://www.portland.gov/transportation/planning/tsp-document-downloads • Pricing Options for Equitable Mobility (2021) https://www.portland.gov/transportation/planning/pricing-options-equitable-mobility-poem	Page 8 **City of Portland**
Oregon Metro	• Climate Smart Strategy (2014) https://www.oregonmetro.gov/climate-smart-strategy • Regional Transportation Plan (2018) and Appendix J: Climate Smart Strategy Implementation and Monitoring https://www.oregonmetro.gov/regional-transportation-plan https://www.oregonmetro.gov/sites/default/files/2019/04/02/RTP-Appendix_J_Climate_Smart_Strategy_Monitoring181206.pdf • Regional Congestion Pricing Study (2021) https://www.oregonmetro.gov/regional-congestion-pricing-study	Page 18 **Metro**
TriMet	• TriMet Climate Action Plan (2022) https://trimet.org/bettertransit/pdf/TriMet-Climate-Action-Plan.pdf • Cleaner Environment & Sustainability https://trimet.org/bettertransit/environment.htm • TriMet News: TriMet announces major actions to reduce its carbon footprint https://news.trimet.org/2019/12/trimet-announces-major-actions-to-reduce-its-carbon-footprint/	Page 22 **TriMet**
Port of Portland	• Environment: Climate Change Strategy https://www.portofportland.com/Environment • Environmental Objectives and Targets (2016-2017) http://cdn.portofportland.com/pdfs/Env_Home_16_17_ObjTrgts.pdf	Page 23 **Port of Portland**

Sources		Jump Link
City of Vancouver	• Vancouver City Council zero emissions goal (June 2022) https://www.cityofvancouver.us/citycouncil/page/city-council-approves-resolution-officially-adopting-ambitious-climate-action-goals • *Climate Action Plan – anticipated in spring 2022.* • Sustainable Vancouver https://www.cityofvancouver.us/publicworks/page/sustainable-vancouver	Page 26 **City of Vancouver**
C-TRAN	• Mission and Vision https://www.c-tran.com/about-c-tran/mission-and-vision	Page 31 **C-TRAN**
Port of Vancouver	• Climate Action Plan https://www.portvanusa.com/environmental-services/climate-action-plan/	Page 32 **Port of Vancouver**
SW Washington Regional Transportation Council (RTC)	• None.	

Partner Agency – WSDOT	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
WSDOT Secretary's Executive Order 1113: GHG Reduction Goals	**GHG Reduction Target**. By 2030, reduce overall emissions of greenhouse gases in the state to fifty million metric tons, or 45% below 1990 levels;	**Yes – Aligned.** IBR is working with partners to establish GHG reduction targets. IBR has a goal to contribute to reducing GHG emissions. The goals associated with transportation options aim to shift travel demand to low GHG modes, constructions goals center around reducing construction-based emissions, goals for maintenance and operations are all aiming to reduce GHG. In areas where emissions cannot be reduced, IBR is considering offsets.	4
	GHG Reduction Target. By 2040, reduce overall emissions of greenhouse gases in the state to twenty-seven million metric tons, or seventy percent below 1990 levels;	**Yes – Aligned.** IBR is working with partners to establish GHG reduction targets. IBR has a goal to contribute to reducing GHG emissions. The goals associated with transportation options aim to shift travel demand to low GHG modes, constructions goals center around reducing construction-based emissions, goals for maintenance and operations are all aiming to reduce GHG, and in areas where emissions cannot be reduced goals are included to offset the emissions.	4
	GHG Reduction Target. By 2050, reduce overall emissions of greenhouse gases in the state to five million metric tons, or ninety-five percent below 1990 levels.	**Yes – Aligned.** IBR is working with partners to establish GHG reduction targets. IBR has a goal to contribute to reducing GHG emissions. The goals associated with transportation options aim to shift travel demand to low GHG modes, constructions goals center around reducing construction-based emissions, goals for maintenance and operations are all aiming to reduce GHG, and in areas where emissions cannot be reduced goals are included to offset the emissions.	4
	Energy efficiency	**Yes – Aligned.** IBR climate goals include using a renewable power supply, high efficiency lighting, and an electric vehicle maintenance fleet, all of which contribute to the IBR's energy efficiency. *Reducing Climate Impacts – Maintenance and Operations*	4

Partner Agency – WSDOT	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	Reducing pollution	**Yes – Aligned.** IBR climate goal to reduce GHG, which contributes to the reduction of pollution.	4
	Enhanced resilience	**Yes – Aligned.** IBR includes climate resiliency goals, such as designing for performance in a range of environmental conditions resulting from evolving climate, and considering climate impacts to future growth and population centers	4

Partner Agency – ODOT	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
ODOT Strategic Action Plan	Equity– Prioritize diversity, equity, and inclusion by identifying and addressing systemic barriers to ensure all Oregonians benefit from transportation services and investments.	**Yes – Aligned.** IBR prioritization of equity concerns will assist in advancing this goal	4
	Modern Transportation System – Build, maintain and operate a modern, multimodal transportation system to serve all Oregonians, address climate change, and help Oregon communities and economies thrive.	**Yes – Aligned.** IBR purpose directly corresponds to this goal. By shifting travel demands to lower GHG modes and improving transportation efficiency the replacement bridge will fit into this goal. *Reducing Climate Impacts – Transportation Options*	4
	Sufficient and Reliable Funding – Seek sufficient and reliable funding to support a modern transportation system and a fiscally sound ODOT.	**Yes – Aligned.** The IBR seeks sufficient and reliable funding.	4
ODOT Climate Action Plan (2021)	Reduce emissions from the transportation system.	**Yes – Aligned.** IBR aims to reduce vehicle-based GHG emissions. *Reducing Climate Impacts – Transportation Options* *Reducing Climate Impacts – Construction*	4
	Make the transportation system more resilient to extreme weather events.	**Yes – Aligned.** IBR directly addresses this, "Consider changes in environmental conditions resulting from changes in our climate" with goals to address increased weather extremes in the road surface, and expansion of the bridge. *Climate Resiliency- Environmental Changes*	4
Statewide Transportation Strategy (STS)	The Statewide Transportation Strategy: A 2050 Vision for Greenhouse Gas Reduction (STS) is Oregon's carbon reduction roadmap for transportation and includes strategies for substantially reducing GHG emissions from the transportation sector.	**Yes – Aligned**. IBR aims to lower emissions which will contribute to the goal of lowering overall state emissions. *Reducing Climate Impacts – Transportation Options* *Reducing Climate Impacts – Maintenance and Operations*	4
Governor's Executive Order 20-04: State GHG Reduction Goals	**GHG Reduction Target**. Per Executive Order 20-04, achieve State greenhouse gas emission reduction goals to at least 45 percent below 1990 emissions levels by 2035, and at least 80 percent below 1990 levels by 2050.	**Yes – Aligned.** IBR is working with partners to establish GHG reduction targets. IBR has a goal to contribute to reducing GHG emissions. The goals associated with transportation options aim to shift travel demand to low GHG modes, constructions goals center around reducing construction-based emissions, goals for maintenance and operations are all aiming to reduce GHG, and in areas where emissions cannot be reduced goals are included to offset the emissions.	4

Partner Agency – ODOT	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
DLCD: Updated Transportation Planning Rules	Oregon Dept. of Land Conservation and Development (DLCD) is proposing updates to the statewide Transportation Planning Rules (TPR). Existing rules are not sufficient to meet the state's Metropolitan GHG Reduction Targets, so updated rules aim to reduce climate pollution. The amended rules would require local governments in metropolitan areas to: • Plan for greater development in transit corridors and downtowns, where services are located and less driving is necessary; • Prioritize system performance measures that achieve community livability goals; • Prioritize investments for reaching destinations without dependency on single occupancy vehicles, including in walking, bicycling, and transit; • Plan for and manage parking to meet demonstrated demand, and avoid over-building of parking in areas that need housing and other services; • Plan for needed infrastructure for electric vehicle charging; and • Regularly monitor and report progress.	**Yes – Aligned.** IBR aims to reduce vehicle-based GHG emissions by expanding transportation options for non-auto trips. This includes high capacity transit and safe, comfortable bike and pedestrian infrastructure. It also includes an equitable tolling program. Together the elements of the bridge program contribute to the region's livability and provide alternatives to driving.	4

Partner Agency – City of Portland	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
Climate Action Plan (2015)	**GHG Reduction Target**. Portland and Multnomah County have committed to reducing local carbon emissions by 80 percent below 1990 levels by 2050, with an interim goal of a 40 percent reduction by 2030.	**Yes – Aligned.** IBR is working with partners to establish GHG reduction targets. IBR has a goal to contribute to reducing GHG emissions. The goals associated with transportation options aim to shift travel demand to low GHG modes, constructions goals center around reducing construction-based emissions, goals for maintenance and operations are all aiming to reduce GHG, and in areas where emissions cannot be reduced goals are included to offset the emissions.	4
	The City and County are committed to leveling this playing field. We're working to: • Increase access to transit, sidewalks, bike lanes and other transportation options. • Reduce exposure to pollution and excessive heat. • Improve access to parks and other natural resources. • Reduce burdens of housing and energy costs.	**Yes – Aligned.** IBR will increase access to transit and active transportation amenities. IBR is exploring ways to mitigate excessive heat through design and increasing tree cover. *Reducing Climate Impacts – Transportation Options* *Climate resiliency- Environmental Changes* **Not applicable.** IBR climate goals do not directly address air pollution, access to parks, housing and energy costs, but there is no conflict.	4
	By 2030 Reduce the total energy use of all buildings built before 2010 by 25 percent.	**Not applicable.** As a new structure, this goal does not directly apply to the replacement bridge. IBR is likely to include a renewable power supply and high efficiency lighting, allowing structures to fit within the energy efficiency parameters.	n/a
	By 2030 Achieve zero net carbon emissions in all new buildings and homes	**Yes – Partial.** Any buildings associated with IBR will comply with local standards. Primary elements do not include buildings or homes.	2
	By 2030 Supply 50 percent of all energy used in buildings from renewable resources, with 10 percent produced within Multnomah County from on-site renewable sources, such as solar.	**Yes – Aligned.** IBR aims to increase renewable power supply for energy needs. IBR will work with local utilities to access renewable energy sources. The team recognizes that the Clean Energy Transformation Act in WA will change the landscape for purchasing renewable energy; the law will require all electricity produced in the state to be GHG neutral by 2030 and GHG free by 2045. There may be opportunities for accessing renewable power within this timeframe. *Reducing Climate Impacts –Maintenance and Operations*	4

Partner Agency – City of Portland	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	Create vibrant neighborhoods where 80 percent of residents can easily walk or bicycle to meet all basic daily, non-work needs and have safe pedestrian or bicycle access to transit. Reduce daily per capita vehicle miles traveled (VMT) by 30 percent from 2008 levels.	**Yes – Aligned.** IBR includes reducing travel demand, shift travel demand to low GHG modes and improve transportation efficiency, which will contribute to this goal. *Reducing Climate Impacts –Travel Options*	4
	Improve the efficiency of freight movement within and through the Portland metropolitan area	**Yes – Aligned.** IBR will improve transportation efficiency, which will benefit all travelers, including freight. *Reducing Climate Impacts – Travel Options*	4
	Increase the fuel efficiency of passenger vehicles in use to 40 miles per gallon and manage the road system to minimize emissions.	**Yes – Partial.** IBR includes the use of electric vehicle maintenance fleet; Reducing Climate Impacts- Travel Options, improving transportation efficiency will also minimize emissions. *Reducing Climate Impacts – Maintenance and Operations*	2
	Reduce lifecycle carbon emissions of transportation fuels by 20 percent.	**Not applicable;** no conflict. While none of the IBR climate goals contribute or align directly, there is no conflict. IBR goals to lower emissions and reduce lifecycle emissions from materials and reduce transport distances support this goal.	n/a
	Reduce consumption-related emissions by encouraging sustainable consumption and supporting Portland businesses in minimizing the carbon intensity of their supply chains.	**Yes – Aligned.** IBR includes the use of local manufacturers, sourcing materials locally, and reducing transport which align well with this goal. *Reducing Climate Impacts -- Construction*	4
	Reduce food scraps sent to landfills by 90 percent.	**Not applicable.** As IBR has no effect on food, this goal doesn't have correlation to IBR climate goals; however there is no conflict.	n/a
	Recover 90 percent of all waste generated	**Yes – Aligned.** IBR has a zero-waste goal for demolition. *Reducing Climate Impacts - Construction*	4
	Reduce the consumption of carbon-intensive foods and support a community-based food system.	**Not applicable.** As IBR has no effect on food consumption this goal doesn't have correlation to IBR climate goals; no conflict.	n/a

Partner Agency – City of Portland	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	Sequester carbon through increased green infrastructure (trees, plants, soil) and natural areas. Reduce effective impervious areas by 600 acres. Expand the urban forest canopy to cover at least one-third of the city, with a minimum canopy cover of 25 percent of each residential neighborhood and 15 percent of the central city, commercial and industrial areas	**Yes – Partial.** IBR climate goal for GHG offsets will help to mitigate construction-related emissions that cannot be eliminated. Plans to create a robust landscape plan that relies on much higher than traditional tree and planting replacement rates in the public right of way could also bring Portland closer to the goal of expanding the urban forest canopy. *Reducing Climate Impacts- Offsets*	2
	Reduce risks and impacts from heat, drought, and wildfire by preparing for hotter, drier summers with increased incidence of extreme heat days.	**Yes – Aligned.** IBR climate goals for adaptive and resilient design are in alignment. *Climate resiliency- Environmental Changes*	4
	Reduce risks and impacts from flooding and landslides by preparing for warmer winters with the potential for more intense rain events.	**Yes – Aligned.** IBR climate goals for adaptive and resilient design are in alignment. *Climate Resiliency- Environmental Changes* *Reducing Climate Impacts – Construction*	4
	Build City and County staff and community capacity to prepare for and respond to the impacts of climate change.	**Yes – Aligned.** IBR construction and procurement will support DBE businesses in increasing capacity for climate-responsive practices. *Reducing Climate Impacts – Construction* *Climate Resiliency –Development and Behavioral Changes*	4
	Build City and County staff and community capacity to ensure effective implementation and equitable outcomes of climate action efforts.	**Yes – Aligned.** IBR engagement and equity efforts are focused on equitable process and equitable outcomes, in support of this goal. *Climate Resiliency –Development and Behavioral Changes*	4
Climate Emergency Declaration (2020)	**GHG Reduction Target**. Be it further resolved, that the City of Portland adopts a new target of achieving **at least a 50% reduction in carbon emissions below 1990 levels by 2030** and net-zero carbon emissions before 2050. These targets will be carried forward into future Climate Action Plan updates and work plans	**Yes – Aligned.** IBR is working with partners to establish GHG reduction targets. IBR has a goal to contribute to reducing GHG emissions. The goals associated with transportation options aim to shift travel demand to low GHG modes, constructions goals center around reducing construction-based emissions, goals for maintenance and operations are all aiming to reduce GHG, and in areas where emissions cannot be reduced goals are included to offset the emissions.	4

Partner Agency – City of Portland	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	GHG Reduction Target. To inform future Climate Action Plan updates and workplans, the City of Portland will analyze decarbonization pathways to **achieve carbon neutrality by 2050** with clear interim goals, including a commitment to monitoring any remaining emission sources and implementing policies or mechanisms to reduce those emissions, including but not limited to the role of urban sequestration and negative carbon technologies.	**Yes – Aligned.** IBR is working with partners to establish GHG reduction targets. IBR has a goal to contribute to reducing GHG emissions. The goals associated with transportation options aim to shift travel demand to low GHG modes, constructions goals center around reducing construction-based emissions, goals for maintenance and operations are all aiming to reduce GHG, and in areas where emissions cannot be reduced goals are included to offset the emissions.	4
Transportation System Plan: Policies (2020)	**Transportation Policy:** Mode share goals and vehicle miles travelled (VMT) reduction: Increase the share of trips made using active and low-carbon transportation modes. Reduce VMT to achieve targets set in the most current Climate Action Plan and Transportation System Plan, and meet or exceed Metro's mode share and VMT targets.	**Yes – Aligned.** IBR is working with partners to establish GHG reduction targets. IBR has a goal to contribute to reducing GHG emissions. The goals associated with transportation options aim to shift travel demand to low GHG modes, constructions goals center around reducing construction-based emissions, goals for maintenance and operations are all aiming to reduce GHG, and in areas where emissions cannot be reduced goals are included to offset the emissions.	4

Partner Agency – City of Portland	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	Transportation Policy: Transportation strategy for people movement: Implement a prioritization of modes for people movement by making transportation system decisions according to the following ordered list: • Walking • Bicycling • Transit • Fleets of electric, fully automated, multiple passenger vehicles • Other shared vehicles • Low or no occupancy vehicles, fossil-fueled non-transit vehicles When implementing this prioritization, ensure that: • The needs and safety of each group of users are considered, and changes do not make existing conditions worse for the most vulnerable users higher on the ordered list. • All users' needs are balanced with the intent of optimizing the right-of-way for multiple modes on the same street. • When necessary to ensure safety, accommodate some users on parallel streets as part of a multi-street corridor. • Land use and system plans, network functionality for all modes, other street functions, and complete street policies, are maintained. • Policy-based rationale is provided if modes lower in the ordered list are prioritized.	**Yes – Partial**. IBR serves primarily to improve mobility and access for I-5, part of the interstate highway system, so the modal prioritization is not aligned. Even so, IBR will improve and expand safe, direct travel options for people walking, biking/rolling and taking transit within the project area.	2
	Transportation Policy – GHG Reduction Target: By 2035, reduce Portland's transportation-related carbon emissions to 50% below 1990 levels, at approximately 934,000 metric tons.	**Yes – Aligned.** IBR is working with partners to establish GHG reduction targets. IBR has a goal to contribute to reducing GHG emissions. The goals associated with transportation options aim to shift travel demand to low GHG modes, constructions goals center around reducing construction-based emissions, goals for maintenance and operations are all aiming to reduce GHG, and in areas where emissions cannot be reduced goals are included to offset the emissions.	4

Partner Agency – City of Portland	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
Pricing Options for Equitable Movement (2021)	**We are in a climate crisis.** The transportation sector contributes more than 40% of greenhouse gas emissions in the Portland region. Reducing transportation emissions will take a three-pronged approach: 1. Reducing driving by making other options safer and more attractive. 2. Shifting the trips that remain on the road to zero-emission vehicles (including cars, buses and freight). 3. Planning and building connected, inclusive, and complete neighborhoods to reduce the need for long trips.	**Yes – Partial**. IBR is centering climate and equity outcomes that influence all stages of decision making. - Expanding transportation options is one of the most significant means that the IBR program has to reduce driving trips. - IBR supports the transition to zero-emission vehicles. The IBR climate program will explore ways to electrify the fleet used for construction and ongoing operations and maintenance. - IBR is contributing to building connected and complete communities in the project area.	2
	The City should utilize the Equitable Mobility Framework to guide pricing policy deliberations and commit to evaluating equitable mobility impacts of the existing system and any future proposed transportation policy. This includes impacts to moving people and goods, safety, climate and health, and the economy.	**TBD**. IBR has not established details of a pricing program yet, but variable pricing will be a key component to manage demand. IBR is committed to evaluating equitable tolling structures.	tbd
	The City must engage community stakeholders, especially those representing BIPOC communities, Portlanders living on low incomes, people with disabilities, multi-lingual and displaced communities in the next stage of pricing policy development, as well as ongoing evaluation.	**Yes – Aligned**. IBR will continue to uphold its commitment to meaningfully engage the public and priority equity communities in decision making. Equity and equitable access to travel is a shared priority, and IBR is committed to evaluating equitable tolling structures.	4
	The City must advance complementary strategies alongside pricing to improve equitable mobility outcomes. Pricing is just one policy tool and not a stand-alone solution. Additional transportation demand management programs; multimodal infrastructure, operations and service investments; land use policies; affordable housing; and more must also be prioritized to create a more equitable and sustainable mobility system.	**Yes – Aligned**. IBR has not established details of a pricing program yet, but variable pricing will be a key component to manage demand. Equity and equitable access to travel is a shared priority, and IBR is committed to evaluating equitable tolling structures.	4

Partner Agency – City of Portland	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	Prioritize the goal of reducing traffic demand and using the existing transportation system as efficiently as possible to move people and goods in a more climate-friendly and equitable way. While pricing generates revenue and the reinvestment of revenue is a critical way to make pricing strategies equitable, revenue generation should never be the top priority.	**Yes – Aligned**. IBR has not established details of a pricing program yet, but variable pricing will be a key component to manage demand.	4
	Recognize that a pricing policy is only effective if it reduces traffic demand and/or raises enough revenue to fund effective demand management or multimodal improvements. • Setting rates or surcharges too low to affect demand or fund improvements is inequitable. • Programs should be designed to be data driven and regularly reviewed for impact. Rates and surcharges should be set to meet policy goals.	**TBD**. IBR has not established details of a pricing program yet, but variable pricing will be a key component to manage demand.	tbd
	Provide exemptions for households living on low incomes. • The City should develop one set of income-based policy standards that can be applied to current and future pricing programs to limit administrative costs and complexity. • Until a universal basic income can be guaranteed, exempting households living on low- incomes should be the highest priority to avoid exacerbating current inequities. • When exemptions are not possible, cash rebates or payments to households living on low incomes is preferred as it allows individuals to make the best transportation decisions for their personal situation. • More evaluation and community engagement are needed to determine what specific design would be most equitable and would minimize overall burdens, while still achieving demand management outcomes. • Pricing programs should build off existing means-testing systems wherever possible to not add additional program access burdens.	**TBD**. IBR has not established details of a pricing program yet, but variable pricing will be a key component to manage demand. IBR will continue to uphold its commitment to meaningfully engage priority equity communities in decision making. Equity and equitable access to travel is a shared priority, and IBR is committed to evaluating equitable tolling structures.	tbd

Partner Agency – City of Portland	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	Center climate and equity outcomes (e.g., reducing greenhouse gas emissions, reducing transportation cost burdens, expanding job access, etc.) throughout pricing program design. • This includes evaluating how different variable-rate designs, where prices change based on factors like income, time of day, congestion levels, occupancy, geography, and fuel efficiency may further advance climate and equity goals, with a bias toward equitable outcomes. • Evaluation should not unnecessarily delay implementation but should be thorough and focused on understanding impacts to BIPOC community members, Portlanders with low incomes, and people with disabilities. The City should also commit to ongoing evaluation of equity implications of policies once implemented. • To move with the urgency required by the climate crisis, pricing policies that focus on managing demand for people with the most options should be prioritized. As stated above, exemptions for drivers with low incomes are critical	**Yes – Aligned**. IBR has not established details of a pricing program yet, but variable pricing will be a key component to manage demand. IBR centers climate and equity outcomes. Equity and equitable access to travel is a shared priority, and IBR is committed to evaluating equitable tolling structures.	4

Partner Agency – City of Portland	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	Reinvest revenue generated from pricing in strategies that further expand equitable mobility. • Pricing revenue should be reinvested to support frequent, competitive and high-quality multimodal access to areas where pricing is implemented and to mitigate potential negative impacts of traffic diversion. • High-priority complementary investment areas include transit service, operations and infrastructure; biking and walking infrastructure; affordable housing near transportation options; and multimodal discounts and financial incentives, including driving options for those without access who need it. Additional investment areas include electrification infrastructure and rebates as well as maintaining the existing infrastructure necessary for multimodal mobility. • Community stakeholders should always be involved in revenue allocation decisions.	**TBD**. IBR has not established details of a pricing program yet, but variable pricing will be a key component to manage demand. IBR is committed to evaluating equitable tolling structures. Use of the revenues has not yet been examined.	tbd
	Reduce unequal burdens of technology and enforcement. • Technology and payment systems must be designed to reduce barriers for individuals with limited access to bank accounts (e.g., by allowing use of prepaid debit cards). • Technology and payment systems should include strong privacy protections. • The location of pricing infrastructure should be considered so it doesn't overtly impact BIPOC or communities living on low incomes. • Automated enforcement mechanisms should be used to reduce the potential for enforcement bias. • Tickets and fines for non-compliance should be means-based (i.e., structured by income level) to mitigate disproportionate impacts.	**TBD**. IBR has not established details of a pricing program yet, but variable pricing will be a key component to manage demand. IBR centers climate and equity outcomes. Equity and equitable access to travel is a shared priority, and IBR is committed to evaluating equitable tolling structures. Technology and enforcement mechanisms have not yet been examined.	tbd

Partner Agency – Metro	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
Metro Climate Smart Strategy (2014)	Implement adopted local and regional land use plans	**Yes – Aligned.** IBR does not have land use authority. However, the program will be designed to align with current land use plans and solutions will be forward compatible with denser, transit-oriented communities. Additionally, IBR climate goals support finding design solutions that foster complete and walkable communities.	4
	Make transit convenient, frequent, accessible, and affordable	**Yes – Aligned.** IBR includes goals to shift travel demand to low GHG modes, which includes high-capacity transit, which will contribute to Metro's goal. *Reducing Climate Impacts –Transportation Options*	4
	Make biking and walking safe and convenient	**Yes – Aligned.** IBR includes goals to increase and improve accessibility for people who walk, bike, and roll. The IBR solution will include major improvements to bicycle and pedestrian options. *Reducing Climate Impacts –Transportation Options*	4
	Make streets and highways safe, reliable, and connected	**Yes – Aligned.** IBR goals clearly align with this goal. The IBR solution will improve transportation efficiency, which aims to reduce congestion, design for traffic smoothing, and target moderate speeds. In addition to reducing emissions, it will also improve road safety. *Reducing Climate Impacts –Transportation Options*	4
	Use technology to actively manage the transportation system	**Yes – Aligned.** IBR includes goals to improve transportation efficiency which includes the use of Transportation Management systems and ITS. *Reducing Climate Impacts –Transportation Options*	4
	Provide information and incentives to expand the use of travel options	**Yes – Aligned.** IBR climate goals include transportation demand management strategies and increasing range of transportation options. *Reducing Climate Impacts –Transportation Options*	4
	Make efficient use of vehicle parking and land dedicated to parking	**Yes – Aligned.** If Park and Rides are included, this goal will be applied.	4
	Support transition to cleaner, low carbon fuels and more fuel-efficient vehicles	**Yes – Aligned.** IBR climate goals include an electric vehicle maintenance fleet for ongoing facility maintenance and operations. *Reducing Climate Impacts – Maintenance and Operations*	4
	Secure adequate funding for transportation investments	**Yes – Aligned.** IBR is a transportation investment in itself.	4

Partner Agency – Metro	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
Regional Transportation Plan (2018)	**GHG Reduction Target.** Reduce transportation-related greenhouse gas emissions to at least 20% below 2005 emissions levels by 2035 and 35% below 2005 levels by 2050 for the Portland metropolitan area *(Table 2.5: GHG emissions reduction targets)*	**Yes – Aligned.** IBR is working with partners to establish GHG reduction targets. IBR has a goal to contribute to reducing GHG emissions. The goals associated with transportation options aim to shift travel demand to low GHG modes, constructions goals center around reducing construction-based emissions, goals for maintenance and operations are all aiming to reduce GHG, and in areas where emissions cannot be reduced goals are included to offset the emissions.	4
	Climate Leadership Policy 1: Implement adopted local and regional land use plans.	**Yes – Aligned.** IBR recognizes the importance of local and regional land use planning, and its influence on travel patterns and climate outcomes.	4
	Climate Leadership Policy 2: Make transit convenient, frequent, accessible, and affordable.	**Yes – Aligned.** Existing transit options are limited. IBR will provide high-capacity transit that improves transit service frequency and reliability.	4
	Climate Leadership Policy 3: Make biking and walking safe and convenient.	**Yes – Aligned.** Existing active transportation facilities are inadequate; IBR will improve the active transportation network and make it easier for people to walk, roll and bike.	4
	Climate Leadership Policy 4: Make streets and highways safe, reliable, and connected.	**Yes – Aligned.** IBR will improve safety, connectivity and reliability for I-5 and connecting streets. The program will address seismic vulnerability, safety concerns with the existing roadway design, congestion and travel time reliability, limited public transit, impaired freight movement, and inadequate active transportation facilities.	4
	Climate Leadership Policy 5: Use technology to actively manage the transportation system and ensure that new and emerging technology affecting the region's transportation system supports shared trips and other Climate Smart Strategy policies and strategies.	**Yes – Aligned.** IBR will incorporate intelligent transportation systems (ITS) and demand management tools to actively manage the roadway network.	4
	Climate Leadership Policy 6: Provide information and incentives to expand the use of travel options.	**TBD.** IBR has not yet made decisions regarding information and incentives, but expanding transportation options is a key component of the IBR climate framework, and there is no conflict.	tbd

Partner Agency – Metro	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	Climate Leadership Policy 7: Make efficient use of vehicle parking spaces through parking management and reducing the amount of land dedicated to parking.	**TBD.** IBR does not yet have goals specific to parking management, but there is no conflict.	tbd
	Climate Leadership Policy 8: Support Oregon's transition to cleaner fuels and more fuel-efficient vehicles in recognition of the external impacts of carbon and other vehicle emissions.	**Yes – Aligned.** IBR supports the transition to zero-emission vehicles. The IBR climate program will explore ways to electrify the fleet used for construction and ongoing operations and maintenance.	4
	Climate Leadership Policy 9: Secure adequate funding for transportation investments that support the RTP climate leadership goal and objectives.	**Yes – Aligned.** IBR is a transportation investment in itself.	4
RTP Appendix J: Climate Smart Strategy Implementation and Monitoring (2018)	The full list of RTP Climate Smart Strategy **performance monitoring targets** are shown on page 15 of the document.	**TBD.** IBR is working with partners to establish GHG reduction targets. IBR has not set climate performance targets for operations after construction. The design option screening process incorporates many climate metrics to inform design selection.	tbd
Regional Congestion Pricing Study (2021)	*Best Practices for Implementing Congestion Pricing Programs in an Equitable Manner.* Pricing program design impact on equity outcomes: A more equitable pricing and investment strategy would include the following components: **Variable pricing; Targeted exemption; focus on transit; focus on vulnerable communities.** A less equitable pricing and investment strategy would include: 24-hr flat rate pricing; no supportive investments in transit; no focus on vulnerable communities Congestion pricing programs and projects can improve equity outcomes by (**1)** Reducing harm and increasing benefits if agencies are willing to **focus engagement on historically impacted residents and other stakeholders traditionally at a disadvantage** and ensure they have a role in decision making at every step in the process.	**TBD**. IBR has not established details of a pricing program yet, but variable pricing will be a key component to manage demand. IBR will continue to uphold its commitment to meaningfully engage priority equity communities in decision making. Equity and equitable access to transportation is a shared priority, and IBR is committed to evaluating equitable tolling structures.	tbd

Partner Agency – Metro	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	Congestion pricing programs and projects can improve equity outcomes by (**2) Committing to targeted investments** of net toll revenues for locally supported improvements such as improved transit infrastructure and services and traffic safety improvements.	**TBD**. IBR has not established details of a pricing program yet, but variable pricing will be a key component to manage demand. Transit investment will be key to the overall program. IBR is currently considering a range of high-capacity transit options, all of which would greatly improve transit frequency and reliability compared to today.	tbd
	Congestion pricing programs and projects can improve equity outcomes by (**3) Exploring who pays and to what degree**, and considering a suite of affordability programs such as rebates or exemptions for low-income drivers, a "transportation wallet", or other investments that address affordability.	**TBD**. IBR has not established details of a pricing program yet, but variable pricing will be a key component to manage demand. Equity and equitable access to transportation is a shared priority, and IBR is committed to evaluating equitable tolling structures.	tbd

Partner Agency – TriMet	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
Climate Action Plan	**GHG Reduction Target.** Reduce operational emissions to reach net zero by 2050. Benchmarks: In 2022, reduce operational emissions 60% below baseline In 2030, reduce operational emissions 70% below baseline In 2040, reduce operational emissions 90% below baseline In 2050, reduce operational emissions to net zero TriMet will be separately evaluating how growing transit mode share and growing ridership can help reduce regional emissions.	**Yes – Aligned.** IBR is working with partners to establish GHG reduction targets. IBR has a goal to contribute to reducing GHG emissions. The goals associated with transportation options aim to shift travel demand to low GHG modes, constructions goals center around reducing construction-based emissions, goals for maintenance and operations are all aiming to reduce GHG, and in areas where emissions cannot be reduced goals are included to offset the emissions.	4
TriMet Sustainability	Convert MAX to 100% wind power in 2020	**Not applicable**; no conflict. Does not apply to IBR climate goals but has no conflict. Similarly, IBR will be considering integration of renewable power generation.	n/a
	Stop diesel bus purchases after 2025	**Not applicable**; no conflict. Does not apply to IBR climate goals but has no conflict.	n/a
	Convert buses to renewable diesel beginning in April 2020	**Not applicable**; no conflict. Does not apply to IBR climate goals but has no conflict.	n/a
	Convert non-bus fleet to electric & non-bus heavy-duty vehicles to renewable diesel by 2030	**Yes – Partial.** IBR climate goals include goals to use low emissions vehicles. Construction goal aims to use low emissions construction equipment and vehicles, and Maintenance and Operations goal aims to have an electric fleet of vehicles for maintenance. These goals support this by setting an example of other agencies using low impact vehicles. *Reducing Climate Impacts – Construction* *Reducing Climate Impacts - Operations and Maintenance*	2
	Support Youth Pass Program	**Not applicable**; no conflict. Does not apply to IBR climate goals but has no conflict.	n/a
	Conduct a carbon baseline analysis and develop a net zero carbon strategy	**Not applicable**; no conflict. Does not apply to IBR climate goals but has no conflict.	n/a

Partner Agency – TriMet	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	Develop a carbon lens	**Yes - Aligned.** IBR climate framework aims to put climate at the center of the design process, similar to a "carbon lens."	4
	Support regional air quality testing	**Not applicable.** IBR climate goals are not in conflict.	n/a

Partner Agency: Port of Portland	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
Climate Change Strategy	Our goal by 2020 is to lower all our carbon emissions by 15 percent below 1990 levels.	**Not applicable**; no conflict. Does not apply to IBR climate goals but has no conflict.	n/a
	Reduce diesel particulate matter by 75% from Port-controlled operations from 2000 baseline levels by 2020.	**Not applicable**; no conflict. Does not apply to IBR climate goals but has no conflict.	n/a
Environmental Objectives and Targets (year)	[Need document details]		
Environmental Objectives and Targets (2016-2017)	**Minimize impacts to air quality:** The Air Quality Program facilitates implementation of the Port's Air Quality Policy, which has a primary goal of promoting clean air for all who live in airsheds affected by Port activities. To do this, the Port utilizes emissions inventories and aspect/impact analyses of its planned and actual activities that have, or can have, a significant impact on the airshed. Recognizing that not all emission sources are under the Port's direct control, the Port seeks opportunities to improve air quality by facilitating and encouraging partnerships, education, and outreach to assist customers, tenants, and other stakeholders in reducing marine and aviation-related emissions. The Port supports efforts of the International Maritime Organization and International Civil Aviation Organization to set global standards to reduce emissions from marine vessels and aircraft	**Yes – Aligned.** IBR climate goals aim to lower emissions which will contribute to the goal of lowering overall state emissions and improving air quality. *Reducing Climate Impacts – Transportation Options* *Reducing Climate Impacts – Construction*	4
	Reduce energy consumption and carbon emissions: The Port developed the Energy and Carbon Management Master Plan to reduce energy consumption and carbon emissions. The plan aligns closely with the Air Quality program and presents a six-	**Yes – Aligned.** IBR climate goals aim to lower emissions which will contribute to the goal of lowering overall state emissions. *Reducing Climate Impacts – Transportation Options* *Reducing Climate Impacts – Construction*	4

Partner Agency: Port of Portland	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	point strategy for reaching the Port's GHG reduction goal. The master plan sets the foundation for establishing targets and a portfolio of projects identified and scheduled for implementation.		
	Minimize impacts and seek opportunities to enhance natural resources: The Natural Resources Program seeks to ensure the development and maintenance of a consistent, ecosystem-based framework for all decisions involving natural resources at the Port. The Port takes a proactive approach to managing natural resources and is responsible for the long-term management of its mitigation commitments. Engaging with the community to identify opportunities has been an important aspect in target selection to support regional conservation goals and initiatives.	**Yes – Aligned.** IBR climate goals aim to create a robust landscape plan that relies on much higher than traditional tree and planting replacement rates in the public right of way. This renews natural resources and supports conservation goals. IBR additionally will take a proactive approach to natural resources protection and avoiding impacts where possible. *Reducing Climate Impacts – Offsets*	4
	Minimize impacts to water resources: The Port of Portland's Stormwater Management Program is designed to prevent, reduce, and eliminate the discharge of polluted stormwater to the Columbia Slough and Willamette and Columbia rivers. In addition, the Port continues to set targets in support of the Water Conservation Strategy developed in 2014 that defines strategies to eliminate waste, improve efficiency and use alternative water sources across the Port. It strives to further integrate water conservation into the Port's daily operations, business planning, maintenance, and capital projects.	**Yes – Aligned.** IBR design will include elements that managing stormwater due to increased storm intensities, this will have an overall impact in reducing water pollution. Additionally, the program will be designing additional stormwater treatment beyond what is provided by current facilities. *Climate Resiliency- Environmental Changes*	4
	Reduce waste generation and hazardous materials use: Five Years to Zero Waste is the Port of Portland's ambitious plan developed in 2014 to create a guidance framework for the actions necessary to reach "Zero-Waste" status, which the EPA defines as landfill waste diversion of 90% or greater. This plan	**Yes – Aligned.** IBR climate goals include zero waste goals for demolition, helping to directly support this goal. *Reducing Climate Impacts – Construction*	4

Partner Agency: Port of Portland	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	has been developed through an ongoing partnership with Portland State University's Community Environmental Services, as part of the Port's commitment to innovative, industry-leading waste minimization efforts within the broader framework of the Port's EMS. This plan sets out a framework to achieve Zero Waste status by implementing broad strategies in key areas, with specific actions, priorities, and targets. The Port has made great strides toward Zero Waste at Port-owned properties.		

Partner Agency – City of Vancouver	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
Climate Action Plan: Goals and Policies (2022)	[Plan forthcoming August 2022]		
City Council Statement on GHG Reduction	**GHG Reduction Target.** The City of Vancouver is advancing its positive direction to achieve the leading-edge climate action goals it endorsed in 2021. On Monday, June 6, following in-depth analysis and discussion, Vancouver City Council unanimously approved an amended version of the City's Climate Priority Resolution that calls for adopting some of the most ambitious goals in the nation, including: • An 80% reduction in municipal operations Greenhouse Gas (GHG) emissions by 2025 • An 80% reduction in GHG emissions by the Vancouver community by 2030 • Carbon neutrality by both municipal operations and the Vancouver community by 2040	**Yes – Aligned.** IBR is working with partners to establish GHG reduction targets. IBR has a goal to contribute to reducing GHG emissions. The goals associated with transportation options aim to shift travel demand to low GHG modes, constructions goals center around reducing construction-based emissions, goals for maintenance and operations are all aiming to reduce GHG, and in areas where emissions cannot be reduced goals are included to offset the emissions.	4

Partner Agency – City of Vancouver	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
Sustainability Plan	Greenhouse gas emissions meet existing and emerging state and federal requirements.	**Yes – Aligned.** IBR desired outcomes include reducing GHG emissions and will met all state and federal requirements.	4
	Environmental health is protected or improved by minimizing and where possible, eliminating: 1. The use of hazardous or toxic materials by residents, businesses, and City operations. 2. The levels of pollutants entering the air, soil, and water. 3. The risks that environmental problems pose to human and ecological health.	**Yes – Aligned.** IBR has set goals for low emissions construction methods, equipment, and vehicles which align with the goals of reducing hazardous or toxic materials. IBR Climate Resiliency goals consider the impacts that climate change can have on the bridge and the communities around the bridge. These goals are aligned with reducing the risks that environmental problem s pose to human and ecological health. *Reducing Climate Impacts – Construction* *Climate Resiliency – Development and Behavior Change*	4
	No one geographic or socioeconomic group in the City is being unfairly or disproportionately impacted by environmental pollution	**Yes – Aligned.** IBR environmental justice and equity commitments to avoid disproportionate harms are aligned with this goal.	4
	Consumption of fresh, locally produced, organic produce and foods increases to promote public health and to minimize resource consumption and negative environmental impacts.	**Not applicable**; no conflict.	n/a
	City and community consumption - specifically consumption on non-local, nonrenewable, non-recyclable and non-recycled materials, water, energy, and fuels - decrease. City takes a leadership role in encouraging sustainable or green procurement and considers ways to become a zero-waste city over the long term.	**Yes – Aligned.** IBR sets the goal to use local manufacturers and source materials locally, this directly aligns and supports this goal. *Reducing Climate Impacts – Construction*	4

Partner Agency – City of Vancouver	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	The use of local, non-polluting, renewable, and recycled resources is encouraged	**Yes – Aligned.** IBR sets the goal to use local manufacturers and source materials locally, this directly aligns and supports this goal. Additionally, IBR climate goals include lifecycle analysis for environmental impacts of materials, which will help to support this goal by ensuring that materials used are sustainable. *Reducing Climate Impacts – Construction* *Reducing Climate Impacts – Maintenance and Operations*	4
	A multi-modal transportation system exists that minimizes and, where possible, eliminates pollution and motor vehicle congestion while ensuring safe mobility and access for all without compromising our ability to protect public health and safety.	**Yes – Aligned.** IBR will contribute to this goal. Reducing travel demand, shifting travel demand to low GHG modes, and improving transportation efficiency will all contribute to the outcomes desired in this goal. *Reducing Climate Impacts – Transportation Options*	4
	Auto dependency is reduced and affordable alternative, sustainable modes of travel are increased.	**Yes – Aligned.** IBR will contribute to this goal. IBR aims to minimize auto travel demand and shift travel demand to low GHG modes such as walking, biking, or transit. *Reducing Climate Impacts – Transportation Options*	4
	Vancouver has a diverse, vibrant, stable, local economy that supports the basic needs of all segments of the community.	**Yes – Aligned.** IBR supports this goal by setting a goal to use local manufacturers. *Reducing Climate Impacts – Construction*	4
	Businesses, organizations, and non-profits within the city work with the City of Vancouver to increase efficient use of resources through sustainable business practices.	**Yes – Aligned.** IBR supports this goal by setting a goal to use local manufacturers and provide support for small firms and DBE firms to increase capacity for sustainable practices. *Reducing Climate Impacts – Construction*	4
	Sustainable or “green” businesses are encouraged to locate in the City of Vancouver.	**Yes – Aligned.** IBR plans to utilize local and sustainable manufactures and will act as a reliable transportation option for local businesses but should otherwise have no negative impact on this goal.	4

Partner Agency – City of Vancouver	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	A sufficient open-space system is developed and maintained so that it is diverse in uses and opportunities and includes natural functions/wildlife habitat, as well as passive and active recreation with equitable distribution of parks, trees, pathways throughout the City.	**Yes – Aligned.** IBR includes a goal to create a robust landscape plan that relies on much higher than traditional tree and planting replacement rates in the public right of way. Assisting this goal in that it will increase greenspace and tree cover in the area that mitigation is done. *Reducing Climate Impacts – Offsets*	4
	Land use and transportation planning and policies create compact, mixed-use projects, forming urban villages designed to maximize affordable housing and encourage walking, bicycling and the use of existing or future public transit options.	**Yes – Aligned.** IBR includes the goal to minimize travel demand and increase the walkability of the area, and shift travel demand to low GHG modes such as biking, or transit. These goals will support Vancouver's goals by expanding walkability and bikeability within the program area of impact and beyond. *Reducing Climate Impacts – Transportation Options*	4
	Residents recognize that we all share the local ecosystem with other living things that warrant respect and responsible stewardship. Vancouver uses land efficiently in order to minimize the need to expand the urban footprint to accommodate growth.	**Yes – Partial.** IBR does not have land use authority; however, the program will prioritize transportation solutions that are compatible with more compact, walkable and transit-oriented communities. *Reducing Climate Impacts – Transportation Options* *Reducing Climate Impacts – Offsets*	2
	All development meets the 2030 Challenge in urban growth areas. Clark County and cities have an integrated approach to achieving sustainability.	**Yes – Partial.** IBR is considering options for sustainability certification from third parties such as Greenroads, Envision (ISI), and Living Building Challenge (Living Future). These are similar to the 2030 Challenge, but specifically for infrastructure projects.	2
	A mix of affordable, livable, and green housing types is achieved and maintained throughout the City of Vancouver for people of all socio-economic/cultural/household groups, including seniors, singles and the disabled.	**Not applicable**; no conflict. The IBR goals will have no negative impacts on the housing types in the City of Vancouver.	n/a

Partner Agency – City of Vancouver	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	LEED-certified or equivalent commercial new buildings are encouraged and promoted.	**Yes – Aligned.** While IBR is not focused on building construction it does have goals that include using low emissions methods, materials, equipment, and vehicles during construction. IBR is looking at infrastructure sustainability rating systems that match or exceed LEED standards	4
	All residents of Vancouver are able to meet their basic needs and are empowered to enhance their quality of life.	**Yes – Partial.** IBR climate goals will have no negative impact on this goal. However, having a new sustainable bridge may facilitate this goal. IBR prioritization of equity concerns will assist in advancing this goal.	2
	Community members have access to housing, health and social services, education, economic opportunity, and cultural and recreational resources.	**Yes – Aligned.** IBR will increase transportation options and broaden access for people walking, rolling, and taking transit. The bridge provides a necessary avenue for access to the listed resources.	4
	There is respect and appreciation of the value added to the community by differences among its members in race, religion, gender, age, economic status, sexual orientation, disabilities, immigration status and other special needs.	**Yes – Aligned.** The IBR equity program will assist in advancing this goal.	4
	Community members of all ages participate actively and effectively in civic affairs and community improvement efforts.	**Yes – Aligned.** IBR equity and engagement programs are in alignment and will assist in advancing this goal.	4
	An actively engaged community helps the City of Vancouver to carry out and improve Vancouver's Sustainability Plan	**Yes – Partial.** IBR climate goals will have no negative impact on this goal. IBR prioritization of equity concerns, process equity, and inclusive engagement will assist in advancing this goal.	2
	Community members of all ages and cultures understand the basic principles of sustainability and use them to guide their decisions and actions, personally and collectively.	**Yes – Partial.** IBR supports community education in sustainability and will have no negative impact on this goal.	2

Partner Agency – C-TRAN	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
C-TRAN	C-TRAN services contribute positively to the region's sustainability, livability, and economic vitality by helping manage traffic congestion, reduce dependence on foreign oil, lower carbon emissions, contain transportation costs for employers and employees, enable denser land use and development of urban areas, and provide essential transport to persons with no other means of travel.	**Yes – Aligned.** IBR climate goals aim to shift travel demand to low GHG modes this includes increasing access and connection for high-capacity transit, supporting this goal. *Reducing Climate Impacts – Transportation Options*	4

Partner Agency – Port of Vancouver	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
Port of Vancouver Climate Action Plan	Apply sustainability standards to new construction projects	**Yes – Aligned.** IBR is evaluating adherence to several sustainability rating systems for substantial project elements.	4
	Develop sustainable construction standards such as low-carbon concrete and asphalt, low-emission construction vehicles, construction waste reduction, and materials reuse	**Yes – Aligned.** IBR climate goals include sustainable materials selection. *Reducing Climate Impacts – Construction*	4
	Continue lighting retrofits	**Not applicable**; no conflict. Does not apply to IBR but has no conflict. Similarly, IBR will be designing for energy efficient lighting.	n/a
	Install occupancy sensors, building controls, programmable thermostats and smart meters	**Not applicable**; no conflict. IBR assets will be designed including sensors for smart operations	n/a
	Replace aging HVAC units with energy efficient technology	**Not applicable**; no conflict. IBR assets will be designed including energy efficient technology	n/a
	Explore renewable energy opportunities including onsite solar power generation, small-scale wind generation, geothermal energy, and replacement of natural gas	**Not applicable**; no conflict. IBR assets will be designed to optimize access to renewable energy sources.	n/a
	Electrify or hybridize diesel and gasoline powered vehicles and equipment	**Yes – Aligned.** Reducing emissions associated with maintenance and operations includes a goal to utilize an electric vehicle maintenance fleet, the use of an electric vehicle maintenance fleet by a public agency often increases the support/accessibility for other agencies to switch as well.	4
	Install EV charging infrastructure	**Yes – Aligned.** IBR is looking at integrating charging needs into the transportation system.	4
	Replace use of diesel with low carbon fuels such as renewable diesel	**Yes – Aligned.** Reducing emissions associated with maintenance and operations includes a goal to utilize a renewable power supply and to use electric vehicles for the maintenance fleet, this goal aligns with that.	4

Partner Agency – Port of Vancouver	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	Work with C-Tran to provide transit service to the Port and provide transit subsidies to employees	**Not applicable**; no conflict.	n/a
	Install bicycle infrastructure such as secure parking and showers to promote bicycle commuting	**Yes – Aligned.** IBR includes goals to reduce vehicle-based emissions and shifting to transit and active transportation, including bicycles. If routes that commuters use are accessible to bicycles, it will support this goal.	4
	Support effective carpool options	**Yes – Aligned.** IBR includes goals to reduce vehicle-based emissions and shifting to transit and active transportation, including a carpool/HOV lane.	4
	Promote telecommuting through enhanced virtual work infrastructure and policies	**Not applicable**; no conflict.	n/a
	Offset emissions from business travel	**Not applicable**; no conflict.	n/a
	Promote use of low-carbon ground transport options for business travel	**Yes – Aligned.** IBR will include high-capacity transit that can serve business travelers across the region. *Reducing Climate Impacts – Transportation Options*	4
	Provide recycling services and infrastructure	**Not applicable**; no conflict.	n/a
	Develop a waste reduction plan	**Yes – Aligned.** The IBR has zero waste goals for demolition, these goals don't support each other, but show an alignment in the area.	4
	Promote the use of green infrastructure to manage stormwater	**Yes – Aligned.** IBR design will incorporate sustainable stormwater management strategies.	4
	Explore water system efficiencies	**Yes – Aligned.** IBR design will incorporate sustainable design practices, such as water efficiency.	4
	Develop sustainability standards for new construction projects on port property	**Not applicable**; no conflict.	n/a

Partner Agency – Port of Vancouver	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	Develop sustainable construction standards such as low-carbon concrete and asphalt, low-emission construction vehicles, construction waste reduction, and materials reuse for projects occurring on port property	**Yes – Aligned**. IBR aims to reduce construction-related emissions and support	4
	Explore carbon reduction during collaborations on agreements with tenants/customers	**Not applicable**; no conflict.	n/a
	Pursue partnerships, incentives, and grant opportunities to support tenant/customer energy efficiency, equipment electrification and other carbon reduction initiatives	**Yes – Partial.** IBR climate goals aim for similar expansion of energy efficient systems.	2
	Emphasize and increase marketing efforts to pursue innovative business opportunities and renewable, clean energy projects	**Not applicable**; no conflict.	n/a
	Promote lighting retrofits by tenants	**Not applicable**; no conflict.	n/a
	Promote installation of occupancy sensors, building controls, programmable thermostats and smart meters by tenants	**Not applicable**; no conflict.	n/a
	Promote replacement of aging HVAC units with energy efficient technology in tenant facilities	**Not applicable**; no conflict.	n/a
	Support onsite renewable energy generation by tenants	**Not applicable**; no conflict.	n/a
	Encourage tenants to replace natural gas use with low carbon/renewable alternatives	**Not applicable**; no conflict.	n/a
	Promote the electrification and hybridization of diesel and gasoline powered vehicles and equipment	**Yes – Aligned.** Reducing emissions associated with maintenance and operations includes a goal to utilize an electric vehicle maintenance fleet, the use of an electric vehicle maintenance fleet by a public agency often increases the support/accessibility for other agencies to switch as well.	4
	Install common use EV charging infrastructure	**Yes – Aligned.** IBR is looking at integrating charging facilities into the design.	4

Partner Agency – Port of Vancouver	Partner Agency – Specific Goal	Alignment with IBR Program Goals	Match
	Promote the replacement of diesel with low carbon fuels such as biodiesel, renewable diesel, and hydrogen	**Yes – Aligned.** Reducing emissions associated with maintenance and operations includes a goal to utilize an electric vehicle maintenance fleet, the use of an electric vehicle maintenance fleet by a public agency often increases the support/accessibility for other agencies to switch as well.	4
	Evaluate the use of fuel cells for heat and power, mobile equipment, and locomotives	**Not applicable**; no conflict.	n/a
	Promote the use of clean trucks and low carbon drayage vehicles	**Yes – Aligned.** Reducing emissions associated with maintenance and operations includes a goal to utilize an electric vehicle maintenance fleet, the use of an electric vehicle maintenance fleet by a public agency often increases the support/accessibility for other agencies to switch as well.	4
	Evaluate the use of shore power options for vessels visiting the Port	**Not applicable**; no conflict.	n/a
	Facilitate the development of a terminal equipment inventory to help target new investments and grant opportunities	**Not applicable**; no conflict.	n/a
	Encourage visits by cleaner or more fuel-efficient vessels	**Not applicable**; no conflict.	n/a
	Explore partnerships to promote shipping via the river system for eastbound cargo	**Not applicable**; no conflict.	n/a
	Promote idle reduction by rail vehicles/equipment (including locomotives)	**Not applicable**; no conflict.	n/a
	Evaluate the development of infrastructure to support electric locomotives for on-port switching operation	**Not applicable**; no conflict.	n/a

Attachment B. Hayden Island/Marine Drive Screening and Evaluation Materials

Attachment B-1. Screening Summaries

Hayden Island/Marine Drive | Relative Design Option Comparison

2013 Design

- Climate Impacts/Adaptation
- Natural Environment
- Built Environment
- Active Transportation
- Transit Access
- Vehicles
- Freight
- Cost
- Seismic

Equity Lens

- Avoids Harm
- Community Benefit
- Mobility/Accessibility

Climate Lens

- Multimodal Environmental Factors
- Complete Communities
- Reduces Idling
- Resilience

Design Option 1: Full Interchange

- Climate Impacts/Adaptation
- Natural Environment
- Built Environment
- Active Transportation
- Transit Access
- Vehicles
- Freight
- Cost
- Seismic

Equity Lens

- Avoids Harm
- Community Benefit
- Mobility/Accessibility

Climate Lens

- Multimodal Environmental Factors
- Complete Communities
- Reduces Idling
- Resilience

Design Option 5: Partial Interchange

- Climate Impacts/Adaptation
- Natural Environment
- Built Environment
- Active Transportation
- Transit Access
- Vehicles
- Freight
- Cost
- Seismic

Equity Lens

- Avoids Harm
- Community Benefit
- Mobility/Accessibility

Climate Lens

- Multimodal Environmental Factors
- Complete Communities
- Reduces Idling
- Resilience

Design Option 2: Partial Interchange

Does not meet Purpose and Need.

Design Option 3: Partial Interchange

Does not meet Purpose and Need.

Design Option 4: No Interchange

Does not meet Purpose and Need.

Design options are evaluated in comparison to each other and do not reflect overall program ratings.

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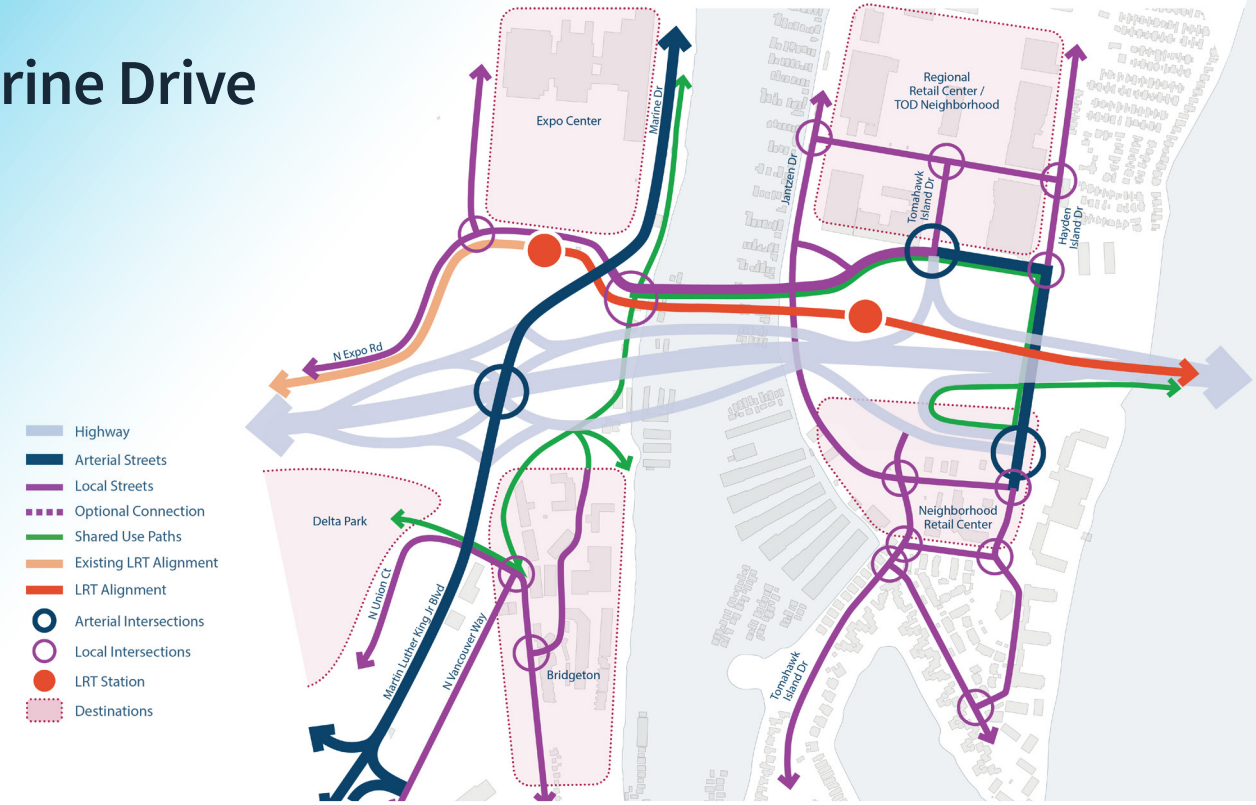
Hayden Island/Marine Drive

2013 Design

☑ Meets Purpose and Need



Screening Summary

2013 Design		
Climate Impacts/Adaptation	◑	- Larger construction footprint (comparison is not based on expected user emissions) - Addresses future river elevation and integrates with new Levee Ready Columbia flood protection improvements **(RE)**
Natural Environment	◔	- Larger footprint over aquatic habitat - Larger footprint over terrestrial habitat
Built Environment	◑	- Most non-residential building impacts **(AH)** - More floating home displacements **(AH)** - Large scale and complexity of I-5 structures over Hayden Island challenge for local placemaking opportunities **(AH, CB, CC)** - Does not includes Tomahawk Island Drive crossing **(CC)**
Active Transportation	◑	- Less direct north-south shared use path **(MA, ME)** - Lower quality of active transportation experience on east-west streets **(MA, ME)** - Higher number of shared use path road/transit crossings **(MA)**
Transit Access	◑	- Less east-west island connectivity because it does not include Tomahawk Island Drive **(MA, ME)** - Wider highway footprint **(ME)**
Vehicles	●	- Intersection traffic operations meet ODOT and City of Portland performance standards at Hayden Island and Marine Drive study area intersections **(RI)**
Freight	●	- Freight to/from Marine Drive area operates acceptably with minimal delay through the interchange **(RI)**
Cost	◕	- Lower construction cost - Higher estimated O&M cost
Seismic	◑	- Seismic retrofits North Portland Harbor Bridge; does not replace

Equity Lens

- ◑ Avoids Harm **(AH)**
- ◑ Community Benefit **(CB)**
- ◔ Mobility/Accessibility **(MA)**

Climate Lens

- ◑ Multimodal Environmental Factors **(ME)**
- ◑ Complete Communities **(CC)**
- ● Reduces Idling **(RI)**
- ◕ Resilience **(RE)**

Best ● ◕ ◑ ◔ ○ Good

Design options are evaluated in comparison to each other and do not reflect overall program ratings.

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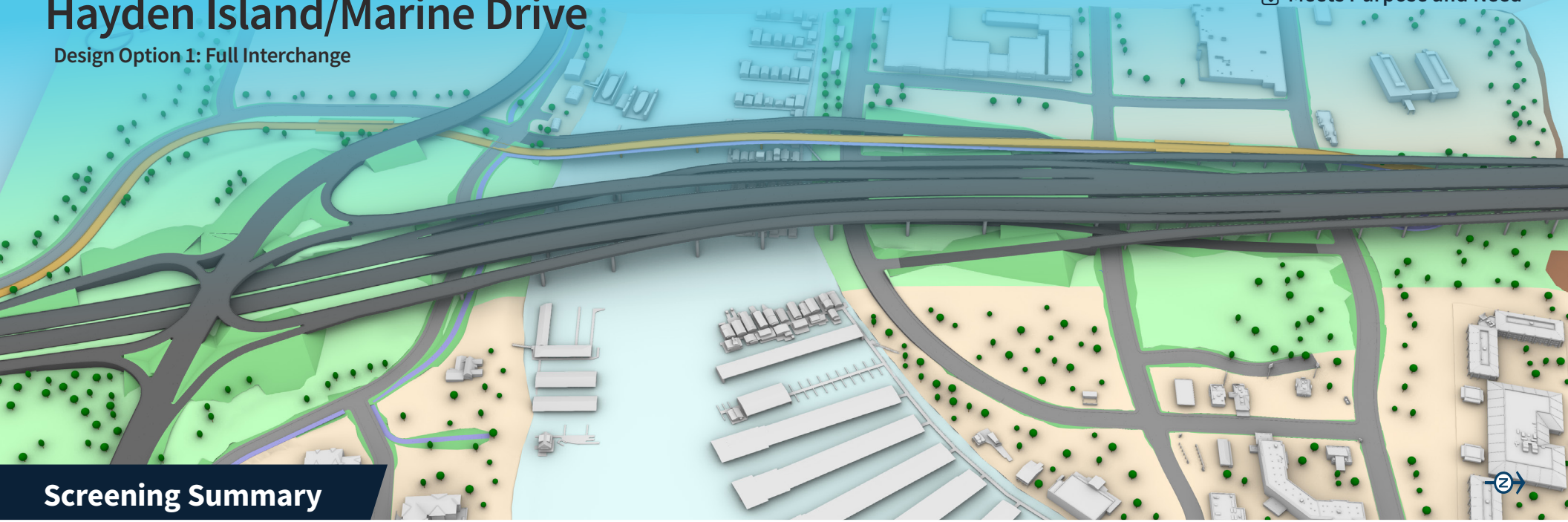
Hayden Island/Marine Drive

Design Option 1: Full Interchange

☑ Meets Purpose and Need



Screening Summary

Design Option 1: Full Interchange		
Climate Impacts/Adaptation	◑	- Larger construction footprint (comparison is not based on expected user emissions) - Addresses future river elevation and integrates with new Levee Ready Columbia flood protection improvements **(RE)**
Natural Environment	◑	- Larger footprint over aquatic habitat - Larger footprint over terrestrial habitat
Built Environment	◑	- Fewer non-residential building impacts **(AH)** - Most floating home displacements **(AH)** - Large scale and complexity of I-5 structures over Hayden Island challenge for local placemaking opportunities **(AH, CB, CC)** - Includes Tomahawk Island Drive crossing **(CC)**
Active Transportation	◕	- More direct north-south shared use path **(MA, ME)** - Lower quality of active transportation experience on east-west streets **(MA, ME)** - Higher number of shared use path road/transit crossings **(MA)**
Transit Access	◕	- Inclusion of Tomahawk Island Drive improves east-west island connectivity **(MA, ME)** - Wider highway footprint **(ME)**
Vehicles	●	- Intersection traffic operations meet ODOT and City of Portland performance standards at Hayden Island and Marine Drive study area intersections **(RI)**
Freight	●	- Freight to/from Marine Drive area operates acceptably with minimal delay through the interchange **(RI)**
Cost	◑	- Higher construction cost
Seismic	●	- Replaces North Portland Harbor Bridge

Equity Lens

- ◑ Avoids Harm **(AH)**
- ◑ Community Benefit **(CB)**
- ◕ Mobility/Accessibility **(MA)**

Climate Lens

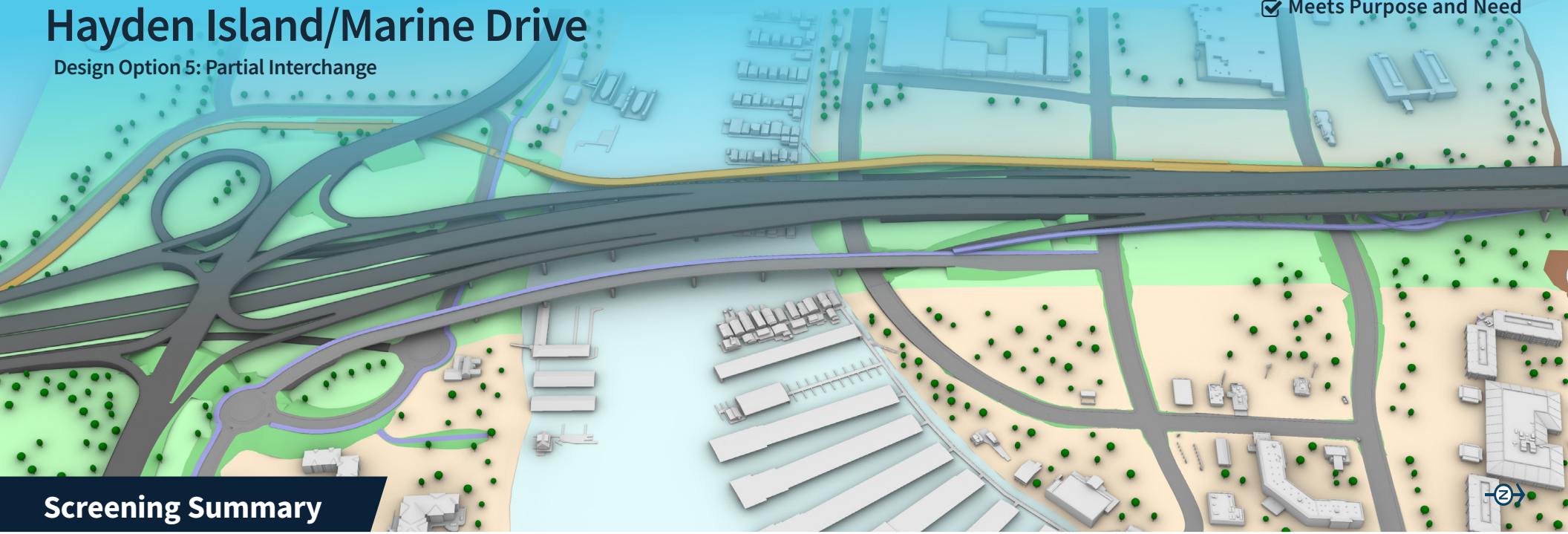
- ◕ Multimodal Environmental Factors **(ME)**
- ◑ Complete Communities **(CC)**
- ● Reduces Idling **(RI)**
- ◕ Resilience **(RE)**

Best
● ◕ ◑ ◔ ○
Good

Hayden Island/Marine Drive

Design Option 5: Partial Interchange

☑ Meets Purpose and Need



Screening Summary

Design Option 5: Partial Interchange		
Climate Impacts/Adaptation	◕	- Smaller construction footprint (comparison is not based on expected user emissions) - Addresses future river elevation and integrates with new Levee Ready Columbia flood protection improvements **(RE)**
Natural Environment	◕	- Smaller footprint over aquatic habitat - Smaller footprint over terrestrial habitat - Levee closure structure part of freeway interchange ramps
Built Environment	◕	- Fewer non-residential building impacts **(AH)** - Least floating home displacements **(AH)** - Smaller scale and complexity of I-5 structures over Hayden Island is less challenging for local placemaking opportunities **(AH, CB, CC)** - Includes Tomahawk Island Drive crossing **(CC)**
Active Transportation	●	- Most direct north-south shared use path **(MA, ME)** - Higher quality of active transportation experience on east-west streets **(MA, ME)** - Lower number of shared use path road/transit crossings **(MA)**
Transit Access	●	- Inclusion of Tomahawk Island Drive improves east-west island connectivity **(MA, ME)** - Narrower highway footprint **(ME)**
Vehicles	◕	- Intersection traffic operations meet ODOT and City of Portland performance standards at Hayden Island and Marine Drive study area intersections **(RI)** - Longer routing and more challenging wayfinding for Hayden Island traffic to/from Portland via I-5 and/or Interstate Ave
Freight	●	- Freight to/from Marine Drive area operates acceptably with minimal delay through the interchange **(RI)**
Cost	◑	- Higher construction cost
Seismic	●	- Replaces North Portland Harbor Bridge

Equity Lens

- ◕ Avoids Harm **(AH)**
- ◕ Community Benefit **(CB)**
- ● Mobility/Accessibility **(MA)**

Climate Lens

- ● Multimodal Environmental Factors **(ME)**
- ◕ Complete Communities **(CC)**
- ● Reduces Idling **(RI)**
- ◕ Resilience **(RE)**

Best
● ◕ ◑ ◔ ○
Good

Attachment B-2. Screening Matrix

Interstate BRIDGE Replacement Program		Marine Drive/Hayden Island Interchanges		●/● = least impact, high scoring ◑/◑ = few impacts, middle scoring ○/○ = more/most impact, low scoring	Green Harvey balls are subsets of blue Harvey balls, where applicable.	Note: All data are approximate. More detailed impacts will be determined during the NEPA analysis. Some numbers have been rounded.
Metric	**Desired Outcomes Supported**	**Equity Objectives Supported**	**Climate Objectives Supported**	**2013 Design (RD00)**	**Design Option 1: Full Interchange (RD03)**	**Design Option 5: Partial Interchange 3 (RD20)**	**Qualitative Description**
Climate							
Climate impacts of construction (footprint)	CL.1, CL.2		CONST	116.7 acres ○	117.1 acres ○	109.7 acres ◑	Design option footprint is used as surrogate for construction impacts. Larger footprints are assumed to have greater construction impacts and associated emissions.
Future climate disruption/events are integrated into design performance standards	CL.3		RES	Yes ●	Yes ●	Yes ●	All options address river elevation interests. No option is unique in preparedness for temperature extremes. Future design refinements of selected option will allow for evaluation of materials and other adaptation interests.
Support long-term climate change adaptation where feasible (e.g., increased flooding, etc.)	CL.3, CL.4		RES	● Flooding: Yes, will integrate with new Levee Ready Columbia flood protection improvements ● Heat retention potential: most significant due to footprint size (116.7 acres) ◑	● Flooding: Yes, will integrate with new Levee Ready Columbia flood protection improvements ● Heat retention potential: most significant due to footprint size (117.1 acres) ◑	● Flooding: Yes, will integrate with new Levee Ready Columbia flood protection improvements ● Heat retention potential: moderate to high due to footprint size (109.7 acres) ◑	All options address river elevation interests. No option is unique in preparedness for temperature extremes. Future design refinements of selected option will allow for evaluation of materials and other adaptation interests. NOTE - construction footprint area values may suggest greater heat effect for larger footprints.

Metric	Desired Outcomes Supported	Equity Objectives Supported	Climate Objectives Supported	2013 Design (RD00)	Design Option 1: Full Interchange (RD03)	Design Option 5: Partial Interchange 3 (RD20)	Qualitative Description
Environment and Community Health							
Built Environment							
Aesthetics				◑	○	●	
User experience surrounding the structure (design option).	EQ.3	AH, CB	ACT, CC	◑ Large scale of structure Very cluttered and wide bridgehead at north of Hayden Island *does not support local plan for positive park environment below structure Cleanest (uncluttered) bridge alignment over North Portland Harbor Potentially unprogrammed spaces between and under I-5 infrastructure	○ Large scale of structure Cluttered and wide bridgehead at north of Hayden Island *does not support local plan for positive park environment below structure Many crossing structures at different heights create visual clutter over North Portland Harbor Potentially unprogrammed spaces between and under I-5 infrastructure	● Scale of structure is smaller Clean and narrow bridgehead at north of Hayden island *supports local plan for positive park environment below structure Clean (uncluttered) bridge alignment over North Portland Harbor Less potentially unprogrammed spaces between and under I-5 infrastructure	
User experience on the structure (design option).	EQ.3	AH, CB	ACT, CC	Constantly changing relationship between SUP and vehicle lanes, challenge for SUP clarity and comfort ○	Constantly changing relationship between SUP and vehicle lanes, challenge for SUP clarity and comfort ○	SUP on edge of local road bridge (good opportunity for low speed placemaking and good views) ●	
Air Quality				●	●	●	
Traffic volumes by mode and intersection delay and level of service	CL.1, CL.4, EQ.2		RID	●	●	●	This is the same data as was summarized in rows 98.
Proximity of design option's pedestrian/bicycle infrastructure to vehicle lanes (potential emissions for "next to" or "below" vehicles)	EQ.1, EQ.2, EQ.6	AH, MA		◑	◑	◑	The distance between high-volume roadway or rail corridors and pedestrian infrastructure has an inverse relationship for air quality outcomes, with the influence extending about 500-600' downwind from travel corridors. This metric is not a differentiator between design options on Hayden Island or Marine Drive
Community resources. Number of known community or cultural resources within the design option footprint and in equity priority areas or identified through community engagement (*Hayden Island Community Church*)	EQ.6	AH		0 ●	0 ●	0 ●	Hayden Island Community Church was identified by CAG leads. HI members of the CAG were also asked, but have not identified additional sites.

Metric	Desired Outcomes Supported	Equity Objectives Supported	Climate Objectives Supported	2013 Design (RD00)	Design Option 1: Full Interchange (RD03)	Design Option 5: Partial Interchange 3 (RD20)	Qualitative Description
Cultural/historic resources. Number of known or potentially eligible historic and cultural resources within the design option footprint				Known eligible: 2 Known not eligible: 1 Unknown eligibility: 18 ◑	Known eligible: 2 Known not eligible: 0 Unknown eligibility: 19 ◑	Known eligible: 2 Known not eligible: 0 Unknown eligibility: 19 ◑	Buildings constructed in 1982 or older will be assessed for eligibility in NRHP. No known archeological sites near the design option footprints.
Hazardous Materials. Potential Priority Hazardous Material Sites within the footprint				12 ◑	19 ◑	17 ◑	
Land Use				○	◑	●	
Placemaking opportunities supported by project based on what is appropriate for the location compatible with adopted land use plans and initiatives			CC	Least opportunities, less connected urban fabric due to widest footprint of freeway and ramps ○	Fewer opportunities, less connected urban fabric due to wider footprint of freeway and ramps ◑	Greater opportunities, more connected and contiguous urban fabric due to narrower footprint of freeway and ramps ●	Wider infrastructure footprint creates a wider break between urban fabric on east and west side of the infrastructure. Placemaking opportunities benefit from greater continuity in the urban fabric and smaller breaks. This metric is based on "Size of Footprint" metric below.
Planned station location(s) supportive of land uses in comprehensive plans			CC	Less supportive. Station is shown close to Jantzen Dr which differs from Hayden Island Plan ◑	More supportive. Station can be located near Tomahawk Island Drive, better serving both north, east, south, and west sides of the island ●	More supportive. Station can be located near Tomahawk Island Drive, better serving both north, east, south, and west sides of the island ●	
Design option supportive of local street network and land use/City development vision on Hayden Island			CC	Not supportive. Tomahawk Island Drive connection not included ○	Somewhat supportive. Tomahawk Island Drive included, supports Hayden Island Plan street grid. Provides local bridge connectivity. ◑	Somewhat supportive. Tomahawk Island Drive included, supports Hayden Island Plan street grid, finer street grid better bike & pedestrian connectivity and transit supportive land uses. Provides local bridge connectivity. ◑	
Existing direct highway access maintained to/from Hayden Island				●	●	◑	
Size of footprint of design option on land over Hayden Island				97.6 acres ◑	98.1 acres ◑	89.4 acres ●	

Metric	Desired Outcomes Supported	Equity Objectives Supported	Climate Objectives Supported	2013 Design (RD00)	Design Option 1: Full Interchange (RD03)	Design Option 5: Partial Interchange 3 (RD20)	Qualitative Description
Neighborhoods and populations				○	○	◑	
Approximate number of non-residential buildings impacted by footprint	EQ.6	AH		Commercial: 20 Industrial: 4 Recreation: 0 Utilities: 4 TOTAL: 28 ○	Commercial: 14 Industrial: 4 Recreation: 0 Utilities: 4 TOTAL: 22 ◑	Commercial: 15 Industrial: 4 Recreation: 0 Utilities: 4 TOTAL: 23 ◑	Updated building impacts for all options based on refined building data (added missing buildings).
Approximate number of displaced floating homes	EQ.6			21-25 ◑	27-37 ○	18-22 ●	
Number of east-west local streets on Hayden Island	EQ.1, EQ.2	MA	ACT, CC	1 with highway ramp connections 1 with local street grid only ◑	2 with highway ramp connections 1 with local street connection ○	1 with highway ramp connections 1 with arterial connection 1 with local street grid only ◑	
Kenton-Hayden Island-Bridgeton neighborhoods connected to one another by local multimodal streets (Local east-west street adjacent to Marine Drive under I-5) .	EQ.1, EQ.2	MA	ACT, CC	Kenton uses west arterial bridge with option to use I-5. Bridgeton uses west arterial bridge via Marine Drive and Force Avenue to access HI. # local routes 2 Avg local route distance: 2.1 miles ○	Kenton and Bridgeton neighborhoods can use west arterial to access Hayden Island. Kenton has option to use I-5. # local routes 2 Avg local route distance: 1.3 miles ◑	Kenton to HI would use Expo Rd to Vancouver Way extension to east arterial bridge; Bridgeton to HI would use east arterial bridge. # local routes 2 Avg local route distance: 1.3 miles ◑	
Arterial bridges provide non-freeway connections between Hayden Island and North Portland communities (show differences in access for Bridgeton, Kenton, etc.)	EQ.1, EQ.2	MA	ACT, CC	◑ 1 local street bridge Hayden Island to Bridgeton: 5 intersections (via Expo Road to Force Ave to MD/MLK) Hayden Island to Kenton (Victory Blvd): 1 intersection (via Expo Road)	◑ 1 local street bridge Hayden Island to Bridgeton: 2 intersections (via local bridge) Hayden Island to Kenton (Victory Blvd): 2 intersections (via Expo Road)	◑ 1 arterial bridge Hayden Island to Bridgeton: 1 intersection (via local bridge) Hayden Island to Kenton (Victory Blvd): 4 intersections (via Expo Road)	

Metric	Desired Outcomes Supported	Equity Objectives Supported	Climate Objectives Supported	2013 Design (RD00)	Design Option 1: Full Interchange (RD03)	Design Option 5: Partial Interchange 3 (RD20)	Qualitative Description
Noise				●	◑	◑	
Number of high sensitivity and residential receptors within 500 feet of highway in design option		AH		Category 1: 0 Category 2: 42 (all floating homes) ◑	Category 1: 0 Category 2: 52 (all floating homes) ○	Category 1: 0 Category 2: 53 (all floating homes) ○	FTA Category 1, High Sensitivity: Buildings or parks where quiet is an essential element of their purpose. FTA Category 2, Residential: Buildings where people normally sleep (e.g., residences, hospitals, and hotels)
Proximity of highway in design option to manufactured home community (eastern edge) on Hayden Island	EQ.2, EQ.6	AH		620 feet ●	690 feet ●	690 feet ●	(Noise/vibration for manufactured homes was a community concern for the 2013 LPA.)
Noise generation potential due to design parameters (grades, intersections, # of ramps, etc.)				4 ramps on HI ◑	4 ramps on HI ◑	2 ramps on HI ◑	
Parks, Recreation, and Open Space (PROS). Area of acquired or converted existing or planned PROS (by effect and by type of resource)				0 existing 0 planned ●	0 existing 0 planned ●	0 existing 0 planned ●	Hayden Island Plan (2009): The planned park would be located under the new bridge; therefore the options do not require acquisition/conversion. See Section 4(f) metric for additional details.
Parks, Recreation, and Open Space (PROS). Area of acquired or converted PROS in equity priority areas or identified through community engagement (by effect and by type of resource)		CB	RES	N/A	N/A	N/A	There are no equity priority areas within the design options' footprints
Section 4(f). Use of non-historic Section 4(f) resources (net benefit, temporary occupancy, *de minimis* , use or constructive use)				●	●	●	Anticipated impacts were developed with input from discussions with the Section 4(f) technical lead. Any impacted trails would be rerouted/reconstructed. HI park is planned to be under the bridge.
Section 4(f). Use of non-historic Section 4(f) resources (net benefit, temporary occupancy, *de minimis* , use or constructive use) in equity priority areas or identified through community engagement		AH		N/A	N/A	N/A	There are no equity priority areas within the design options footprints

Metric	Desired Outcomes Supported	Equity Objectives Supported	Climate Objectives Supported	2013 Design (RD00)	Design Option 1: Full Interchange (RD03)	Design Option 5: Partial Interchange 3 (RD20)	Qualitative Description
Natural Environment							
Water quality and hydrology. Area of new impervious surface within FEMA-mapped floodplains (proxy for volume of fill)	CL.3, CL.4		RES	2.1 acres ◑	1.6 acres ●	1.4 acres ●	
Water quality and hydrology. Levee impacts (i.e., difference in how levee system functions)	CL.3, CL.4		RES	The MDw-5S on-ramp is placing fill over the top of the Denver Ave Hook levee. This should not impact levee operations as we are not cutting into or reducing the top of levee elevation. ◑	The MDw-5S on-ramp will be filling over the top of the Denver Ave Hook levee. This should not impact levee operations as we are not cutting into or reducing the top of levee elevation. I-5 is being re-aligned slightly to the west in the MD interchange area which will require the reconstruction of both NB and SB lanes and will have some potential impacts to the Denver Ave levee during construction. ◑	The 5S loop on-ramp and the MDw-5S on-ramp are placing fill over the top of the Denver Ave Hook levee. The new alignments are being placed on fill so impacts to the levee is minimal, but the roadway is now part of the levee which is not preferred by the USACE. I-5 is being re-aligned slightly to the west in the MD interchange area which will require the reconstruction of both NB and SB lanes and will have some potential impacts to the Denver Ave levee during construction. Levee closure structure could interact with southbound on-ramp. ○	
Wildlife and habitat. Total acreage of habitat areas (upland and riparian) crossed by design option	CL.4		RES	5.6 acres ◑	4.8 acres ◑	3.7 acres ●	
Wildlife and habitat. Total acreage of potential shaded aquatic habitat (proxy for in-water work, shading, and construction duration)	CL.4		RES	12.4 acres ○	12.5 acres ○	10.8 acres ◑	

Metric	Desired Outcomes Supported	Equity Objectives Supported	Climate Objectives Supported	2013 Design (RD00)	Design Option 1: Full Interchange (RD03)	Design Option 5: Partial Interchange 3 (RD20)	Qualitative Description
Efficient Movement of People and Goods							
Active Transportation							
Quality of active transportation experience	5.1, 5.3, CL.1	MA	ACT	◑	◑	◑	
Quality of 40-Mile-Loop Path/Vancouver Way experience (percent "open" SUP distance across interchange/arterial bridge footprint				Higher proportion of open SUP distance/duration under structures translating to more daylight, visibility, user comfort/security (35%) ●	Higher proportion of open SUP distance/duration under structures translating to more daylight, visibility, user comfort/security (35%) ●	Higher proportion of open SUP distance/duration under structures translating to more daylight, visibility, user comfort/security (33%) ●	
Quality of 40-Mile-Loop Path /Vancouver Way experience (length of segment under structure; # of structures overhead; anticipated roadway classification or character)				410 feet (high) 4 structures overhead (high) no Vancouver Way Extension (low) ◑	410 feet (high) 5 structures overhead (low) local street (high) ●	550 feet (med) 5 structures overhead (low) collector (med) ◑	Longer distance = a lower score More structures overhead = lower score Roadway classification indicates the likelihood of the road providing a human-scaled character. Arterial road = a low score
Quality of active transportation experience on Jantzen Drive (length of segment under structure; # of structures overhead; anticipated roadway classification or character)				540 feet (med) 4 structures overhead (med) local street (high) ◑	550 feet (med) 6 structures overhead (low) arterial (low) ○	410 feet (high) 4 structures overhead (med) arterial (low) ◑	Longer distance = a lower score More structures overhead = lower score Roadway classification indicates the likelihood of the road providing a human-scaled character. Arterial road = a low score
Quality of active transportation experience on Tomahawk Island Drive (length of segment under structure; # of structures overhead; anticipated roadway classification or character)				N/A - no Tomahawk Island Drive	490 feet (low) 8 structures overhead (low) local street (high) ○	230 feet (high) 4 structures overhead (high) collector (low) ◑	Longer distance = a lower score More structures overhead = lower score Roadway classification indicates the likelihood of the road providing a human-scaled character. Collector road = a low score
Quality of active transportation experience on Hayden Island Drive (length of segment under structure; # of structures overhead; anticipated roadway classification or character)				420 feet (low) 5 structures overhead (low) arterial (low) ○	440 feet (low) 5 structures overhead (low) arterial (low) ○	215 feet (high) 3 structure overhead (high) local street (high) ●	Longer distance = a lower score More structures overhead = lower score Roadway classification indicates the likelihood of the road providing a human-scaled character. Arterial road = a low score
Visibility of onward route (East-West)	5.1, 5.3, CL.1		ACT	○	◑	●	
				Hayden Island Drive: good visibility under I-5 ●	Hayden Island Drive: good visibility under I-5 ●	Hayden Island Drive: good visibility under I-5 ●	
				N/A - No Tomahawk Island Drive	Tomahawk Island Drive: visibility under I-5 with structures blocking views either side. ◑	Tomahawk Island Drive: good visibility under I-5 ●	
				Jantzen Drive: dip in road alignment and low bridge height over a long length will limit views under I-5 ○	Jantzen Drive: good visibility to water and low bridge height ●	Jantzen Drive: good visibility to water and low bridge height ●	
				Vancouver Way Extension: low existing bridge height will limit views under I-5; no roadway parallel to SUP ○	Vancouver Way Extension: low bridge height will limit views under I-5 ◑	Vancouver Way Extension: low bridge height will limit views under I-5 ◑	

Metric	Desired Outcomes Supported	Equity Objectives Supported	Climate Objectives Supported	2013 Design (RD00)	Design Option 1: Full Interchange (RD03)	Design Option 5: Partial Interchange 3 (RD20)	Qualitative Description
Visibility of onward route (North-South)	5.1, 5.3, CL.1		ACT	◑	●	●	
				Vancouver to 40-mile loop: no clear SUP route across Hayden Island ○	Vancouver to 40-mile loop: clear SUP route across Hayden Island ●	Vancouver to 40-mile loop: clear SUP route across Hayden Island ●	
				Vancouver to Hayden Island: indirect route if going north from Hayden Island; unclear access to SUP bridge from west of I-5 ○	Vancouver to Hayden Island: direct route if going north from Hayden Island; clear access to SUP bridge from island ●	Vancouver to Hayden Island: direct route if going north from Hayden Island; clear access to SUP bridge from island ●	
				Hayden Island to 40-mile loop: direct route across west arterial bridge from intersection with 40-mile loop ●	Hayden Island to 40-mile loop: direct route adjacent to transit bridge from intersection with 40-mile loop ●	Hayden Island to 40-mile loop: route across east arterial bridge crosses over the 40-mile loop trail; however direct route to Delta Park ●	
Proportion of space below I-5	5.1, 5.3, CL.1		ACT	○	◑	●	
				Hayden Island Drive: moderate length with high and wide proportions of route below I-5; views toward water ◑	Hayden Island Drive: moderate length with high and wide proportions of route below I-5; views toward water ◑	Hayden Island Drive: short length with high and wide proportions of route below; views toward water ●	
				N/A - No Tomahawk Island Drive	Tomahawk Island Drive: some visual structural depth out of proportion to space below I-5; long length with low and narrow route below I-5 ◑	Tomahawk Island Drive: proportional visual depth to clearance below I-5; short length, with low and wide route below I-5 ●	
				Jantzen Drive: visual depth is out of proportion with space below I-5; long length with low and narrow proportions of route below I-5 ○	Jantzen Drive: some visual depth out of proportion with space below I-5; long length with low and narrow proportions of route below I-5 ◑	Jantzen Drive: proportional visual depth to clearance below I-5; moderate length (with gaps) with low and wide (open towards water) proportions below I-5 ●	
				N/A	Vancouver Way Extension: visual depth is out of proportion with space below I-5; long length with low and narrow (views to water blocked by levee) proportions below I-5 ○	Vancouver Way Extension: proportional visual depth to clearance below I-5; shorter length with low and narrow (views to water blocked by levee) proportions below I-5 ○	
Direct route on SUP between Delta Park and Hayden Island (Tomahawk Island Drive)	5.4, CL.1		ACT	4,630 feet ◑	4,700 feet ◑	4,080 feet ●	<4,000 ft ; 4,000ft - 5,000 ft, > 5,000 ft
Direct route on SUP from Delta Park to Columbia Way (Portland-Vancouver)	5.4, CL.1		ACT	11,750 feet ○	8,970 feet ●	8,490 feet ●	<9,000 ft; 9,000 ft - 11,000 ft; > 11,000 ft
Marine Drive Interchange Ped/Bike Signal Progression				SPUI: 2-3 crossing stages	SPUI: 2-3 crossing stages	SPUI: 2-3 crossing stages	Assumes ped actuated signals at RT lane crossings. SPUI = single point urban interchange.
Number of Marine Drive conflict points			ACT	SPUI: 8 ◑	SPUI: 8 ◑	SPUI: 8 ◑	Absolute number of pedestrian street crossings required to cross I-5 on Marine Dr

Metric	Desired Outcomes Supported	Equity Objectives Supported	Climate Objectives Supported	2013 Design (RD00)	Design Option 1: Full Interchange (RD03)	Design Option 5: Partial Interchange 3 (RD20)	Qualitative Description
Number of Pedestrian crossings of Hayden Island ramp terminals		MA	ACT	Folded diamond: 3 crossings	Tight diamond: 4 crossings	Half diamond: 2 crossings	Absolute number of pedestrian street crossings
Provides new or improved local street access points and east-west connections for active transportation	5.2, 5.4, CL.1	MA	ACT, CC				
Number of SUP conflict locations (crossings)	5.3, CL.1	MA	ACT				
Number of local anchors connected by SUP	5.1, 5.4, CL.1		ACT	3	3	3	Anchors: W Hayden Island, E Hayden Island, Expo Center/Kenton, Delta Park/Bridgeton
Number of SUP conflict points (crossings) near transit stations	5.2, 5.3, CL.1	MA	ACT				
Transit Access							
Transit user experience, personal security, and ease of access to station (bike/ped/vehicle)	3.1, CL.1	MA	CC, TRA				
LRT HCT options				Does not provide east island access via Tomahawk Is. Dr.	Less connected urban fabric due to wider footprint of freeway and ramps. Tomahawk Is. Dr. provides east island access.	More connected urban fabric due to narrower footprint of freeway and ramps. Tomahawk Is. Dr. provides east island access.	LRT station would likely be elevated
BRT HCT options				N/A	Less connected, more fragmented urban fabric due to wider footprint of freeway and ramps	Connected and contiguous urban fabric due to narrower footprint of freeway and ramps	BRT station would likely be elevated
LRT/BRT HCT option				N/A	Transfer required	Transfer required	LRT station and BRT station would likely be elevated
Bus-on-shoulder Option with local service to Hayden Island				N/A	Not HCT	Not HCT	
Transit station environment (high adjacency to local streets and low adjacency to freeway & ramps)			TRA	Less adjacency to local streets, more adjacent to freeway & ramps	High adjacency to local streets, less adjacent to freeway & ramps	High adjacency to local streets, less adjacent to freeway & ramps	Stations that are adjacent to local streets link riders to the ped/bike network and increase "eyes on the station".
Hayden Island transit station vertical assumption				Elevated	Elevated	Elevated	Considerations: HCT travel time, steep grades (~5-7%), track geometry, at-grade crossing of Tomahawk Island Dr, climate resiliency (existing ground is only 3-5 feet above 100 yr flood elevation), station access, "eyes on station," cost
North-south flexibility of Hayden Island transit station location			TRA	Close to Jantzen Drive	Between Tomahawk Island Drive and Hayden Island Drive	Between Jantzen Drive and Hayden Island Drive	Flexibility assumes elevated station

Metric	Desired Outcomes Supported	Equity Objectives Supported	Climate Objectives Supported	2013 Design (RD00)	Design Option 1: Full Interchange (RD03)	Design Option 5: Partial Interchange 3 (RD20)	Qualitative Description
Freight/Vehicles							
Compatible with applicable design standards for all vehicle modes (i.e., anticipate design exceptions for ODOT, WSDOT, COV, or AASHTO)	4.1, 4.2, 4.3			Yes ●	Yes ●	Yes ●	
Ability of design to accommodate peak traffic demand				Yes ●	Yes ●	Yes ●	
Wayfinding and routing on local streets				●	●	Longer routing and more challenging wayfinding for Hayden Island traffic to I-5 Soutbound and Victory Blvd/Denver Ave/Interstate Ave ○	
Total entering volume at Marine Drive/I-5 intersections (vph) AM/PM peak hour	1.3, 4.4, CL.1		ACT, CC, RID	SPUI 4,360/4,000	SPUI 4,360/4,000	SPUI 4,360/4,000	
Intersection Level of Service, Delay, and ICU at Marine Drive and Hayden Island Ramp Intersections	1.3, 4.4, CL.1		ACT, CC, RID	●	●	●	see supplemental figure
Delay Differential	1.4 , CL.1		RID	●	●	●	
Delay Differential (AM peak hour) on routes originating from I-5 southbound Route 1: I-5 SB to Hayden Island Drive/Parker Route 2: I-5 SB to Tomahawk/Parker Route 3: I-5 SB to Marine Drive/Force Ave Route 4: I-5 SB to Marine Drive/6th Ave to Route 5: I-5 SB to Jubitz (via Vancouver Way)				Route 1: 19 seconds Route 2: 28 seconds Route 3: 23 seconds Route 4: 48 seconds Route 5: 48 seconds ●	Route 1: 38 seconds Route 2: 23 seconds Route 3: 24 seconds Route 4: 46 seconds Route 5: 46 seconds ●	Route 1: 41 seconds Route 2: 26 seconds Route 3: 22 seconds Route 4: 47 seconds Route 5: 47 seconds ●	Delay (in seconds) differential for 5 routes (noted in column A) through interchange intersections - lower delay is better. (travel time is the same through intersections outside of the study area)
Delay Differential (PM peak hour) on routes originating from I-5 southbound Route 1: I-5 SB to Hayden Island Drive/Parker Route 2: I-5 SB to Tomahawk/Parker Route 3: I-5 SB to Marine Drive/Force Ave Route 4: I-5 SB to Marine Drive/6th Ave to Route 5: I-5 SB to Jubitz (via Vancouver Way)				Route 1: 19 seconds Route 2: 30 seconds Route 3: 3 seconds Route 4: 54 seconds Route 5: 54 seconds ●	Route 1: 38 seconds Route 2: 23 seconds Route 3: 3 seconds Route 4: 49 seconds Route 5: 49 seconds ●	Route 1: 40 seconds Route 2: 25 seconds Route 3: 4 seconds Route 4: 54 seconds Route 5: 54 seconds ●	Delay (in seconds) differential for 5 routes (noted in column A) through interchange intersections - lower delay is better. (travel time is the same through intersections outside of the study area)
Delay Differential (AM peak hour) on routes originating from I-5 northbound Route 1: I-5 NB to Hayden Island Drive/Parker Route 2: I-5 NB to Tomahawk/Parker Route 3: I-5 NB to Marine Drive/Force Ave Route 4: I-5 NB to Marine Drive/6th Ave to Route 5: I-5 NB to Jubitz (via Vancouver Way)				Route 1: 52 seconds Route 2: 60 seconds Route 3: 22 seconds Route 4: 4 seconds Route 5: 4 seconds ●	Route 1: 30 seconds Route 2: 50 seconds Route 3: 23 seconds Route 4: 3 seconds Route 5: 3 seconds ●	Route 1: 65 seconds Route 2: 60 seconds Route 3: 19 seconds Route 4: 4 seconds Route 5: 4 seconds ●	Delay (in seconds) differential for 5 routes (noted in column A) through interchange intersections - lower delay is better. (travel time is the same through intersections outside of the study area)

Metric	Desired Outcomes Supported	Equity Objectives Supported	Climate Objectives Supported	2013 Design (RD00)	Design Option 1: Full Interchange (RD03)	Design Option 5: Partial Interchange 3 (RD20)	Qualitative Description
Delay Differential (PM peak hour) on routes originating from I-5 northbound Route 1: I-5 NB to Hayden Island Drive/Parker Route 2: I-5 NB to Tomahawk/Parker Route 3: I-5 NB to Marine Drive/Force Ave Route 4: I-5 NB to Marine Drive/6th Ave to Route 5: I-5 NB to Jubitz (via Vancouver Way)				Route 1: 68 seconds Route 2: 76 seconds Route 3: 36 seconds Route 4: 2 seconds Route 5: 2 seconds ◑	Route 1: 27 seconds Route 2: 47 seconds Route 3: 40 seconds Route 4: 2 seconds Route 5: 2 seconds ●	Route 1: 73 seconds Route 2: 68 seconds Route 3: 36 seconds Route 4: 2 seconds Route 5: 2 seconds ◑	Delay (in seconds) differential for 5 routes (noted in column A) through interchange intersections - lower delay is better. (travel time is the same through intersections outside of the study area)
Delay Differential (AM peak hour) on routes destined for I-5 northbound Route 1: Hayden Island Drive/Parker to I-5 NB Route 2: Tomahawk/Parker to I-5 NB Route 3: Marine Drive/Force Ave to I-5 NB Route 4: Marine Drive/6th Ave to I-5 NB Route 5: Jubitz (via Vancouver Way) to I-5 NB				Route 1: 17 seconds Route 2: 47 seconds Route 3: 61 seconds Route 4: 4 seconds Route 5: 4 seconds ●	Route 1: 48 seconds Route 2: 13 seconds Route 3: 51 seconds Route 4: 5 seconds Route 5: 5 seconds ●	Route 1: 22 seconds Route 2: 26 seconds Route 3: 53 seconds Route 4: 5 seconds Route 5: 5 seconds ●	Delay (in seconds) differential for 5 routes (noted in column A) through interchange intersections - lower delay is better. (travel time is the same through intersections outside of the study area)
Delay Differential (PM peak hour) on routes destined for I-5 northbound Route 1: Hayden Island Drive/Parker to I-5 NB Route 2: Tomahawk/Parker to I-5 NB Route 3: Marine Drive/Force Ave to I-5 NB Route 4: Marine Drive/6th Ave to I-5 NB Route 5: Jubitz (via Vancouver Way) to I-5 NB				Route 1: 23 seconds Route 2: 55 seconds Route 3: 56 seconds Route 4: 2 seconds Route 5: 2 seconds ●	Route 1: 60 seconds Route 2: 24 seconds Route 3: 50 seconds Route 4: 13 seconds Route 5: 13 seconds ●	Route 1: 84 seconds Route 2: 79 seconds Route 3: 51 seconds Route 4: 12 seconds Route 5: 12 seconds ◑	Delay (in seconds) differential for 5 routes (noted in column A) through interchange intersections - lower delay is better. (travel time is the same through intersections outside of the study area)
Delay Differential (AM peak hour) on routes destined for I-5 southbound Route 1: Hayden Island Drive/Parker to I-5 SB Route 2: Tomahawk/Parker to I-5 SB Route 3: Marine Drive/Force Ave to I-5 SB Route 4: Marine Drive/6th Ave to I-5 SB Route 5: Jubitz (via Vancouver Way) to I-5 SB				Route 1: 26 seconds Route 2: 45 seconds Route 3: 1 seconds Route 4: 41 seconds Route 5: 41 seconds ◑	Route 1: 6 seconds Route 2: 11 seconds Route 3: 1 seconds Route 4: 41 seconds Route 5: 41 seconds ●	Route 1: 74 seconds Route 2: 69 seconds Route 3: 22 seconds Route 4: 42 seconds Route 5: 42 seconds ◑	Delay (in seconds) differential for 5 routes (noted in column A) through interchange intersections - lower delay is better. (travel time is the same through intersections outside of the study area)
Delay Differential (PM peak hour) on routes destined for I-5 southbound Route 1: Hayden Island Drive/Parker to I-5 SB Route 2: Tomahawk/Parker to I-5 SB Route 3: Marine Drive/Force Ave to I-5 SB Route 4: Marine Drive/6th Ave to I-5 SB Route 5: Jubitz (via Vancouver Way) to I-5 SB				Route 1: 28 seconds Route 2: 42 seconds Route 3: 1 seconds Route 4: 57 seconds Route 5: 57 seconds ◑	Route 1: 4 seconds Route 2: 9 seconds Route 3: 1 seconds Route 4: 52 seconds Route 5: 52 seconds ●	Route 1: 73 seconds Route 2: 68 seconds Route 3: 1 seconds Route 4: 56 seconds Route 5: 56 seconds ◑	Delay (in seconds) differential for 5 routes (noted in column A) through interchange intersections - lower delay is better. (travel time is the same through intersections outside of the study area)
Freight volumes at on/off-ramps at Marine Drive intersections and I-5 ramps	2.1, CL.1		RID	SPUI 1,465/760	SPUI 1,465/760	SPUI 1,465/760	Total Entering Volume (freight only) at MD intersections

Metric	Desired Outcomes Supported	Equity Objectives Supported	Climate Objectives Supported	2013 Design (RD00)	Design Option 1: Full Interchange (RD03)	Design Option 5: Partial Interchange 3 (RD20)	Qualitative Description
Financing/Cost							
Approximate project cost (data represents the change in cost from the 2013 Design)	CO.3			●	+120 M to +170 M ◑	+90 M to +140 M ◑	
Avoids major utilities (e.g., transformers, substations)	CO.3			●	PWB - 16" main Gas - 8 5/8" HP CenturyLink 3x6" submerse steel cond CenturyLink 15x4" Tel duct ◑	PWB - 16" main Gas - 8 5/8" HP CenturyLink 3x6" submerse steel cond CenturyLink 15x4" Tel duct ◑	
Estimated O&M cost and ownership	CO.3			O&M of existing NPH bridge 2 hwy structures over NPH 1 arterial/transit structure over NPH ○	5 hwy structures over NPH 1 arterial/transit structure over NPH Complex and longer structures over HI ◑	4 hwy structures over NPH 1 arterial structures over NPH 1 transit structure over NPH ◑	
Seismic							
Increase seismic resiliency by replacing North Portland Harbor Structure	6.1			No - seismic retrofit ◑	Yes - replace NPH bridge ●	Yes - replace NPH bridge ●	
Compatibility							
Fully compatible with stacked highway bridge configuration (one bridge)				Southbound: Yes Northbound: Possible with design exceptions	Southbound: Yes Northbound: Possible with design exceptions	Yes	
Fully compatible with side-by-side highway bridge configuration (two bridge)				Yes	Yes	Yes	
	Teal highlighting is used to identify which design option has the highest score for a given metric						
	Grey highlighting it used when a metric is not a differentiator of design options						

Equity Objectives for Screening Criteria	Climate Objectives for Screening Criteria
AH = Avoid further harm: Avoid rather than simply mitigate disproportionate impacts on equity priority groups. CB = Community benefits: Find opportunities for and implement local community improvements in addition to required mitigations EO = Economic opportunity: Ensure that economic opportunities generated by the program benefit minority and women owned firms, BIPOC workers, workers with disabilities, and young people. MA = Mobility and accessibility: Improve mobility, accessibility, and connectivity, especially for lower income travelers, people with disabilities, and communities who experience transportation barriers.	ACT = Supports mode shift to low or no emission travel (i.e., active transportation: walking, rolling, biking) CC = Supports complete communities CONST = compatible with low carbon construction ITS = Supports intelligent transportation systems O&M = Supports low emission operations and maintenance RES = Improves resilience to uncertain climatic conditions RID = Reduces idling of vehicles (freight, single-occupancy vehicles, transit) TRA = Supports mode shift to transit (i.e. improves access, travel time, reliability, etc.)

Oregon Department of Transportation

WSDOT

Attachment C. Main River Crossing Screening and Evaluation Materials

Attachment C-1. River Crossing Option Comparison

Interstate BRIDGE Replacement Program

River Crossing Option Comparison

November 2022

Attachments updated September 2023

Oregon

For Americans with Disabilities Act (ADA) or Civil Rights Title VI accommodations, translation/interpretation services, or more information call 503-731-4128, TTY 800-735-2900 or Oregon Relay Service 7-1-1.

Washington

Accommodation requests for people with disabilities in Washington can be made by contacting the Washington State Department of Transportation (WSDOT) Diversity/ADA Affairs team at wsdotada@wsdot.wa.gov or by calling toll-free, 855-362-4ADA (4232). Persons who are deaf or hard of hearing may make a request by calling the Washington State Relay at 711. Any person who believes his/her Title VI protection has been violated, may file a complaint with WSDOT's Office of Equity and Civil Rights Title VI Coordinator by contacting (360) 705-7090.

River Crossing Option Comparison

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ATTACHMENTS

A IBR Program Navigation Impact Report

B Immersed Tube Tunnel Concept Assessment Report

C River Crossing Bridge Clearance Assessment Report – Movable Span Options

ACRONYMS AND ABBREVIATIONS

API	area of potential impact
BNSF	BNSF Railway
CRC	Columbia River Crossing
C-TRAN	Clark County Public Transportation Benefit Area Authority
CFR	Code of Federal Regulations
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
I-5	Interstate 5
I-205	Interstate 205
IBR	Interstate Bridge Replacement
ITT	immersed tube tunnel
Metro	Oregon Metro
NEPA	National Environmental Policy Act
NIR	Navigation Impact Report
ODOT	Oregon Department of Transportation
OHWM	ordinary high-water water mark
PDX	Portland International Airport
ROD	Record of Decision
ROW	right-of-way
RTC	Southwest Washington Regional Transportation Council
SR	State Route
SUP	shared use path
TBM	tunnel boring machine
TriMet	Tri-County Metropolitan Transportation District of Oregon
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard

1. INTRODUCTION

The Interstate Bridge Replacement (IBR) program is a continuation of the Interstate 5 (I-5) Columbia River Crossing (CRC) Project and will replace the aging I-5 bridges across the Columbia River with a modern, seismically resilient, multimodal structure. The Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) are the lead federal agencies responsible for ensuring that the program complies with the National Environmental Policy Act (NEPA) and associated regulations and policies.[1]

The IBR program must define the type of river crossing that will replace the existing bridges over the Columbia River. In June 2022, the U.S. Coast Guard (USCG) responded to the IBR's program's Navigation Impact Report (NIR) and issued a Preliminary Navigation Clearance Determination for the IBR program that prescribed a vertical and horizontal navigation clearance for the river crossing that would have a high likelihood of obtaining a favorable permit decision. The USCG also requires that the horizontal navigation clearance meet the U.S. Army Corps of Engineers (USACE) requirement, which is currently set to equal to or greater than 400 feet. The IBR program continues to coordinate with the USACE regarding their requirement for a 400 feet horizontal clearance and proposed shift in the primary navigation channel toward the center of the Columbia River. The IBR program anticipates a final decision from the USACE in 2023. Based on technical evaluations, agency coordination, public outreach, and discussions with partner agencies, the IBR program recommends a fixed-span bridge with a vertical clearance of 116 feet.

This report provides context for the replacement crossing, identifies the various river crossing options, including their advantages and disadvantages, and provides the IBR program's reasoning for the recommended bridge configuration and height.

[1] In addition to FHWA and FTA, there are six joint lead agencies: Oregon Department of Transportation, Washington State Department of Transportation, Oregon Metro (Metro), and Southwest Washington Regional Transportation Council, Tri County Metropolitan Transportation District (TriMet), and Clark County Public Transportation Benefit Area (C-TRAN).

2. PURPOSE AND NEED

A "Purpose and Need" statement is a foundational document under NEPA that identifies and defines the transportation problem(s) that a project must address. The adopted statement for the IBR program is paramount to considering various river crossing options because the selected option must address the identified transportation problems.

As part of the NEPA process, the IBR program worked with regional and local partner agencies and the public to confirm the program's Purpose and Need statement. Through work completed in 2021, the IBR program determined that the needs identified in the CRC Project's Purpose and Need statement are still pertinent. Thus, the Purpose and Need statement for the IBR program, provided below, remains the same as in the 2011 Record of Decision (ROD) for the CRC Project. The Purpose and Need statement was developed by the lead agencies, project sponsors, and the CRC Task Force.[2]

Note: The text of the Purpose and Need statement has not been edited or updated, with the exception of references to the program name. More recent data and supplemental information are provided in sidebars.

2.1 Project Purpose

The purpose of the proposed action is to improve I-5 corridor mobility by addressing present and future travel demand and mobility needs in the IBR program area. The program area extends from approximately Columbia Boulevard in the south to State Route (SR) 500 in the north. Relative to the No-Build Alternative, the proposed action is intended to achieve the following objectives: a) improve travel safety and traffic operations on the I-5 bridges and associated interchanges; b) improve connectivity, reliability, travel times, and operations of public transportation modal alternatives in the program area; c) improve highway freight mobility and address interstate travel and commerce needs in the program area; and d) improve the I-5 river crossing's structural integrity (seismic stability).

[2] The CRC Task Force was a 39-member group formed in 2005 comprising leaders representing a broad cross section of Washington and Oregon communities. Public agencies, businesses, civic organizations, neighborhoods, and freight, commuter, and environmental groups were represented on the task force. The group met 23 times over the course of the project development phase to advise the CRC Project team and provide guidance and recommendations at key decision points. The task force concluded its work in summer 2008 after making its recommendation on the locally preferred alternative.

2.2 Project Need

The specific needs to be addressed by the proposed action are:

- **Growing travel demand and congestion**: Existing travel demand exceeds capacity of the I-5 bridges and associated interchanges. This corridor experiences heavy congestion and delays lasting 4 to 6 hours daily during the morning and afternoon peak travel periods and when traffic accidents, vehicle breakdowns, or bridge lifts occur. Due to excess travel demand and congestion in the I-5 bridge corridor, many motorists take the longer, alternative Interstate 205 (I-205) route across the river. Spillover traffic from I-5 onto parallel arterials such as Martin Luther King Jr. Boulevard and Interstate Avenue increases local congestion. In 2005, the two crossings carried 280,000 vehicle trips across the Columbia River daily. Daily traffic demand over the I-5 crossing is projected to increase by more than 35% during the next 20 years, with stop-and-go conditions increasing to approximately 15 hours daily if no improvements are made.
- **Impaired freight movement**: I-5 is part of the National Truck Network and the most important freight highway on the West Coast, linking international, national, and regional markets in Canada, Mexico, and the Pacific Rim with destinations throughout the western United States. In the center of the program area, I-5 intersects with the Columbia River's deep-water shipping and barging, as well as two river-level transcontinental rail lines. The I-5 crossing provides direct and important highway connections to the Port of Vancouver and Port of Portland facilities located on the Columbia River, as well as the majority of the area's freight consolidation facilities and distribution terminals. Freight volumes moved by truck to and from the area are projected to more than double over the next 25 years. Vehicle-hours of delay on truck routes in the Portland-Vancouver area are projected to increase by more than 90% over the next 20 years. Growing demand and congestion will result in increased delay, costs and uncertainty for all businesses that rely on this corridor for freight movement.

The duration of **congestion** on the I-5 bridges roughly doubled over the past 14 years. In 2019 there were almost 12 hours of congestion per day.

Travel demand in 2019 exceeded capacity during peak periods on the Interstate Bridge on weekdays and weekends. The total number of vehicles using the bridge was 143,400 (average weekday daily traffic).

Over 14,000 **freight trips** crossed the Interstate Bridge daily in 2019, accounting for just under 10% of daily traffic across the bridge. Freight volumes moved by truck, to and from the area, are expected to increase by 50% to 75% over the next 25 years.

Bus travel times in 2019 were four times longer during the morning peak period compared to off-peak periods.

- **Limited public transportation operation, connectivity, and reliability**: Due to limited public transportation options, a number of transportation markets are not well served. The key transit markets include trips between the Portland Central City and the city of Vancouver and Clark County; trips between north/northeast Portland and the city of Vancouver and Clark County; and trips connecting the city of Vancouver and Clark County with the regional transit system in Oregon. Current congestion in the corridor adversely impacts public transportation service reliability and travel speed. Southbound bus travel times across the bridge are currently up to three times longer during parts of the a.m. peak compared to off peak. Travel times for public transit using general purpose lanes on I-5 in the program area are expected to increase substantially by 2030.
- **Safety and vulnerability to incidents**: The I-5 river crossing and its approach sections experience crash rates more than twice the statewide averages for comparable facilities. Incident evaluations generally attribute these crashes to traffic congestion and weaving movements associated with closely spaced interchanges and short merge distances. Without breakdown lanes or shoulders, even minor traffic accidents or stalls cause severe delay or more serious accidents.
- **Substandard bicycle and pedestrian facilities**: The bike/pedestrian facilities on the I-5 bridges are about 3.5 to 4 feet wide, narrower than the 10-foot standard, and are located extremely close to traffic lanes, thus impacting safety for pedestrians and bicyclists. Direct pedestrian and bicycle connectivity are poor in the program area.
- **Seismic vulnerability**: The existing I-5 bridges are in a seismically active zone. They do not meet current seismic standards and are vulnerable to failure in an earthquake.

The program area experiences **crash rates** nearly three times higher than statewide averages for comparable facilities. There were seven fatal crashes in the program area between 2015 and 2019. Crashes in the IBR Program area could increase by over almost 30% by 2045 if no improvements are made.

The existing **shared use paths** are narrower than current standards and are not compliant with the Americans with Disabilities Act. The paths are in close proximity to traffic lanes, which for bicyclists and pedestrians increases the exposure to vehicular traffic, noise, and emissions.

Seismic issues include that the structures lack the ductility of similar modern bridges and that both bridge spans are supported by hundreds of timber piles that sit within loose sand that will liquefy during a strong earthquake. The combined effect—settlement and lateral movement—would prove devastating to the bridge spans, likely triggering their collapse even if the bridge managed to somehow survive the shaking.

3. CRC PROJECT ALTERNATIVES ANALYSIS, SCREENING, AND SELECTED ALTERNATIVE

For the CRC Project, an alternatives development, screening, evaluation, and refinement process was conducted under NEPA, which led to the selection of a reasonable range of alternatives that were studied in the CRC Draft Environmental Impact Statement (EIS). A wide range of transportation alternatives and improvements were considered during screening and subsequent evaluation, including bored tunnels as well as supplemental and replacement bridges of different heights and types, such as movable-span bridges and fixed-span bridges.

Two rounds of evaluation and screening (known as Step A and Step B) were conducted for the CRC Project to narrow these components. In April 2006, the Step A screening evaluated 37 transit and crossing components. Step A focused on whether a component could meet the Purpose and Need statement; any components that failed to meet the Purpose and Need were dismissed from further study. The screening eliminated 22 river crossing types and transit modes, including a replacement bored tunnel and high-level bridges (such as cable stay or suspension bridges) that would encroach on protected airspace for Pearson Airfield and not improve safety or decrease vulnerability to incidents compared to a mid-level bridge.

During the Step B screening in June 2006, the remaining 15 crossing and transit components were scored on the adopted project values,[3] which were developed and formalized by the CRC Task Force. The intent of the Step B screening was to evaluate the remaining components against a more detailed set of criteria, so that only the most promising and potentially effective components would be advanced into alternatives packaging and modeling. All of the components that entered the Step B round were advanced for further evaluation.

While all components passed Step B, additional analysis was being completed at the same time to further screen several components. Further evaluations and additional information revealed substantial issues with several river crossing components, including low-level bridges and a supplemental bored tunnel, and these were dismissed from further study. At the June 14, 2006, CRC Task Force committee meeting, members passed two motions without opposition to eliminate further consideration of all supplemental and replacement movable-span and tunnel alternatives. Representatives of partner agencies, including City of Portland, City of Vancouver, Oregon Metro (Metro), Southwest Washington Regional Transportation Council, Tri-County Metropolitan Transportation District of Oregon (TriMet), Clark County Public Transportation Benefit Area Authority (C-TRAN), Port of Vancouver, and Port of Portland, were in attendance.

[3] The adopted project values were community livability and human resources; mobility, reliability, accessibility, congestion reduction, and efficiency; safety; regional economy, freight mobility; stewardship of natural resources; and distribution of benefits and impacts.

As summarized above and detailed in the CRC Final EIS, a thorough and detailed alternatives analysis was conducted for the CRC Project that considered numerous types of river crossings. The outcome of this process identified the reasonable range of alternatives that were evaluated in the Draft EIS, which consisted of four build alternatives (two supplemental crossings and two replacement crossings) and one no-build alternative.

The approved Selected Alternative for the CRC Project was described in the 2011 ROD and included a replacement fixed-span bridge with 95 feet of vertical clearance over the primary navigation channel. Following the issuance of the ROD, the project entered the final design and permitting phase. In response to the concerns raised by the USCG, impacts on the ability of the USACE dredge Yaquina to transit the bridge, and concerns raised by other river users over the bridge height in the ROD, the project team evaluated options for a mid-level bridge with greater vertical clearance for navigation. Based on the analysis in the CRC NIR, the project team decided to refine the bridge design and increase the vertical clearance to 116 feet. In 2012, the CRC Project team conducted a NEPA reevaluation to determine whether refining the bridge's proposed vertical clearance to 116 feet and the new information on river users and vessels would result in any new significant adverse environmental impacts that were not evaluated in the previous NEPA process. The reevaluation concluded that there were no new significant impacts under NEPA for the 116-foot bridge. A permit application and supporting materials were provided to the USCG and a permit was issued for a bridge with this vertical clearance in 2013; however, that permit was contingent on securing other required permits and authorizations as well as implementing mitigation to affected marine users. The mitigation effort was halted when the CRC project was suspended, therefore making the permit issued by the USCG inexecutable.

A bridge height of 116 feet was selected based on the vessel analysis contained within the 2012 NIR and because that height balances the needs of navigation and surface transportation while minimizing additional landside and environmental impacts. A bridge height of 116 feet would allow the project to avoid or minimize impacts to nearly all river users and vessels and to mitigate the remaining impacts.

As detailed in Section 2 and Section 3, the Purpose and Need statement and the proposed main river crossing component of the program have not changed since 2013. The proposed replacement of the existing two lift span bridges with two fixed-span bridges that provide a vertical navigational clearance of 116 feet over the primary navigation channel is the result of several decades of work, which included a thorough review of various river crossing options to select a crossing that best meets the needs of all users while addressing the Purpose and Need statement. The IBR program conducted a NEPA reevaluation in 2021 that evaluated physical and contextual changes in the program area since 2013. Based on the reevaluation, FHWA and FTA determined that a supplemental EIS is required to update and supplement the design, evaluation of impacts and benefits, and mitigation commitments that led to the CRC ROD in 2011 and subsequent updates in 2012–2013.

4. SITE CONDITIONS

This section describes the site conditions at the river crossing location, including navigation considerations, existing conditions in the built and natural environment, and anticipated future conditions.

4.1 Navigation Considerations

The Columbia River, including both the main channel and the North Portland Harbor,[4] is considered a navigable waterbody. Vertical constraints on vessels are determined largely by vessel height, bridge height, and river water levels. As part of requirements for the Rivers and Harbors Act Section 9 Bridge Permit, the IBR program completed a NIR that included a survey of vessels that typically pass through the location of the bridges, including their vertical clearance needs. The following sections summarize existing navigation conditions on the Columbia River, anticipated future navigational needs, and the potential impacts to vessels from different vertical clearances at the Interstate Bridge.

4.1.1 Existing Navigation Conditions

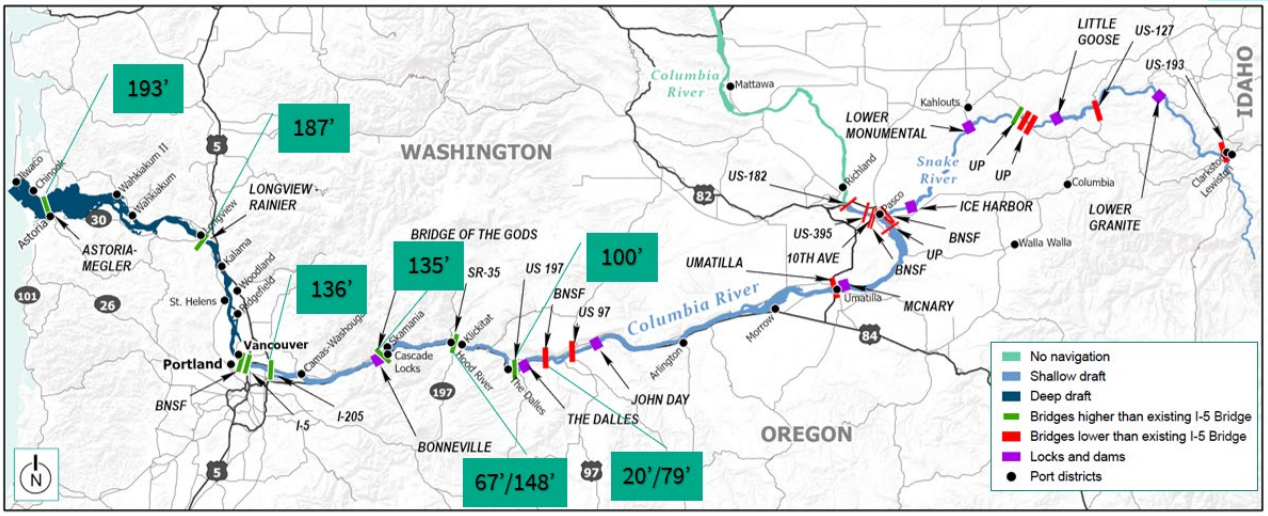
Through the Portland-Vancouver metropolitan area, the Columbia River is crossed by bridges at four locations: the I-5 crossing, known as the Interstate Bridge; the I-205 crossing, known as the Glenn L. Jackson Memorial Bridge; the BNSF Railway (BNSF) Vancouver railroad bridge; and the North Portland Harbor bridge. Figure 1 identifies the existing bridges over the Columbia River and their vertical clearances. The I-205 bridge is the closest crossing upriver (east) of the existing bridges and any vessels traveling upriver are restricted by that bridge's vertical clearance of 136 feet. An analysis of river users showed that most cargo comes from or is dropped at locations upriver of the I-5 bridges. There are numerous bridges between Vancouver and the cargo origins/destinations that have much lower vertical clearances, and the vessels are designed to accommodate those lower clearances.

Existing land uses are described in Appendix A of the NIR (Attachment A to this report). There are four existing water-dependent industrial sites within the jurisdiction of the City of Vancouver: CBC, Vigor, Marine Park marina, and the Western Forest Products property. It is likely that these areas will continue in industrial use. Only the uses at the CBC are currently height constrained, as detailed in the NIR. In addition, there are two marinas (McCuddy's Steamboat Landing Marina and Tidewater Cover Marina) and several private docks associated with private residences.

On the south side of the river, between the I-5 bridges and the I-205 bridge, there are many recreational marinas that are used by both powerboats and sailboats. See Attachment A for additional information on existing land uses and navigation needs.

[4] The North Portland Harbor is a side channel of the Columbia River that separates Hayden Island and the Oregon shore. This waterway is also known as the Oregon Slough.

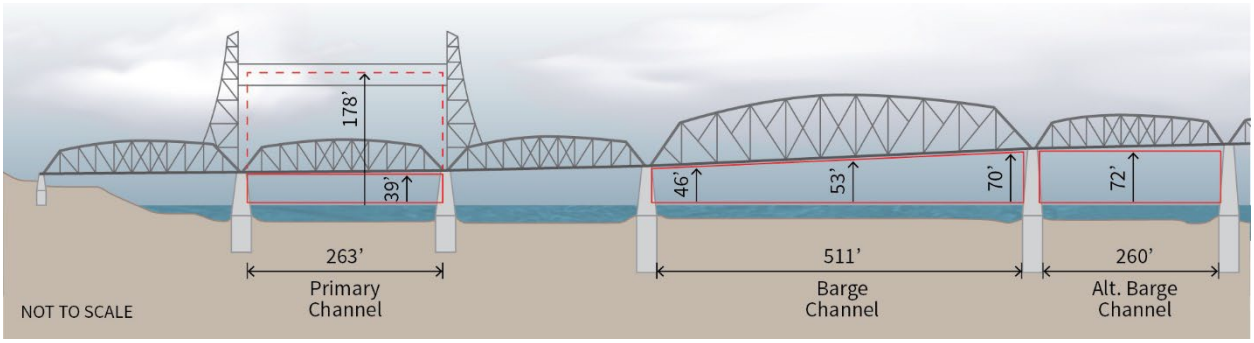
Figure 1. Existing Bridges Over the Columbia River



Under the I-5 bridges, vessels[5] pass through one of three channels: the primary channel, the barge channel, or the alternate barge channel. Figure 2 shows the vertical clearances provided by the existing I-5 bridges at both the lift span and fixed spans that align with the federal navigation channels. As shown, the primary channel lies under the existing lift spans and has a horizontal clearance of 263 feet and a vertical clearance of 39 feet in the closed position and 178 feet in the fully raised position. The highest clearance of the barge and alternate barge channels provides a vertical clearance of 72 feet.

[5] Vessels currently using the river in the vicinity of the IBR program area include tugs and barges, recreational sailboats and powerboats, marine contractor barges with construction cranes and materials, cruise and passenger boats, dredges, government vessels, vessels transporting shipments of marine industrial businesses and fabricators, and others.

Figure 2. Vertical Clearances Provided by the Existing I-5 Bridges



*Vertical clearance shown relative to 0 feet Columbia River Datum

Note: This figure is looking east (upriver), with the City of Vancouver to the left and the City of Portland to the right.

Most vessels do not require an opening of the lift span because they are low enough to transit the bridge using the vertical clearance provided by one of the three channels. Between 2012 and 2020, the lift span was used for vessels an average of 157 times per year (i.e., excluding lifts for maintenance and training). The existing I-5 bridges are opened for approximately 5% to 7% of river traffic. Figure 3 shows the number of bridge lifts per vessel type. Tugs and barges are responsible for the largest share of bridge openings (58%), followed by sailboats (33%).

Figure 3. Annual Bridge Openings: 2012–2020

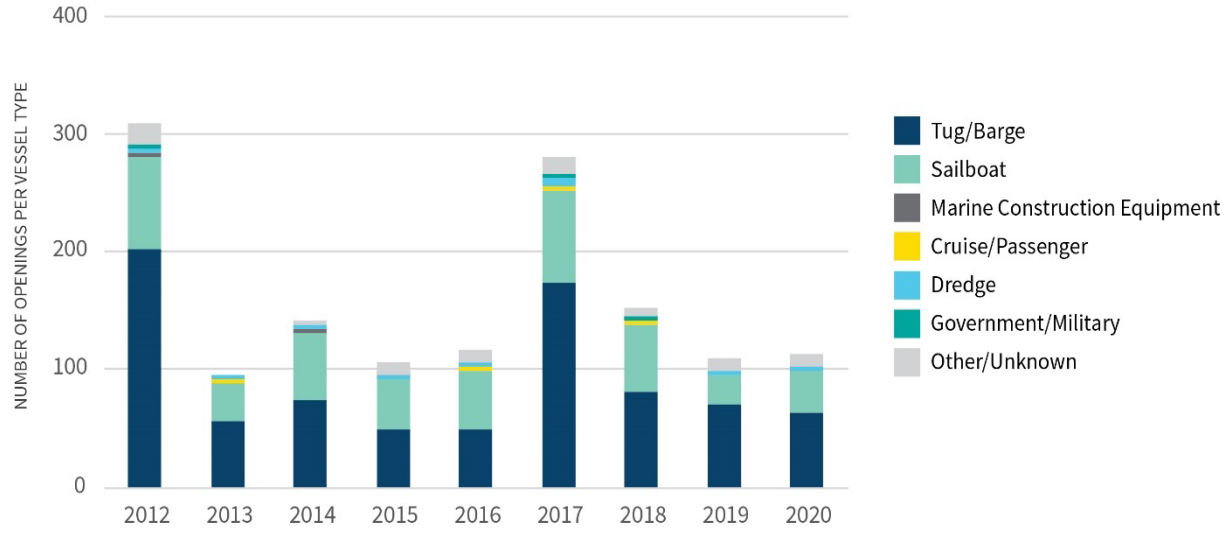


Table 1 lists the number of estimated openings per year and the number of vessels that would require an opening and could be restricted from passing at specific times when the bridge is restricted from

opening per federal regulations. This does not include separate openings that may be needed for maintenance and training. The Code of Federal Regulations (CFR) stipulates that the current bridge shall not be opened for vessels Monday through Friday from 6:30 a.m. to 9 a.m. or from 2:30 p.m. to 6 p.m. (CFR Title 33 Chapter I Subchapter J, Part 117 § 117.869), corresponding to peak commute times. A replacement bridge with an opening would likely include similar restrictions and, depending on the vertical clearance provided in the closed position, may seek to further restrict openings to the period of lowest vehicular traffic (i.e., midnight to 4 a.m.).

Table 1. Number of Bridge Lifts per Year by Vertical Clearance

Bridge Height[a] (closed or highest fixed span)	Estimated Openings/Year	Number of Vessels/Users Requesting a Bridge Opening
116 feet[b]	85[c]	9[d]
95 feet	154[e]	53[e]
72 feet	157[f]	270[g]

a. Bridge heights as measured from 0 feet Columbia River Datum. For purposes of calculating potential bridge openings, water is assumed to be 16 feet Columbia River Datum.

b. During the CRC Project, agreements were negotiated with the four impacted users that were unable to modify operations (such as accepting an air gap of less than 10 feet) in order to transit a bridge height of 116 feet. Three upstream fabricators entered into agreements with the CRC Project. The anticipated agreements would have resulted in payments to the companies that would be used by the companies at their business discretion and control. Payments were never made as the project was stopped. The remaining vessel owner decided to terminate negotiations that involved a payment to compensate the owner for vessel modifications and an agreement was never finalized.

c. Based on vessels identified in the 2021 Navigation Impact Report and reported frequency of transit provided by user.

d. Represents worst case scenario. Five of the nine vessels would not require an opening based on mitigation such as accepting a lesser air gap, thereby also reducing the estimating openings per year.

e. Based on the CRC Navigation Impact Report and updated with 2012 to 2020 lift data and updated user information from the 2021 Navigation Impact Report.

f. Based on the average number of lifts for vessels for the existing bridge from 2012 to 2020, as 72 feet is the height of the highest fixed span on the existing bridge. This likely overestimates the number of openings by a small number because some openings are not due to height constraints. Additional lift data analysis is underway to narrow the potential overestimates regarding the number of openings.

g. Represents the number of distinct vessels noted in bridge logs from 2012 to 2020. Not every vessel requires a lift every year, and some vessels occur only once in the data.

Table 2 identifies the various categories of vessels and notes whether they would or would not be affected by a span with vertical clearances of 100 feet, 116 feet, and 125 feet. The majority of vessels and river traffic would not be impacted by any of the fixed-span bridges shown. However, a bridge height of 100 feet would result in certain key vessels not being able to transit the bridge, such as the dredge Yaquina, that are critical for river operations as well as certain marine construction equipment and the tallest sailboats that are locally based. Certain marine contractors and industrial fabricators would be impacted at any of the heights shown.

Table 2. Bridge Height Impacts Comparison, 2012–2020

Vessel Type	Air Draft (typical)	100 feet	116 feet	125 feet	Vessel Frequency	Annual Lift Frequency
Tugs and Tows	<60 feet	Not impacted	Not impacted	Not impacted	High	64.2
Sailboats	<90 feet[a]	Impacted	Not impacted	Not impacted	High	18.8
Marine Contractor Equipment	40 to 90 feet[b]	*Sometimes impacted*	*Sometimes impacted*	*Sometimes impacted*	Unknown	Unknown
Cruise Ships	48 to 63 feet	Not impacted	Not impacted	Not impacted	High	0.1
Tall Ships	90 feet[c]	*Sometimes impacted*	Not impacted	Not impacted	Very Low	0.4
USCG Juniper Class Buoy Tenders	83 feet	Impacted	Not impacted	Not impacted	Not impacted	0.2
USACE Dredge Yaquina	92 feet	Impacted	Not impacted	Not impacted	Not impacted	2.4
U.S. Navy Vessels	43 to 59 feet	Not impacted	Not impacted	Not impacted	Not impacted	0
Fabricators/ Industrial Freight	Up to 178 feet	Impacted	Impacted	Impacted	Very Low	Unknown[d]

a. One sailboat with a reported vessel height of 120 feet was responsible for two bridge lifts during the 8-year period. This vessel is no longer based in the area.

b. Two contractors reported vessel heights of 120 feet or greater.

c. Step down mast to 65 feet.

d. Only Thompson Metal Fab Inc. reported trip details. Lift data from the Oregon Department of Transportation does not have detail to determine other trips. From 2012 to 2020, Thompson Metal reported 14 trips. Of these, 12 would be able to transit a bridge height of 100 feet, one trip would have not been able to transit a bridge height of 125 feet or less and one trip would not have been able to transit a bridge height of 100 feet or less.

4.1.2 Future Navigation Needs

The lifespan of the proposed replacement bridge, future industrial development upstream of the I-5 bridges, and future vessel sizes were considerations taken into account when identifying future navigation needs on this section of the Columbia River. The replacement river crossing will likely be designed for a service life of 100 years or more, and the NIR considered potential impacts from prospective upstream commercial development that could result in different navigation on the

waterway. The analysis concluded that both political and geographic constraints were the primary factors affecting commercial/industrial development along the upstream waterway.

Land use restrictions imposed by the Columbia River Gorge National Scenic Area, topography, transportation access parallel to shorelines (SR 14, Interstate 84, and BNSF and Union Pacific Railroad), and existing open spaces limited the areas for future water-dependent land uses. All of the industrial uses between the BNSF bridge and BNSF Celilo Falls rail bridge are in urban areas and primarily within established industrial parks (e.g., Columbia Business Center, Port of Cascade Locks Industrial Park). According to the Future Use Analysis conducted for the NIR, there are no planned developments within the subject area[6] that would be served by marine transport that could be limited by a proposed replacement bridge with a vertical navigation clearance of 116 feet.

Efforts are underway in upriver counties to reuse vacant or underutilized industrial waterfront parcels in forest products manufacturing (which is not height constrained) or in non-water-dependent uses, including commercial business parks, mixed-use residential/commercial developments, and tourist centers.

There has been an overall trend in the shipping industry to larger vessel sizes.[7] This is particularly evident for container ships and other ocean-going vessels to take advantage of efficiencies and the increased ability of major navigation routes such as the Panama Canal.[8] Some vessels of this type operate in the Lower Columbia River, but there are no suitable origins or destinations located upstream of the I-5 bridges. The majority of the vessel traffic on the Columbia River are tugs and barges. These are limited by the size of the Columbia River lock system and other upstream vertical and horizontal constraints and have not seen a change in sizes or dimensions during the same period as ocean-going vessels. Because there are no destinations for ocean-going vessels upstream of the I-5 bridges, this increase in vessel size is not expected to impact future navigation needs.

Vessels engaged in national defense activities or emergency response are also not expected to change. Current activity would not be limited by a proposed replacement bridge with a vertical navigation clearance of 116 feet. Larger vessels operated by the Military Sealift Command, such as the USNS Mercy hospital ship, infrequently visit the Lower Columbia River primarily for maintenance activities at the Vigor Swan Island facility or at other berths in the Columbia River. No needs to travel past the I-5 bridges have been identified in comments from agencies on the replacement bridge.

[6] The subject area for the Future Use Analysis was defined as extending from the I-5 bridges to the BNSF Railway rail bridge at Celilo Falls and landward from the river approximately 0.5 miles.
[7] International Transport Forum. 2015. The Impact of Mega-Ships.
[8] U.S. Department of Agriculture. No date. Bulk Vessel Types and Capacity. https://agtransport.usda.gov/stories/s/Bulk-Vessel-Fleet-Size-and-Rates/bwaz-8sgs/

4.2 Existing Conditions

4.2.1 Airspace

There are two airports in proximity to the program area: Portland International Airport (PDX) in Portland, Oregon, and Pearson Field in Vancouver, Washington. PDX is located approximately 3 miles southeast on the Oregon side of the Columbia River and is the major regional airport. Pearson is located directly east of the existing I-5 bridges and is an active airfield managed by the City of Vancouver, serving general aviation users.

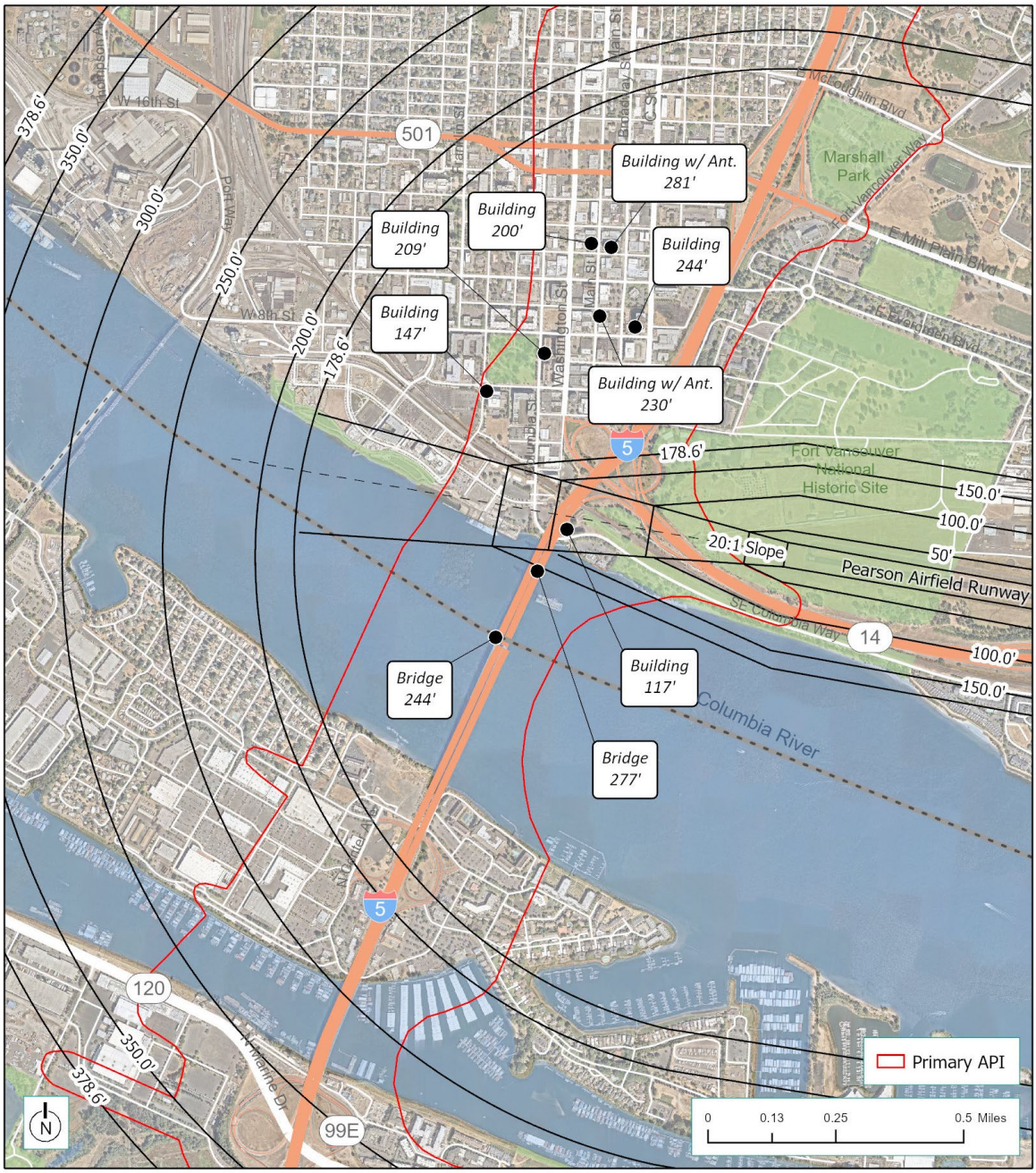
The departure and approach zones of both Pearson and PDX extend above the existing bridges and would therefore extend over the area of potential impact of a replacement river crossing. The previous analysis conducted for the CRC Project identified different types of airspace impacts that could occur with the CRC Project. The CRC analysis indicated that none the alternatives under consideration in the Draft EIS would have long-term effects on aviation activities at PDX, but they did have the potential to affect the aviation activities at Pearson. These included departure impacts associated with the proposed SR 14 interchange ramps and lighting and the proposed I-5 sign structures.

Any proposed changes to the Pearson Field Part 77 Airspace[9] will require review and approval by the Federal Aviation Administration (FAA). The IBR program would be required to submit a Form 7460 to the FAA for the program's design (by the designer) and one for construction (by the contractor). Each form would delineate any penetrations of the Part 77 Surface that would occur (permanent works relative to design and temporary works pertaining to construction). The FAA will use that information to determine if the proposed facility poses a hazard to air navigation or causes inefficient use of airspace.

Figure 4 shows the existing Part 77 airspace penetration for Pearson Field. As shown, the towers of the existing I-5 bridges currently penetrate this airspace as well as that of several buildings in downtown Vancouver. Pearson has special departure and take-off procedures that help the aircrafts avoid obstacles; aircrafts typically avoid flying directly over the existing bridges.

[9] FAA Title 14 CFR Part 77, Objects Affecting Navigable Airspace.

Figure 4. Existing Pearson Field Part 77 Airspace Penetration



If the FAA's review results in a hazard or inefficient use of airspace determination, the bridge or the means and methods of construction may have to be adjusted. Alternatively, it may be possible to restrict construction and/or airfield operations to accommodate any temporary intrusions. Permanent intrusions could require permanent airfield operational adjustments and the bridge owner would likely have to assume liability for any mishaps associated with the penetration(s). In the event

the bridge is determined to be a hazard and/or results in efficient use of airspace, the Authority Having Jurisdiction would have the option to take legal action to force a revision to or terminate the development.

4.2.2 Cultural Resources, Section 106, and Section 4(f)

There are numerous cultural and recreational resources in and near the IBR program area, including resources protected by Section 106 of the National Historic Preservation Act and/or Section 4(f) of the U.S. Transportation Act. Section 106 resources are properties that are listed or eligible for listing in the National Register of Historic Places, defined in the Section 106 regulations as "historic properties." Section 4(f) resources are publicly owned parks and recreation areas, waterfowl and wildlife refuges, and historic sites considered to have national, state, or local significance. A historic property is identified during the Section 106 evaluation and carried through to the Section 4(f) evaluation.

The historic built environment within the program area includes approximately 250 above-ground resources. These resources include residential, commercial, maritime, aviation, transportation, military, and other structures.

There is also a rich history of intertribal presence within the program area since time immemorial. As a result, the program area includes numerous high-significance resources. For the CRC Project, it was determined that all alternatives would be likely to impact these resources. Similarly, because potential impacts would be challenging to minimize or avoid under any alternative, it is anticipated that the IBR program would result in adverse effects on some archaeological resources as well.

There are approximately 200 Section 4(f) resources within the program area, including eligible historic resources, cultural resources, and public parks and recreation areas. As a result, Section 4(f) use and *de minimis* impact determinations are expected throughout the program area. Fort Vancouver, which is a National Historic Site managed by the National Park Service includes a plethora of sensitive resources (above and below ground) located throughout the property. These resources are protected under various regulations, including Section 106 and Section 4(f). Because of its proximity to the program area, adverse indirect and visual impacts to Fort Vancouver are possible. Figure 5 identifies the Section 4(f) parks and recreation resources near the program area, including National Historic Sites that are open to the public.

Figure 5. Section 4(f) Recreation Resources

4.2.3 Tribal Considerations

Native Americans have occupied this area since time immemorial. Pre-contact peoples established a strong relationship with the natural environment in addition to an expansive trade hub with other communities, fostering a cultural stronghold in the region across millennia. In the early 19th century, the Hudson's Bay Company established their regional headquarters at Fort Vancouver, building upon and integrating with the existing indigenous trading empire to establish a commercial epicenter and one of the largest settlements in the American West and connecting a wide range of diverse cultures with the resources in the region.

The IBR program recognizes and respects this expansive natural and cultural history, consulting with 11 Tribes and various natural resource organizations to ensure the program considers resources appropriately. Government-to-government consultation with 10 federally recognized Tribes is conducted regularly in addition to formal consultation under Section 106 of the National Historic Preservation Act.

Tribal considerations include culturally sensitive sites, impacts to aquatic species (including salmonid species and lamprey), aquatic and upland habitat, and water quality. Culturally sensitive sites include cultural resource locations on land and in the water, associated with the expansive cultural history of the area. Potential impacts on aquatic species and habitat and water quality include effects on fisheries upriver, downriver, and within the program area; treaty fishing sites above Bonneville; and culturally important species such as salmon, steelhead, lamprey, and eulachon. Potential sources of impacts include construction (e.g., pile driving and in-water work), direct habitat impacts, and stormwater runoff.

4.2.4 Habitat

The program area contains several different habitat types, including the Columbia River as well as North Portland Harbor and the Columbia Slough.[10] The Columbia River and North Portland Harbor provide habitat for a variety of native fish species (including Endangered Species Act [ESA]-listed species), such as several salmon and trout species, Pacific eulachon, and Pacific lamprey. Marine mammals are also present in the program area. The Columbia Slough is located in North Portland and provides habitat for many of the fish and wildlife species that use the Columbia River. The Columbia Slough provides some of the only remaining off-channel and refugia habitat[11] in the lower Willamette River area.

Terrestrial habitat within the program area includes fragmented forested riparian and wetland habitat, which supports species that are tolerant of human disturbance. The most highly functioning

[10] The Columbia Slough is a waterway just south of the program area.
[11] A location that supports an isolated and/or relict population of a once more widespread species. Relict populations are species that were more diverse and/or widespread in the past.

terrestrial habitats are those that still have connectivity to other areas with intact habitat. Figure 6 shows potential habitat areas in Vancouver, and Figure 7 shows potential habitat areas in Portland.

Key concerns for habitat related to the river crossing options include in-water work disturbing fish habitat and migration patterns, benthic habitat disturbance, and shading. Benthic habitats refer to the lowest ecological zone of a water body, including the sediment and substrate, and are generally areas of high biological activity, providing processes such as primary production, consumption, nutrient cycling and decomposition.[12] Benthic habitats provide a source of primary productivity for native fish, including several populations of ESA-listed salmon and steelhead, Pacific eulachon, white sturgeon, Pacific lamprey, and river lamprey.[13]

The river crossing options would have different impacts on habitats due to differences in the size of in-water structures (e.g., piers), length of time needed for in-water work, and construction methods (e.g., drilled shafts and pile driving for bridges or cut/cover and dredging for tunnels).

The program's effects on the different habitat types during construction would range from temporary to permanent impacts. Avoidance and minimization measures and best management practices would be implemented during construction to reduce habitat impacts. Impacts that are unavoidable would be mitigated through agency compensatory mitigation requirements, such as mitigation for waters of the U.S. Additional conservation efforts would be implemented for any impacts to habitats that are not currently covered under existing regulations, such as species of importance to Tribes.

[12] Benthic habitats within the Columbia River have been substantially altered from their historic condition by a variety of factors, including dredging activities; however, they continue to provide substantial habitat function to the aquatic species that rely on them.

[13] Shallow water benthic habitats in particular are important for out-migrating juvenile salmonids. Benthic habitats may provide substrate conditions that are suitable for adherence and incubation of Pacific eulachon eggs. Larval Pacific and river lamprey ammocetes burrow into benthic substrates and filter feed on algae, diatoms, and detritus for multiple years before metamorphizing into juveniles and out-migrating.

Figure 6. Potential Habitat in Vancouver, Washington

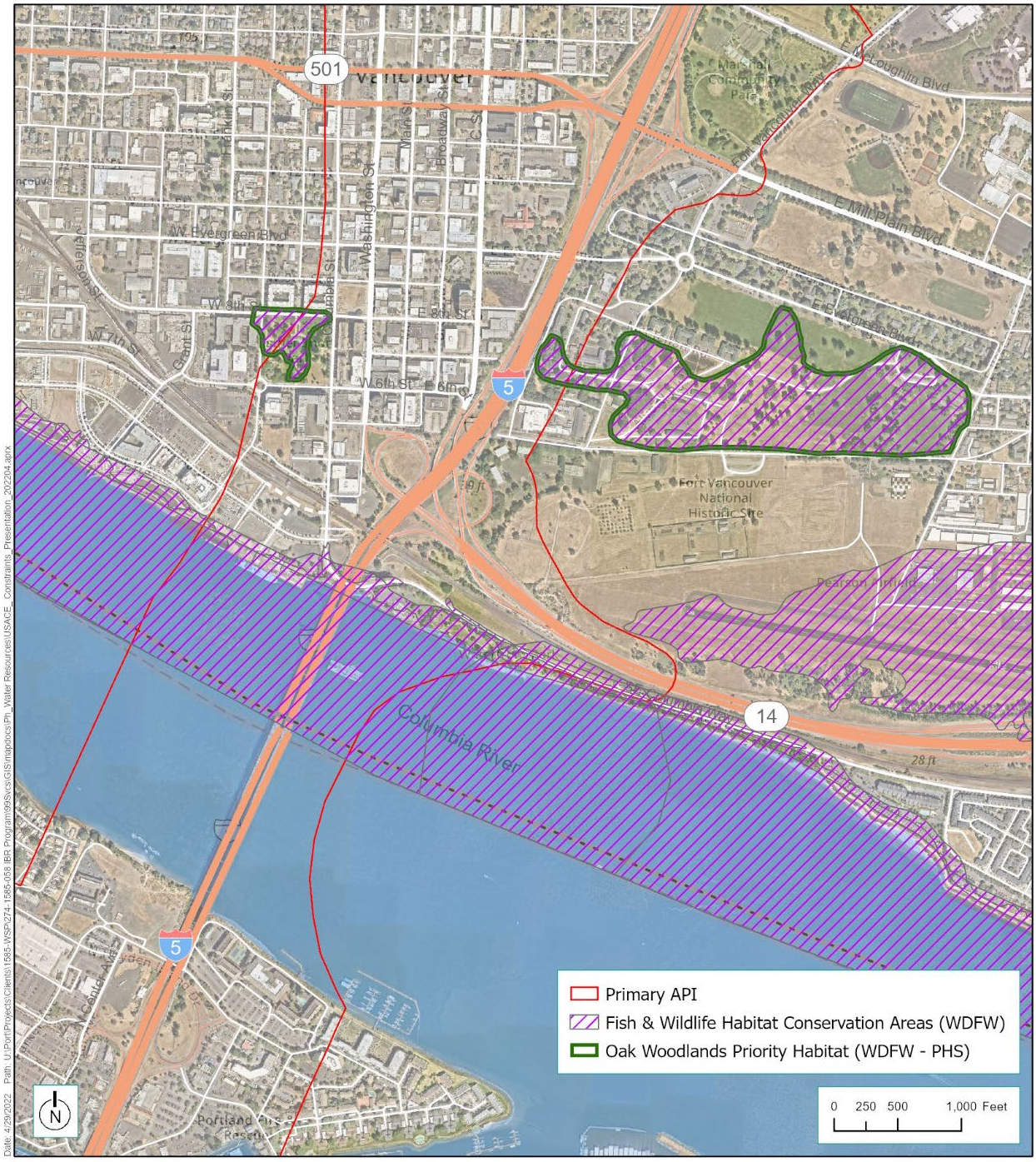
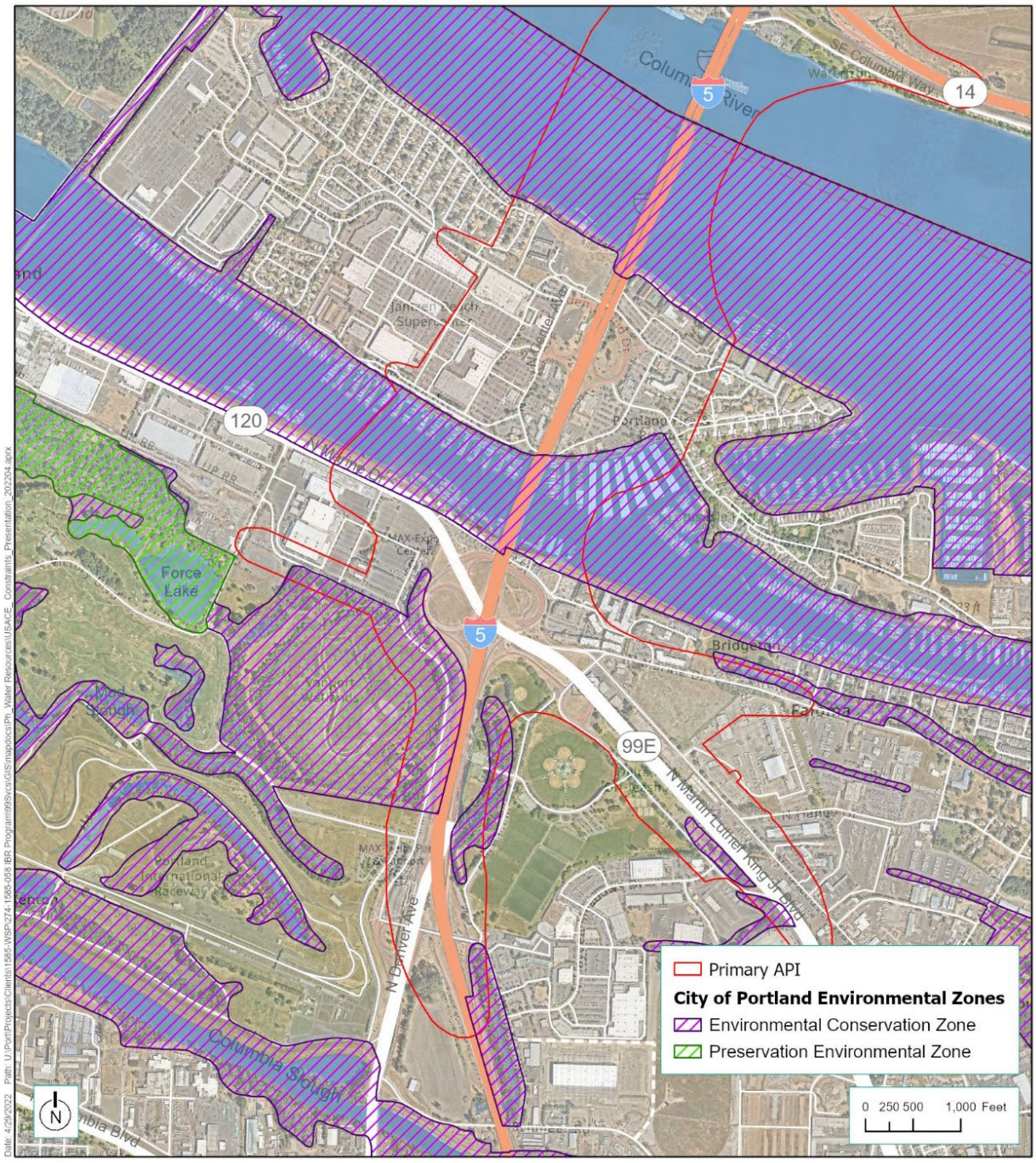


Figure 7. Potential Habitat in Portland, Oregon



4.2.5 Highway and Local Road Connections

Traffic data from 2019 shows that the various highway and local road connections experience different levels of daily vehicle volumes. Table 3 and Table 4 show the northbound and southbound daily vehicle volumes at the SR 14, Downtown Vancouver (Washington Street and C Street), and Hayden Island on and off ramps. The largest volumes are at the on ramp and off ramp to SR 14. The various river crossing options, which are described in Section 5, have different effects on how vehicles access these ramps and local streets.

Table 3. 2019 Daily Vehicle Volumes at Highway and Local Road Connections on I-5 Southbound

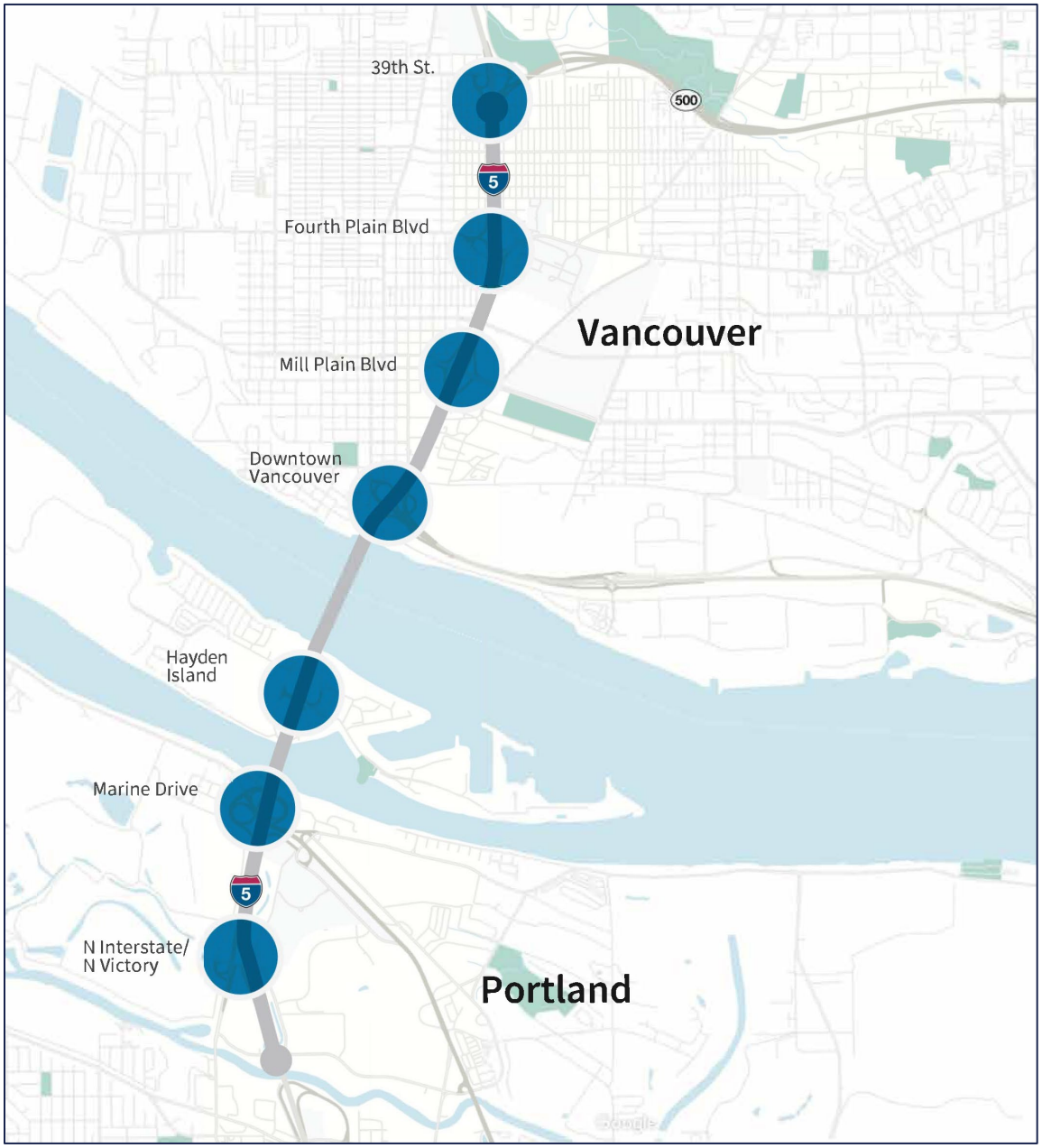
I-5 Southbound	2019 Daily Vehicle Volume
Off Ramp to SR 14 Eastbound	14,545
On Ramp from Washington Street (Downtown Vancouver)	3,680
On Ramp from SR 14 Westbound	11,220
Off Ramp to Hayden Island	8,730
On Ramp from Hayden Island	10,040

Table 4. 2019 Daily Vehicle Volumes at Highway and Local Road Connections on I-5 Northbound

I-5 Northbound	2019 Daily Vehicle Volume
On Ramp from SR 14 Westbound	16,505
Off Ramp to C Street (Downtown Vancouver)	3,110
Off Ramp to SR 14 Eastbound	13,110
On Ramp from Hayden Island	7,990
Off Ramp to Hayden Island	10,040

Figure 8 identifies the seven existing interchanges on I-5 within the program area. Depending on the type of river crossing selected, some of these interchanges may be eliminated if an option cannot connect to the existing routes in these locations. Eliminated interchanges would, in turn, affect the daily vehicle volumes experienced at other interchanges.

Figure 8. Interchanges in the Program Area



4.3 Future Considerations

Future considerations that may affect the river crossing include sea-level rise and the planned transportation networks in Portland and Vancouver, including active transportation, high-capacity transit, and highway design. The future transportation improvements described below include improvements proposed by the IBR program and local/regional partners.

4.3.1 Sea-level Rise

The IBR program is considering the potential effects of sea-level rise on the program, including how future conditions such as river levels and extreme weather events might impact the river crossing. Information on anticipated future conditions from the Climate Change Impacts Group[14] and the U.S. Geological Survey[15] was reviewed. Because of the distance from the ocean and the height above sea level, the anticipated effects of sea-level rise are reduced at the program site. A 0.5-foot increase in Columbia River levels is expected at Vancouver, based on a 3.3-foot (1-meter) sea-level rise.

Because the best available science provides no quantitative predictions of how daily or monthly average flows could change, it is difficult to translate the general climate change predictions into precise conclusions regarding future vessel clearances. However, a 0.5-foot increase would not be expected to change any vessel impacts due to the use of the ordinary high-water mark (OHWM) for determining available vertical clearance. Water levels are below the OHWM over 98% of the time and the river already has daily fluctuations greater than the predicted 0.5 foot increase due to tidal influence; therefore, the effect of sea level rise on water levels near the bridge area would be negligible.

In addition to river level changes caused by global sea-level rise, two planning efforts are underway and would have the potential to influence water levels at the I-5 bridges: the modernization of the international Columbia River Treaty between the U.S. and Canada and the proposed removal of the four lower Snake River dams. The IBR program is aware of these ongoing plans and all river crossing options will be designed in consideration of potential impacts in the program vicinity.

For these reasons, sea-level rise can be planned for/accommodated under any of the river crossing options (but may require specific design details).

[14] Miller, I.M., Morgan, H., Mauger, G., Newton, T., Weldon, R., Schmidt, D., Welch, M., Grossman, E. 2018. Projected Sea Level Rise for Washington State – A 2018 Assessment. A collaboration of Washington Sea Grant, University of Washington Climate Impacts Group, University of Oregon, University of Washington, and U.S. Geological Survey. Prepared for the Washington Coastal Resilience Project. Updated July 2019.
[15] Assessment of Columbia and Willamette River Flood Stage on the Columbia Corridor Levee System at Portland, Oregon, in a Future Climate. Scientific Investigations Report 2018–5161.

4.3.2 Active Transportation

Active transportation refers to human-powered modes of transportation, such as walking, biking, or rolling (e.g., using a wheelchair or scooter). Feedback from the community reinforced that improved connectivity between high-capacity transit and active transportation facilities is an important priority of the program. As part of the IBR program, there would be active transportation improvements, including a separated shared use path (SUP) on the river crossing. The SUP would have transit connections and connections to existing/planned trails and destinations, such as the Renaissance Trail, Columbia Way, and Hayden Island. Additionally, the highway design proposed by the IBR program will have a grade less than or equal to 5%, meeting Americans with Disabilities Act standards for the SUP.

4.3.3 High-capacity Transit

C-TRAN and TriMet both operate transit service in the program area. There is a benefit gained by integrating the established transit modes from both C-TRAN and TriMet with the transit component of the IBR program. C-TRAN designed their overall operations as a feeder-system to TriMet's expanded light rail service, which allows for the integration of a light rail terminus to provide effective reach into the transit services operated by C-TRAN.

The IBR program, with the support of local partners, is proposing a light rail transit extension of the TriMet's Yellow line from the Expo Center across the Columbia River and into Vancouver, terminating at Evergreen Boulevard, which best integrates existing transit investments in the region. To merge the two metro area transit systems together, the Evergreen bus terminus offers the best opportunity for faster, safer, and more reliable service while minimizing disruptions to downtown Vancouver.

4.3.4 Highway Design

The IBR program includes highway improvements on I-5 between SR 500 and Victory Boulevard, including modifications to seven interchanges. The general configuration of five interchanges would not change, but two interchanges would be modified: a full interchange would be located on Marine Drive and a partial interchange would be on Hayden Island. The IBR program is proposing a partial interchange on Hayden Island and a full interchange on Marine Drive and adding one auxiliary lane northbound and one auxiliary lane southbound between Marine Drive in Portland and Mill Plain Boulevard in Vancouver.

The IBR program also proposed adding one auxiliary lane northbound and one auxiliary lane southbound between Marine Drive in Portland and Mill Plain Boulevard in Vancouver, including on the replacement river crossing.

5. RIVER CROSSING OPTIONS

There are several types of river crossings that could be used to cross the Columbia River, either going under the river (tunnels) or over the river (bridges). These options provide different horizontal and vertical clearances for maritime navigation. Each option has both advantages and disadvantages in terms of meeting the Purpose and Need statement (Section 2), potential impacts to site conditions (Section 4), and other considerations, such as constructability and cost. The following sections provide an overview of each crossing option and identify the advantages, disadvantages, and other considerations that must be taken into account when identifying the preferred river crossing option for the IBR program.

The concepts assessed in this report are preliminary. They are not under design and remain at the planning conceptual level. They will not be advanced to the design stage until or unless deemed appropriate and necessary by program leadership in coordination with agency partners.

5.1 Tunnels

The IBR program investigated two types of tunnels that could potentially be used as a crossing for the Columbia River: a bored tunnel and an immersed tube tunnel (ITT). As described below, these tunnels differ in construction methods, possible alignments, general design, and some impacts (e.g., they have different upland connections) but are similar in other impacts (e.g., they both provide unlimited vertical clearance and eliminate over-water shading, etc.).

5.1.1 Bored Tunnel

A bored tunnel is constructed using a tunnel boring machine (TBM), which digs a bore (or tube) under the ground surface. For the IBR program's anticipated traffic and transit needs, a bored tunnel option would likely include four discrete bores, including two adjacent bores for vehicles (each up to 60 feet in diameter and spaced 60 feet apart) and two adjacent bores for transit (each 21 feet in diameter and spaced 20 feet apart); however, consideration would be given to a single, large-diameter transit bore during design development. Given this preliminary side-by-side layout, a bored tunnel option under the Columbia River would result in a footprint approximately 260 feet wide.

Figure 9 shows a cross section of the SR 99 tunnel in Seattle, which consists of a single 56-foot bored tunnel with two lanes of traffic each way. A similar cross-section would initially be considered for the large-diameter vehicular bores for the IBR program.

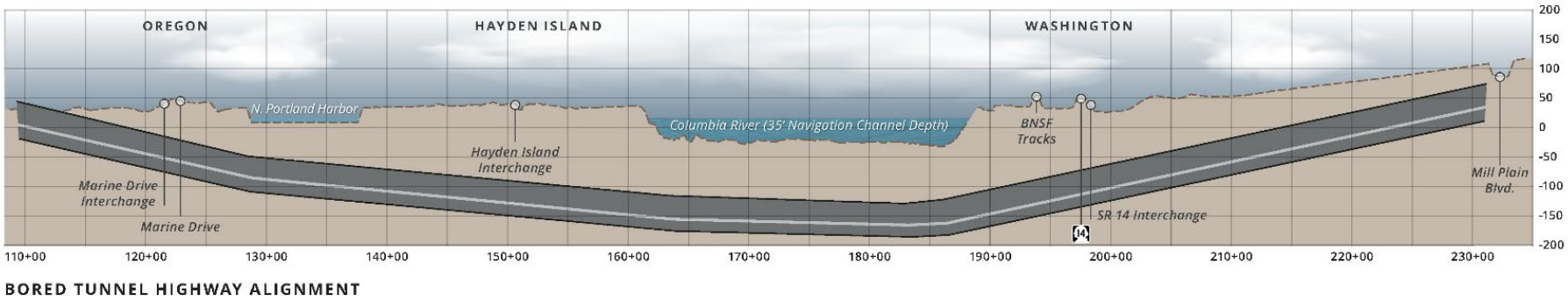
Figure 9. Bored Tunnel Example – SR 99 Tunnel in Seattle

A profile concept for the larger, vehicular tunnel bores is provided in Figure 10. As shown, the bored tunnels would daylight south of Victory Boulevard and north of Mill Plain Boulevard, eliminating the existing interchanges (and their local connections) at Victory Boulevard, Marine Drive, Hayden Island, SR 14, and Mill Plain Boulevard. The top of the bores would initially be set at approximately 60 feet below river bottom, extending to approximately 175 feet below river bottom (at the lowest point of the tunnels). The steepest road grade in each tunnel would be between 4% and 4.5%. Transit stations between the tunnel portals would need to be located at significant depth below street level; however, it should be noted that a twin bore solution for the transit tunnel would allow for shallower tunnel and station depths than a four-bore tunnel, and refinement of layout of the respective bores would occur during design development. Additionally, design development for the bored tunnel would entail assessing ground improvements below the river to shallow up the profile of the respective bores, thereby reducing length and cost. This approach would require environmental clearances and would be evaluated on the basis of its benefits and/or impacts to the project cost and schedule.

In addition to the IBR program's evaluation, it should also be noted that bored tunnel options, including replacement and supplemental tunnels, were evaluated as part of the alternatives screening process during the CRC Project's alternatives analysis (described in Section 3). A replacement tunnel would be the only structure for the crossing as the I-5 bridges would be demolished. A supplemental tunnel would accommodate approximately half of the vehicular traffic on I-5, and the existing bridges would be retrofitted to handle the remainder.

In recent discussions with partner agencies, the IBR program revisited prior evaluations, reconfirmed the findings of the CRC screening process, and concluded that a bored tunnel would still not meet the Purpose and Need. Specifically, a replacement bored tunnel would fail to fulfill four needs because the tunnel would surface south and north of much of the program area, thereby not serving most of the access needs for this section of I-5, including the needs of active transportation, transit, private vehicles, and freight. In addition, a bored tunnel option presents significant, though not insurmountable, construction challenges and impacts, such as potential impacts to Fort Vancouver and temporary loss of local connections.

Figure 10. Bored Tunnel – Potential Highway Alignment Under the Columbia River



5.1.2 Immersed Tube Tunnel

An ITT consists of a series of prefabricated tunnel segments that are constructed on land and then sunk into a dredged trench (approximately 360 to 540 feet wide and 2,600 feet [0.5 miles] long) under the river bottom. In-water excavation would require approximately 4 million cubic yards of material. Total excavation for the tunnel facility would be approximately 8 to 9 million cubic yards of material. Tunnel segments would then be connected under water, and the tunnel would be dewatered. Recognizing that the previous planning effort assumed a bored tunnel, the IBR program assembled a group of professionals with international experience in tunnel design and construction to provide a comprehensive conceptual review of the suitability of an ITT.

The Tunnel Concept Assessment (Attachment B) details the technical considerations of designing, constructing, and operating an ITT, including the dredging process and soil removal. The ITT concept developed by the IBR program for the Concept Assessment would accommodate all three transportation modes: roadway, high-capacity transit, and an SUP for active transportation (Figure11). The tunnel section would consist of six adjacent cells, separated by concrete walls, located within a rectangular tube approximately 180 to 184 feet wide. One cell would accommodate four lanes of traffic for northbound I-5 and another cell would accommodate four lanes of traffic for southbound I-5. Two cells, one for each direction, would accommodate northbound and southbound high-capacity transit. One cell would accommodate the SUP. One cell would accommodate the operations and maintenance/egress route. It is assumed that all of these modes would be housed within a single immersed tube cross-section.

Figure 11. ITT – Conceptual Cross-Section Below the Columbia River

AT = Active Transportation

A profile of a potential ITT replacement crossing is provided in Figure 12. The land side approaches of the ITT would transition from an immersed tube to a cut and cover tunnel, and then to an open-air

section as the tunnel returns to grade. Temporary easements would be required for construction, while permanent right-of-way would be the same (or similar) to what is currently needed for I-5.

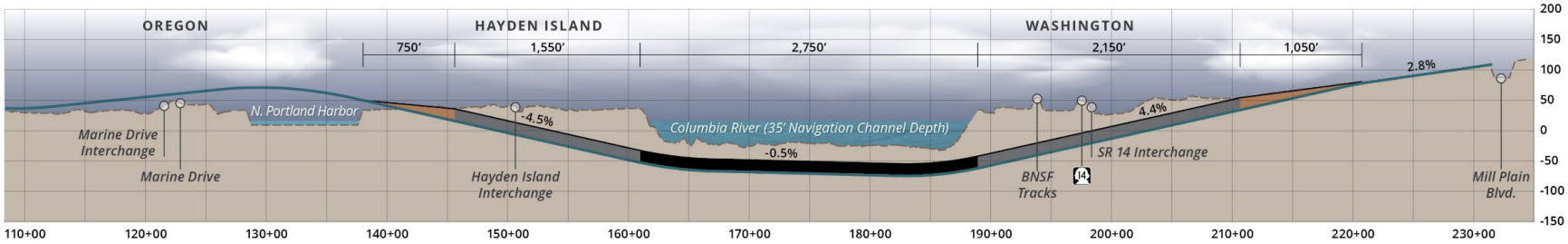
As shown, an ITT would likely daylight on the southern end of Hayden Island in Portland and near Evergreen Boulevard in Vancouver. This would eliminate connections to I-5 at SR 14 and Hayden Island. An ITT would require in-water work and trenching in the Columbia River. Transit stations between the two tunnel portals would be located approximately 50 to 100 feet below street level.

The top of the ITT would be approximately 10 feet below the river bottom, extending to approximately 70 feet below the river bottom (at the lowest point of tunnel). Like a bored tunnel, the steepest roadway grades would be between 4% and 4.5%.

The Tunnel Concept Assessment concluded that an ITT is technically feasible; however, there are numerous challenges, as identified in Table 5. These challenges include significant out-of-direction travel for drivers, freight, transit users, bicyclists and pedestrians; the inability to tie into existing connections, such as SR 14, Vancouver City Center, and Hayden Island; safety concerns for bicyclists and pedestrians; and significant archaeological, cultural, and environmental impacts. In-water work and trenching in the Columbia River would require substantial mitigation for impacts to habitat and species, including benthic habitat, salmonid species, and lamprey. Additionally, cost estimates for the ITT would be substantially higher than cost estimates for a replacement bridge and approaches (a comparison of tunnel options to bridge options is provided in Section 5.4). Notably, the cost estimate does not include other highway, interchange, and high-capacity transit improvements that would be necessary.

Figure 12. ITT – Potential Highway Alignment Under the Columbia River

Black = ITT; Gray = Cut and cover tunnel; Brown = Open-air section



PROFILE: DOWNSTREAM ALIGNMENT

5.1.3 Tunnel Crossing Evaluation and Considerations

Table 5 lists key details for the tunnel options that should be considered when selecting a river crossing for the IBR program. While there are some key differences in the impacts and considerations between a bored tunnel and an ITT, the tunnel options have many similarities (as identified by merged cells in the table below).

Table 5. Evaluation and Considerations for Tunnel Options

Topic	Bored Tunnel	ITT
Active Transportation/ SUP	• **Safety concerns** due to enclosed SUP for over 1 mile (e.g., no "eyes on the path," emergency egress, fire and life safety) • **Missed** direct connectivity from the SUP on the river crossing to local trails on both sides of the river (e.g., Renaissance Trail, Marine Drive Trail) • Opportunities to **improve connectivity** between existing trails on the Washington shore and potential for more park space along the river due to removal of existing I-5 connections	
Aviation	• **No penetration** into Pearson airspace	
Columbia River Navigation	• **Unlimited** horizontal and vertical navigation clearances • **Compatible** with to existing navigation channels • **Eliminates navigation hazards** at the bridge location (e.g., bridge piers, bridge deck) in/over the river	

Topic	Bored Tunnel	ITT
Construction Considerations	• Requires **significant, challenging** launching pits for the TBM(s) • Requires a **record or near-record diameter** TBM for vehicular tunnel bores	• Requires **unconventional and complex** below-grade construction to accommodate interchange connections consisting of cut and cover tunnels with large temporary excavations. This would make **construction impractical** • Construction would require **negotiation and approval of a permit from BNSF** to construct over/under/through their right-of-way (ROW); it is unlikely that BNSF would accept interruptions of their operations, and therefore construction would likely require the program construct a temporary alternative route; **there is no readily available route**
Cost Considerations	• Due to the significant disadvantages of a bored tunnel (e.g., would eliminate five interchanges), a conceptual cost estimate was not developed. However, it is certain that a bored tunnel would be **more expensive than an ITT** (due to such factors as increased construction method costs, significantly increased tunnel length, and increased construction risk mitigation)	• A conceptual construction cost estimate[a] of $**2.5 billion** for an ITT (from grade to grade) was developed based on previously completed projects and the collective expertise of the team

Topic	Bored Tunnel	ITT
Environmental Considerations	• **Eliminates over-water shading** impacts to fish and marine habitat. While a bored tunnel would go under the river, thus reducing/avoiding impacts to the river, **an ITT would require dredging the river bottom** – see below for impacts specific to an ITT • **Potential to reuse riverfront properties**/land above the tunnel; construction noise, vibration, and congestion impacts to businesses, impacts to neighborhoods and parks/recreation due to tunnel portals and local connections; utilities would require substantial relocations • **Impacts on local communities and neighborhoods** from construction of the cut and cover sections, tunnel portals, and local connections, including displacement of businesses and residences and neighborhood isolation • **Removes the bridge from the viewshed**, which benefits historic properties, parks and trails, and other resources	
	• Construction could **avoid impacts** to aquatic plants, fish, and other marine animals/plants by boring below the river bottom	• **In-water trenching and dredging** would disturb the river bottom across the entire width of the Columbia River, including the riverbanks (in-water excavation would require approximately 4 million cubic yards of material) • Dredged material would need to be placed in an in-water or upland site and **may require special handling** if contaminated materials are found; disturbance of the river bottom and nearshore habitat would require mitigation • **In-water construction** would impact aquatic plants, fish and other amphibians, marine mammals, and birds (including ESA-listed species) • Concerns with **cultural resources** along the shoreline and underwater; could impact

Topic	Bored Tunnel	ITT
		Fort Vancouver and Old Apple Tree Park; size and volume of excavation and vibration could **disturb or permanently impact resources** • **Disturbance and suspension of potentially contaminated materials in the river**; large excavation of contaminated soil on land may exceed capacity of existing disposal locations • Excavation of soil would be under constant threat by sand perpetually swept downstream by the Columbia River. **Supplemental dredging would be required** to clean out and reestablish the excavation geometry and possibly enlargement of the excavation.
Geotechnical Considerations	• **Control of ground loss** during tunneling, particularly under the river • **Groundwater control and water tightness** in temporary excavations (e.g., launch pits) and permanent underground structures (e.g., stations) • **Balancing incorporation of ground improvements** for ground strengthening and liquefaction mitigation with tunnel profile depth to mitigate against tunnel buoyancy	• **Ground improvement would likely be required** to improve the soils of the river bottom above, below, and around the ITT, which contributes **to high construction schedule and cost risks**
High-Capacity Transit	• An underground station could result in **high costs and construction risks** due to ground conditions near the river	

Topic	Bored Tunnel	ITT
Highway Traffic	• Due to missed connections (loss of **five** interchanges), large volumes of traffic would be **rerouted through local streets** to access I-5	• Due to missed connections (loss of **two** interchanges), large volumes of traffic would be **rerouted through local streets** to access I-5
Highway/Local Connections	• **Eliminates five**[b] I-5 interchanges, resulting in a loss of access to local streets and requiring modifications to the adjoining corridors	• **Eliminates two**[c] I-5 interchanges, resulting in a loss of access to local streets and require modifications to the adjoining corridors
Operational Considerations	• Requires a **full-time staffed operations center** for monitoring the mechanical, electrical, and traffic control systems and security • Requires **additional and different systems requirements** (fixed firefighting systems; mechanical ventilation systems [jet fans]; standpipe system; tunnel thermal protection systems; drainage systems; traffic monitoring systems; security systems)	
Safety	• Requires **extensive fire and life safety systems** • Requires **additional and different safety requirements**[16] (fixed firefighting systems; mechanical ventilation systems [jet fans]; standpipe system; tunnel thermal protection systems; drainage systems; traffic monitoring systems; security systems) • Fire prevention and ventilation **difficult** at abrupt changes in geometry • Hazardous materials are **not typically permitted in tunnels** (would require approval at the state level) • **Safety concerns due to enclosed tunnel** with two points of access (e.g., potential delays in emergency response, road blockage due to a collision)	
Structural Considerations	• Requires **more rigorous design efforts** and specialty contractors	

[16] Note: These requirements are also listed under "Operational Considerations." The listed requirements also pertain to safety considerations.

Topic	Bored Tunnel	ITT

[a] The conceptual construction costs do not include an allowance for soft costs such as design, construction management, contingency, or life-cycle considerations. These costs are for a facility that would accommodate I-5, high-capacity transit, and the SUP. This estimate does not include other highway, interchange, or high-capacity transit improvements that would be necessary. See Attachment B.

[b] Victory Boulevard, Marine Drive, Hayden Island, SR 14, and Mill Plain Boulevard

[c] Hayden Island and SR 14

5.2 Movable-Span Options

This assessment assumes that the upstream and downstream spans between Piers 5 and 6 (which flank the proposed primary navigation channel) would be movable. All other spans of the river crossing would be fixed. The movable spans would accommodate vehicular traffic, light rail transit, and a SUP. Refer to Attachment C for a comprehensive assessment of the movable-span options.

The three types of movable spans considered are described as follows:

1. A **vertical lift span** is similar to the type of movable span that exists on the crossing today, in which the span would rise vertically while remaining parallel with the deck.
2. A double-leaf **bascule span** would open in the middle, with each leaf rotating from a normal horizontal position to a nearly vertical position; to reach this position, each leaf would pivot around a horizontal axis on trunnion shafts attached to each side of the span.
3. A **swing span** is similar to the downstream BNSF bridge; in this design, the span opens by pivoting on a central pier and then rotating in a horizontal plane around a center support (vertical axis). For the IBR program, two swing spans would be required in order to provide the necessary horizontal clearance.

5.2.1 Vertical Lift Span

Vertical lift span bridges have been constructed with navigation channel (horizontal) clearances in the range of up to 500 feet and vertical clearance of approximately 200 feet. This type of span would provide a predetermined vertical clearance for river navigation, which, in this case, has been prescribed by the USCG to meet or exceed that of the current lift span (178 feet).

The cross-section of a vertical lift span would be consistent with that proposed for the fixed-span bridge with two[17] double-deck side-by-side bridges. The upstream bridge would have northbound I-5 lanes on the upper deck and a SUP on the lower deck, and the downstream bridge would have southbound I-5 lanes on the upper deck and two-way light rail transit on the lower deck.

The lift spans would be located between Piers 5 and 6 to provide up to 178 feet of vertical clearance over the proposed primary channel. Vertical lift spans are required to be on a straight section of bridge that has a level (or nearly level) deck.

Figure 13 shows an example of a single double-deck vertical lift bridge in Houghton, Michigan. The IBR program would require two side-by-side double-deck vertical lift bridges to accommodate multimodal traffic.

[17] The combination of the length, width, and depth of the lift spans required for the IBR program would result in one of the biggest, if not the biggest, lift span in the world. A single, wider lift span was not considered as it would significantly exceed the widest movable bridge span in the world.

Figure 13. Double-deck Vertical Lift Bridge Example – Portage Lake Bridge, Houghton, MI

5.2.2 Bascule Span

The practical limit for a double-leaf bascule span is approximately 350 feet long. If the IBR program were to use this type, the bascule spans would hinge from Piers 5 and 6 to provide unlimited vertical clearance over the proposed primary channel. Bascule spans are required to be on a straight section of bridge that has a level (or nearly level) deck.

A double-leaf bascule arrangement would be needed to accommodate the required width of the navigation channel. This option could be accommodated by a two-bridge double-deck arrangement[18] similar to the fixed-span bridge options. Figure 14 shows an example of a double-deck double-leaf bascule bridge in Chicago, Illinois.

[18] Due to the machinery required to operate movable spans of this size, the bascule span option could also comprise three single-deck bridges by adding a third bridge, such that the upstream bridge would accommodate northbound I-5, the adjacent downstream bridge would accommodate southbound I-5, and a third bridge would be adjacent to the southbound I-5 bridge and accommodate light rail transit and the SUP.

Figure 14. Double-deck Double-leaf Bascule Bridge Example – Wells Street Bridge, Chicago, IL

5.2.3 Swing Span

The swing span option would require one double-deck swing span on Pier 5 and one on Pier 6. The spans would be approximately 150 feet wide to accommodate the width of both directions of I-5 on the upper deck and light rail transit and the SUP on the lower deck. The swing spans would pivot on Piers 5 and 6 to provide unlimited vertical clearance for river navigation on the primary navigation channel. The span would need to be approximately 550 feet long to provide the 400-foot-wide horizontal river navigation channel.

The cross-section of a swing span would be similar to that proposed for the fixed-span bridge, except there would be one bridge instead of two. Northbound and southbound I-5 would be on the upper deck, and a SUP and two-way light rail transit would be on the lower deck.

Figure 15 shows an example of a single-deck double-swing bridge in York County, Virginia. For this assessment, the swing span would be double-deck.

Figure 15. Single-deck Double-swing Bridge Example – Coleman Bridge, York County, VA

5.2.4 Movable-Span Evaluation and Considerations

Table 6 identifies key details for each of the movable-span options. As shown, all options have advantages and disadvantages that should be taken into consideration when selecting a river crossing replacement.

Table 6. Evaluation and Considerations for Movable-Span Options

Topic	Vertical Lift Span	Bascule Span	Swing Span
Active Transportation/ SUP	• **Delay to SUP** users during a bridge opening; no suitable detour route is available • Lower bridge elevation would be a **benefit for path users** (reduced grades would increase ease of access and operability of the SUP)		
Aviation	• Lift span towers would **permanently** penetrate Pearson airspace	• Leaves would **temporarily** penetrate Pearson airspace when open	• **No penetration** into to Pearson airspace

Topic	Vertical Lift Span	Bascule Span	Swing Span
Columbia River Navigation	• Provides **178 feet or unlimited vertical clearance** for navigation • **Openings required** to accommodate tall vessels/cargo • **Lower vertical clearance** (in the closed position) than that provided by a fixed-span bridge (see Section 5.3) • Requires 400 feet of horizontal clearance per the USACE • Movable-span operations, and thus river navigation operations, would likely need to be **restricted to nighttime openings** to minimize impacts to vehicle traffic and transit operations • Primary navigation channel would be **moved south**		
Construction Considerations	• **Extended construction schedule** (approximately 1 to 2 years) due to in-water work, equipment, and specialized workforce required		
	--	• **Additional schedule extension** with third bridge configuration	--
Cost Considerations	• Construction cost of two 450-foot lift spans: $500 million • Total bridge cost (Pier 1-8): **$930 million**	• Three bridge option: Construction cost of three 400-foot single-level bascule spans: $600 million Total bridge cost: **$1.03 billion** • Two bridge option: Construction cost of two 400-foot double-deck bascule spans: $550 million. Total bridge cost (Pier 1-8): **$980 million**	• Construction cost of two 550-foot swing spans: $800 million. • Total bridge cost (Pier 1-8): **$1.23 billion**

Topic	Vertical Lift Span	Bascule Span	Swing Span
Environmental Considerations	• **Increased air quality pollutant and greenhouse gas emissions** due to vehicular idling during a bridge opening • **Increased in-water work** due to size of foundations would increase impacts to biological resources, hazardous materials, and historic structures and archaeological resources • **Challenging stormwater containment** due to the bridge joints that allow the movable span to function		
	• **Permanent visual impacts** due to lift towers	• **Additional displacement of benthic habitat** with third bridge configuration • **Additional over-water shading** with third bridge configuration • **Visual impact** during bridge opening	• **Increased land use and development impacts** due to downstream location of bridge (required for construction)
Geotechnical Considerations	• **Requires more substantial river piers and pier foundations** to support the span as compared to a fixed-span (movable parts are more sensitive to foundation settlement) to ensure smooth operation over its lifetime.		
High-Capacity Transit	• **Reduced train speed** over bridge • **Interruptions to operations** during a bridge opening throughout 18-mile service network unless openings are restricted to nighttime only. Nighttime openings could also impact the start of service. • **Extensive maintenance** to keep communications, power and track operable • Opportunity to decrease the profile elevation and grade could **improve connections** to the Vancouver Waterfront station for transit vehicles and transit patrons		

Topic	Vertical Lift Span	Bascule Span	Swing Span
Highway Traffic	• The cycle time for a bridge opening would be 20 to 30 minutes. • Daytime bridge lifts **could impact traffic volumes** for up to an hour or more; nighttime bridge lifts would not impact traffic volumes for multiple hours a day • To reduce congestion and improve mobility, movable-span operations would likely **need to be restricted to specific days and/or times**		
	--	• **Fastest cycle time** to open and close the bridge resulting in less congestion	--
Highway/Local Connections	• **Maintains** local highway and street connections • **Retains** existing interchange locations • Reduced grades would **increase the ease of ramp connections**, primarily on the Hayden Island end of the bridge		
Operational Considerations	• More likely to result in **misalignment or damage** from a seismic event • **Requires a bridge operator** on site • Requires **additional maintenance** associated with mechanical and electrical systems		
Safety	• Crash rate is expected to be **3 to 4 times higher** during a bridge lift than during normal operating conditions		

Topic	Vertical Lift Span	Bascule Span	Swing Span
Structural Considerations	• Requires more **rigorous design efforts** and **specialty contractors**		
	• Towers up to **60 feet taller** than vertical clearance required • Counterweights in the towers would require **additional seismic design considerations** to mitigate earthquake impacts	• Would be **one of the largest** double-leaf bascule spans in the world • Potential for **operational problems** due to span imbalance, keeping counterweight pit dry, and center locks issues • Must resist seismic and wind loading **to a greater extent** than other movable bridge types	• Would be **one of the largest** movable spans of its type in the world • Low profile and **does not require expensive counterweights.** • **Less massive piers** than a bascule or vertical lift bridge • **More machinery** than a bascule or vertical lift bridge: an end-centering device and end-lifting devices

5.3 Fixed-Span Bridges

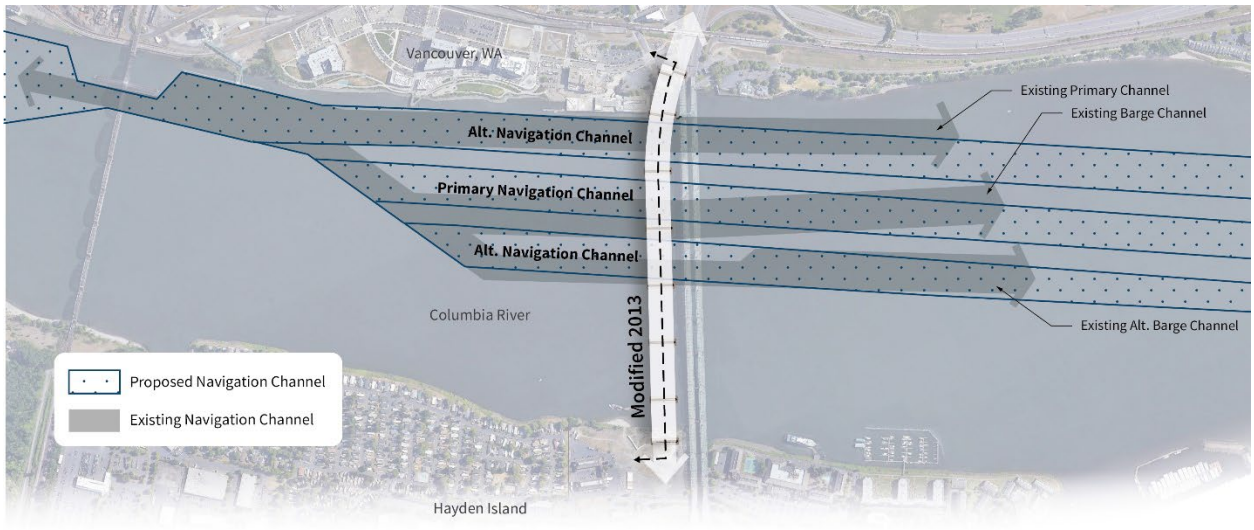
A fixed-span bridge is a bridge with no moving parts (as opposed to a bridge with a movable span). A local example of a high-level fixed-span bridge is the Astoria-Megler Bridge, which provides nearly 205 feet of vertical clearance for navigation (Figure 16). An example of a mid-level fixed-span bridge is the Vicksburg Bridge between Louisiana and Mississippi, which provides 116 feet of vertical clearance (Figure 17).

Figure 16. High-level Fixed Bridge Example – Astoria-Megler Bridge, Astoria, OR, and Point Ellice, WA

Figure 17. Mid-level Fixed Bridge Example – Vicksburg Bridge, Delta, LA, and Vicksburg, MS

Figure 18 shows a conceptual bridge plan (aerial view) of a fixed-span replacement bridge over the Columbia River, which could apply to a high-level fixed-span bridge (178 feet of vertical clearance) or a mid-level fixed bridge (116 feet of vertical clearance). As shown, a fixed-span bridge would require changes to the existing federal navigation channels in order to align the channels with the bridge piers and to align the primary channel with highest point of the bridge profile.

Figure 18. Conceptual Bridge Plan: Fixed-span Bridge



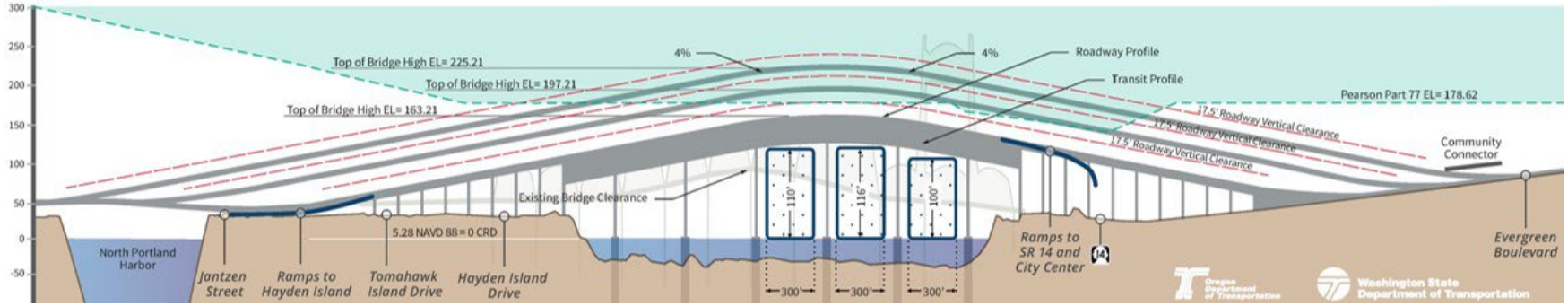
An evaluation of a high-level and mid-level fixed-span bridges is provided below, along with a summary of the advantages and disadvantages of these river crossing options.

5.3.1 High-Level Fixed Span

A high-level fixed-span bridge would provide up to 178 feet of vertical clearance over the Columbia River, which is the current vertical clearance under the existing lift spans (when open). This height would require long transitions from the peak elevation down to match the existing grades of I-5. Due to grade limitations of highways, light rail, and SUPs, the 4% grade is the maximum profile recommended, but with the higher clearance, the length of grade is longer to match to existing I-5 grades north and south of the river crossing. The higher profile would make connections to SR 14 and Hayden Island extremely challenging and unrealistic to accomplish.

Figure 19 illustrates the anticipated bridge profile (side view, looking west) for a high-level fixed-span bridge. The figure shows two navigational clearances, 178 feet and 150 feet, and a comparison to the 116-foot mid-level clearance. As shown, interchanges at SR 14 and Hayden Island would be removed, transit stations on Hayden Island and Vancouver waterfront would be extremely high, path users would climb to higher elevations, path connections to Hayden Island and the Vancouver Waterfront would be more challenging, and the bridge would encroach in the FAA Pearson Field restricted airspace (area highlighted in green in the figure).

Figure 19. Bridge Profile: High-level Fixed-span Bridge



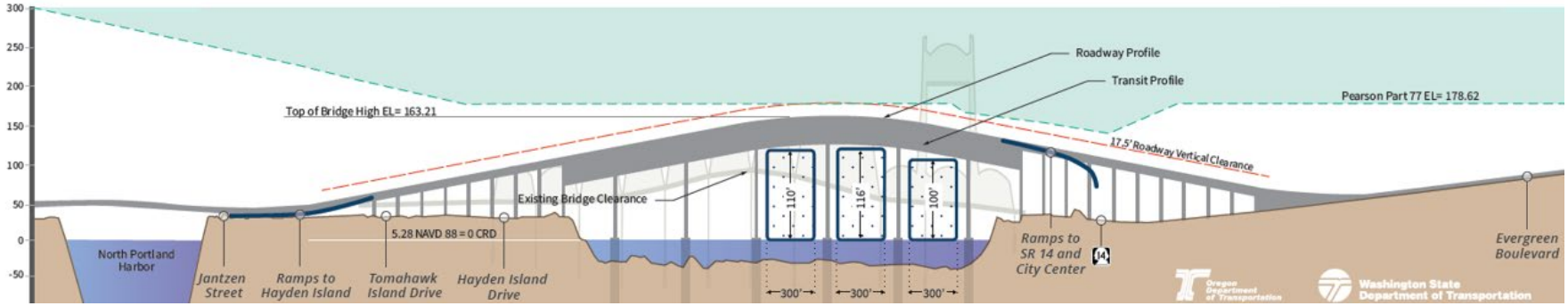
5.3.2 Mid-Level Fixed-span

A mid-level fixed-span bridge would provide 116 feet of vertical clearance over the Columbia River.[19] A mid-level fixed-span bridge would connect to the existing I-5 grades on Hayden Island and south of Evergreen Boulevard in Vancouver with a recommended maximum grade of 4%.

Figure 20 illustrates the anticipated bridge profile (side view, looking north) for a mid-level fixed span. As shown, this option would touch down on Hayden Island in Portland and south of Evergreen Boulevard in Vancouver. The bridge height would fall below the Part 77 FAA Pearson Field airspace (i.e., it would not penetrate the airspace). The bridge would provide 116 feet of vertical clearance in the primary channel and 100 to 110 feet in the barge and alternative barge navigation channels.

[19] As noted in Section 3, the vertical clearance over the primary channel was raised to 116 feet as part of a NEPA reevaluation. The USCG issued a Section 9 bridge permit for this clearance in 2013; however, that permit was contingent on securing other required permits and authorizations as well as implementing mitigation to affected marine users.

Figure 20. Bridge Profile: Mid-level Fixed-span Bridge



5.3.1 Fixed-Span Bridge Evaluation and Considerations

Table 7 identifies key details for both a high-level and mid-level fixed-span bridge. As shown, both options have advantages and disadvantages that should be taken into consideration when selecting a river crossing replacement.

Table 7. Evaluation and Considerations for Fixed-span Bridge Options

Topic	High-level Fixed	Mid-level Fixed
Active Transportation/ SUP	• Connections to Hayden Island and Vancouver waterfront **would be challenging** due to height above ground	• Connections to existing grade at Hayden Island and Vancouver waterfront **can be achieved** with ramps
Aviation	• **Permanent protrusion** into Part 77 FAA Pearson airspace	• **Likely penetration** into Part 77 FAA Pearson airspace (lights and signs only – the bridge would not protrude)
Columbia River Navigation	• Primary navigation channel would be **moved south** to the bridge profile high point	
	• Would accommodate a vertical clearance **up to 178 feet** for river navigation	• Would accommodate a vertical clearance **up to 116 feet** for river navigation • Would **reduce** navigation clearances as they exist today • **Mitigation** proposed for 4 vessels/users (reported approximately 70 trips/year)[a]
Construction Considerations	• **Conventional** construction methods and risks	

Topic	High-level Fixed	Mid-level Fixed
Cost Considerations	• The work completed for CRC, and supported by the IBR program, suggested **higher costs** for a higher fixed-span bridge. This is in part due to the changes that would occur at each land side connection, accounting for differences in interchanges, transit stations, and active transportation connections	• Construction cost of two 450-foot fixed spans: $70 million • Total bridge cost (Pier 1-8): **$500 million**
Environmental Considerations	• **Smaller aquatic footprint** compared to tunnels and movable-span bridges; **less in-water work/structures** than tunnel options, and **smaller pier foundations** compared to movable-span bridges	
	• Sustained 4% grade would result in **increased greenhouse gas emissions** • Sustained 4% grade would create **noise** impacts due to the use of Jake brakes for freight vehicles on the descent • **New visual impacts** to/from Fort Vancouver and to/from Hayden Island	• Shorter sustained 4% grade would result in **less greenhouse gas emissions** than high-level fixed • Shorter sustained 4% grade would result in less **noise** impacts than high-level fixed • Would have **less viewshed** impacts than a high-level bridge
Geotechnical Considerations	• **Smaller** piers and foundations than a movable span	• **Smaller** piers and foundations than movable span or a high-level fixed
High-Capacity Transit	• **Avoids impacts** to transit operations related to a movable span	
	• Station locations (Hayden Island, downtown Vancouver) would be **very elevated**, which would make **fire and life safety more challenging**	• Station location on Hayden Island would be a **typical** elevated station, one level up • Station in downtown Vancouver would be elevated **but more reasonably able to accommodate fire and life safety**

Topic	High-level Fixed	Mid-level Fixed
Highway Traffic	• **Avoids** traffic safety impacts related to a movable span	
	• Sustained 4% grade would **slow down freight** • Due to missed connections at **two interchanges**, large volumes of traffic would be **rerouted through local streets** to access I-5	• Shorter sustained 4% grade would have a **lesser impacts on freight speed**
Highway/Local Connections	• **Missed** local connections (would touch down at Marine Drive and at Mill Plain) • Would **eliminate two** I-5 interchanges (Hayden Island, SR 14/Downtown Vancouver)	• **Maintains** local highway and street connections • **Retains** existing interchange locations
Operational Considerations	• **Does not require** on-site or specialized operation staff	
Safety	• **Avoids traffic safety impacts** related to a movable span	
Structural Considerations	• No significant differentiators identified	

a. During the CRC Project, agreements were negotiated with the four impacted users that were unable to modify operations (such as accepting an air gap of less than 10 feet) in order to transit a bridge height of 116 feet. Three upstream fabricators entered into agreements with the CRC Project. The anticipated agreements would have resulted in payments to the companies that would be used by the companies at their business discretion and control. Payments were never made because the project was stopped. The remaining vessel owner decided to terminate negotiations that involved a payment to compensate the owner for vessel modifications, and an agreement was never finalized.

5.4 Comparison of River Crossing Options

Table 8 provides a detailed side-by-side comparison of each of the river crossing options in terms of effects on active transportation, aviation, Columbia River navigation, construction considerations, cost considerations, environmental considerations, geotechnical considerations, high-capacity transit, highway traffic, highway and local connections, operational considerations, safety, and structural considerations. The table is color coded and provides a symbol to indicate if a consideration is an advantage (green, with a "+" symbol), disadvantage (red, with a "-" symbol), or neutral (yellow, with a "•" symbol).

More detailed analyses of the tunnel options and the movable-span options can be found in Attachments B and C, respectively.

Table 8. River Crossing Option Comparison

	Bored Tunnel	Immersed Tube Tunnel	Lift Span	Bascule Span	Swing Span	High-level Fixed	Mid-level Fixed
Active Transportation/SUP	– **Safety concerns** due to enclosed SUP for over 1 mile (e.g., no "eyes on the path, emergency egress, fire and life safety) – **Missed direct connectivity** from the SUP on the river crossing to local trails on both sides of the river (e.g., Renaissance Trail, Marine Drive Trail) + Opportunities to **improve connectivity** between existing trails on the Washington shore and potential for more park space along the river due to removal of existing I-5 connections		– **Delay to SUP users** during a bridge opening; **no suitable detour route** is available + Lower bridge elevation would be a **benefit for path users** (reduced grades would **increase ease of access and operability** of the SUP)			– Active transportation connections to Hayden Island and Vancouver waterfront **would be challenging** due to height above ground	+ Connections to existing grade at Hayden Island and Vancouver waterfront **can be achieved with ramps**
Aviation	+ **No penetration** in Pearson airspace		– Lift span towers would **permanently penetrate** Pearson airspace	• Leaves would **temporarily penetrate** Pearson airspace when open	+ **No penetration** in Pearson airspace	– **Permanent penetration** into Pearson airspace	• **Likely penetration** of lights and signs into Pearson airspace
Columbia River Navigation	+ **Unlimited** horizontal and vertical navigation clearances + **Compatible** with existing navigation channels + **Eliminates navigation hazards** (e.g., bridge piers, bridge deck) in/over the river		+ Provides **178 feet or unlimited vertical clearance** for navigation – **Openings required** to accommodate tall vessels/cargo – **Lower vertical clearance** (in the closed position) than that provided by the fixed-span bridge – Movable-span operations and thus river navigation operations would likely need to be **restricted to nighttime openings** to minimize impacts to vehicle traffic and transit operations • Primary navigation channel would be **moved south** • Requires **400 feet** of horizontal clearance per the USACE			+ **No change in vertical clearance** • Primary navigation channel would be **moved south** to the bridge profile high point	• Would accommodate a vertical clearance **up to 116 feet** for navigation • Would **reduce** navigation clearances as they exist today • Primary navigation channel would be **moved south** to the bridge profile high point – **Mitigation** for 4 vessels/users is proposed (reported approximately 70 trips/year)[a]

	Bored Tunnel	Immersed Tube Tunnel	Lift Span	Bascule Span	Swing Span	High-level Fixed	Mid-level Fixed
Construction Considerations	– Requires **significant, challenging** launching pits for the TBM(s) – Requires a **record or near-record** diameter TBM for vehicular tunnel bores	– Requires **unconventional and complex** below-grade construction to accommodate interchange connections consisting of cut and cover tunnels with large temporary excavations. This would make **construction impractical** – Construction would require **negotiation and approval of a permit from BNSF** to construct over/under/through their ROW; it is unlikely that BNSF would accept interruptions of their operations, and therefore construction would likely require the program construct a temporary alternative route; **there is no readily available route**	• **Extended construction schedule** (approximately 1 to 2 years) due to in-water work, equipment, and specialized workforce required			+ **Conventional** construction methods and risks	
			--	• Additional **schedule extension** with third bridge configuration	--		

	Bored Tunnel	Immersed Tube Tunnel	Lift Span	Bascule Span	Swing Span	High-level Fixed	Mid-level Fixed
Cost Considerations	– Due to the significant disadvantages of a bored tunnel (e.g., would eliminate five interchanges), a conceptual cost estimate was not developed. However, it is certain that a bored tunnel would be **more expensive than an ITT** (due to such factors as increased construction method costs, significantly increased tunnel length, and increased construction risk mitigation)	– Total tunnel cost (from grade to grade): **$2.5 billion**	– Construction cost of two 450-foot lift spans: $500 million – Total bridge cost (Pier 1-8): **$930 million**	Three bridge option: – Construction cost of three 400-foot single-level bascule spans: $600 million – Total bridge cost (Pier 1-8): **$1.03 billion** Two bridge option: – Construction cost of two 400-foot double-deck bascule spans: $550 million – Total bridge cost: **$980 million**	– Construction cost of two 550-foot swing spans: $800 million – Total bridge cost (Pier 1-8): **$1.23 billion**	• The work completed for CRC and supported by the IBR program suggested **higher costs** for a higher fixed-span bridge. This is, in part, due to the changes that would occur at each land side connection, accounting for differences in interchanges, transit stations, and active transportation connections.	+ Construction cost of two 450-foot fixed spans: $70 million + Total bridge cost: **$500 million**
Environmental Considerations	+ **Eliminates over-water shading** impacts to fish and marine habitat. While a bored tunnel would go under the river, thus reducing/avoiding impacts to the river, an ITT would require dredging the river bottom – **see below for impacts specific to an ITT** + **Potential to reuse riverfront properties**/land above the tunnel + **Removes the bridge from the viewshed**, which benefits historic properties, parks and trails, and other resources – Construction **noise, vibration, and congestion** impacts to businesses – **Impacts to neighborhoods and parks/recreation** due to tunnel portals and local connections – Utilities would require **substantial relocations** – **Impacts on local communities and neighborhoods** from construction of the cut and cover sections, tunnel portals and local connections, including displacement of businesses and residences and neighborhood isolation		– **Increased air quality pollutant and greenhouse gas emissions** due to vehicular idling during a bridge opening – **Increased in-water work** due to size of foundations would increase impacts to biological resources, hazardous materials, and historic structures and archaeological resources – **Challenging stormwater containment** due to the bridge joints that allow the movable span to function			+ **Smaller aquatic footprint** compared to tunnels and movable-span bridges + **Less in-water work/structures** than tunnel options + **Smaller pier foundations** compared to movable-span bridges	

	Bored Tunnel	Immersed Tube Tunnel	Lift Span	Bascule Span	Swing Span	High-level Fixed	Mid-level Fixed
	+ Construction could **avoid impacts to aquatic** plants, fish, and other marine animals/plants by boring below the river bottom	– **In-water trenching and dredging would disturb the river bottom** across the entire width of the Columbia River, including the riverbanks (in-water excavation would require approximately 4 million cubic yards of material) – Disturbance of the river bottom and nearshore habitat **would require mitigation** – Dredged material would need to be placed in an in-water or upland site and **may require special handling** if contaminated materials are found – **In-water construction** would impact aquatic plants, fish, amphibians, marine mammals, and birds (including ESA-listed species) – **Concerns for cultural resources** along the shoreline and underwater; could impact Fort Vancouver and Old Apple Tree Park; size and volume of excavation and vibration could disturb or permanently impact resources – Disturbance and suspension of **potentially contaminated materials in the river**; large excavation of	– **Permanent visual impacts** due to lift towers	– **Additional displacement of benthic habitat** with third bridge configuration; additional over-water shading with third bridge configuration – **Visual impact** during bridge opening	– **Increased land use and development impacts** due to downstream location of bridge (due to construction considerations)	– Sustained 4% grade would result in **increased greenhouse gas emissions** – Sustained 4% grade would create **noise impacts** due to the use of Jake brakes for freight vehicles on the descent – **New visual impacts** to/from Fort Vancouver and to/from Hayden Island	+ Shorter sustained 4% grade would result **in less greenhouse gas emissions** than high-level fixed + Shorter sustained 4% grade would result in **less noise** impacts than high-level fixed. + Would have **less viewshed impacts** than a high-level bridge

	Bored Tunnel	Immersed Tube Tunnel	Lift Span	Bascule Span	Swing Span	High-level Fixed	Mid-level Fixed
		– contaminated soil on land may exceed capacity of existing disposal locations – Excavation of soil will be under constant threat by sand perpetually swept downstream by the Columbia River. **Supplemental dredging would be required** to clean out and re-establish the excavation geometry and possibly enlargement of the excavation.					
Geotechnical Considerations	– **Control of ground loss** during tunneling, particularly under the river – **Groundwater control and water tightness** in temporary excavations (e.g., launch pits) and permanent underground structures (e.g., stations) – **Balancing incorporation of ground improvements** for ground strengthening and liquefaction mitigation with tunnel profile depth to mitigate against tunnel buoyancy	– **Ground improvement would likely be required** to improve the soils of the river bottom above, below and around the ITT, which contributes to **high construction schedule and cost risks**	• **Requires more substantial river piers and pier foundations** to support the span as compared to a fixed span (movable parts are more sensitive to foundation settlement) to ensure smooth operation over its lifetime			+ **Smaller** piers and foundations than a movable span	+ **Smaller** piers and foundations than movable span or a high-level fixed
High-Capacity Transit			– **Reduced** train speed over bridge			+ **Avoids impacts** to transit operations related to a movable span	

	Bored Tunnel	Immersed Tube Tunnel	Lift Span	Bascule Span	Swing Span	High-level Fixed	Mid-level Fixed
	– An underground station could result in **high costs and construction risks** due to ground conditions near the river		– **Interruptions to operations** during a bridge opening throughout 18-mile service network, unless openings are restricted to nighttime only – **Extensive maintenance** to keep communications, power and track operable + Opportunity to decrease the profile elevation and grade could **improve connections** to the Vancouver Waterfront station for transit vehicles and transit patrons			– Station locations (Hayden Island, downtown Vancouver) would be **very elevated**, which would make **fire and life safety more challenging**	• Station location on Hayden Island would be a **typical** elevated station, one level up • Station in downtown Vancouver would be elevated **but more reasonably able to accommodate fire and life safety**
Highway Traffic	– Due to missed connections (**loss of five interchanges**), large volumes of traffic would be **rerouted through local streets** to access I-5	– Due to missed connections (**loss of two interchanges**), large volumes of traffic would be **rerouted through local streets** to access I-5	– The cycle time for a bridge opening would be **20 to 30 minutes** – Daytime bridge lifts **could impact traffic volumes** for an hour or more; nighttime bridge lifts would not impact traffic volumes for multiple hours a day – To reduce congestion and improve mobility, movable-span operations would **likely need to be restricted** to specific days and/or times + Reduced length of grade of the lower profile **would benefit freight and other vehicles** that might be affected by the lower speeds caused by steeper grades			+ **Avoids traffic safety impacts** related to a movable span	
			--	+ **Fastest cycle time** to open and close the bridge resulting in less congestion	--	– Sustained 4% grade would **slow down freight** – Due to missed connections at **two interchanges**, large volumes of traffic would be **rerouted through local streets** to access I-5	+ Shorter sustained 4% grade would have a **lesser impact on freight speed**
Highway/Local Connections	– **Eliminates five I-5 interchanges**. This would result in a loss of access to local streets and require modification to the SR 14 corridor	– **Eliminates two I-5 interchanges.** This would result in a loss of access to local streets and require modification to the SR 14 corridor	+ **Maintains** local highway and street connections + Reduced grades would **increase the ease of ramp connections**, primarily on the Hayden Island end of the bridge – **Retains** existing interchange locations			– **Missed** local connections (would touch down at Marine Drive and at Mill Plain) – Would **eliminate two I-5 interchanges** (Hayden Island, SR 14/Downton Vancouver)	+ **Maintains** local highway and street connections – **Retains** existing interchange locations

	Bored Tunnel	Immersed Tube Tunnel	Lift Span	Bascule Span	Swing Span	High-level Fixed	Mid-level Fixed
Operational Considerations	– Requires a **full-time staffed operations center** for monitoring the mechanical, electrical, traffic control systems, and security – Requires **additional and different systems requirements** (fixed firefighting systems; mechanical ventilation systems [jet fans]; standpipe system; tunnel thermal protection systems; drainage systems; traffic monitoring systems; security systems)		– More likely to result in **misalignment or damage** from a seismic event – **Requires a bridge operator** on site – Requires **additional maintenance** associated with mechanical and electrical systems			+ **Does not require** on-site or specialized operation staff	
Safety	– Requires **extensive fire and life safety systems** would be required – Requires **additional and different** safety requirements (fixed firefighting systems; mechanical ventilation systems [jet fans]; standpipe system; tunnel thermal protection systems; drainage systems; traffic monitoring systems; security systems) – Fire prevention and ventilation **difficult at abrupt changes** in geometry – **Hazardous materials are not typically permitted** in tunnels (would require approval at the state level) – Safety concerns due to **enclosed tunnel with two points of access** (e.g., potential delays in emergency response, road blockage due to a collision)		– Crash rate is expected to be **3 to 4 times higher during a bridge lift** than during normal operating conditions			+ **Avoids traffic safety impacts** related to a movable span	
Structural Considerations	– Requires **more rigorous design efforts** and specialty contractors		– Requires **more rigorous design efforts** and specialty contractors – Towers up to **60 feet taller** than vertical clearance required – Counterweights in the towers would **require additional seismic design** considerations to mitigate earthquake impacts	– Would be **one of the largest** double-leaf bascule spans in the world – Potential for **operational problems** due to span imbalance, keeping counterweight pit dry, and center locks issues – Must **resist seismic and wind loading** to a greater extent than	– Would be **one of the largest** movable spans of its type in the world – **More machinery** than a bascule or vertical lift bridge: an end-centering device and end-lifting devices • Low profile and **does not require**	+ **Traditional** major complex bridge design delivery	

	Bored Tunnel	Immersed Tube Tunnel	Lift Span	Bascule Span	Swing Span	High-level Fixed	Mid-level Fixed
				other movable-span options	expensive counterweights • **Less massive piers** than a bascule or vertical lift bridge		

[a] During the CRC Project, agreements were negotiated with the four impacted users that were unable to modify operations (such as accepting an air gap of less than 10 feet) in order to transit a bridge height of 116 feet. Three upstream fabricators entered into agreements with the program. The anticipated agreements would have resulted in payments to the companies that would be used by the companies at their business direction and control. Payments were never made because the project was stopped. The remaining vessel owner made a decision to terminate negotiations that involved a payment to compensate the owner for vessel modifications, and an agreement was never finalized.

6. CONCLUSION

As part of the NEPA process, the IBR program will identify the type of river crossing that will be advanced for further study in the Supplemental Draft EIS. This report provides a summary of the different river crossing options that could be used to replace the I-5 bridges over the Columbia River.

Table 9 identifies how the river crossing options would (or would not) meet the six needs identified in the Purpose and Need statement.

Table 9. River Crossing Options and Purpose and Need

F = Fail; P = Pass

Purpose and Need	Tunnel (Bored and ITT)	Movable (Bascule, Swing, and Lift)	Fixed (High-level, Mid-level)
Growing travel demand and congestion	**F:** Missed connections would cause diversion onto local streets	**P:** Improved over existing conditions, although delays associated with openings	**F (High-level):** Missed connections would cause diversion onto local streets **P (Mid-level):** improved over existing conditions
Impaired freight movement	**F:** Missed connections at Hayden Island and SR 14/downtown. Vancouver would have negative impacts on freight movement	**P:** Lower grade would be more conducive to freight movement; Freight moving at night would be subject to delays	**F (High-level):** Missed connections at Hayden Island and SR 14/downtown Vancouver would have negative impacts on freight movement **P (Mid-level):** Would improve freight movement
Limited public transportation operation, connectivity, and reliability	**F:** Would not improve service due to missed connections	**P:** Feasible, although complicated due to disruptions and operations and maintenance	**F (High-level):** Cannot accommodate preferred grade **P (Mid-level):** Can accommodate preferred grade

Purpose and Need	Tunnel (Bored and ITT)	Movable (Bascule, Swing, and Lift)	Fixed (High-level, Mid-level)
Safety and vulnerability to incidents	**P:** May reduce potential for collisions compared to existing conditions	**P:** Similar potential for collisions compared to existing conditions	**P:** Would reduce potential for collisions compared to existing conditions
Substandard bicycle and pedestrian facilities	**F:** Problematic due to enclosed route for over 1 mile (safety, missed connections)	**P:** Lower grade would be better than fixed-span bridge, although there would be delays during openings	**F (High-level):** Cannot accommodate preferred grade **P (Mid-level):** Can accommodate preferred grade
Seismic vulnerability	**P:** Can be constructed to current seismic standards	**P:** Can be constructed to current seismic standards (although more likely to suffer misalignment or damage in a seismic event)	**P:** Can be constructed to current seismic standards

As shown in the table, the tunnel options and high-level fixed-span bridge fail to meet the Purpose and Need. The movable-span options could be designed and operated (i.e., bridge openings restricted to a limited nighttime window) to meet the Purpose and Need.

The replacement fixed-span bridge option with 116 feet of vertical clearance is the result of extensive technical and environmental work, as well as many years of public and agency coordination. In 2011, the CRC Project's Selected Alternative, which consisted of a replacement fixed-span bridge with 95 feet of vertical clearance, was adopted in the ROD. In 2011/2012, the CRC Project raised the vertical clearance to 116 feet in response to feedback from the USCG and river users. A 2012 NEPA re-evaluation on the height increase concluded there were no new significant impacts, and in 2013 the USCG issued a bridge permit for 116 feet (contingent on receipt of the USACE Section 408 authorization and agreements with affected river users). As noted previously, the IBR program's update to the NIR in 2021 concluded that there have been no significant changes related to river users since the CRC Project.

Based on technical evaluations, agency coordination, public outreach, and discussions with partner agencies, all of which are reflected in this report and its attachments, the IBR program recommends a fixed-span bridge with a vertical clearance of 116 feet as the Modified LPA and will continue to study movable-span options. The rationale and analysis summarized in this report demonstrates that the identified option provides the best replacement river crossing for the community and region. A fixed

bridge with 116 feet of vertical clearance is a solution that balances the needs of all users and modes of transportation, including freight and personal vehicles, transit, active transportation, aviation, and river users. This river crossing option has the best ability to meet the Purpose and Need statement, meet the community's values and priorities,[20] minimize environmental impacts, contributes to achievement of climate and equity goals and other program desired outcomes, and will use conventional design and construction methods, contributing to a lower cost.

[20] Community values and priorities for the IBR program were developed and adopted by the Community Advisory Committee and are available at: https://www.interstatebridge.org/media/t0kh3ey4/revised-community-values-priorities-5-20-21_remediated-1.pdf

Attachment A. IBR Program Navigation Impact Report

Interstate Bridge Replacement Program

Navigation Impact Report

November 2021
Revised May 2022

Interstate Bridge Replacement Program

Navigation Impact Report

Prepared for:

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EXECUTIVE SUMMARY

The Interstate Bridge Replacement (IBR) program, previously referred to as the Columbia River Crossing (CRC) Project, is a bridge, public transit, highway, and active transportation improvement project that would improve safety and mobility in the Interstate 5 (I-5) corridor between Portland, Oregon, and Vancouver, Washington. The IBR program includes replacement of the existing I-5 crossings of the Columbia River and Oregon Slough.

Construction of the proposed I-5 bridges will require bridge permits issued pursuant to Section 9 of the Rivers and Harbors Act of 1899 by the U.S. Coast Guard (USCG). One requirement of the process is the completion of a Navigation Impact Report (NIR) to assess impacts on navigation from the proposed bridges. The CRC Project developed an NIR in 2012 in support of a bridge permit that was issued by the USCG, but the permit subsequently expired. The IBR program utilized the navigation information developed for the CRC Project and updated and validated the information to reflect changed conditions since development of the CRC NIR and to reflect the USCG bridge permitting guidance adopted since 2012.

To determine updated navigation information, known river users, including commercial, recreational, passenger cruise, and federal users, as well as marine contractors and fabricators, were contacted to confirm the accuracy of existing information and determine whether any changes had occurred to their vessels or operations. To capture information about users that may not have been included in prior studies, additional outreach was conducted directly with marinas, through maritime and general publications, through an online survey, and through presentations to maritime groups. In addition, I-5 bridge lift data and other river use information were updated to reflect the time between the prior CRC NIR and the present. Land use data were also collected to identify land use changes or activities that could affect future navigation. Additional water level data were evaluated to update river levels and potential impacts on vertical navigation clearance.

Required openings of the I-5 bridge declined from an average of 289 per year from 1997 to 2011 to 157 per year from 2012 to 2020. From 2012 to 2020, 58% of the bridge openings were for tugs, 17% for sailboats, and the remainder for other vessel types. These openings represent 5% to 7% of the river traffic based on openings of the BNSF railroad bridge just downstream of the I-5 bridges and use of the locks at the Bonneville dam. Some vessel traffic has changed due to new vessels being added by existing users such as Tidewater Barge Lines, changed practices such as the Navy no longer using escort vessels for reactor shipments to Hanford, and vessels no longer in service in the area, such as the *Hawaiian Chieftain*. No deep-draft vessel use was documented as passing upriver of the I-5 bridge. There have been limited new marine development activities upriver of the I-5 bridge, and a number of facilities have ceased operations.

An impact analysis was conducted using the navigation information collected and comparing the information against the proposed bridge heights. Bridge heights of 116 feet and 121 feet (as measured above 0 Columbia River Datum [CRD]) were considered. These heights represent the Locally Preferred Alternative from the CRC that balances the needs of navigation with other constraints, including aviation, environmental impacts, and surface transportation needs and an allowance of an additional 5

feet that could potentially be provided by refined bridge designs but may reduce the horizontal clearance between bridge piers. The ordinary high water mark of 16 feet above 0 CRD was used to represent water levels and is a level that has only been exceeded 1.2% of the time from 1972 to 2020. An air gap of 10 feet was also used and represents an additional distance above the air draft of the vessel (highest point of the vessel above the water) to provide a safety margin.

The analysis found that construction of a 116-foot bridge would result in impacts to eight vessels/users. Further analysis showed that reducing the air gap to 5 feet and modifying specific vessel operations would reduce the impacts to four vessels/users. Increasing the bridge height to 121 feet would result in the same reduction in impacts. Table ES-1 summarizes the impacted vessels.

Table ES-1 Impacted Vessels/Users

Vessel	Owner	Vessel Type	Air Draft (feet)	Trip Frequency
TBD (fabricator's tallest future shipment)	Greenberry Industrial	Barge with fabricated materials	136	Any time of the year
TBD (fabricator's tallest future shipment)	Vigor	Barge with fabricated materials	130	Any time of the year
TBD (fabricator's tallest reported shipment)	Thompson Metal Fab	Barge with fabricated materials	165	Any time of the year
DB Taylor	JT Marine	Marine contractor vessel	131	Up to 10 trips per month at all times of the year

The IBR program has committed to mitigation for these impacted users. Specific mitigation agreements would be determined prior to application for a bridge permit and undertaking construction.

Navigation under the I-5 bridge across the Oregon Slough is limited to small recreational vessels and limited commercial vessels that can navigate under the existing fixed bridge height of 35 feet. The IBR program has committed to meeting or exceeding the vertical and horizontal clearance provided by the

existing bridge for new and replacement bridges on the Oregon Slough. No impacts to navigation or mitigation have been identified for Oregon Slough users.

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ACRONYMS AND ABBREVIATIONS

BPAG	Bridge Permit Application Guide
CFR	Code of Federal Regulations
CRC report	CRC River User Data Report
CRC	Columbia River Crossing
CRD	Columbia River Datum
DEIS	Draft Environmental Impact Statement
Diversified Marine	Diversified Marine, Inc.
EIS	Environmental Impact Statement
FEIS	Final Environmental Impact Statement
FHWA	Federal Highway Administration
Foss	Foss Maritime Company
FTA	Federal Transit Administration
Greenberry	Greenberry Industrial LLC
HME	Hickey Marine Enterprises
hp	Horsepower
I-205	Interstate 205
I-5	Interstate 5
I-84	Interstate 84
IBR	Interstate Bridge Replacement
Knife River	Knife River Corporation
LPA	Locally Preferred Alternative
Manson	Manson Construction Co.
NEPA	National Environmental Policy Act
NIR	Navigation Impact Report
NOAA	North American Oceanic and Atmospheric Administration
ODOT	Oregon Department of Transportation
PSNS	Puget Sound Naval Shipyard
RM	River Mile
ROD	Record of Decision
Ross Island	Ross Island Sand and Gravel
Schooner Creek	Schooner Creek Boat Works
SDS	SDS Lumber Company and SDS Tug & Barge

SR	State Route
Tidewater	Tidewater Barge Lines
USCG	U.S. Coast Guard
UVTB	Upper Vancouver Turning Basin
Vigor	Vigor Works, LLC
WSDOT	Washington State Department of Transportation

1. PART 1: INTRODUCTION AND BACKGROUND

1.1 Summary

As one of the largest rivers in North America, the Columbia River is among the defining geographic features of the Pacific Northwest. It serves as an important transportation corridor, and its resources have provided the economic and cultural foundations of Native American and western settlements.

Through the Portland-Vancouver metropolitan area, the Columbia River is crossed by bridges at four locations: the Interstate 5 (I-5) crossing, known as the Interstate Bridge; the Interstate 205 (I-205) crossing, known as the Glenn L. Jackson Memorial Bridge; the BNSF Vancouver railroad bridge; and the I-5 Oregon Slough (also known as the North Portland Harbor) Bridge. Like the river, the I-5 corridor is a major regional and national resource. It is the principal north-south corridor for the movement of goods and services on the West Coast of the U.S. from Canada to Mexico. Within the metropolitan area, it provides access to major economic centers such as the Ports of Portland and Vancouver and commercial and business districts throughout the region.

The Interstate Bridge Replacement (IBR) program, previously referred to as the Columbia River Crossing (CRC) Project, is a bridge, public transit, highway, and active transportation improvement project that would improve safety and mobility in the I-5 corridor between Portland, Oregon, and Vancouver, Washington. The IBR program area begins at State Route (SR) 500 in Vancouver and extends to Columbia Boulevard in Portland and includes the existing I-5 crossing of the Columbia River. Replacing the aging bridges across the Columbia River with modern, seismically resilient, multimodal structures that provide improved mobility for people, goods and services is a high priority for Oregon and Washington.

Construction of the proposed I-5 bridge will require bridge permits issued pursuant to Section 9 of the Rivers and Harbors Act of 1899 by the U.S. Coast Guard (USCG). The USCG permits the location and plans of bridges in the interest of public navigation. A bridge permit is the written approval of the location and plans of a bridge constructed across a navigable waterway of the U.S. The Columbia River, including both the main channel and the Oregon Slough, is considered a navigable waterbody.

A primary requirement of the Section 9 permit is the completion of a Navigation Impact Report (NIR) to assess the impacts on navigation from the proposed bridge. NIRs provide the most accurate picture of current and prospective navigation on a waterway. The NIR is submitted to the USCG and used as part of the USCG's evaluation and issuance of a preliminary navigational clearance determination. The application for bridge permits will be completed after the National Environmental Policy Act (NEPA) process has been finalized and when construction funding has been secured or is more certain. Separate bridge permits will be necessary for the main span I-5 bridges and the separate bridge(s) over the Oregon Slough. This NIR report was prepared consistent with Appendix A of the USCG Bridge Permit Application Guide (BPAG) (USCG 2016). This report is an update to the 2012 CRC NIR (ODOT and WSDOT 2012) to reflect changed conditions since development of the original NIR and to reflect the

USCG guidance adopted since the CRC Project was stopped. Part 1 of this report provides background information and project details. Part 2 addresses the requirements of Appendix A to the BPAG.

1.2 Prior Efforts

An Environmental Impact Statement (EIS) was prepared for the CRC Project, with a Final EIS (FEIS) published in September 2011 and a Record of Decision (ROD) in December 2011. Following the ROD, the CRC NIR was completed in 2012 in support of the Section 9 bridge permit application. The CRC NIR contains the results of a comprehensive analysis of the navigation needs of the Columbia River at the project site, as well as conclusions regarding the impacts to navigation of the then-proposed replacement of the existing I-5 bridge over the Columbia River. The data collected regarding navigation needs of the Columbia River at that time represent a significant resource that will be used as a data source for completing the Section 9 bridge permit for the IBR program. These data are assumed to be accurate but will require validation for any changes that may have occurred regarding the navigation needs described in the CRC NIR.

The CRC FEIS and NIR evaluated navigation impacts, costs, and environmental and landside impacts of mid-level bridges ranging from 95 to 125 feet above 0 feet (Columbia River Datum [CRD].) All bridge heights and vertical clearances noted in this report are based on a water level of 0 feet CRD unless specified otherwise. Bridge heights greater than 125 feet had been dismissed during the alternatives screening process for the CRC Project because they would encroach on protected airspace for Pearson Field airport and provided only a minimal reduction in navigation impacts while increasing costs and resulting in other landside impacts. Low-level bridges were similarly dismissed because they would have required a movable span that would disrupt traffic, cause more accidents, impact navigation, and be more expensive to construct, maintain and operate. The CRC Project proposed to construct a bridge with a vertical clearance of 116 feet because that design balanced the needs of navigation, airfield operations, and surface transportation, while minimizing additional landslide and environmental impacts, as discussed in the 2012 CRC Bridge Height NEPA Re-Evaluation (CRC 2012).

A Section 9 permit from the USCG was granted in September 2013 for the construction of the replacement bridges as proposed by the CRC Project. That permit expired when the CRC Project was stopped and construction had not commenced within three years, and a new Section 9 permit(s) will be required for the IBR program.

1.3 Proposed Project

The Interstate Bridge Replacement Program (IBR) program is a multimodal transportation project to improve Interstate 5 (I-5) corridor mobility by addressing present and future travel demand and mobility needs in the program area. The IBR program will implement new river crossings over the Columbia River and the Oregon Slough, with associated improvements to I- 5. This report provides detailed consideration of a fixed-span bridge over the Columbia River with a vertical clearance of 116 feet to 121 feet above 0 feet Columbia River Datum (CRD). For the Oregon Slough crossing(s) the replacement or supplemental bridges will meet or exceed the vertical and horizontal clearances provide by the existing I-5 bridge.

The existing I-5 bridges over the Columbia River have a maximum vertical clearance of 178 feet provide by the lift span with varying fixed clearances at the barge channel and alternate barge channel. The existing I-5 bridge over the Oregon Slough provides for a vertical clearance of 35 feet. The vertical clearance design evaluated in this report was considered during the NEPA process for the CRC Project. The analysis in this report provides updated vessel and river use data and user impact analysis. A detailed description of the IBR program and the bridge design used for conducting the impact analysis is contained in Section 1.5.

1.4 Purpose of this Report

This report is provided to meet the requirements for a Navigation Impact Report (NIR) as defined in the USCG Bridge Permit Application Guide (BPAG) Appendix A (USCG 2016). The purpose of the NIR is to accurately determine the current and prospective navigation on the waterway and to analyze the navigational impacts of bridge design alternatives. This report describes the physical features of the Columbia/Snake River system, the current and prospective navigation needs, the proposed replacement bridges, potential navigation impacts to navigation as result of the proposed replacement bridges, and potential mitigation strategies to address identified impacts to navigation. The report follows the order of information consistent with BPAG Appendix A beginning at Part 2. This introductory section provides background information regarding the IBR program.

Information and findings in this report will be used by the USCG to issue a preliminary navigation clearance determination and help inform the program's application for a bridge permit from the USCG. The preliminary navigation clearance determination is the USCG's evaluation of whether the proposed bridge clearances meet the reasonable needs of navigation and are a reasonable alternative to be analyzed in the environmental documentation. As outlined in the BPAG and in the 2014 Memorandum of Understanding between the USCG, Federal Highway Administration (FHWA), Federal Transit Administration (FTA), and Federal Railroad Administration, this preliminary determination is normally completed prior to or concurrent with the NEPA scoping process (USCG 2014). Since a ROD was already issued for the CRC Project the process will vary from that described in the BPAG. The IBR program is undertaking a NEPA re-evaluation and expects to complete a Supplemental Environmental Impact Statement (EIS) to reflect changes to the program and existing conditions. Issuance of the preliminary navigation clearance determination is expected to occur prior the Supplemental EIS so that its findings can be used in the NEPA process.

1.5 Project Description

The IBR program will implement replacement river crossings over the Columbia River with associated improvements to I- 5. This report provides details regarding replacing the current bridges over the main Columbia River channel with fixed-span bridges with a vertical clearance of 116 to 121 feet. The I-5 Oregon Slough bridge will also be replaced and will provide horizontal and vertical clearance that meets or exceeds what is currently provided at the existing bridge. Other project elements could include:

1. Improvements to the existing I-5 mainline and interchanges within Washington and Oregon.

2. A variety of active transportation improvements throughout the project corridor, including a multiuse path connecting to the existing system. The path would allow users to travel from north Portland, to and across Hayden Island and over the Columbia River, into downtown Vancouver.
3. Provisions for high-capacity transit.
4. Transportation demand and system management measures to be implemented with the program, including the use of tolls, subject to the authority of the Washington and Oregon transportation commissions.

While the IBR program will utilize past work to inform the current effort, the details of a bridge replacement solution have not been finalized. Given the variety of changes that have occurred since the CRC Project, design refinements will need to be considered by the IBR program including to the bridges. Upcoming efforts to identify a multimodal solution that meets community needs and priorities include working with local agencies and the community to look at such design options as high-capacity transit options, interchange improvements, urban design, interchanges, travel lanes, bridge height and type, and multiuse path facilities and connections. The bridge design for the main channel that is used in evaluating impacts to navigation is the design of the bridge permitted by the USCG in 2014 and is reflected in the details below. The actual design of the program that will be permitted may be different than that described herein, but vertical and horizontal clearances are expected to be maintained.

1.5.1 Columbia River Bridges

The parallel bridges that form the existing I-5 crossing over the Columbia River will be replaced by two new parallel bridges with an upper and lower deck. The eastern structure will accommodate northbound highway traffic on the bridge deck, with a bicycle and pedestrian path on the lower deck; the western structure will carry southbound traffic on the bridge deck, with transit provisions on the lower deck. Whereas the existing bridges have only three lanes each, with virtually no shoulders, each of the new bridges was designed to be wide enough to accommodate three through lanes and up two add/drop lanes. Lanes and shoulders will be built to full Washington State Department of Transportation (WSDOT) and Oregon Department of Transportation (ODOT) design standards. The existing bridges will be completely removed following construction of the replacement bridges.

1.5.1.1 Location

The replacement bridges will be located just downstream of the existing bridge to accommodate maintenance of traffic during construction.

1.5.1.2 Vertical and Horizontal Clearance

The replacement bridges, as selected in the ROD and the 2014 NEPA Re-evaluation, will have a maximum vertical clearance of 116 feet for the primary channel and 113 feet and 99 feet respectively for the alternate barge channel and barge channel spans each over a 300-foot-wide navigation clearance. To provide 300 feet of navigation clearance between bridge piers would require bridge spans greater than 400 feet. The design includes spans of 465 feet. The IBR program is evaluating

design options that may allow for additional vertical clearance without additional encroachment on the protected airspace for Pearson Airfield. To reflect this potential, an alternative is included that increases the vertical clearance by 5 feet.

A history of the different bridge heights considered, and the reasoning behind the bridge height of 116 feet is detailed later in this report.

1.5.1.3 Pier Locations

The existing bridges over the Columbia River have nine in-water pier sets. Each of the new bridges will be built on six pairs of in-water piers plus two pairs of piers on land. Each of these pier sets will be supported by a foundation of approximately sixteen 10-foot-diameter drilled shafts. Each group of shafts will be tied together with a concrete cap measuring approximately 75 by 75 feet at the water line. Columns or pier walls will rise from the shaft caps and connect to the superstructure of the bridges.

1.5.1.4 Oregon Slough Bridge(s)

The existing bridge over the Oregon Slough will be replaced. In 2012, the CRC Project did not propose replacing the existing structure and proposed adding one or more bridges for transit and other roadways. The IBR program has determined that the existing structure will need to be replaced for seismic safety. The design of the replacement bridge including the need for supplemental bridges has not been developed, but the IBR program has committed to providing vertical and horizontal clearances that will be the same or greater than the existing clearances of the Oregon Slough bridge. This would result in a minimum vertical clearance of 35 feet and a minimum horizonal clearance of 215 feet. The location of the Oregon Slough crossing has not been determined. It is likely that new or replacement bridges will need to be located at least partly outside the current bridge footprint to accommodate maintenance of traffic during construction as well as transit and active transportation connections.

1.5.1.5 Columbia River Bridge Heights Considered during CRC Project NEPA Process

Elements of the CRC Project have been proposed and studied since the early 1990s. In 2002, the I-5 Transportation and Trade Partnership produced an evaluation of multiple highway, transit, and river crossing improvements in this corridor and other parts of I-5 (Portland-Vancouver 2002). This process gathered public and stakeholder input on issues and potential solutions for transportation problems in the I-5 corridor, and the partnership recommended that the region move forward with several specific projects, including the CRC Project in 2012, and now the IBR program.

After FTA and FHWA issued a Notice of Intent to prepare an EIS in September 2005, the CRC Project team began working closely with the public, stakeholders, and local jurisdictions to develop the CRC Project's purpose and need. Following the adoption of the purpose and need, the project team developed an evaluation framework that is based on the purpose and need and set forth the criteria by which project components would be evaluated and screened for further consideration. The project team began soliciting ideas and identifying possible transportation components (for example, various

transit technologies and river crossing types and locations), and over 70 such components were identified. With public and agency input, the project team performed two rounds of evaluation and screening, as well as conducted additional evaluation and research, to narrow these options and assemble these components into 12 alternative packages. The project team then analyzed how well each alternative would address the criteria from the evaluation framework. In January 2007, the project team launched an intensive public involvement effort to present the results of this evaluation and invite comments on which alternatives should move forward into the DEIS.

During the CRC Project's early NEPA analysis and community outreach, a variety of bridge types and heights were considered. Bridge heights were evaluated in relation to impacts on river users; traffic safety; airspace; transit; downtown Vancouver, Washington; Hayden Island, Oregon; and the overall project footprint. Local communities and the two states recognized the need to balance these sometimes competing interests as potential solutions were evaluated. The bi-state CRC Task Force considered the need for the following:

1. Improved navigational safety and access.
2. Observing Federal Aviation Administration requirements that obstructions should be avoided for the safe operation of aircraft.
3. Replacement of substandard features and improved sightlines for safety on I-5.
4. Improved interstate traffic and freight mobility.
5. Grades that would accommodate transit.
6. Bridge landings that are compatible with local land use and community plans.
7. Improved bicycle and pedestrian access.
8. Safer connections to the adjacent state highway system.

In 2006, a long list of project components—including multiple transit modes, various bridge heights, various highway configurations, and other options—were evaluated to determine which should advance into further alternatives analysis. For the purposes of the analyses at that time, three representative bridge heights were evaluated for the main span: low with a movable span (around 65 feet), mid (95 to 110 feet), and high (around 130 feet). Based on study results and input, the bi-state task force recommended the following:

1. Removing the low level, movable span bridge components from consideration due to negative impacts to highway mobility, highway safety, freight movement, maintenance costs, and the lack of a significant difference in community impacts when compared to a higher mid-level fixed-span bridge.
2. Removing four high-level bridge components (greater than 130 feet) because of safety concerns with Pearson Field and 2004 findings that all known commercial and recreational vessels could be accommodated at 125 feet.
3. Advancing the mid-range height component based on the 2004 boat survey findings that a fixed span of 80 feet would accommodate all but six known vessels.

Also in 2006, the USCG accepted "cooperating agency" status and provided critical guidance to the project, including offering a public hearing for review and comment of a mid-level replacement bridge. At the September 2006 USCG public hearing, 17 people testified; one construction barge owner requested a bridge with a "high" level of navigation clearance, and one fabricator requested 100 feet.

During this same period, the Federal Aviation Administration reported it had "no objections" to the mid-level bridge height provided for the agency's consideration.

The bi-state task force moved the mid-level bridge component forward within different multimodal alternatives for technical analysis in the DEIS. About 1,600 public and agency comments were received on the DEIS in 2008. Of the comments stating a preference on the bridge element, the majority favored a replacement (mid-level bridge) as compared to no action or a supplemental bridge. Of the 1,024 comments expressing an opinion on the replacement bridge, 66% were favorable and 34% were unfavorable. Only 346 comments expressed an opinion on the supplemental bridge, with 48% favorable and 52% unfavorable.

Based on the technical analysis in the DEIS and public and agency comments, the bi-state task force and six boards and councils of each local sponsor agency unanimously recommended a replacement bridge at mid-range height with an extension of light rail to Clark College in Vancouver for the Locally Preferred Alternative (LPA). The development and refinement of the LPA was informed by public input—over 29,000 public contacts at more than 1,000 public events.

In early 2011, the Oregon and Washington governors initiated a three-month bridge type review process and ultimately identified a composite deck truss design for the replacement river crossing structures. More than 250 people and organizations provided comment. Of those, 12 commented on vertical navigational clearance or highway grade. Only one (a private citizen) said the mid-level height would potentially impede river navigation. The other 11 suggested that a higher bridge could impact aviation and bicycle and pedestrian mobility. The USCG did not submit comments at that time.

During 2011, approximately three years after the DEIS was issued, the USCG forwarded an amended height request from an existing river user, and a new river user was also identified with concerns about the bridge height. In September 2011, the FEIS was published. During this time, the USCG expressed written concern regarding the proposed 95-foot bridge height based on comments received from river users and notified the project team that 125 feet clearance would be given serious consideration during their review.

Following the issuance of the ROD the project entered the final design and permitting phase. In response to the concerns raised by the USCG, impacts to the ability of the USACE dredge *Yaquina* to transit the bridge and concerns raised by other river users over the bridge height in the ROD, the project evaluated options for a mid-level bridge with greater vertical clearance for navigation. Based on the analysis in the CRC NIR and this additional evaluation the project decided to refine the bridge design and increase the vertical clearance to 116 feet.

In 2012 the CRC Project team conducted a NEPA re-evaluation to determine whether refining the bridge's proposed vertical clearance to 116 feet and the new information on river users and vessels would result in any new significant adverse environmental impacts that were not evaluated in the

previous NEPA process. The re-evaluation concluded that there were no new significant impacts under NEPA for the 116-foot bridge (CRC 2012). A permit application and supporting materials were provided to the USCG and a permit was issued for a bridge with this vertical clearance in 2013.

A bridge height of 116 feet was selected based on the vessel analysis contained within the 2012 NIR and because that height balances the needs of navigation and surface transportation, while minimizing additional landside and environmental impacts. A bridge height of 116 feet would allow the project to avoid or minimize impacts to nearly all river users and vessels, and to mitigate the remaining impacts. A mid-level bridge higher than 116 feet would provide only minimal reductions in navigation impacts, but would add construction costs and increase environmental and landside impacts as follows:

1. 120- or 125-foot bridge would have the same impact on the tallest known vessels/users as the 116-foot bridge. Without mitigation, these vessels could not pass at any time of year. The mitigation for these vessels/users would be the same with each of these vertical clearances.
2. A 120-foot or 125-foot bridge would have higher landside and environmental impacts than a 116-foot bridge (as discussed in the 2012 NIR) and higher construction costs.

A bridge lower than 116 feet would have lower construction costs, but would have greater impacts on navigation:

1. A bridge with 115 feet or less of vertical clearance would not meet the vertical clearance requested by the USACE for their dredge vessel Yaquina.
2. A bridge with 110 feet of vertical clearance would reduce the construction cost, but would potentially impact up to seven additional vessels.
3. A bridge with 105 feet of vertical clearance would reduce the construction cost, but would potentially impact up to 14 additional vessels.

Design issues and impacts associated with increased bridge heights are summarized generally below:

4. Maximum mainline grades: The maximum grade of the mainline traffic lanes on the north and south ends of the bridges. Typically, the higher the bridge, the steeper the mainline grade required. As the grade increases traffic performance and traffic safety may decrease because it is more difficult for vehicles to accelerate and maintain speeds as they climb steeper grades.
5. Changes in entrance ramp grades: Higher bridges will result in longer or steeper on-ramps, which will require additional traffic analyses and potentially design changes to ensure safe merging and weaving operations, especially for heavy trucks.
6. Transit grade and stations: On the Washington side, increased bridge heights will result in changes in the grade of dedicated transit elements. This could affect transit performance and could create changes in station locations and affect the planned downtown Vancouver street network.
7. Protected airspace: Take-offs and landings from the Pearson Field are directed to use Federal Aviation Administration-designated air space (known as the Part 77 Imaginary Surface). With increasing bridge heights (greater than 95 feet of vertical clearance), there are two primary locations where intrusions into the protected airspace are of concern. One location is on the main span of the bridge over the Columbia River, and the other is at the SR 14/I-5 interchange

(the loop ramp in the northeast quadrant of the interchange). Typical illumination on the interstate is in the range of 50 feet above the road surface. With bridge heights of 105 to 110 feet and above, luminaires on the bridge would penetrate the Part 77 surface. Luminaires and sign gantries on the highest ramps within the SR 14 interchange would start to penetrate the Part 77 surface when the bridge exceeds about 115 feet.

8. Foundation sizes: The size of the bridge piers and foundations. This is of concern not only because of increasing costs, but also because of the potential for impacts to the river beyond those previously identified and addressed.
9. Southbound I-5 access from Vancouver: Under some of the bridge heights considered, the planned southbound on-ramp to I-5 from 6th Street may no longer be feasible because of the change to on-ramp alignment. This would be a direct result of the lengthened structures on the bridge touch down points in Vancouver.

The effects of bridge heights from 95 feet to 125 feet in increments of 5 feet on each of these elements was detailed in Section 7.3.2 of the 2012 NIR. Additional analysis was also provided in Section 7.3.2 for bridge heights providing up to 178 feet of vertical clearance and for a bridges incorporating a movable span.

1.6 IBR Program Purpose and Need

The purpose and need statements below are based on the 2012 FEIS and ROD, which was developed by the lead agencies, project sponsors, and CRC Task Force. The IBR program is using the ROD as the basis of the program and will not change the purpose and need.

1.6.1 Project Purpose

The purpose of the proposed action is to improve I-5 corridor mobility by addressing present and future travel demand and mobility needs in the IBR program area. The program area extends from approximately Columbia Boulevard in the south to SR 500 in the north. Relative to the No-Build Alternative, the proposed action is intended to achieve the following objectives: a) improve travel safety and traffic operations on the I-5 bridges and associated interchanges; b) improve connectivity, reliability, travel times, and operations of public transportation modal alternatives in the program area; c) improve highway freight mobility and address interstate travel and commerce needs in the program area; and d) improve the I-5 river crossing's structural integrity (seismic stability).

1.6.2 Project Need

The specific needs to be addressed by the proposed action are:

1. **Growing travel demand and congestion**: Existing travel demand exceeds capacity of the I-5 bridges and associated interchanges. This corridor experiences heavy congestion and delays lasting 4 to 6 hours daily during the morning and afternoon peak travel periods and when traffic accidents, vehicle breakdowns, or bridge lifts occur. Due to excess travel demand and congestion in the I-5 bridge corridor, many motorists take

the longer, alternative I-205 route across the river. Spillover traffic from I-5 onto parallel arterials such as Martin Luther King Jr. Boulevard and Interstate Avenue increases local congestion. In 2005, the two crossings carried 280,000 vehicle trips across the Columbia River daily. Daily traffic demand over the I-5 crossing is projected to increase by more than 35% during the next 20 years, with stop-and-go conditions increasing to approximately 15 hours daily if no improvements are made.

2. **Impaired freight movement**: I-5 is part of the National Truck Network, and the most important freight highway on the West Coast, linking international, national, and regional markets in Canada, Mexico, and the Pacific Rim with destinations throughout the western U.S. In the center of the program area, I-5 intersects with the Columbia River's deepwater shipping and barging, as well as two river-level transcontinental rail lines. The I-5 crossing provides direct and important highway connections to the Port of Vancouver and Port of Portland facilities located on the Columbia River, as well as the majority of the area's freight consolidation facilities and distribution terminals. Freight volumes moved by truck to and from the area are projected to more than double over the next 25 years. Vehicle-hours of delay on truck routes in the Portland-Vancouver area are projected to increase by more than 90% over the next 20 years. Growing demand and congestion will result in increased delay, costs and uncertainty for all businesses that rely on this corridor for freight movement.
3. **Limited public transportation operation, connectivity, and reliability**: Due to limited public transportation options, a number of transportation markets are not well served. The key transit markets include trips between the Portland Central City and the city of Vancouver and Clark County; trips between north/northeast Portland and the city of Vancouver and Clark County; and trips connecting the city of Vancouver and Clark County with the regional transit system in Oregon. Current congestion in the corridor adversely impacts public transportation service reliability and travel speed. Southbound bus travel times across the bridge are currently up to three times longer during parts of the a.m. peak compared to off-peak. Travel times for public transit using general purpose lanes on I-5 in the program area are expected to increase substantially by 2030.
4. **Safety and vulnerability to incidents**: The I-5 river crossing and its approach sections experience crash rates more than twice the statewide averages for comparable facilities. Incident evaluations generally attribute these crashes to traffic congestion and weaving movements associated with closely spaced interchanges and short merge distances. Without breakdown lanes or shoulders, even minor traffic accidents or stalls cause severe delay or more serious accidents.
5. **Substandard bicycle and pedestrian facilities**: The bike/pedestrian facilities on the I-5 bridges are about 3.5 to 4 feet wide, narrower than the 10-foot standard, and are located extremely close to traffic lanes, thus impacting safety for pedestrians and bicyclists. Direct pedestrian and bicycle connectivity are poor in the program area.
6. **Seismic vulnerability**: The existing I-5 bridges are in a seismically active zone. They do not meet current seismic standards and are vulnerable to failure in an earthquake.

2. PART 2: NAVIGATION IMPACTS

2.1 Means of Data Collection

This section describes the methods used to obtain navigation data.

2.1.1 Methodology

To obtain information on the current and potential future navigation needs and characteristics of the vessels that transit the bridge location, the program team conducted the following activities.

1. Identified known river users. The CRC River User Data Report (CRC report) was the primary source for known river users, including commercial, recreational, passenger cruise, and federal users, as well as marine contractors and fabricators. Additional and updated information was obtained from the Hood River-White Salmon Bridge Replacement Project NIR (completed in September 2019). Contact information for known river users was also updated and/or verified through internet research and consultation with industry groups and organizations. Known recreational users were identified through contact with area marinas and other recreational vessel service providers within an approximately 3-mile radius of the project location.
2. Prepared and distributed (via email as the preferred method) a letter and river user data sheet to identified known river users to request vessel navigation and dimensional characteristics.
3. Prepared an online survey to collect river user data from the general public (unknown users) and distributed via public notices (described below) and through the IBR program website.
4. Collected USACE data on lock usage at Bonneville and BNSF data on bridge openings on the Columbia River and Oregon Slough.
5. Collected bridge lift data from ODOT to determine if vessels required a lift that were not otherwise captured in the outreach to known river users. For the users that were not included within the known users data and did not provide information through the river user survey, attempts were made to locate the vessels through internet research and/or contact the owners through email and/or telephone.
6. Held discussions with specific users such as fabricators and shipyards to discuss unique user needs.
7. Prepared a public notice for distribution and publication in the USCG Local Notice to Mariners, in local newspapers and specialty publications as identified in Appendix C, and on the program website and social media accounts.
8. Conducted presentations about the program to the Pacific Northwest Waterways Association, the Lower Columbia River Harbor Safety Committee and indicated the need to obtain river user data. The program team encouraged attendees to complete the river user data survey and/or update or verify the information on the known river user data sheets.
9. Sent an email notice and request for information for distribution by the Pacific Northwest Waterways Association to its members.

10. Reviewed land use and zoning along the waterway and public port authority plans to identify future business/industrial property plans that could influence the types and characteristics of vessels that would require transit under the proposed bridge.
11. Followed up with specific river users via telephone or email after they had received the river user data sheet to answer any questions and facilitate a timely response.

2.1.1.1 River User Data

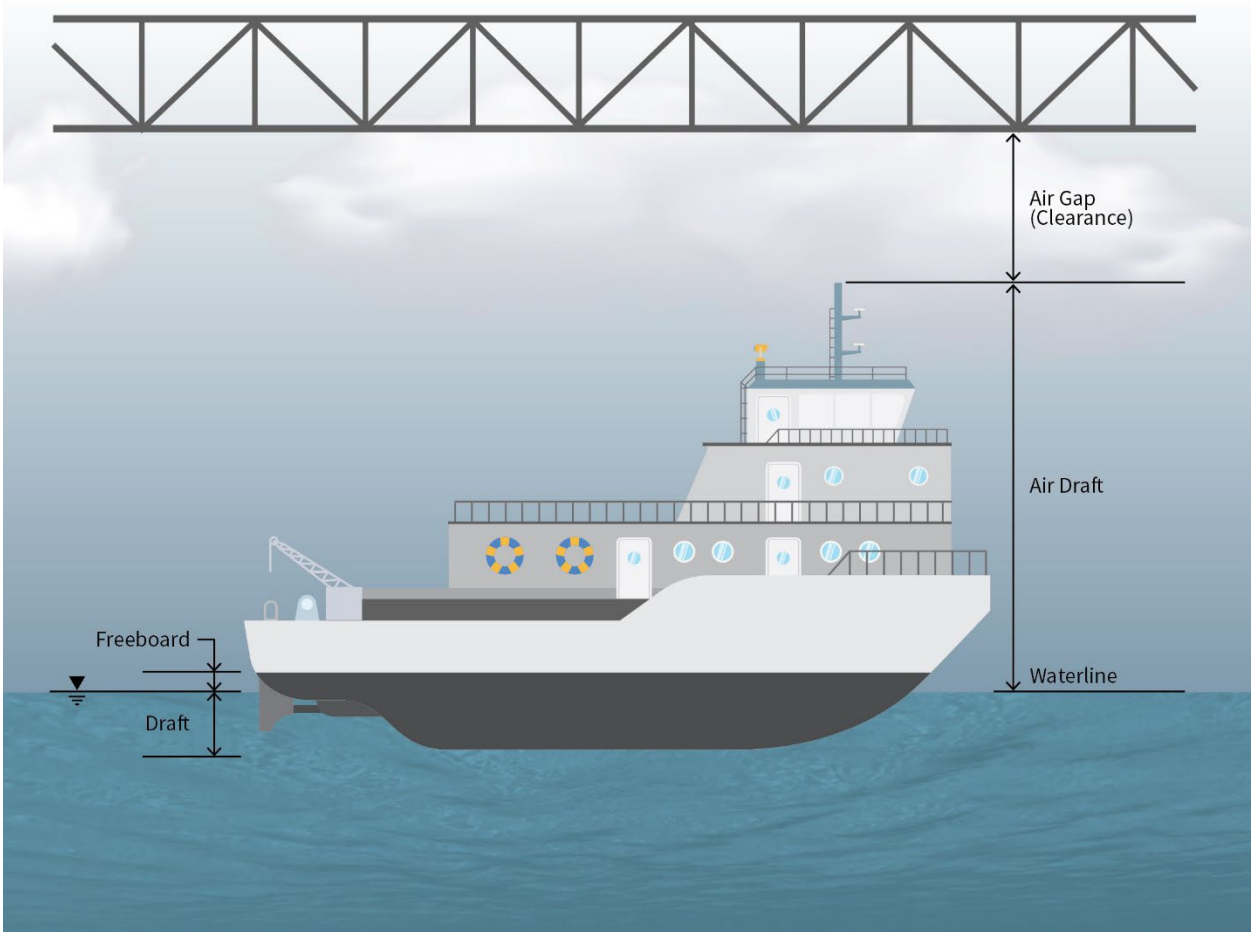
The following information was collected through the river user outreach efforts. A copy of all correspondence and a full reporting of the outreach efforts is included in Appendix B and C. Known Columbia River users who transit under the existing bridges were contacted and surveyed regarding the navigation and dimensional features of their vessels and equipment. Known river users were identified consistent with the methodology identified above. Vessel data sheets were provided, requesting the following information:

1. Company and/or owner of the vessel and contact information.
2. Vessel name.
3. Vessel type.
4. Specialized vessel (e.g. limited maneuverability due to design or mode of operation).
5. Vessel category.
6. USCG document number.
7. Primary mooring location.
8. Type and quantity of cargo, if applicable.
9. Length (overall) in feet.
10. Beam (width) in feet.
11. Draft (depth of hull below waterline, unladen) in feet.
12. Air draft (height of the highest fixed point above the waterline, unladen) in feet.
13. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of the bridge) in feet.
14. Safety margin (horizontal clearance required by vessel to navigate through the bridge) in feet.
15. Transit speed under Interstate Bridge and load configuration.
16. Time of year of passage.
17. Tug assistance requirement.
18. Frequency of passage under Interstate Bridge main channel (typical per month).
19. Frequency of passage under the Oregon Slough (North Portland Harbor) bridge (typical per month).

Information on recreational vessels was obtained through the online survey, marina contacts, and individual contact with vessel owners if needed. All the information gathered during the user survey was self-reported. However, some information was verified by field surveys for the CRC Project. Figure

2.1-1 is a diagram of vertical reference descriptions listed on the river user data sheet using a tug as the example vessel.

Figure 2.1-1. Vertical Reference Diagram



The bridge vertical clearance is the distance from the water surface to the lowest member of the bridge structure. The air gap is the additional height above the highest point on a vessel necessary to allow for a safety factor when transiting under a bridge due to wave- and wind-induced movements in the vertical plane. This is especially applicable for sailboats and other low weight vessels since they have greater responses to wave conditions. Vessel responses are unique for a given ship's geometry and weight distribution and vary with the ship's forward speed, the channel bathymetry, and environmental conditions such as wind and wave direction, height, and length. The amount of air gap is also influenced by visibility. For a project with a long design life, the long-term impacts caused by changing river runoff characteristics, sea level rise, and land subsidence are potential considerations as well. Air gap is in general provided by the vessel operator but may be adjusted if a request air gap seems unreasonable.

Since the river level fluctuates, a river level that is exceeded only 1.2% or less of the time during the life of a project is a conservative design criterion for determining the near maximum surface for a heavily used channel. At the I-5 bridges, this design river level is 16 feet CRD and is used to determine whether a vessel is height restricted.

Users Contacted

Known river users were identified from the CRC report and the Hood River-White Salmon Bridge Replacement NIR. Users were contacted by email and telephone. Users were divided into the following categories: commercial tugs, tows, and barges; marine contractors; federal/emergency/maintenance; passenger cruise; and recreation.

Commercial, Marine Contractor, Passenger Cruise, and Federal Users

Forty commercial, marine contractor, fabricator, shipyard owner, federal, and passenger cruise users were contacted. Approximately half have responded confirming the vessel data obtained from prior reports and/or providing updated vessel information. Table 2.1-1 lists the commercial, marine contractor, passenger cruise, and federal river users contacted, the vessel category, and indicates if a response was received. Many responders in these categories operate multiple vessels.

Table 2.1-1. Commercial, Marine Contractor, Passenger Cruise, and Federal River Users Contacted

Company Name	Category	Response
Advanced American Construction	Marine Contractor	No
American Cruise Lines	Passenger Cruise	Yes
American Queen Steamboat Company	Passenger Cruise	No
American Waterways, Inc.	Passenger Cruise	Yes
Bergerson Construction	Marine Contractor	No
Bernert Barge Lines	Commercial Tugs/Tows/Barges	Yes
Brusco Tug and Barge	Commercial Tugs/Tows/Barges	No
Cadman	Industrial	Yes
Cal Portland	Marine Contractor	No
Centerline Logistics (previously Olympic Tug & Barge)	Commercial Tugs/Tows/Barges	No
Diversified Marine	Marine Contractor	Yes
The Dutra Group	Marine Contractor	No
Foss	Commercial Tugs/Tows/Barges	No
General Construction (Kiewit)	Marine Contractor	Yes
Greenberry Industrial LLC	Fabricator	Yes
Grays Harbor Historical Seaport	Passenger Cruise	No
Hickey Marine	Marine Contractor	No
JE McAmis	Marine Contractor	No

Table 2.1-1. Commercial, Marine Contractor, Passenger Cruise, and Federal River Users Contacted

Company Name	Category	Response
JT Marine	Marine Contractor	Yes
Knife River	Marine Contractor	No
Legendary Yachts	Shipyard	Yes
Lindblad/National Geographic Expeditions	Passenger Cruise	Yes
Manson Construction	Marine Contractor	No
Mark Marine Service	Marine Contractor	No
NorthBank Civil and Marine	Marine Contractor	Yes
Puget Sound Naval Shipyard	Federal	Yes
Ross Island	Marine Contractor	Yes
SDS Tug & Barge	Commercial Tugs/Tows/Barges	No
Schnitzer Steel Industries	Fabricator	Yes
Schooner Creek Boat Works	Shipyard	Yes
Shaver	Commercial Tugs/Tows/Barges	Yes
Thompson Metal Fab	Fabricator	Yes
Tidewater	Commercial Tugs/Tows/Barges	Yes
Tongue Point Job Corps (Maritime Training Program)	Federal	No
UnCruise	Passenger Cruise	No
USACE	Federal	Yes
USCG, Marine Safety Unit (Portland)	Federal	Yes
Vigor Works, LLC	Fabricator	Yes

Recreational Users

Recreational users were not generally contacted individually, and information was obtained from recreational marinas in the project vicinity, as well as through responses to the online river user survey. Marinas contacted are listed below. Of the marinas contacted, only Hood River and St. Helens provided a response. Both marinas indicated they do not have boats that exceed 80 feet in height. The marinas that did not respond may have distributed the online survey link to their tenants, as several respondents to the online survey indicated a mooring location at one of the marinas listed below.

Marinas Contacted

1. Astoria Yacht Club
2. Big Eddy Marina
3. Camas-Washougal Marina
4. Columbia River Yacht Club

5. Dolphin Yacht Club
6. Grand Banks Yacht Club
7. Hayden Bay Marina
8. Hayden Island Yacht Club
9. Hood River Marina
10. Jantzen Bay Marina
11. Longview Yacht Club
12. McCuddy's Marina
13. Multnomah Channel Yacht Club
14. Nots Boating Club
15. Portland Yacht Club
16. Riverside Yacht Club
17. Rose City Yacht Club
18. Sauvie Island Yacht Club
19. St. Helens Marina
20. The Dalles Marina
21. Tomahawk Bay Marina
22. Tomahawk Bay Yacht Club
23. Tyee Yacht Club

Online Survey

As of the date of this report, the online survey has received 39 responses. Five surveys were received for commercial vessels, three for cruise vessels (one large passenger cruise vessel and two smaller vessels that self-reported as cruise vessels), seven for recreational motor vessels, 23 for sailboats, and one for a kayak.

2.1.1.2 Bridge Opening Data

The primary channel under the existing Interstate Bridge provides a vertical clearance of 39 feet when the lift span is in the lowered position. Navigation lights below the structure reduce the clearance to 38 feet in the lowered position. The barge channel and alternate barge channel provide for vertical clearance of 58 feet and 72 feet, respectively. Vessels that require a clearance greater than this or that cannot safely negotiate the alternate channels require that the lift span be raised.

Vessels that require the lift span to be raised indicate that the particular vessel could be impacted by the replacement bridge height. However, as noted above, the lift spans are also raised because of

maneuverability limitations, and thus not all vessels that require a lift span are constrained by the height of the existing fixed spans, and this must be considered in reviewing bridge opening trends. To identify vessels that have historically and currently required bridge lift span openings, the program team reviewed bridge lift data provided by ODOT. The bridge tenders operating the lift spans of the existing bridges record details of each lift in a logbook. Information recorded in the log includes the date and time of the opening, the name of the vessel or vessels transiting, the type of vessel, the lift elevation, the current water level, and weather conditions, among other data. The 2012 CRC NIR reported lift data from January 1, 1987, to December 17, 2011, and this was supplemented with data from 2012 to 2020.

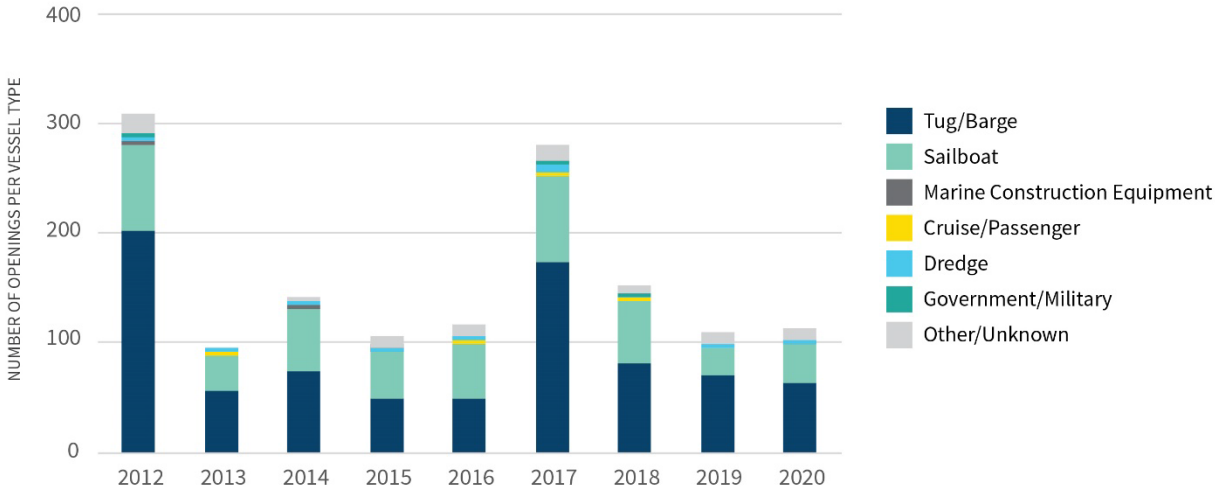
The program team reviewed the logs and categorized bridge openings by type of vessel:

- Tugs and barges (including tugs proceeding with no barge or with barges in tow).
- Sailboats.
- Construction equipment (defined as power barges, crane barges, derricks, etc.).
- Cruise and passenger boats (vessels providing passenger service between downriver and upriver locations).
- Dredges (including the USACE dredge Yaquina and other privately owned dredges).
- Government or military vessels (U.S. Navy, USCG, and the Astoria Job Corps, etc.).
- Other/Unknown (vessels that had no name or designation).

Many vessels that transit under the existing bridges do not require an opening of the lift span. These vessels are either are low enough to pass through the lift span in the lowered position or use one of the two alternate channels to the south of the lift span.

Bridge opening trends from 2012 to 2020 are presented in Figure 2.1-2. The number of bridge opening events (excluding openings for bridge maintenance, in which no vessel transited) ranged from a low of 92 events (2013) to a high of 309 events (2012), with an average of 157 events per year. This compares with a low of 70 events (2004) and a high of 863 events (1997), with an average of 289 events per year from 1997 through 2011. A spreadsheet of all bridge openings from 1997 to 2020 is included in Appendix E.

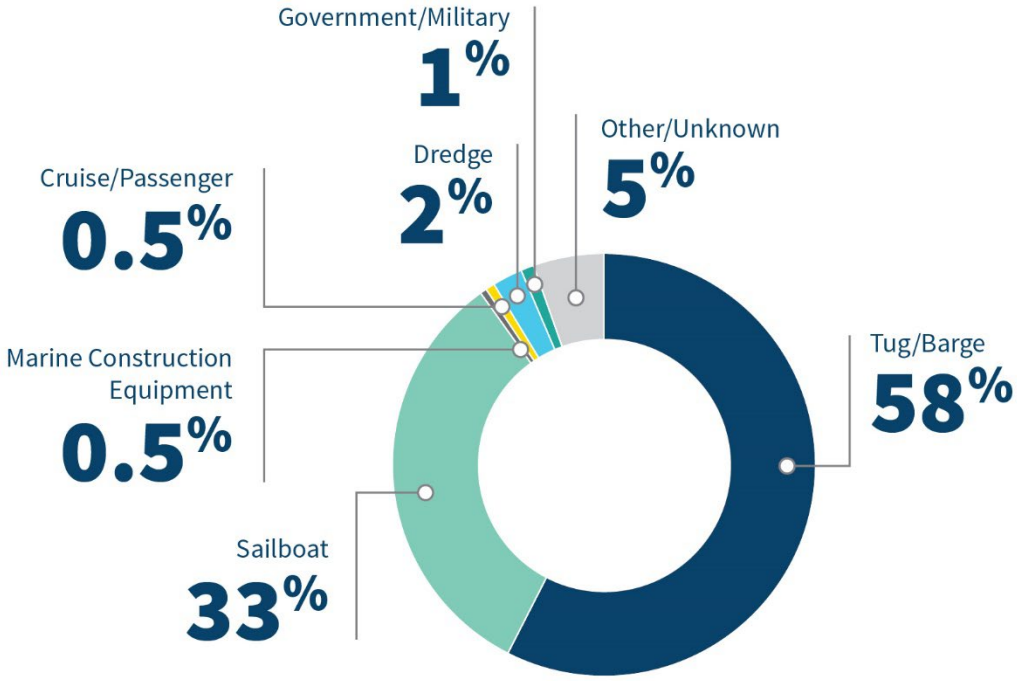
Figure 2.1-2. Bridge Opening by Vessel Type by Year: 2012 to 2020



Source: I-5 Bridge Tender Logs as categorized by the project team.

Figure 2.2-3 summarizes the share of bridge opening events by type of vessel over a nine-year period (2012 to 2020). Tugs and barges accounted for over half (58%) of all openings, followed by sailboats at 33% and vessels where a type could not be determined at 5%. Each of the remaining vessel types accounted for between 1 and 2%. Comparing this with the data from 1987 and 2011 shows little change in openings except for the reduction in lifts involving construction equipment. From 1987 to 2011, tugs and barges accounted for over half of all openings, followed by sailboats at 22% and construction equipment at 17%, with each of the remaining vessel types accounting for 1% to 4%.

Figure 2.1-3. Bridge Openings by Vessel Type 2012 to 2020



Source: I-5 Bridge Tender Logs as categorized by the project team.

2.1.1.3 Bridge Openings as a Share of Total Navigation Activity

There are no sources of information that directly compare the number of bridge opening events with all river activity because the only recorded transits of the bridge are those that require a bridge opening. However, data are available that characterize the annual vessel activity for commercial tugs and barges and recreational boats, as discussed below.

The number of commercial lockages at the Bonneville dam provides a useful estimate of the total transits (or events) that occur at the existing bridges, because nearly all of the traffic passing through the Bonneville lock was linked to terminals located downriver of the bridges. BNSF bridge opening data also provide information on vessel transits that may also occur at the existing I-5 bridge as most commercial vessels and sailboats require an opening of the BNSF bridge.

Bonneville lock data from the years 2000 through 2011, as reported in the CRC NIR, show an average of 2,596 commercial lockages at the dam, where the share of this traffic that required an opening at the bridges represented an average of 3.6% of estimated total trips. From 2012 through 2020, 22,584 passages were recorded, showing an average of 2,258 per year (USACE 2021d). Where the share of this traffic that required an opening at the bridges represented an average of 7% of estimated total trips.

The number of openings of the BNSF bridge can provide information on total commercial vessel traffic and most sailboats, as they require an opening to navigate the bridge, and there are limited origins/destinations between the BNSF bridge and the existing I-5 bridge, and most vessels would have to pass both bridges. The BNSF rail bridge (BNSF Columbia Draw 9.6) saw a total of 19,636 openings between the years 2015 and 2020, where the share of this traffic that required an opening at the bridges represented an average of 4% of estimated total trips.

2.2 Present Governing Structures

Existing bridges and other structures spanning the river, such as electric transmission lines, can restrict vessel use based on their existing horizonal and vertical clearances. This section describes the governing structures affecting navigation at the project location and defines the limits of navigation that could be impacted by the proposed replacement bridges.

2.2.1 Columbia River

Table 2.2-1 contains details of the existing structures crossing the Columbia River between the mouth of the Columbia River and the BNSF railroad bridge at Celilo. The existing Interstate Bridge is a governing structure as all bridges downstream currently provide greater vertical clearance. The BNSF bridge at Celilo is located at RM 201.2, which is approximately 10 miles upriver from The Dalles lock and dam (RM 191.5). The lift span provides a maximum vertical clearance of 79 feet above the normal pool elevation behind The Dalles dam when open, making it a controlling factor for vertical clearance. This means that the height constraint imposed by a vertical clearance of 116 to 121 feet potentially affects river traffic vertical clearance for approximately 95 miles, or 20% of the river system. Vessels originating upstream of this location or downstream and traveling to an upstream destination upriver of the BNSF rail bridge at Celilo, are limited to a vertical clearance of 79 feet included an air gap in order to transit through the bridge. Upstream of the BNSF rail bridge at Celilo, there are other bridges with navigation clearances lower or similar. These include the Interstate 82 Bridge (71 feet), and Union Pacific Railroad Bridge upriver of McNary Dam (72 feet). A complete list of bridges and other crossings are shown in Appendix D.

Table 2.2-1. Existing Columbia Navigation Clearances

Bridge	River Mile	Horizontal Clearance (feet)	Vertical Clearance (feet)	Vertical Clearance with Span Open (feet)
Astoria-Megler Bridge	13.5	1,070	193	NA
Power Cable	40.0	NA	230	NA
Power Cable	62.4	NA	216	NA
Lewis & Clark Bridge	66.0	1,120	187	NA
Power Cable	104.2	NA	220	NA
BNSF Rail Bridge	105.6	200	39	Unlimited
Existing Interstate Bridge	106.5	263	39	178
Glenn L. Jackson Memorial Bridge (I-205)	112.7	469	136	NA
Power Cable (directly west of Bonneville Lock and Dam)	145.1	NA	210	NA
Bonneville Lock and Dam (navigation lock)	145.3	86	Unknown	Unlimited
Power Cable	146.6	NA	190	NA
Bridge of the Gods	148.3	655	135	NA
Hood River-White Salmon Bridge	169.8	246	67	148
Power Cable	171.1	NA	155	NA
Power Cable	173.8	NA	159	NA
Power Cable	186.2	NA	155	NA

Table 2.2-1. Existing Columbia Navigation Clearances

Bridge	River Mile	Horizontal Clearance (feet)	Vertical Clearance (feet)	Vertical Clearance with Span Open (feet)
The Dalles Bridge (navigation lock approach)	191.6	250	100	NA
The Dalles Bridge (main span)	191.6	551	81	NA
The Dalles Lock & Dam	191.8	86	NA	100
Power Cable	191.9	NA	125	NA
Power Cable	201	NA	123	NA
BNSF Celilo Bridge	201.2	300	20	79

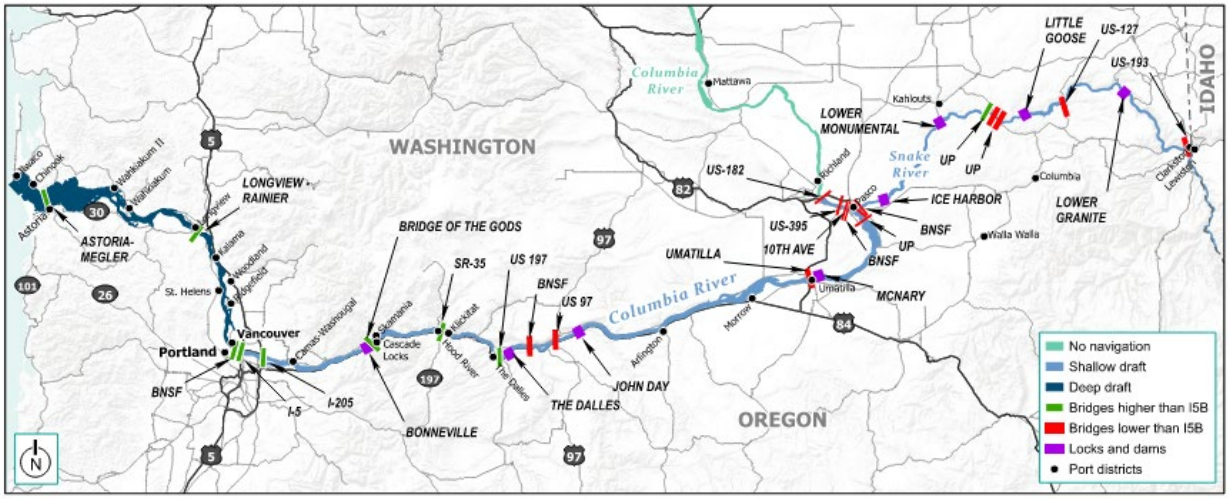
Key:
NA = not applicable
I-205 = Interstate 205

The Bonneville Lock and Dam at the navigation lock approach (RM 145.3) is currently the most restrictive horizontal clearance at 86 feet. This is not representative of the horizonal clearance at bridges as vessels approach and depart the locks at low speeds but does represent the limiting factor for vessels navigating above the Bonneville dam. The most restrictive horizonal clearance of 200 feet is provided by the BNSF railroad bridge, located approximately 1 mile downstream of the existing I-5 bridges in Vancouver.

Plans are currently underway for a fixed height bridge to replace the existing SR 35 bridge located in Hood River (RM 106.5) identified in Table 2.2-1. The existing SR 35 bridge includes a lift span with a vertical clearance of 67 feet in the closed position and 148 feet in the open position above the normal pool elevation behind the Bonneville dam. The analysis for replacement bridges assessed impacts to users based on two proposed navigation envelopes—80 feet of vertical clearance across a 450-foot horizontal clearance and 90 feet of vertical clearance across a 250-foot horizontal clearance at the center span of the bridge (WSP 2019). A preliminary navigation clearance determination was issued by the USCG for the replacement bridge. This NIR does not consider the replacement bridge but were this bridge to be completed it would change the governing structures and reduce the area with the potential to be impacted by height restrictions from the IBR program.

Figure 2.2-1 shows the location of the governing structures on the Columbia-Snake River System. Appendix D includes details on the navigation clearances for all bridges, cables, and locks across the Columbia River (from the mouth to Richland, Washington), and across the Snake River (from the mouth to Lewiston, Idaho).

Figure 2.2-1. Columbia-Snake River System Map



2.2.2 Oregon Slough

Table 2.2-2 contains details of the existing structures on the Oregon Slough.

Table 2.2-2. Existing Structures on the Oregon Slough

Bridge	River Mile[1]	Horizontal Clearance (feet)	Vertical Clearance (feet)	Vertical Clearance with Span Open (feet)
Power Cables	104.2	NA	160	NA
BNSF Railroad	105.6	200	39	Unlimited
I-5	106.5	215	35	NA
Power Cable	106.7	NA	54	NA

Note:
[1] River mile reference is to the Columbia River since Oregon Slough is not numbered separately

Key:
I-5 = Interstate 5
NA = not applicable

Because the existing I-5 bridge across the Oregon Slough has vertical clearance of 35 feet, it represents the most restrictive vertical clearance on the waterway. The most restrictive horizontal clearance is the BNSF Railroad bridge.

2.3 Waterway Characteristics

The following section identifies the navigational characteristics of these two navigable waters in the immediate program area.

2.3.1 Introduction

The Columbia River headwaters are located in in British Columbia, Canada, through which it flows for approximately 425 miles before entering the continental U.S. in northeast Washington. From the border in flows generally south to its confluence with the Snake River where it turns west and forms the boundary between Washington and Oregon for the remainder of its course to the Pacific Ocean. The river is an important natural resource and also serves a vital role for power generation, irrigation, navigation, and recreational purposes. The river is navigable for deep-draft vessels from its mouth to Portland, Oregon, and Vancouver, Washington, and for shallow-draft vessels to Lewiston, Idaho via the Snake River.

The Columbia River's deep-draft navigation system provides for a 43-foot-deep by 600-foot-wide channel from inside the Columbia River Bar upriver to ports on both the Washington and Oregon sides of the river at approximately river mile (RM) 106. The upriver end of this section of the channel, known as the Columbia and Lower Willamette, is just downriver from the existing I-5 bridges.

From just downstream of the I-5 bridges to the head of navigation in Lewiston, Idaho, the Columbia River is maintained as a shallow-draft system predominantly supporting tug and tow vessel traffic. The shallow-draft system has a controlling depth of approximately 15 feet. Just east of The Dalles is a BNSF railroad bridge at Celilo Falls with a vertical clearance of 79 feet, which is notably less than the bridge heights under consideration for the IBR program.

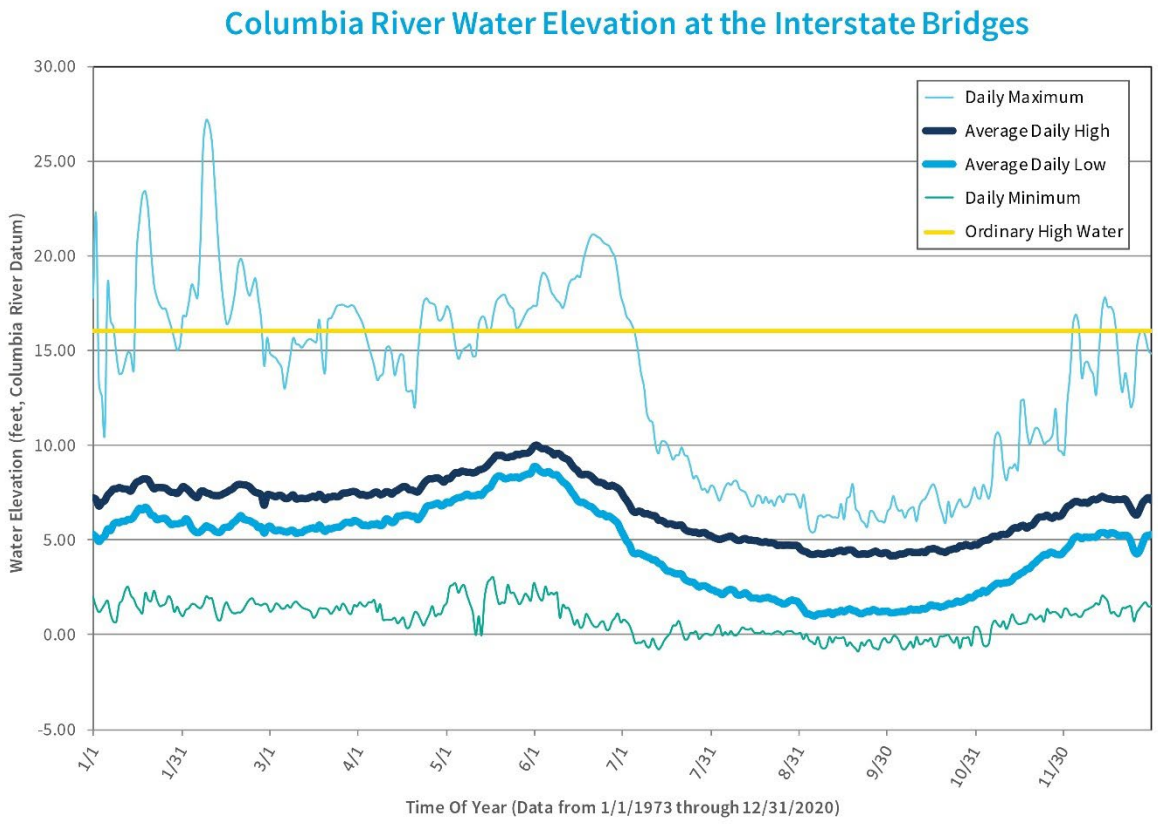
Between the I-5 bridges and the Celilo Falls BNSF railroad bridge 95 miles to the east, many shoreline land uses are dependent on the Columbia River. In general, the Columbia River shoreline is identified by local jurisdictions as a resource to be leveraged for river-dependent uses that are more in line with recreational, environmental, habitat, or economical purposes than with industrial marine, water-dependent uses. The intrinsic value of the Columbia River is largely in its natural beauty, especially within the National Scenic Area located roughly 50 miles east of I-5. The most significant land use control is the 85-mile-long Columbia River Gorge National Scenic Area, which protects the natural beauty of the gorge and severely limits industrial development outside of existing incorporated communities.

2.3.2 River Water Level at the I-5 Bridges

One of the critical factors influencing vertical clearance is river water level, which fluctuates daily and over the course of the year. Figure 2.3-1 summarizes the variability in water levels for the Columbia River at the I-5 bridges from 1972 through 2020. Included in the figure are daily maximum, daily

minimum, average daily high, and average daily low water levels. Appendix F contains the data used to develop this chart.

Figure 2.3-1. Columbia River Water Elevation at the Interstate Bridges (1972–2012)



The Columbia River generally follows a seasonal trend of lowest water levels in late summer, moderately higher than average water levels in the winter (except for occasional storm-induced high water), and the highest average water levels in May and June coinciding with peaks in spring snowmelt and rainfall. In general, the following river water level trends can be observed from the data collected over the past 50 years:

- The highest average daily high is approximately 10 feet above CRD and occurs in late May/early June. The lowest average daily low is approximately 2 feet above CRD and occurs in early September.
- The ordinary high water level of 16 feet above CRD was exceeded less than 1.2% of the time over the past 50 years. This is used as the “analysis level” for identifying vessels that would be impacted by different vertical clearances, as discussed in Section 2.17.

River levels at the I-5 bridges are influenced primarily by variations in runoff. However, the river level is tidally influenced between its mouth at the Pacific Ocean and the Bonneville dam. The tidal influence is less at high river flow conditions and greater during low flow conditions. According to NOAA Chart 18526, the diurnal range of the tide during low river stages is 1.8 feet at Vancouver. The range becomes progressively smaller with higher stages of the river.

2.3.2.1 Waterway Stages

According to records maintained by the National Weather Service, the following are the flood categories and river stages for the Columbia River downstream of the I-5 bridge:

- Action Stage – 15 feet above CRD
- Flood Stage – 16 feet above CRD
- Moderate Flood Stage – 20 feet above CRD
- Major Flood Stage – 25 feet above CRD

According to the Federal Emergency Management Agency National Flood Insurance Study for Clark County, Washington, the 100-year flood level is 26.12 above CRD (FEMA 2018).

The top five historical river crests (feet above CRD) for the Columbia River downstream of the I-5 bridges are:

1. 31.0 feet on June 13, 1948
2. 30.8 feet on June 1, 1948
3. 27.7 feet on December 25, 1964
4. 27.6 feet on June 4, 1956
5. 27.2 feet on February 9, 1996

The top four low water records for the Columbia River downstream of the I-5 bridges are:

1. -1.20 feet on January 7, 1937
2. -1.10 feet on November 8, 1936
3. -0.80 feet on July 30, 1978, and July 24, 1989
4. -0.74 feet on July 14, 2001

While many vessels will not transit during very high water stages, self-reported observations from marine contractors included reports of being very busy during the February 1996 flood event, when they had to perform many rescues and temporary repairs of vessels, docks, and moorings, and had frequent transits under the lift span of the I-5 bridges.

2.3.2.2 Potential Climate Change Impacts

Climate change could affect future Columbia River water levels, as described in Chapter 3 of the CRC FEIS. This was based on reviewing research conducted by the University of Washington's Climate

Change Impacts Group. Section 3.19 of the FEIS summarizes how the project might perform under potentially changing conditions predicted because of climate change. Updated information from the Climate Change Impacts Groups (Miller 2018) and other sources was also reviewed. Based on the published information, the impacts of climate change in the IBR program area that could be relevant to future Columbia River water levels and vessel clearance are projected as follows:

- Relative sea level rise in the Pacific Northwest will vary regionally based on uplift and subsistence. For 2100, the projected absolute sea level rise is 1.0 to 2.2 feet in the low scenario and 1.4 to 2.8 feet in a high scenario. For 2150, the projected ranges are 1.5 to 3.8 in the low scenario and 2.3 to 4.9 feet in a high scenario.
- Warmer winter temperatures in the Columbia River Basin will result in lower snowpack and higher winter base flows. Lower base flows are expected in the spring and summer months, and an increased likelihood of more intense storms may increase the chance of flooding. Average annual precipitation is likely to stay within the range of 20th century variability; however, there will be a shift in the amount and timing of seasonal precipitation, with a trend toward more winter precipitation.
- Seasonal shift in temperature and precipitation will likely impact base and peak flows and river water levels. Warmer, wetter winters will likely lead to higher winter base flows and river stages, while lower base flows and river stages will likely occur in spring and summer months.

There is uncertainty associated with these predictions, and the best available science does not provide specific predictions for how climate change impacts would change the daily or monthly average highs and lows at the bridge crossing. Further, while numerous studies have been performed on the impacts of climate change on the Columbia River, they have focused on hydrology. No known studies have evaluated the potential changes to the stage of the Columbia River, which is affected by river management and discharge as well as tide in the lower Columbia.

However, based on existing data regarding how Pacific Ocean tidal changes affect river water levels at the bridges, it is reasonable to expect that if sea levels rise as predicted, there would be a resulting increase in water levels at the bridge during low runoff periods that is less than the absolute increase in sea levels projected at the coast and little to no impact during the higher runoff periods. As indicated above, the climate change predictions, if accurate, suggest that average spring flows, which are historically the highest of the year, will be lower in the future; that average winter flows will be higher (peak average flows could shift away from the spring and toward the winter season); and that average summer flows, historically the lowest of the year, will be even lower in the future.

Because the best available science provides no quantitative predictions of how daily or monthly average flows could change, it is difficult to translate the general climate change predictions into precise conclusions regarding future vessel clearances. However, given that the average annual precipitation is not expected to change, this suggests that average annual runoff would be similar, and thus average annual river levels at the bridge would likely be similar to what they have been in the past 50 years. Sea level rise could have a minor impact on these water levels during low runoff periods.

Given the predictions in seasonal precipitation changes, however, any impact of sea level rise could be counteracted by low flows being even lower in the future. This combination could result in slightly

more vertical clearance during the spring and summer months compared to recent history, and slightly less during the winter months, at least during the days following storms or major precipitation events. However, these changes would not be expected to affect the ordinary high water level, which is the water level considered for evaluating vertical clearance available to vessels.

2.3.3 Natural Flow of the Waterway

Currents at the bridge location are generated by flows released at Bonneville dam. According to the Federal Emergency Management Agency Flood Insurance Study for Portland, Multnomah County, Oregon dated November 26, 2010, the average cross sectional velocity for the 100 year flood near the I5 bridge is 3.8 feet/sec (2.25 knots) (FEMA 2018). Note that this velocity is the average of the entire cross section. Localized velocities, especially near the center of the channel, could be greater. During low flow periods the current is affected by tides, such that slack tide can result in very little to no current. Currents used in the simulation effort are shown in Table 2.3-1. No current information was found for the Oregon Slough.

Table 2.3-1. Columbia River Currents

Designation	Discharge at The Dalles (KCFS)	River Gage @I-5 Bridge (CRD)	Current Magnitude (fps/knots)
Normal	140	2.8	1.84/1.09
Transition	400	14.5	3.65/2.16
10-Year	540	19.1	4.35/2.58

Key:
CRD = Columbia River Datum
fps = feet per second
I-5 = Interstate 5
KCFS = 1,000 cubic feet per second

When traveling with a river current, vessels need to maintain a faster speed than the current to provide steerage. Consequently, at higher river velocities, speed over ground is increased and the required distance to negotiate turns becomes greater. Should the vessel need to stop for any reason, it must compensate for the river flow by backing down. If the vessel is towing a non-self-propelled barge or other vessel, the tow can lose control and the only chance to stop the tow would be to turn around. Barges being towed often have a tug alongside them while transiting under bridges and along other parts of the river to provide greater control.

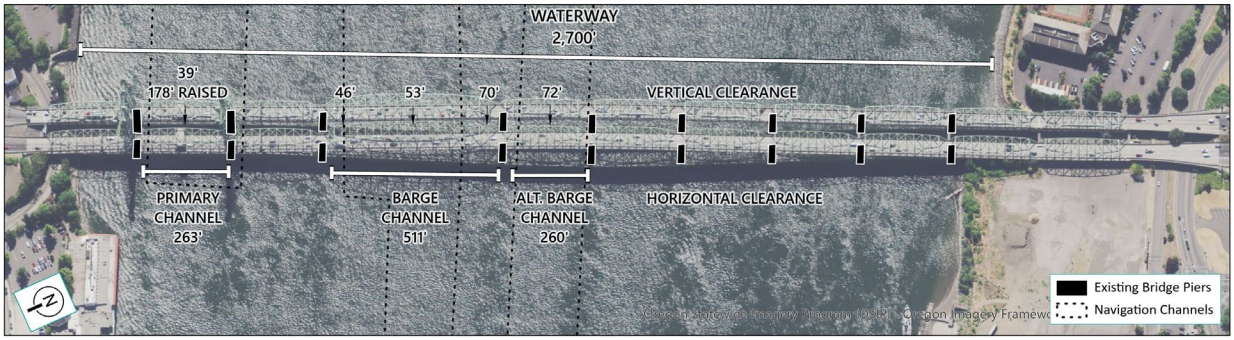
2.3.4 Waterway Width and Depth

2.3.4.1 Columbia River

The main Columbia River at the location of the I-5 bridge has a width of approximately 2,700 feet. The river is constrained by urban development with hardened banks. The width is relatively consistent up-

and downstream of the bridge for a considerable distance. The maintained federal channel widths and the overall river width are shown in Figure 2.3-2.

Figure 2.3-2. Columbia River Width



As noted previously, the channel depths maintained at the bridge by the USACE are either 15 or 17 feet. Available depth as shown by the most recent channel surveys completed by the USACE show water depths of 30 feet in the primary channel, 21 to 25 feet in the barge channels and depths of up to 48 feet outside the channels. Water shallower than 20 feet is limited to within 50 feet of the Washington shoreline and 300 feet of the Oregon shoreline (USACE 2021b).

Water depths in the UVTB and the Lower Columbia and Willamette project downstream of the bridge are currently less than the authorized depth of 35 feet. The most recent channel survey from the USACE in August of 2021 shows water depths of 20 to 30 feet downstream of the bridge for approximately 3,300 feet (USACE 2021c).

2.3.4.2 Oregon Slough

The Oregon Slough is a side channel of the Columbia River that separates Hayden Island and the Oregon shore. This waterway is also known as the North Portland Harbor, and this name is used on many maps, charts, and in other documents. Oregon Slough is used in this report for consistency with the name used on the bridge permit issued for the construction of the existing I-5 bridge and for the federal navigation project that is on portions of the waterway. However, North Portland Harbor is used in many prior documents, including other IBR program documents, and may be shown in figures and maps. The names should be used interchangeably.

The Oregon Slough at the location of the I-5 bridge has a width of approximately 950 feet. The waterway is constrained by a federal levee on the south bank and urban development and infrastructure on both shorelines. The river widens just upstream but is a relatively consistent width downstream to its confluence with the main Columbia River channel. The Oregon Slough has numerous floating home and recreational and commercial moorage facilities that constrain the channel both up- and downstream of the I-5 bridge. This restricts the available width of the waterway for navigation to approximately 350 feet just upstream with even narrow widths available further east. These constraints are not generally present downstream of the BNSF bridge.

Water depths at the Oregon Slough are shown as approximately 8 to 10 feet at the I-5 bridge on North American Oceanic and Atmospheric Administration (NOAA) charts (NOAA 2020). Water depths vary considerably up- and downstream of the bridge, with depths of 40 feet or more downstream near the Port of Portland berths and shoaling at the upstream confluence with the Columbia, with depths as shallow as 3 to 4 feet. There are no available USACE surveys of the waterway at the existing bridge as it is not a federal project.

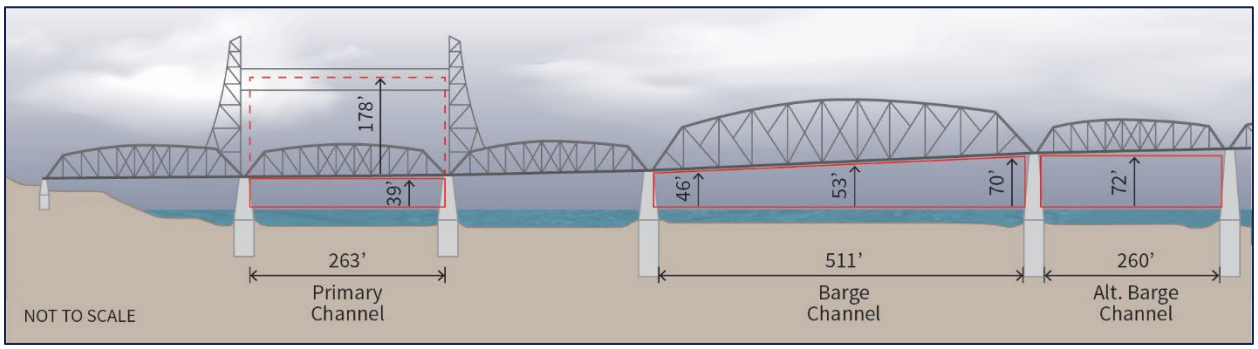
2.3.5 Channel and Waterway Alignment

There are three bridges crossing the main channel of the Columbia River in the program area: the northbound and southbound structures of the I-5 bridges and the BNSF railroad bridge.

Under the I-5 bridges, vessels that are restricted to the navigation channel (the majority of commercial vessel traffic) pass through one of three designated federal navigation channels: the primary channel, the barge channel and the alternate barge channel (see Figure 2.3-3).

- The primary channel corresponds with the bridges' lift spans and has a horizontal clearance of 263 feet and a vertical clearance of 39 feet in the closed position and 178 feet in the raised position.
- The barge channel lies under the wide spans of the bridges and has a horizontal clearance of 511 feet and a vertical clearance ranging from 46 feet to 70 feet.
- The alternate barge channel occupies the span directly to the south of the wide span and has a horizontal clearance of 260 feet and a vertical clearance of 72 feet.

Figure 2.3-3. Existing I-5 Columbia River Navigation Clearances



The third bridge in the program area—the BNSF railroad bridge—is located approximately 1 mile downstream (westerly) from the I-5 bridges and provides unlimited vertical clearance through a 200-foot-wide movable swing span. It provides a vertical clearance of 39 feet in the closed position. There is only a single federal channel corresponding with the swing span. The vertical clearance of 39 feet is generally available on the fixed spans across the width of the bridge outside the federal navigation channel.

The most direct vessel route through this river section is through the I-5 bridges' primary channel lift spans and through the BNSF bridge's swing span. This route is relatively straight and is preferred

during times of high velocity river flow and for vessels with limited maneuverability when traveling downstream regardless of vessel height. Vessels that require a vertical clearance over 39 feet necessitate the lift spans and swing span to open to complete the transit. The Code of Federal Regulations (CFR) stipulates that the I-5 draw shall not be opened Monday through Friday from 6:30 a.m. to 9 a.m. or from 2:30 p.m. to 6 p.m. (CFR Title 33 Chapter I Subchapter J, Part 117 § 117.869).

Vessel operators can avoid the need for a bridge lift by utilizing the I-5 bridges' barge or alternate barge channels as vertical clearance and vessel maneuverability allows. Vessels are generally prohibited from requesting a lift span when they can pass without a lift (CFR Title 33 Section 117.11). The use of these channels requires a more complex maneuver than does the route through the primary channel and requires the vessel to navigate a relatively complex "S" curve path between the I-5 bridges and the BNSF bridge to pass through the BNSF swing span. The alternate barge channel (the southernmost channel) requires a more pronounced maneuver than the barge channel. These routes are generally shown in Figure 2.3-4 and are designated as the barge channel route and the alternate barge channel route. The channel locations would be modified to accommodate the proposed vertical clearance locations and location of the bridge piers. Proposed navigation channels are shown in Figure 2.3-5.

Figure 2.3-4. Existing Columbia River Navigation Channels

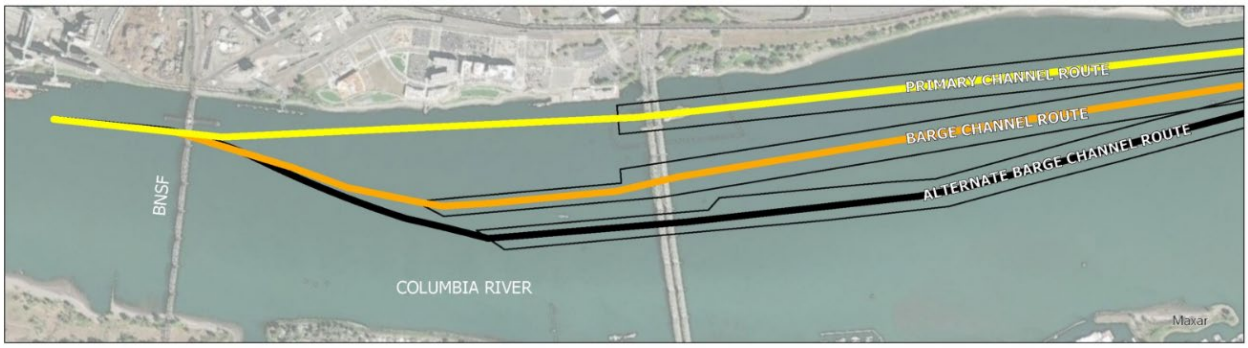
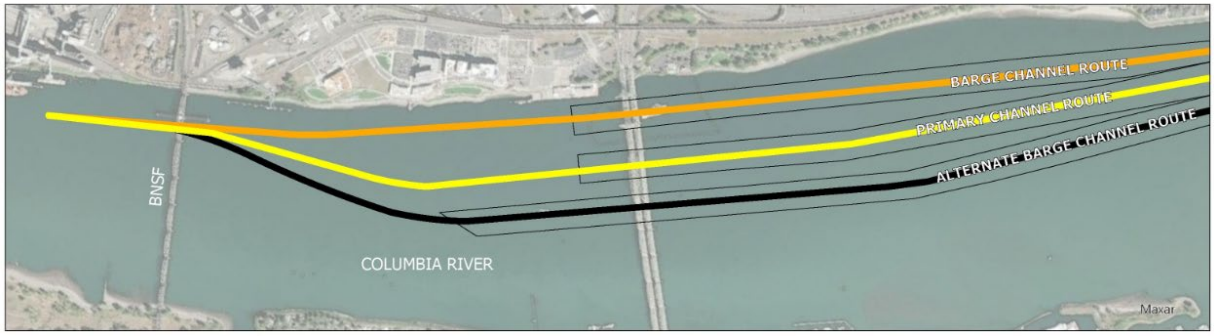


Figure 2.3-5. Proposed Columbia River Navigation Channels



2.4 Emergency Operation, National Defense and Channel Maintenance Vessels

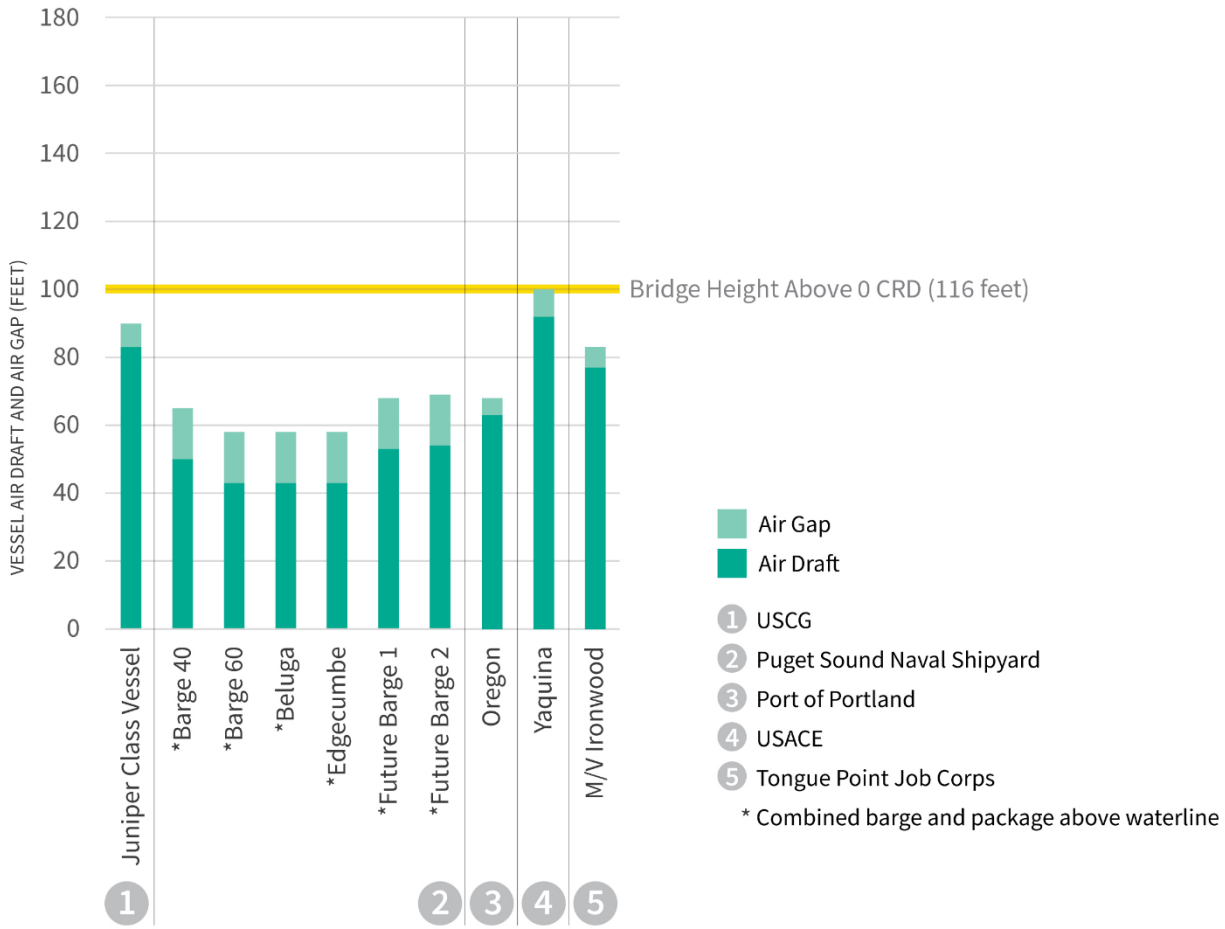
Vessels operated by the USACE, USCG, and U.S. Navy s, as well as training vessels from the Tongue Point Job Corps Maritime Training Program and a dredge operated by the Port of Portland operate on the rivers. These vessels are described below, and air drafts and air gaps from the river user survey are included on Figure 2.4-1. User and survey data on these vessels are included in Appendix B and C.

- The Port of Portland provided vessel characteristics for the *Dredge Oregon*. The port indicated an air draft of 63 feet with a desired air gap of 5 feet. They noted that the dredge utilizes "spuds" to hold itself on position and navigate within the channel. When in the stowed position for transit, the spuds are the highest point on the dredge at approximately 75 feet above the waterline. However, the port indicated that if the dredge were required to transit upriver from the Interstate Bridge, it would be reasonable to hire a derrick barge and crane to remove the spuds at the port's facility in the Swan Island harbor and place them on a barge, then reinstall them after the dredge has been towed upriver from the bridge. The port did not provide typical frequency of transit under the Interstate Bridge by month. They noted the dredge has transited under the I-5 bridge six times in the past.
- U.S. Navy Puget Sound Naval Shipyard (PSNS) in Bremerton, Washington, dismantles nuclear reactor compartments from deactivated nuclear submarines and cruisers. These compartments are then shipped via barge from Bremerton to the Port of Benton, where they are transferred to a large trailer for permanent disposal at the U.S. Department of Energy Hanford Reservation, approximately 7 miles from the Port of Benton. The U.S. Navy PSNS provided information on six freight barges, including two future barges (Barge 40, Barge 60, Beluga, Edgecumbe, Future Barge 1, and Future Barge 2) with air drafts ranging from 43 to 59 feet and desired air gaps of 15 feet. The vessels typically transit the bridge location during mid-March to mid-April and September through October. Shipment time and frequency will vary but could average two per year per vessel. U.S. Navy PSNS indicated that they use contract tugboats with the above vessels, and Tidewater holds the current contractor for the river portion of the trip.
- The USACE Portland District confirmed their hopper dredge (*Yaquina*) is the tallest USACE vessel that is expected to transit the bridge location. The *Yaquina* was surveyed as part of the CRC NIR, which noted a 92-foot air draft and an 8-foot desired air gap. The USACE confirmed that the dredge typically works during the in-water work window of August 1 to September 30; however, the dredge needs to be able to transit under the bridge at any time of year to address shoals.
- The USCG Marine Safety Unit (Portland) indicated that the information they provided in response to the Hood River-White Salmon Bridge Replacement river user survey was still accurate. For that project, the USCG provided information on a Juniper-class buoy tender. The vessel's primary mission is as a buoy tender; however, all USCG buoy tenders can perform other USCG missions, including search and rescue, maritime law enforcement, and marine environmental protection. The USCG indicated an air draft of 83 feet and air gap of 7 feet is

needed. The vessel is all-weather capable, and its frequency of passage depends on operations and situations.

- Tongue Point Job Corps Maritime Training Program did not respond to the request for information. They also did not respond to the request as part of the Hood River-White Salmon Bridge Replacement NIR. The CRC NIR indicated that Tongue Point uses the retired USCG *M/V Ironwood* buoy tender as a training vessel for students. The vessel was surveyed as part of the CRC NIR, which indicated an air draft of 77 feet and required air gap of 6 feet. Tongue Point reported one trip per month from May to August.
- The City of Vancouver, City of Portland, Clark County and Multnomah County operate small fire fighting, rescue and law enforcement vessels in the area. These vessels are small and would not be restricted.

Figure 2.4-1. 2.4 Emergency Operation, National Defense and Channel Maintenance Vessels Vessels Air Draft and Air Gap Results



Bridge lift data indicate that dredges accounted for an average of 3% of bridge opening events, ranging from a low of 0 (1989) to a high of 10% (2005). Bridge opening events for dredges averaged three to four per year between 2012 and 2020.

Other government vessels accounted for an average of 1% of bridge opening events, ranging from a low of 0% (there were several years when a government vessel did not request an opening, including 2000, 2002- 2004, 2014 and 2020 among others) to a high of 5% (1994). Government vessels that have required bridge openings include Puget Sound Naval Shipyard nuclear transporters, the USCG *Cutter Henry Blake*, and the *M/V Ironwood*.

Under the assumed conditions, the USACE dredge *Yaquina* would be able to pass under a bridge height of 116 feet in the vessel's current configuration more than 90% of the days of each month of the year. Because the dredge needs to be able to transit at any time of the year as necessary to address potential dredging needs, it is considered impacted by the proposed replacement bridges. The dredge would be essentially unaffected if only a 5-foot air gap is required (it could pass between 98% and 100% of the days in each month) or if the bridge height was 121 feet. The USACE requested a minimum 8-foot air gap for the *Yaquina*. With an 8-foot air gap, it could pass under the 116-foot bridge on more than 98% of the days each month of the year. Accordingly, for the purposes of this analysis, there is no substantial impact.

The USACE maintains the Columbia River navigation channel through dredging. Dredging keeps the navigation channel at its authorized depth and ensures that navigation features are maintained. As indicated above, the existing water depths at the I-5 bridge exceed the authorized depths without maintenance dredging. The CRC team conducted an analysis of capital and maintenance dredging needs associated with the proposed channels described above in January 2014 (CRC 2014). The report found that there would be no need for dredging to establish the channels and that there are no records of dredging within the navigation channels at the existing I-5 bridge for the past 30 years.

Future Vessels

A wide variety of vessel types and configurations can be used for dredging, including suction dredges, barges that use clamshell buckets, and ships equipped with suction equipment.

Equipment used for dredging downstream of the I-5 bridge location would not be constrained by the replacement bridges as it is located or based downstream of the I-5 bridges and does not need to navigate the bridge for other purposes (e.g., maintenance or refueling).

Navigation on the Columbia-Snake system extends nearly 230 miles along the Columbia River to Richland/Pasco/Kennewick, Washington, and also runs along 140 miles of the Snake River from the confluence at Pasco to Lewiston, Idaho. Along this channel, there are also numerous facilities such as docks, boat launches, marinas, intakes, outfalls, dams, and locks that may require regular or infrequent maintenance dredging, which will need equipment in the future to transit through the proposed replacement bridges. Equipment needed for dredging upriver of the BNSF railroad bridge at Celilo is constrained by its height and do not require further consideration.

The USACE typically conducts maintenance dredging yearly on the Vancouver to The Dalles project during the summer season. For 2020 the USACE reported an amount of 132,936 cubic yards (USACE 2021e). The USACE indicates that the dredge Yaquina typically completes this. There is no indication that the type and frequency of dredging will change in the future under current conditions. As discussed in Section 3, the Vancouver to The Dalles project is authorized to a depth of 27 feet but is only maintained to 17 feet. Should conditions change and the USACE undertake dredging of the channel to 27 feet, the capital dredging needs and ongoing maintenance needs would likely require different equipment than presently used. Considering the current channel use, existing facilities, available properties, and other factors, it is not likely that the channel would be extended to its authorized depth.

The USACE has indicated that there are no current plans for replacement of the Yaquina, but, based on the age of the vessel, it will likely require replacement during the life span of the replacement bridges. If the USACE were to replace the Yaquina, it is reasonable that the height of the proposed replacement bridges (if constructed) would be considered in the design specifications for the replacement dredge.

Dredging at berths and for other facilities is typically done by mechanical dredging or by small cutter section dredges due to the small volume of dredging needed. Mechanical dredging is most typically done by clamshell bucket operated by a crane from a barge, which are widely available. Future efforts would be expected to be similar and conducted by equipment that would not be constrained by the replacement bridges.

There is no evidence that the amount of dredging that occurs upriver of the proposed I-5 bridges is likely to be substantially different than in past years. No dredge equipment that would be constrained by the BNSF Celilo Falls rail bridge will be constrained by the proposed I-5 bridges; therefore, only dredge work between the existing I-5 bridges and the Celilo Falls Bridge is potentially impacted.

Government vessels include USCG, U.S. Navy, Tongue Point Job Corps Center, and other government-owned vessels, excluding dredges. As reported no government vessels using the Columbia River are identified as being height constrained by the proposed replacement bridges. There is no known reason to project an increase or change in the type of government vessels transiting upstream of the replacement bridges to change.

2.5 Federal Navigation Projects

The Columbia River and Oregon Slough include several federal navigation projects that are relevant to navigation within the project area. Table 2.5-1 provides a summary of the project details. There are numerous other federal navigation projects on the river including side channels, turning basins, small boat harbors, and anchorages that are not detailed here.

Table 2.5-1. Federal Navigation Projects

Project Name	Limits (RM)	Authorized Depth (feet)	Maintained Depth (feet)	Type of Project	Status
Mouth of the Columbia River	Offshore to RM 3	55	55	Channel	Operational
Columbia and Lower Willamette	RM 3 to RM 105.5	43 (to RM 105.5 and Oregon Slough RM 1.5) 35 (RM 105.5 to 106.5)	43	Channel	Operational Oregon Slough not maintained to 35 feet for entire length
Vancouver Upper Turning Basin	RM 106.5	35	35	Turning Basin	Operational Used infrequently
Vancouver to The Dalles	RM 106.5 to RM 189.7	27	17	Channel	Maintained for barge traffic
Barge Channel	RM 106.5 to 107.5	15	15	Channel	Operational
Alternate Barge Channel	RM 106.5 to 108	17	17	Channel	Operational
Oregon Slough – Upstream Entrance	Oregon Slough RM 5.8 to RM 109	10	10	Channel	Last maintained in 2001

2.5.1 Channel Details

Of the projects listed in Table 2.5-1, the Columbia and Lower Willamette, Vancouver Turning Basin, Vancouver to The Dalles (main or primary channel), barge channel, and alternate barge channel correspond with or are in proximity to the proposed bridge replacements. Figure 2.3-4 shows the existing channel configuration in the vicinity of the existing I-5 bridges.

The Columbia and Lower Willamette project ends just below the existing I-5 bridge. Deep-draft vessels utilizing the channel below the BNSF bridge do not typically use the channel between the two bridges, as there are no suitable berths and the waterway depths are not authorized or maintained to an adequate depth. Therefore, design vessels for the Lower Columbia and Willamette project are not addressed in this NIR.

The portion of the Columbia and Lower Willamette channel between the BNSF bridge and existing I-5 crossing and the Upper Vancouver Turning Basin (UVTB) are located just downstream of the existing I-5 bridge. Because the proposed replacement bridges will be located downstream (west) of the existing bridge, they will be located over the federal navigation projects. The channel was originally authorized in 1878 and the turning basin in 1962. The design vessel used by the USACE for these projects could not be determined. A design vessel was selected for the turning basin in the 2014 Ship Navigation Study (ODOT et al. 2014a), including future operations at the Lafarge facility near the BNSF bridge. The vessel is a small tanker with dimensions of 580 feet length overall, 101 feet beam, and drafts of 20 and 33 feet for ballasted and loaded conditions, respectively.

The Vancouver to The Dalles project begins just downstream of the existing I-5 bridge and was originally authorized by the Rivers and Harbors Act of 1937 with a depth of 27 feet for deep-draft vessels. The design vessel used by the USACE for this project could not be determined. No deep-draft vessel traffic currently uses this channel. The USACE maintains the channel to 17 feet based on current uses, and there are no deep-draft vessel facilities in operation upriver of the I-5 bridge. However, a design vessel was selected for this federal navigation project based on criteria discussed in the 2014 Ship Navigation Study (ODOT et al. 2014a). The vessel is a small product tanker with dimensions of 452 feet length overall, 75 feet beam, and a draft of 25 feet.

The Vancouver to The Dalles channel and the secondary channels located at the existing I-5 bridges are primarily used for shallow-draft barges being pushed by tugs or towboats. The specific design vessel used by the USACE for the project could not be determined. However, a design vessel was selected for this federal navigation project in the 2014 Tow Navigation Study (ODOT et al. 2014b) based on information on present vessels using the navigation channel through contacts with commercial shipping interests and operators. The primary limitation on vessels is dictated by the lock dimensions at the Bonneville dam. Many tugs and barges use the river and vary in size. For the simulation effort, a model tug and typical barges were selected based on equipment in use on the river under four different configurations. Table 2.5-2 lists the tug and barge details used.

Table 2.5-2. Tug and Barge Details

Vessel	Length Overall	Beam	Depth[1]	Other
Tug	95 feet	31 feet	11 feet 6 inches	2,800 horsepower
Grain Barge	275 feet	42 feet	16 feet 6 inches	120,000 bushel capacity

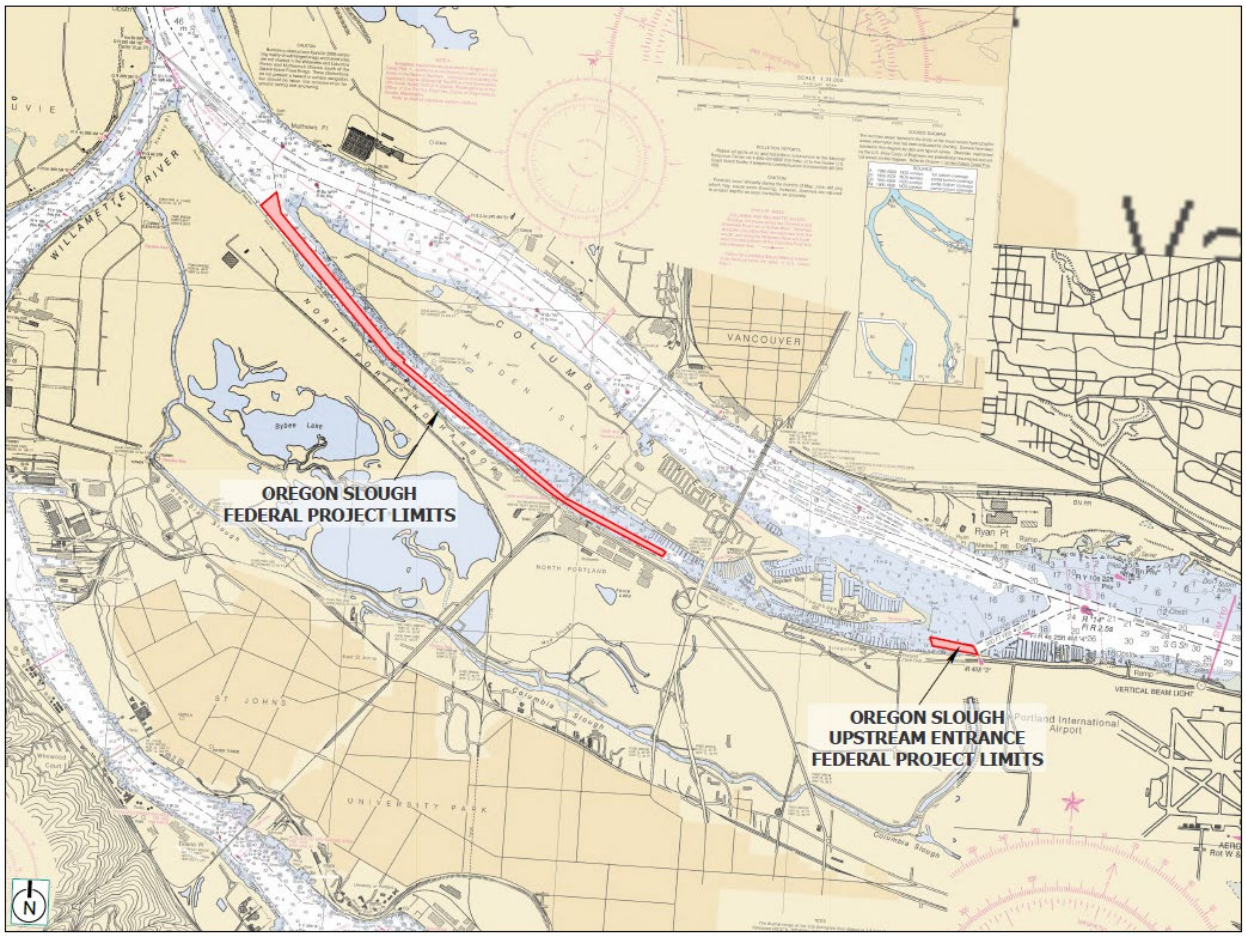
Note:
1. Depth is from top of deck to bottom of keel.

Navigation continues on the Columbia-Snake system beyond The Dalles. Vessels using that project are assumed to be the same as the Vancouver to The Dalles project.

On the Oregon Slough, the Columbia and Lower Willamette federal navigation channel does not extend to the existing I-5 bridge. Project limits extend for 1.5 miles, approximately 1,500 feet downstream from

the existing I-5 bridge. The Oregon Slough – Upstream Entrance project begins approximately 1.5 miles upstream of the existing bridge. Figure 2.5-1 shows the extent of the federal projects on the Oregon Slough. Design vessels for this project are not considered as the channel does not correspond to the bridge location. The USACE recently completed updated environmental documentation to maintain the Oregon Slough – Upstream Entrance to its authorized depth, but the timing of this work is unknown. Since that effort is primarily to support existing navigation, no changes to vessel use or characteristics are anticipated as result of this project.

Figure 2.5-1 Oregon Slough Federal Project Limits



2.5.2 Proposed Channel Changes

The replacement bridges will result in the need to modify the federal project channel locations and the upstream extent of the Vancouver Upper Turning Basin. These changes will be subject to review and authorization by the USACE under a separate process established in Section 14 of the Rivers and Harbors Act of 1899, codified at 33 U.S. Code 408 (Section 408). A decision under Section 408 will be completed prior to the issuance of a Section 9 Bridge Permit by the USCG. The IBR program team will coordinate with the USCG to keep the agency informed through the review process. While these

changes will not be subject to USCG authority, they do have the potential to affect navigation and will be considered as part of this NIR. This section describes the proposed changes, shown in Figure 2.3-5, above.

To maintain the current bridge in an operational condition during construction, the replacement bridges will be placed downstream of the existing bridges. This overlaps with the UVTB, which will be shifted west. No specific definition of the UVTB coordinates and dimensions was located other than an interim report that recommended dimensions of 800 by 2,000 feet. Drawings of the navigation project hydrographic surveys show the dimension to be approximately 800 by 2,250 feet. Based on the information available, it is estimated that the length will be reduced by approximately 200 feet resulting in an assumed length of 1,800 feet.

The three navigation channels (primary, barge, and alternate barge) will be renamed and some locations revised to correspond with the maximum vertical clearance provided by the replacement bridges and based on operational practices described by the towing companies.

The alternate barge channel is currently the southernmost channel. It is also referred to in the industry as the “High Span” and is almost exclusively used by upbound tows and tows with construction equipment that require the higher clearance but do not require using the lift span. Therefore, the current primary use of the alternate barge channel is by upbound tows, which are mostly empty. These tows are generally more controllable than downbound tows and can make the “S” turn needed to transition from the location of the BNSF bridge opening to the alternate barge channel alignment.

The barge channel, the middle of the three channels, is primarily reserved for downbound tows since they have less control, with currents pushing them downstream resulting in greater speed over the ground and less speed through the water. Therefore, these tows need the barge (also referred to in the industry as the “wide span”) navigation channel. This is because use of this channel requires less maneuvering to move toward the Washington shore to align with the BNSF railroad bridge.

Tows requiring air draft that is not available in the wide and high spans must use the lift span, which corresponds to the primary channel. The primary channel will be moved to the south and become the middle channel to correspond with the highest vertical clearance provided by the replacement bridges. The two flanking channels will be designated as barge channels. The barge channel to the north will have a minimum of 99 feet of vertical clearance and would accommodate the majority of commercial traffic on the waterway based on bridge height. The barge channel to the south would have a minimum of 113 feet of vertical clearance.

2.6 Present and Prospective Recreational Navigation

The Columbia River is an active recreational waterway. Recreational vessels are described below. User and survey data on these vessels are included in Appendix B and C. The majority of recreational vessel use consists of small power and sailboats that would not be impacted by bridge heights and widths. Only those vessels with the potential to be impacted are addressed in this section.

- Schooner Creek Boat Works (Schooner Creek) provided information on one sailboat, *Rage*. The vessel has a reported air draft of 90 feet and a desired air gap of 10 feet. *Rage* passes under the

Interstate Bridge typically one time per month in January, February, October, November, and December; five times per month in March and September; seven times per month in April and August; and 10 times per month May through July.

- A private individual provided information on their sailboat, *Make It So*. The boat has a reported air draft of 87 feet and a desired air gap of 10 feet. The boat passes under the Interstate Bridge typically once per month March through May and in September, and two times per month June through August. The CRC NIR indicated that *Make It So* was surveyed and has a surveyed air draft of 90 feet.
- The CRC NIR included information from Legendary Yachts Inc. and their sailboat, *Radiance*. The company confirmed that the information provided for the CRC report remained accurate which indicated a surveyed air draft of 85 feet with a desired air gap of 3 feet. The boat transits under the Interstate Bridge approximately two times per month from July through September. It is moored on the Columbia River in Vancouver. The company also indicated that their operation has been moved to a Vancouver location and that there are no vessels in or planned for production. They would utilize existing facilities (such as other vessel service locations) for any in-water needs.
- The CRC NIR provided information on 14 vessels surveyed at the Portland Yacht Club. The tallest of these vessels had an air draft of 74 feet. The report also provided information on vessels from the Rose City Yacht Club, where the tallest vessel had an air draft of 63 feet. See the CRC NIR pages 6-18 and 6-19 for additional information.

The 2012 CRC NIR identified a sailboat being constructed by Schooner Creek with 139-foot air draft and would not be able to pass under the proposed replacement bridge at any time within a calendar year without mitigation. Schooner Creek was contacted and did not provide any information on this potential vessel. Because no additional information was provided, it is assumed that this vessel was either completed and moved from the area or was never produced and thus would not be impacted by the proposed bridge height.

No recreational power vessels were found to be impacted under the assumed condition. Two sailboats (*Make It So* and *Rage*) were measured with an air draft of 90 feet. Under the assumed condition, the vessels would not be height restricted but it is included in this discussion because of the small margin of error.

Larger recreational sailboats with an air draft exceeding 90 or 95 feet would not be able to pass under the bridge under the assumed conditions. There are no known sailboats of this size in the area, and it is unlikely that this condition would change in the future due to the nature of the waterbody and vessel activity.

Sailboats accounted for an average of 28% of bridge opening events, ranging from a low of 13% (2001) to a high of 45% (2016). The data show that sailboats account for the greater percentage of bridge openings in more recent years than in the past.

Recreational sailboats and powerboats typically use the river more frequently during the peak recreational boating season which occurs between April and October. Sailboats that are affected by the

existing bridges generally had an air draft ranging from 50 to 90 feet, with an average of approximately 70 feet. The majority of the sailboats within the bridge opening data would be able to transit the bridge height options proposed.

Powerboat air drafts ranged from 20 feet to 25 feet and almost never required a bridge opening. There was at least one large private vessel (M/V Meduse) that required a bridge lift within the data.

Future Vessels

Most of the sailboat activity that transits the bridge is generated by residents living in or near the greater Portland area, defined as: Portland Metro Area (Clackamas, Columbia and Multnomah counties in Oregon and Clark and Skamania counties in Washington); adjacent Oregon counties surrounding the Portland Metro Area (Washington, Yamhill, Polk, Marion, Linn, Wasco, Hood River and Sherman Counties); and adjacent Washington counties surrounding the Portland Metro Area (Cowlitz, Lewis, Yakima and Klickitat Counties). Sailboats surveyed in 2021 had an average air draft of 44 feet compared to 66 feet from 2012 data. It is anticipated that sailboat activity and sizing would not likely change significantly from the existing situation.

2.7 Present and Prospective Commercial Navigation

Commercial vessels on the Columbia River include cruise vessels, tugs, tows and barges and marine contractors. In addition, this category addresses specialty fabricators that operate in the area. While these are not vessels they do utilize the waterway. Users and vessels are described below by each category. User and survey data on these vessels are included in Appendix B and C.

2.7.1 Cruise Vessels

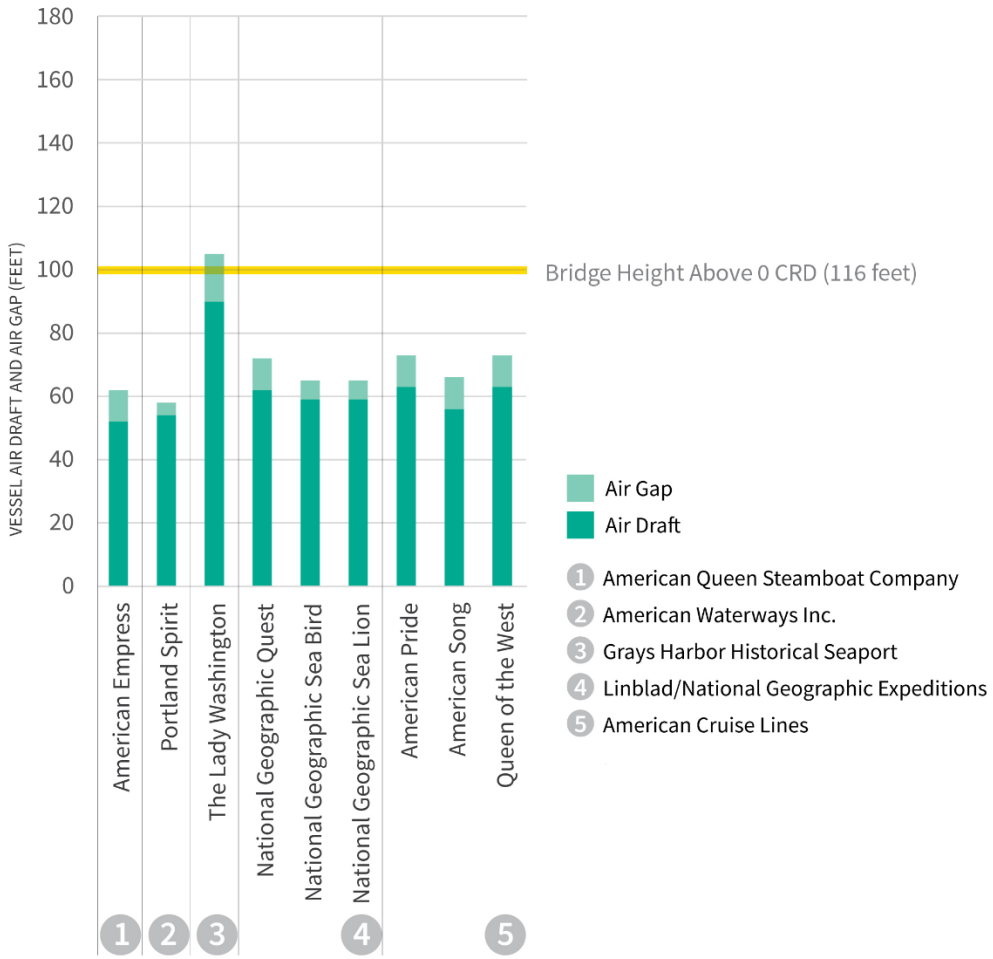
Several passenger cruise lines host tours up and down the Columbia and Snake Rivers. These vessels require frequent passage under the Interstate Bridge during the cruise season. Six passenger cruise lines were contacted, and three responded. Vessel characteristics by company are summarized below, and height clearances from the river user survey are provided on Figure 2.7-1below.

- American Cruise Lines completed the online survey for three vessels: the *American Pride, Queen of the West,* and *American Song*. The *American Pride* and *Queen of the West* have a reported air draft of 63 feet. The *American Song* has a reported air draft of 56 feet. All three vessels have a desired air gap of 10 feet. The vessels transit under the Interstate Bridge approximately 16 times per month during April through November.
- American Queen Steamboat Company did not respond to the request for information. The company did respond to the request as part of the Hood River-White Salmon Bridge Replacement NIR and indicated they have one passenger cruise vessel (*American Empress*) that travels on the Columbia and Snake Rivers. This vessel has an air draft of 52 feet and requires a 10-foot air gap. The Hood River-White Salmon NIR indicated that the *American Empress* passes under the existing Hood River-White Salmon bridge one to two times a week between March and December. Given the cruise route on the company website, this would likely be similar for the Interstate Bridge (https://www.americancruiselines.com/cruises/columbia-and-snake-

river-cruises). The American Queen Steamboat Company was not part of the river user outreach for the CRC NIR.

- American Waterways, Inc., provides passenger service on the Columbia River. The company provided information for a cruise vessel (*Portland Spirit*), which has an air draft of 48 feet and requires at least a 10-foot air gap. The company also indicated that they operated the *Columbia Gorge Sternwheeler*, which is similar in size to the *Portland Spirit,* and the *Willamette Star*, *Crystal Dolphin*, and the *Explorer*, which are much smaller. Frequency of transit was not provided. The CRC NIR indicated that the vessels average about 80 trips per month each on the Columbia River main channel and Oregon Slough from June through October, with fewer trips the rest of the year.
- Lindblad/National Geographic Expeditions provided confirmation regarding their vessels that operate on the Columbia River (*National Geographic Quest*, *National Geographic Sea Lion,* and *National Geographic Sea Bird*). The *National Geographic Quest* has a 62-foot air draft and requires an air gap of at least 10 feet. The *National Geographic Sea Lion* and *Sea Bird* both have air drafts of 59 feet with a 6-foot desired air gap. The *National Geographic Quest* transits under the Interstate Bridge approximately one time per month in September and three times per month in October. The *National Geographic Sea Lion* transits under the Interstate Bridge approximately three times per month in September and one time per month in October. The *National Geographic Sea Bird* transits under the Interstate Bridge approximately three times per month in September, four times per month in October, and one time per month in November.
- Grays Harbor Historical Seaport Authority did not respond to the request for information. They did provide information on two sailing ships (*Lady Washington* and *Hawaiian Chieftain)* during the Hood River-White Salmon Bridge Replacement NIR. Since that time, the *Hawaiian Chieftain* has been sold and is no longer in the area (Olympian 2021). The *Lady Washington* has a raised mast air draft of 90 feet and a stepped-down mast height of 65 feet with a required 15-foot air gap. The maneuverability of these vessels is limited because of their height and auxiliary sails. Grays Harbor Historical Seaport Authority is not currently operating tours due to the COVID-19 pandemic. It is assumed that future transits to upriver destinations could occur and would require transit under the Interstate Bridge. Vessel information for the *Lady Washington* was also included in the CRC NIR, but frequency of transit under the Interstate Bridge was not provided.
- UnCruise Adventures operates one passenger cruise vessel (*S.S. Legacy*) on the Columbia/Snake River system. The program team was not able to reach UnCruise to obtain vessel characteristics. According to its website, the company offers Columbia/Snake River cruises from Portland, Oregon, to Clarkston, Washington, September through December with an upstream destination of Richland, Washington (https://www.uncruise.com/destinations/columbia-river-cruises/columbia-river-itineraries). This route requires the transit of the Celilo railroad bridge (79-foot clearance), the Kalan railroad bridge (72.6-foot clearance), and others. Therefore, it is assumed that the air draft and air gap are less than 72.6 feet.

Figure 2.7-1. Cruise Vessels Air Draft and Air Gap Results



No passenger cruise vessels were identified that were unable to pass under the assumed conditions for the proposed bridge height.

Future Vessels

Cruise and passenger vessels include vessels that operate only on the Columbia and Snake Rivers, as well as those that offer seasonal itineraries. Included in this category are sightseeing boats and overnight cruise vessels.

Future passenger vessels are expected to remain at the heights of existing passenger vessels that transit the area. The cruise and passenger vessels that regularly operate in this area are constrained by other bridges; it is in the best interest of the operators to use vessels that can clear all of the bridges in the region. For example, the Sellwood Bridge in Portland has a vertical clearance lower than that proposed for the IBR program. To operate upriver of the Sellwood Bridge, vessels will necessarily be

able to clear the proposed I-5 bridges. The BNSF Celilo Bridge 95 miles upstream of the I-5 bridges has a vertical clearance significantly lower than the I-5 bridges, and bridges on the Snake River are even lower. Any cruise vessel operating up to Lewiston will be able to clear the proposed I-5 bridges.

2.7.2 Commercial Tugs, Tows, and Barges

This vessel group includes tugboats, towboats, and commercial barges. Tugboat and towboats are referred to generically as tugs. Crane barges associated with marine construction are included in the marine contractor category. Barges requiring tug or tow move up- and downriver with a variety of bulk and container cargoes. Most cargo moves from upriver origins to downriver destinations. Tugs can move without barges or with one or more barges. Barges in general use on the Columbia River for grain, petroleum and other typically uses are not generally included as they have lower vertical clearances than tugs. Some specialty barge information is included.

In the Columbia River, lock dimensions limit tows to 84 feet in width and 650 feet in length (up to four barges). Air drafts and air gaps for commercial tugs, tows and specialty barges are described below by company, and heights provided in the river user survey are presented on Figure 2.7-1.

- Bernert Barge Lines provided information on four towing vessels (*Kathryn B, Lori B, Diane B*, and *Mary B*) that transit the bridge location. The largest air draft for these vessels is approximately 54 feet (*Kathryn B*). The vessels pass under the existing Interstate Bridge up to eight times per month throughout the year. For each of these vessels, a 5-foot air gap is desired.
- Cadman, Inc., an affiliate of Lehigh Hanson (Heidelberg Group), operates one self-unloading aggregate hopper barge that transits the bridge location three times per month in January, four times per month in February through June, five times per month in July through September, four times per month in October, and three times per month in November and December. Its air draft is approximately 49 feet, with a desired air gap of 1 foot. The barge has no mechanical propulsion and requires a tug, which is provided by contract. The company indicated that the tug air draft is typically 52 feet.
- Mark Bernert Tugboat Company provided information via the online survey for one tugboat (*Claire B*). This vessel has a reported air draft of 48 feet with a desired air gap of 4 feet. The vessel transits under the existing Interstate Bridge four times per month March through October.
- SDS Lumber Company and SDS Tug & Barge (SDS) manufacture lumber, plywood, power, and pulp, as well as offering tug and barge services though the marine subsidiary. The company is located in Bingen, Washington. They did not respond to requests to verify or update vessel information. Information for three tugboats (*Dauby*, *Wallace E*, and *Bruce M*) was provided by SDS as part of the Hood River-White Salmon Bridge Replacement NIR. Based on that prior data, the greatest air draft is 56 feet with a desired air gap between 10 and 20 feet depending on the water level and conditions. SDS also transports vessels with spuds that can be lowered to a maximum height of 65 feet with a desired air draft of 15 feet. The CRC NIR reported about 10 trips per month all year for these vessels. The CRC NIR also noted the potential for shipments of loads on SDS barges as tall as 100 feet, but this information was not provided for the more

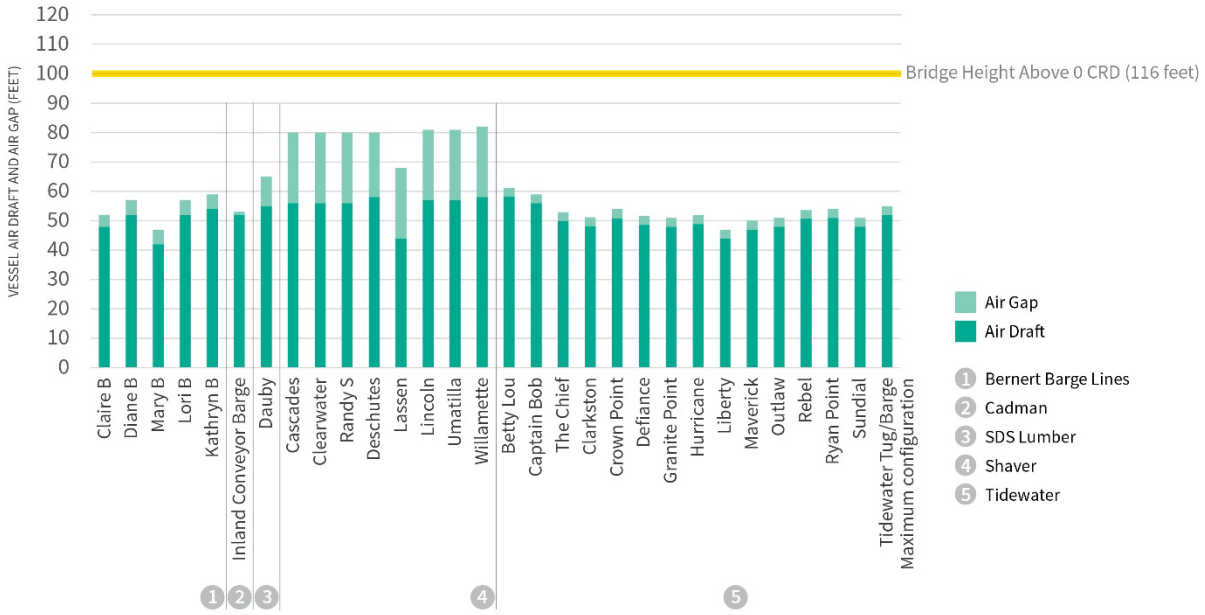
recent Hood River-White Salmon Bridge Replacement Bridge NIR and is not considered in the impact analysis.

- Shaver Transportation provided information on eight tugboats (*Cascades* [push knee], *Clearwater* [push knee], *Deschutes* [tractor tug], *Lassen* [push knee), *Lincoln* [push knee], *Umatilla* [push knee], *Willamette* [tractor tug], and *Randy S* [type not specified]). These vessels were notes as requiring a total clearance (air draft and air gap) of 80 feet. Air drafts range from 44 feet to 58 feet. The vessel data sheets indicated that tug assistance would be required during construction until the existing bridge is removed. The tugs transit under the existing bridge at all times throughout the year.
- Tidewater Barge Lines (Tidewater) provided vessel data sheets for 14 tugboats (*Betty Lou, Captain Bob, Chief, Clarkston, Crown Point, Defiance, Granite Point, Hurricane, Liberty, Maverick, Outlaw, Rebel, Ryan Point,* and *Sundial*). The maximum configuration of these vessels is a tug and four barges. On average, Tidewater vessels pass under the Interstate Bridge 70 times per month. The greatest air draft of these tugboats is 52 feet, with an air gap of 3 feet.

The following companies did not respond to the river user survey, and vessel information was not provided in prior reports. Information was obtained from publicly available sources. As the information was not verified through direct contact, vessel characteristics for this group are not included on Figure 2.7-1, and impacts are not assessed.

- The Brusco Tug and Barge Company website indicates that its Columbia River fleet provides towboat service on the Columbia, Snake, and Willamette Rivers for private customers and for the USACE to tow government-owned tank barges.
- Centerline Logistics (previously Olympic Tug and Barge and Harley Marine Services), according to their website, provides marine petroleum transportation services on the West, East, and Gulf Coasts of the U.S. The company website provides vessel specifications and indicates that two vessels operate in Oregon (the *Investigator* [barge] and *Lizzy Too* [tug]). The *Lizzy Too* has an air draft of 48 feet. The Hood River-White Salmon Bridge Replacement NIR noted that the *Investigator* has an air draft of 26 feet. The company website does not currently list an air draft for this vessel. The Hood River-White Salmon Bridge Replacement NIR also listed the *Willamette Champion* as a vessel that operates in the Portland area, but the current website does not include this vessel.
- Foss Maritime Company (Foss) provides a variety of tug services, including escort and ship assist, oceangoing cargo, and contractor support. For the Columbia/Snake River system, the company website indicates that they provide regional towing service. The CRC NIR indicated that Foss performs harbor-assist work and does not typically transit upriver of the I-5 bridge. Special projects in the past have required transit to the upper Columbia and Snake Rivers. Foss was reported as selling its Columbia River operations in 2013 (Oregonian 2013). Based on this information transit by Foss vessels would be infrequent.

Figure 2.7-2. Commercial Tugs, Tows, and Barges



No tugs or tows were identified that were unable to pass under the assumed conditions for the proposed bridge height.

Tugs and tows transiting this region fall into one of two categories: ocean tugs and barges that serve the metal fabricators at the Columbia Business Center, and tugs and barges that carry commodities on the shallow-draft river system between Portland/Vancouver and Lewiston.

River barges are sized to transit the locks and bridges in the Columbia-Snake River System. Tugs are higher than barges and are the more height-constrained component of this group. Tugs operating in the river system typically have a highest fixed point less than 55 feet high and are constrained by numerous bridges on the Columbia and Snake River system that have lower vertical clearances than the replacement bridges. Future river tugs are expected to remain within these height ranges. An example of this are three new tugs—the *Crown Point, Granite Point,* and *Ryan Point*—that were constructed for Tidewater after the analysis was completed for the CRC Project. As shown in Section 5, these tugs have a maximum air draft of 52 feet.

River barges are typically 150 to 273 feet long with a beam (width) of up to 42 feet. A standard tow consists of a tug with four barges lashed two abreast. This tow configuration can pass through the Bonneville lock, which has a lock chamber that is 86 feet wide and 675 feet long. Future river barges are expected to remain within these dimensions due to the lock restrictions.

Commercial tugs and barges have the highest share of river usage and transit year round accounting for approximately 54% of the bridge opening events across the 35-year study period. Their usage share ranged from a low of 25% (2005) to a high of 65% (2012). Tugs and barges generally ranges from 28 to

61 feet, and the tugs and barges are usually able to use the barge channel or alternate barge channel. Tugs and barges will request an opening of the I-5 bridge to provide sufficient vertical clearance or to make a straight course between the I-5 bridge and the BNSF bridge downstream. The largest share of these bridge lifts for tugs and barges occurs during the spring, when high rainfall and mountain snowmelt combine to increase the current and raise the river level at I-5. Twenty-four to 42% of bridge lifts for tugs and barges occurred in April, May, and June.

Future Vessels

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2.7.3 Marine Contractors

The marine contractors category includes vessels such as crane barges, dredges, and other construction equipment transported by construction contractors on the Columbia River. Transits are not limited to a particular time of year or frequency, as construction work is typically performed on an as-needed or contract basis. Crane barges can conduct a wide range of water-related construction activities and are typically used by marine contractors. Crane barges are not motorized and are moved with tugs or tows. Spuds or anchors are used to keep barges stationary. During travel, the spuds are either raised to a level high enough to prevent the barge spuds from grounding or they are removed and lashed to the deck. The CRC NIR indicated most crane barges in the Columbia River travel with their spuds raised (as this requires the least amount of work), and when raised, the spuds are typically the highest points of the vessel.

Air drafts and air gaps for marine contractor vessels are shown below by company, and information obtained through the river user survey is presented in Figure 2.7-2.

- Advanced American Construction did not respond to the request for information. They also did not respond to the request as part of the Hood River-White Salmon Bridge Replacement NIR. The CRC NIR included information on five crane barges (*DB 125*, *DB 4000*, *DB 4041*, *DB 4100*, and

Paul Bunyan) and one tugboat (*Lindy Marie*). According to the CRC NIR, the barges have an air draft ranging from 78 to 92 feet (with spuds raised), and a 2-foot desired air gap. The *DB 4100* is the tallest crane, with a reported height of 92 feet with the spuds raised. The minimum crane gantry height for the *DB 125* is 51 feet, and for the *DB 4000*, *DB 4041*, and *DB 4100* is 35 feet. The *Paul Bunyan* is a spud barge, and the other barges are portable cranes on spud barges. The tugboat has a 35-foot air draft and a desired air gap of 5 feet. The vessels travel up and down the Columbia River a couple of times a month, all year. A review of the Advanced American Construction website confirmed the vessel characteristics identified above. The *Paul Bunyan* is not listed on the company's website. Therefore, it is unknown whether the *Paul Bunyan* is still part of their fleet. The website also includes descriptions of additional barges and tugs, but it is unknown whether those vessels transit the bridge location.

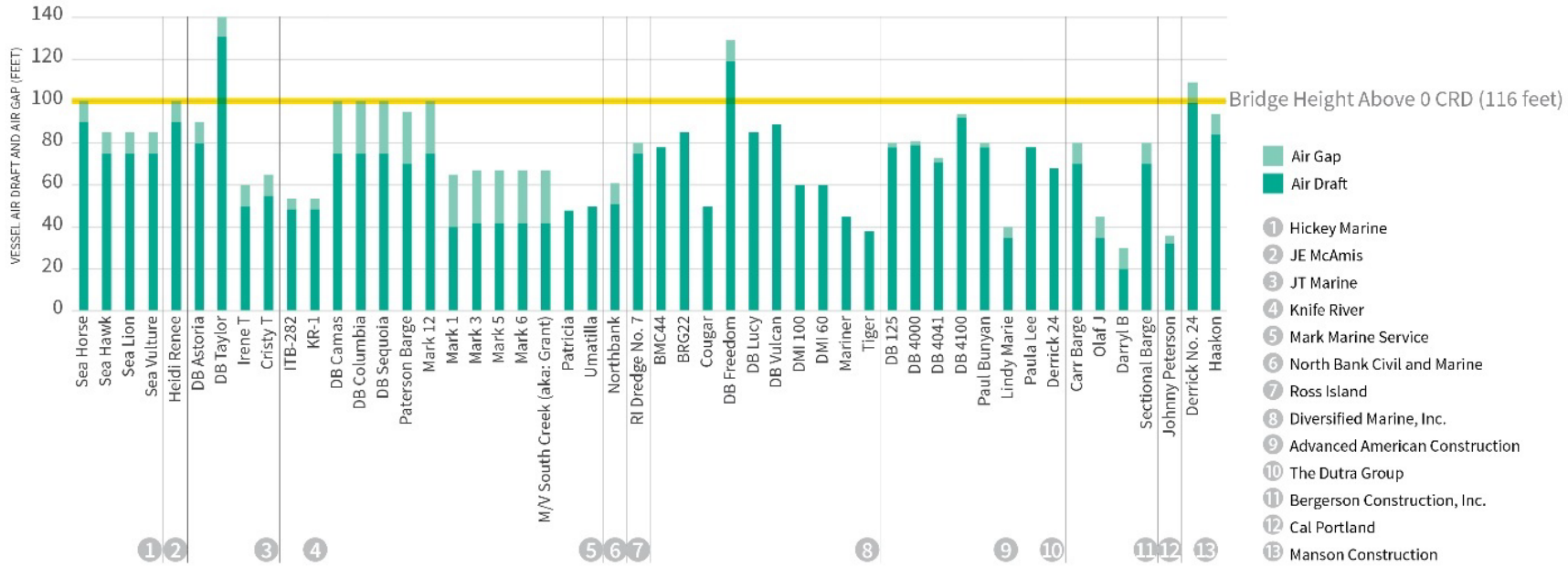
- Bergerson Construction did not respond to the request for information. They also did not respond to the request as part of the Hood River-White Salmon Bridge Replacement NIR. The CRC NIR included information on two barges (*Carr Barge* and *Sectional Barge*) and two tugboats (*Darryl B* and *Olaf J.*). The CRC NIR indicated that the two barges have air drafts ranging from 40 to 150 with the spuds raised. The air draft on the largest vessel with the spuds lowered is 78 feet and the crane lowered is 52 feet. The two tugboats have air drafts of 20 and 35 feet. All four vessels require at least a 10-foot air gap. The vessels transit the Columbia River as contracts require. The Bergerson Construction website does not provide information on their vessels.
- CalPortland Company did not respond to the request for information. The CRC NIR indicated that CalPortland operates a tugboat (*Johnny Peterson*) and a dredge (*Sanderling*), each with an air draft of 32 feet and a preferred air gap of at least 4 feet. The report further noted that the tugboat and dredge transits under the existing Interstate Bridge approximately eight times a month all year.
- Diversified Marine, Inc. (Diversified Marine) provided information on three derrick barges (*DB Freedom, DB Lucy,* and *DB Vulcan*), two spud barges (*BMC44* and *BRG22*), two barges (*DMI 100* and *DMI 60*) and three tugboats (*Cougar*, *Mariner*, and *Tiger*). The *DB Freedom* is the largest of the derrick barges, with an air draft of 119 feet with the crane lowered. The *DB Lucy* has a reported air draft of 85 feet (the CRC NIR noted an air draft of 73 feet with the crane lowered), and the *DB Vulcan* has an air draft of 89 feet (the CRC NIR noted that this height was with the crane lowered). The derrick barges have a desired air gap of 10 feet. The two spud barges (*BMC44* and *BRG22*) have air drafts of 78 and 85 feet, respectively, with spuds raised. The two barges (*DMI 100* and *DMI 60*) both have air drafts of 60 feet. Diversified Marine's three tugboats (*Cougar*, *Mariner*, and *Tiger*) have air drafts of 50, 45, and 38 feet, respectively. Diversified Marine did not provide any information related to frequency of transit. However, as part of the CRC NIR, they indicated that their vessels travel on the Columbia River as contracts are awarded and one trip a month all year is estimated for each vessel.
- The Dutra Group did not respond to the river user survey. They also did not respond to the request as part of the Hood River-White Salmon Bridge Replacement NIR. The CRC NIR included information on two crane barges (*Derrick 24* and *Paula Lee*). The CRC NIR indicated that the crane barges have the potential to work on the Columbia River. The highest point on the cranes

during transit is the A-frame. The *Derrick 24* has an A-frame height of 67 feet 4 inches, and the *Paula Lee* has an A-frame height of 77 feet 6 inches. The CRC NIR also indicated that the height of the A-frame above the waterline assumes the freeboard is half the hull height (halfway between the light- and full-loaded draft). Both vessels are still listed as part of the Dutra Group's fleet on the company website (http://www.dutragroup.com/equipment-aggregates-dredging-marine-construction.html?id=39).

- Hickey Marine Enterprises (HME) did not respond to the request for information. As part of the river user outreach for the Hood River-White Salmon Bridge Replacement NIR, HME provided information on four derrick barges (*Sea Hawk*, *Sea Horse*, *Sea Lion*, and *Sea Vulture*). HME indicated on the vessel data sheets that the *Sea Hawk*, *Sea Lion*, and *Sea Vulture* all have an air draft of 75 feet and a desired air gap of 10 feet, and the *Sea Horse* has a spud height of 90 feet and a desired air gap of 10 feet. The *Sea Horse* has a gantry height of 75 feet. Information on the gantry heights for *Sea Hawk*, *Sea Lion*, and *Sea Vulture* was not provided in the Hood River-White Salmon Bridge Replacement NIR river user survey. The CRC NIR indicated gantry heights of 28 feet, 34 feet, and 43 feet, respectively. The CRC NIR also indicated that trips primarily occur between October and March during the in-water work window, and the company estimated that their barges go upriver approximately six times per year.
- JE McAmis did not respond to the request for information. As part of the river user outreach effort for the Hood River-White Salmon Bridge Replacement NIR, JE McAmis provided information on one derrick barge (*Heidi Renee*). They indicated that the *Heidi Renee* is primarily used for dredging and marine construction and has an air draft of 90 feet (spuds up) and a desired air gap of 10 feet. The spuds can be lowered or removed (the data sheet for the Hood River-White Salmon Bridge Replacement NIR indicated that this is not ideal) for transit. The CRC NIR indicated a height of 12 feet with the spuds removed. The CRC NIR also noted that the company transits the river as required when contracts are awarded.
- JT Marine provided information on two tugboats (*Christy T* and *Irene T*), two crane barges, (*DB Astoria* and *DB Taylor*), and one towboat (*LeAnne T*). *Christy T* has an air draft of 55 feet and *Irene T* has an air draft of 50 with a desired air gap of 10 feet. *DB Astoria* has a height of 80 feet with spuds up and 30 feet with spuds removed. *DB Taylor* has an air draft of 90 feet with spuds and 75 feet with spuds removed. The *DB Taylor* can operate with a boom of 160 feet or 220 feet. The longer boom cannot be lowered to the cradle and has an air draft of 131 feet. A desired air gap of 10 feet was reported for both vessels. An air draft was not reported for the *LeAnne T.* JT Marine indicated that the vessels transit under the Interstate Bridge approximately 10 times per month, all year and one time per month all year under the Oregon Slough bridge.
- Kiewit Corporation confirmed that the vessel information provided for the CRC remained accurate. Six crane barges (*DB General, DB Alameda*, *DB Oakland*, *DB Olympia*, *DB Pacific*, and *DB Seattle*) were identified as having been upriver in the past. Air drafts for these barges range from 70 to 93 feet, with the *DB General* as the tallest vessel. Desired air gaps are 5 to 10 feet. The CRC NIR indicated that there is an optimal angle for the crane boom to be positioned while being towed. If the height is too tall to transit under a bridge, the vessel is moored near the bridge, the crane is lowered to pass under the bridge, and then the vessel is moored again, and the crane raised to the proper tow height.

- Knife River Corporation (Knife River) did not respond to the request for information. As part of the river user outreach for the Hood River-White Salmon Bridge Replacement NIR, Knife River provided information on two deck barges (*KR-1* and *ITB-282*), both with an air draft of 48.5 feet and a desired air gap of 5 feet. In the CRC NIR, Knife River provided information on the *KR-1* and indicated that the deck barge transits the area approximately 4 to 19 times a month all year.
- Manson Construction did not respond to the request for information. They also did not respond to the request as part of the Hood River-White Salmon Bridge Replacement NIR. The CRC NIR included information on two crane barges (*Derrick No. 24* and *Haakon*). The *Derrick No. 24 is* a crane barge with an air draft of approximately 99 feet and a desired air gap of 6 feet. The *Haakon* has an 84-foot air draft and a desired air gap of 5 to 10 feet. The height provided is for the gantry, and no information was provided regarding the ability to modify for lower clearances. The CRC NIR indicated that the *Derrick 24* had not been in the Columbia River system for 10 years but would go into the system if contracted to do.
- Mark Marine Services did not respond to the request for information. The company did respond to the request for the Hood River-White Salmon Bridge Replacement and the CRC Projects. The company provided information on different vessels for the two prior reports. It is not known whether the reported vessels differed due to the different locations of the projects on the Columbia River or if it were due to changes in their fleet. Vessel characteristics as reported in both prior reports is included here. For the Hood River-White Salmon Bridge Replacement NIR, Mark Marine Services provided information on nine barges (*DB Camas*, *DB Columbia*, *DB Sequoia*, *Paterson Barge*, *Mark 12*, *Mark 1*, *Mark 3*, *Mark 5*, and *Mark 6*) and one tugboat (*M/V South Creek*). Of these vessels, the highest air draft is 75 feet, and all desired air gaps are 25 feet. No information was provided in the Hood River-White Salmon Bridge Replacement river user survey regarding whether they can be modified for lower clearances. The CRC NIR indicated that the *DB Camas* spud height is 75 feet and can be lowered. The CRC NIR provided information on four crane barges (*DB Camas* and *DB Columbia*, as reported above, the *Amazon*, indicated as retired, and *Barge #7*, indicated as under construction). No vessel characteristics were provided for *Barge #7* in the CRC NIR or the Hood River-White Salmon Bridge Replacement NIR. The CRC report also provided information on two towboats, *Patricia* and *Umatilla*, with heights of 48 and 50 feet, respectively. The CRC NIR indicated that the company's busiest season is November through February, corresponding with the in-water work window. The company reported passing under the Interstate Bridge an average of one trip per month for the three crane barges and one round trip per year to the Oregon Slough, but the vessels access the slough from downstream and do not cross under the Oregon Slough bridge.
- NorthBank Civil and Marine provided information on one crane barge (*Northbank*), and the vessel data sheet indicated an air draft of 51 feet with the crane boom down in the travel position and a desired air gap of 10 feet.
- Ross Island Sand and Gravel (Ross Island) provided information on one dredge (*Dredge #7*) and one tug (*Rossisle*). Ross Island indicated that Dredge #7 requires a vertical clearance of 75 feet with its positioning spuds raised. The vessels transit under the Interstate Bridge two to four times per year.

Figure 2.7-3. Marine Contractors Air Draft and Air Gap Results



Construction equipment used by marine contractors accounted for an average of 17% of bridge opening events, ranging from no lifts (2013) to a high of 32% (1989 and 2000).opening events, ranging from no lifts (2013) to a high of 32% (1989 and 2000). Bridge transits by marine contractors are dependent upon their home location and the location of the construction project. Three marine contractors are located upriver of the I-5 bridges (including JT Marine, Mark Marine Services and SDS Tug & Barge). These contractors transit the I-5 bridges for downriver construction projects or to pick up supplies from downriver locations. Contractors that are located downriver of the I-5 bridges must transit the bridges for projects located upriver of the bridges.

Marine contractors reported they use the river on an as-needed basis all months of the year depending on the timing of the construction project. Air drafts for construction equipment ranged from 40 to 131 feet.

Marine contractor derrick barges make up the majority of the identified vessels that are impacted by the bridge heights studied due to the height of the crane elements. Contractors typically operate crane barges that conduct a wide range of water-related construction activities. FHWA regulations for bridges specify that special navigation clearances shall normally not be provided for floating construction equipment unless required for navigation channel maintenance (23 CFR 650.807(g)). Derrick barges are often used for dredging and could be used for maintenance or repair of navigation locks. No information was available to determine the status of the specific equipment related to these activities, and no equipment was eliminated from consideration specifically because of these regulations. The following vessels (arranged by the contractors) were considered to be potentially impacted.

Advanced American Construction

Under the assumed conditions, the *DB 4100* would not be able to pass under a bridge height of 116 feet in the vessel's current configuration. The *DB 4100* could pass at least 90 % of the days of each month of the year with a 10-foot air gap, and greater than 98% of days in all months of the year with a 5-foot air gap. The *DB 4100* would not be impacted under the assumed conditions for a bridge height of 121 feet. Accordingly, for the purposes of this analysis, there is no substantial impact at either height.

General Construction Company

Under the assumed conditions, the *DB General* would not be able to pass under a bridge height of 116 feet in the vessel's current configuration. However, when considering the seasonal variations in the river stages and the ability to use a smaller air gap, the *DB General* would be able to pass under a 116-foot bridge during much of the year. The *DB General* could pass under the replacement bridges more than 90% of the days in all the months of the year except the highest-flow months of May and June, when it could pass about 85% and 80% of the days, respectively. The *DB General* would not be impacted under the assumed conditions for a bridge height of 121 feet. The *DB General* also cannot go any farther up the river than the Bonneville dam due to the vessel's beam. Accordingly, for the purposes of this analysis, there is no substantial impact.

JT Marine

Under the assumed conditions, the *DB Taylor* would not be able to pass under a bridge height of 116 feet or 121 feet in the vessel's current configuration when outfitted with a 220-foot crane boom.

Diversified Marine

The *DB Freedom* has an air draft of 119 feet with the crane lowered and would not be able to pass under a bridge height of 116 feet or 121 feet in the vessel's current configuration. Their normal setup for transporting the vessel is to place the crane boom over the top of the tug placed at the stern of the barge. In that position it requires an air draft of up to 119 feet (depending on the tug used for moving the barge). When needed for transiting under obstacles with limited clearance, they have rotated the crane boom to the side of the tug, and lowered it to the level needed to pass under the obstruction. This requires that a crane operator be placed on the barge while in transit. Accordingly, for the purposes of this analysis, there is no substantial impact.

Manson Construction Company

Derrick No. 24 has an air draft of approximately 99 feet and a desired air gap of 6 feet and would be impacted under the assumed conditions for a bridge height of 116 feet. Based on water levels it could pass with a 5-foot air gap at least 90% of the days in all the months of the year except the highest-flow months of May and June, when it could pass at least 75% of the days. It could pass at least 80% of the days of the year, including at least 50% of the days during the high water months of May and June. It would also be impacted by a bridge height of 121 feet but the frequency of days that it would not be able to pass would decrease. Utilizing the air gap indicated by the owner would result in no impact for a bridge height of 121 feet. Information provided by the company indicates there are no plans to bring the vessel to the Columbia River. Accordingly for the purpose of this analysis, there is no substantial impact.

SDS Lumber Company

One reported possible future shipment made by SDS would be obstructed at some point in the year by the proposed 116-foot bridge. SDS has a barge that can ship loads as high as 100 feet. Under the assumed conditions, it could pass under a 116-foot bridge between 55% and 95% of days per month for 5 months of the year (July through November), between 25% and 37% of the days per month for 5 months of the year (December through April), and between 12% and 22% of the days in May and June. With a 5-foot air gap, it could pass more than 88% of the days each month except in May and June when it could pass between 72% and 78% of the days per month. A bridge height of 121 feet would reduce the days in which it would not be able to pass but would not eliminate the restriction. The future load is speculative and is not based on history or a specific future market and updated information was not provided by SDS. Accordingly, for the purposes of this analysis, there is no substantial impact.

Future Vessels

Bridge transits by marine contractors are dependent on their home location and the location of the construction project. Three businesses that provide marine contracting services or operate crane barges are located upriver of the I-5 bridge (JT Marine, Mark Marine Services, and SDS). These contractors transit beneath the I-5 bridge for downriver construction projects or to pick up supplies from downriver locations. Contractors that are located downriver of the I-5 bridges must transit the bridges for projects located upriver of the bridges.

As discussed previously in this report, the BNSF Celilo Bridge, located 95 miles upstream of the IBR program, has a lower vertical clearance than that proposed for the replacement bridges, and any marine construction project used upstream of the Celilo Bridge will not be height constrained by the proposed I-5 bridges. Therefore, the only marine construction projects that would be constrained by the proposed I-5 bridges are those located between the current I-5 bridge and the BNSF Celilo Bridge and that are performed by firms based downstream of the IBR program, and those located downstream of the proposed bridges that are performed by firms based upstream of the IBR program.

The volume of marine construction located between the I-5 bridges and Celilo Bridge in the future will be limited by the amount of property available for development and future construction activity. As discussed under the Future Land Use Analysis, most of this area is in the Columbia River Gorge National Scenic Area, which strictly limits the types of development that may occur. Downstream of the National Scenic Area there are a limited number of sites available for water-dependent development.

Future infrastructure projects between the I-5 bridges location and the Celilo Bridge that may require water-based construction equipment could include bridge replacements, construction of docks or other in-water construction, dredging, or work on The Dalles or Bonneville dams or locks. There are known projects, such as the planned replacement of the Hood River-White Salmon bridge over the Columbia River, and unplanned projects such as dam maintenance and repair, that will likely require floating construction equipment. Since these projects are still in the planning phases or are not currently anticipated, the type and size of this equipment needed cannot be determined. However, past projects can provide an indication of potential needs.

In 2019, emergency repairs were conducted on the Bonneville dam navigation lock by Advanced American Construction. Information published by the company noted that crane barge DB 125 was needed for the repair (AAC n.d.). As shown in Section 5, this vessels would be height constrained by the replacement bridges. Another recent project was The Dalles Dam Upstream Navigation Lock Gate project in 2016. The gate was fabricated by Greenberry at the Columbia Business Center and was transported by barge upstream, where shore-based cranes installed the gate. Photographs show the equipment in transit as being lower than the tug Dauby transporting it and would not be height constrained, as shown in Section 5 (Greenberry Industrial 2021).

Many, but not all, of the marine construction vessels discussed in Section 5 will be able to transit the proposed bridge, given the current figuration of the equipment. It is also important to note that 23 CFR 650.807(g) specifies that special navigation clearances shall normally not be provided for floating construction equipment unless required for navigation channel. Based on past trends and future land

use, future marine construction is not expected to exceed past averages and would not be expected to be height constrained by the replacement bridges. Equipment that, as currently configured, is not able to pass under the proposed I-5 bridges is not precluded from working on projects past the replacement bridges but may require a temporary or permanent modification to transit the bridge.

2.7.4 Fabricators

Fabricators were contacted individually by the program team to discuss their unique navigational needs and identify future business plans that might impact the size and/or type of vessels that transit the bridge location. A summary of the information provided by each company is included below. Additional details are included in Appendix B.

- Greenberry Industrial (Greenberry) is a general industrial fabricator and contractor. The company website indicates that their Vancouver, Washington, location fabricates and ships large tanks, pressure vessels, modules, bridge steel, and large structural components. Greenberry responded to the request for information and completed a vessel data sheet. The data sheet provides additional information on the type of fabricated materials they produce. They indicated that the vessels transporting their cargo have a maximum air draft of 136 feet, with a desired 1-foot air gap.
- Thompson Metal Fab is a heavy structural steel and plate fabrication company located in Vancouver, Washington. Thompson Metal Fab responded to the request for information and provided an extensive summary of their current and potential future operations, as well as information on the height and other characteristics of their past projects that have required a bridge lift. Thompson Metal Fab indicated that they need the same clearance currently provided by the bridge lift span (178 feet) to accommodate their operations. The total height (vessel, cargo, and air gap) of the example projects they provided that previously required a bridge lift ranged from 54 feet to 161 feet. Of the 40 projects included, six had heights above 116 feet, one had a height of 116 feet, and 33 had heights below 116 feet.
- Vigor Works, LLC (Vigor) is a heavy industrial fabrication company that serves the marine, hydroelectric, nuclear, oil and gas, and steel bridge industries. Vigor merged with Oregon Iron Works in 2014 (Vigor 2014) and Oregon Iron Works information was addressed in the 2012 CRC NIR. Vigor responded to the request for information and provided an overview of their current and potential future operations at three locations and around the Columbia Business Center. Vigor operates an aluminum fabrication facility at the former Christensen Yachts site in the Columbia Business Center. This facility will focus on aluminum ships including the construction of a landing craft for the U.S. Navy (Vancouver Business Journal 2019). They indicated that their products and equipment result in an air draft of 130 feet, and they recommend accommodating an air draft of 150 feet.

Due to lack of detail in the bridge tenders' logs, it is difficult to define the bridge lifts associated with metal fabricators located at the Columbia Business Center, which is located just upstream of the Interstate Bridge in Vancouver. However, discussions with the reveal that there is a shipment every year or two, consisting of structures for the oil industry (oil rig modules), local Pacific Northwest industries (structures for forest products plants and other local firms), USACE (lock gates, fish weirs

and other structures) and departments of transportation (mainly bridge structures). Not all these shipments require bridge openings or transits under the bridge. In addition, these firms are currently fabricating structures that support offshore energy programs (wind and tidal power).

Marine industries and fabricators ship products or have vessels transiting under the bridges on an as-needed basis all months of the year.

The tallest projected future shipments from Greenberry, Thompson Metal Fab, and Vigor would not be able to pass unrestricted under a bridge height of 116 feet or 121 feet. The lower reported shipments could pass under all of the studied bridges at least during some part of the year.

Users did not provide information on specific shipments that would be impacted but based the request on past shipments and potential future shipments. Thompson Metal Fab provided detailed information on past shipments from 1973 to 2020, including height of the shipment and air gap provided. The total height (vessel, cargo, and air gap) of the example projects they provided that previously required a bridge lift ranged from 54 to 161 feet. Of the 40 projects included, 19 would be height restricted by the replacement bridges in the assumed condition, and of these nine would be restricted under any stage.

Based on this information, the frequency and type of future shipments that could be impacted is unknown but could be impacted by a bridge height of 116 feet or 121 feet. It is also not known whether it is feasible to modify the way that future shipments are constructed, assembled, or shipped such that they could transit under the replacement bridges. Therefore, these users are potentially impacted by the replacement bridges.

Based on information provided by fabricators and a review of literature, some of the fabricated structures manufactured at the Columbia Business Center could be taller in the future than the tallest shipments in the past. Oil rigs are growing in dimensions in response to new technologies such as directional drilling of oil fields. However, the primary market for these rigs is Alaska, and this area has seen a significant reduction in crude oil production and changing conditions may affect the future demand for the type of drill rigs shipped in the past. These structures may require transiting heights in excess of 125 feet. Other structures, such as fish weirs and bridge trusses, are unlikely to change significantly in the future and would not be height restricted.

Most of the fabricated metal structures are transported by ocean barges bound for destinations located outside of the Columbia River, including Alaska, California and elsewhere. Ocean barges are larger than river barges, with lengths of 400 or more feet and a beam (width) of 100 feet or more. Ocean barges cannot transit through the Bonneville lock because their beam exceeds the width of the lock chamber. As a result, future fabricated metal operations in the affected region of the river are limited to the area downstream of the Bonneville dam.

2.7.5 Annual Cargo Movements

2.7.5.1 Columbia/Snake River System

The Columbia River originates in British Columbia, Canada, and flows for 1,175 miles to its mouth on the Pacific Ocean between Oregon and Washington. The Snake River is one of the main tributaries to

the Columbia River and originates in Wyoming. It flows approximately 868 miles to the confluence with the Columbia at Columbia RM 283. The navigable portion of Columbia/Snake River System begins at the mouth of the Columbia River and extends to the head of navigation in Lewiston, Idaho, at the confluence of the Snake and Clearwater Rivers, approximately 465 miles upriver from Astoria, Oregon, as shown in Figure 2.2-1. The navigable sections include a portion that supports deep-draft oceangoing vessels and a shallow-draft system supporting primarily shallow-draft barges being pushed by towboats or tugs.

The deep-draft navigation system provides for a 43-foot-deep by 600-foot-wide channel from inside the Columbia Bar to Portland, Oregon, and Vancouver, Washington, on the Columbia River—a distance of approximately 105 miles. This section of the channel, known as the Lower Columbia- Willamette, provides deepwater access to facilities at the Washington ports of Longview, Kalama, Woodland, and Vancouver and to the Oregon ports of Astoria, St. Helens and Portland, as well as to industrial facilities and private facilities located in this area. Approximately 60 million tons of cargo passed via the mouth of the Columbia River in 2019 (including both inbound and outbound directions).

The shallow-draft navigation system begins just downstream of the I-5 bridge (at RM 106.5). The Vancouver to The Dalles portion of this section was authorized as a deep-draft system (27 feet authorized depth) to serve oceangoing vessels common at the time. However, the USACE currently maintains the channel to 17 feet based on usage. The controlling depth for the rest of the shallow-draft system (from The Dalles to Lewiston, Idaho) is 14 feet. The section of the river from Vancouver to The Dalles handled approximately 8.4 million tons of cargo annually over a five-year average from 2013 to 2017 (USACE 2021a). More than 90% of this cargo passed through the locks at Bonneville, moving mainly from upriver ports to downriver ports (primarily grain moving down river and petroleum products moving upriver).

2.7.5.2 Oregon Slough

The lower entrance to the Oregon Slough is at Columbia RM 102.5, and the upper entrance (east) is at Columbia RM 108.8. The lower end is the location of several berths operated by the Port of Portland for deep-draft cargo vessels. These include auto berths (601 and 607) and container berths (603, 604, and 605). As reported by the USACE (2019), cargo volumes in 2019 were 330,981 tons. The Port of Portland uses this lower section for storage and staging of equipment associated with the *Dredge Oregon*.

The Port of Portland provided data on vessel calls for their existing berths on the Oregon Slough, as shown in Table 2.7-1. These berths are all deep water facilities and serve vessels using the deep-draft system downstream to the mouth of the river and do not transit upriver to the I-5 bridge location.

Table 2.7-1. Port of Portland Oregon Slough Vessel Call Data by Berth and Year

Berth	2016	2017	2018	2019	2020
601	64	60	57	68	66
603	0	2	1	3	1
604	0	1	5	4	0

605	0	5	23	10	49
607	71	45	71	39	12

Upriver of the BNSF rail bridge, the waterway is dominated by floating homes and recreational vessel moorage, with some commercial traffic associated with an existing marine contractor and shipyard located just downstream of the existing I-5 bridge. The BNSF railroad bridge on the waterway saw a total of 644 openings from January 2015 to July 2021, with an average of 92 openings per year (BNSF 2021). There are relatively few vessels moored between the two bridges and the openings are likely associated with the marine contractor and shipyard

2.7.6 Impacts to Commercial/Industrial Development

The replacement bridges will likely be in place for 100 years or more, and the NIR needs to consider potential impacts from prospective upstream commercial development that could result in different navigation on the waterway. Appendix A to this report assesses land uses along the Columbia River upstream of the I-5 bridge to evaluate the potential for development that could result in prospective navigation different than that currently using the waterway. The appendix includes an analysis of existing commercial and industrial development and land uses suitable for this type of development to identify their likelihood of creating additional navigation activities that could be impacted by the proposed replacement bridges.

The analysis in Appendix A concluded that both political and geographic constraints were the primary factors affecting commercial/industrial development along the waterway. Land use restrictions imposed by the Columbia River Gorge National Scenic Area, topography, transportation access parallel to shorelines (SR 14, Interstate 84 [I-84], and BNSF and Union Pacific railroads), and existing open spaces limited the areas for future water-dependent land uses. All the industrial uses between the BNSF bridge and BNSF Celilo Falls rail bridge are in urban areas and primarily within established industrial parks (e.g., Columbia Business Center, Port of Cascade Locks Industrial Park). There were no planned developments within the study area that would be served by marine transport that could be impacted by the proposed replacement bridge height.

Industrial Campuses Trend

Based on interviews and a literature review, most of the industrially zoned sites along the Columbia River that are owned by ports are being planned as industrial campuses that support light industrial and commercial uses and that will not generate marine traffic or include marine facilities (e.g., docks). This includes properties at the Columbia Business Center, Port of Cascade Locks, Port of Hood River, the Troutdale Reynolds Industrial Park, The Dalles, and Stevenson.

Existing Site Constraints

In many cases, the linear rights-of-way of SR 14, I-84, and the BNSF and Union Pacific railroads, on both sides of the river, can restrict lot depth, making the area less conducive to certain types of

development. Given the steep topography and limited area for placement of these rights-of-way, they often run along the shoreline, precluding industrial development.

Riverfront Trails

Many jurisdictions (such as Hood River, The Dalles, and Vancouver) have recreation trails and plans for future recreation trails and trail expansions along the river. Such trails can create a barrier to other marine-dependent uses of the Columbia River shoreline.

Redevelopment Potential of Industrial Sites with Existing Marine Structures

Redevelopment of sites that have existing marine traffic docking structures could be significantly easier and less expensive because redevelopment of such sites would have the potential to bypass, or have less arduous, environmental permitting requirements than required for new development.

2.7.6.1 Summary of Findings by Subarea

Within the program area, there are undeveloped and potentially re-developable sites along the Columbia River, which are zoned for industrial and other uses that could generate marine traffic that requires varying navigational clearances. Additionally, there are sites that have existing marine infrastructure, such as lumber mills, that could also be redeveloped with different water-dependent uses in the future and that could use the existing marine infrastructure. These sites are primarily located within incorporated jurisdictions.

This section summarizes the findings by subarea.

Clark County, Washington (Vancouver)

The water-dependent industrial sites within the jurisdiction of the city of Vancouver include industrial uses at the Columbia Business Center (metal fabricators include Thompson Metal Fab, Vigor and Greenberry, and JT Marine, a marine contractor), the Western Forest Products property, and the Lafarge property. Recreational water-dependent uses exist at the recreational moorage at Steamboat Landing Marina, Tidewater Cover Marina, and several docks associated with private residences.

It is uncertain whether all of the parcels in the Columbia Business Center will remain in industrial use over the long run. Some of the main fabrication buildings were built in the 1940s. If these areas are redeveloped, it could be as mixed use (residential, commercial and retail uses) like the area immediately to the west. A portion of the eastern shoreline of the Columbia Business Center is owned by Vigor, which has indicated that it will continue in long-term industrial use.

Only the uses at the Columbia Business Center are currently height constrained in the affected area in the city of Vancouver. The height-constrained uses include fabricated structures such as oil rig modules and fish weirs, among others, and marine equipment owned by JT Marine. Based on existing land use regulations, there are no vacant waterfront parcels that could be placed in industrial use.

The Steamboat Landing Marina and private moorages typically serve smaller powerboats and sailboats (up to 40 feet) and are not known to be height constrained. Tidewater Cover Marina has slips available for vessels ranging from 40 to 110 feet. Some recreational sailboats may experience height constraints, depending on the option under consideration.

Clark County, Washington (Camas)

There are two existing water-dependent sites within the jurisdiction of the city of Camas, including the Georgia Pacific Camas Mill and the city of Camas Boat Ramp. The Georgia Pacific Camas Mill has ceased operations of its marine facilities but they remain in place. It is likely that both sites could remain under marine uses in the future.

The Georgia Pacific mill site would not be constrained because it already has a height constraint imposed by the bridges that connect U.S. 14 to Lady Island.

The city of Camas leases a portion of the Columbia River shoreline to Mark Marine Service. The city is in the process of renewing the property lease for an additional five years beyond the current lease. Future use of this parcel could remain in industrial use or change to public access. Mark Marine Vessels are addressed earlier in this report.

Clark County, Washington (Washougal)

The waterfront industrial property in Washougal has been rezoned to highway commercial zoning and is undergoing a process of waterfront revitalization, focusing on mixed-use development (residential and commercial). This development encompasses the Port of Camas-Washougal marina, the site of the former Hambleton Lumber Mill, and the Port of Camas-Washougal's 6th Street property. These three properties are collectively referred to as the Washougal Waterfront.

Most of the moorage slips at the Port of Camas-Washougal marina are covered and are only usable by power boats, which are not height constrained. It is possible that some of sailboats at the marina could be height constrained by the bridge height options being studied. However, most of the sailboats are 50 feet or less in length, and sailboats of this size will not be height constrained by the IBR program.

Industrial development in Washougal is centered in the Port of Washougal's industrial properties at the eastern edge of the city. Heavy industrial zoning at this site accommodates uses such as bulk petroleum product terminals, plants, and storage facilities, which could generate marine traffic. However, a levee and recreation areas/trails parallel the river and separate the industrial site from the water, which inhibits marine industrial uses along the riverfront in Washougal.

Skamania County, Washington

The industrial waterfront properties in Skamania County have traditionally been used by the forest products industry, including the mill sites at Stevenson, Home Valley, and Underwood. As the forest product sector has declined, properties have been held by forest product firms for potential future reuse as a mill site or have been planned for redevelopment to resort or mixed-use development. The

proposed I-5 bridges do not impose a height constraint on shipping activities because log rafts or barges can easily pass under the bridge for destinations transiting downriver of the bridge.

The Port of Skamania owns a business park, cruise terminal, and boat launch at Stevenson. The port's property at Stevenson Landing is on the waterfront and has a cruise ship dock but does not offer waterfront access for water-dependent firms requiring barge service. Within the city of Stevenson, there is interest by the community to enhance recreational waterfront with public access.

Other land holdings in Skamania County provide space for commercial and industrial tenants but do not have direct access to the Columbia River (e.g., the Port of Skamania County's Cascades Business Park, the Lewis and Clark Business Park, and the Wind River Business Park).

Klickitat County, Washington

Most of the occupied industrial lots along the riverfront in Klickitat County are used by the timber industry, which generates cargoes (logs, wood chips, and aggregates, etc.) that are not height constrained. It is expected that the bridge will not have any impacts to shipping related to the timber industry. SDS operates a marine subsidiary from their location in Bingen. Vessels operated by SDS are addressed in Section 5.4.

There are some undeveloped industrial lots along the river in Klickitat County. The county's Industrial Park zoning allows for boat building, assembly, and fabrication of metal products, and additional manufacturing activities as uses permitted outright. However, many of the industrially designated lots are constrained by the railroad right of way, which creates shallow lots from the river and potentially limits large industrial structures on the site.

There are also vacant developable industrial lands at Dallesport Industrial Park. However, the BNSF railroad right of way cuts through the property near the river, leaving a narrow band of land adjacent to the river that is currently used by a barge terminal. It is unlikely that future uses would be height constrained at this location.

Multnomah County, Oregon (Portland)

There are many recreational marinas in the area between Hayden Island and Government Island that are used by both powerboats and sailboats. There are no known plans to change land uses in this section of the riverfront.

Multnomah County, Oregon (Fairview and Troutdale)

The industrially zoned sites in this area generate marine traffic that primarily consists of tugs and barges, which are not height constrained.

The Knife River aggregates terminal in Troutdale is not expected to change uses in the near future. Tugs and barges serving this facility are not height constrained.

Sundial Tug & Barge Works shipyard was closed by Tidewater in early 2011 because the vessel repair and construction business was cyclical and not a core business function. The facility is currently idle,

many of the marine facilities have been removed and the site could be sold or redeveloped. (Oregonian 2011)

The recently developed Troutdale Reynolds Industrial Park is located on the former 700-acre brownfield previously used by Troutdale Aluminum. The site's main tenants are Amazon and FedEx. The development does not include marine facilities, none are planned by the Port of Portland and shallow water would make development of marine facilities difficult.

Hood River County, Oregon (Cascade Locks)

There are undeveloped industrial lots along the river in the city of Cascade Locks. Some of these lots are zoned as light or heavy industrial and could be developed with marine uses. Other available lots in Cascade Locks have been identified for types of development that would not generate marine traffic, such as a business park serving non-water-dependent firms, or entertainment and recreational uses, potentially including a casino.

Cascade Locks is positioning itself as a sailboat racing destination. In general, there is a desire to attract the international sailing community, but the sailboats using this area are smaller and not height constrained by the proposed bridges.

Hood River County, Oregon (Hood River)

Activities that generate marine cargo are limited along Hood River's riverfront, due to the railroad tracks that abut the river for a large portion of the shoreline. In the Port of Hood River area, the emphasis is on recreational development and business park development rather than marine-based industrial uses.

Cruise ships that call Hood River are addressed in Section 5.4. The sailboats homeported in Hood River or calling on a transient basis at Hood River are typically less than 40 feet long and, as a result, are not constrained by the proposed height of the replacement bridges.

There are no known existing or future activities that would be height constrained in Hood River.

Wasco County, Oregon

Bernert Barge Lines and Mid Columbia Producers have barge terminals at the Port of The Dalles. The tugs and barges calling at these terminals are not constrained by the proposed height of the IBR program. The sailboats homeported at or visiting the port's marina are typically smaller and are not height constrained by the replacement bridges.

A new cruise dock was opened in The Dalles in September 2012 that provides a float to serve transient recreational boats, as well as a fixed pier for cruise ships.

Other industrial developments are focused on redevelopment of the Northwest Aluminum site, which offers approximately 120 acres for commercial and industrial development. This site does not provide riverfront access.

Summary of Redevelopment Opportunities

Based on the analysis in Appendix A, there are no known planned developments that would significantly increase navigation or require the use of vessels that would be height constrained by the proposed replacement bridges. Efforts are underway in upriver counties to reuse vacant or underutilized industrial waterfront parcels in forest products manufacturing (which is not height constrained) or in non-water-dependent uses, including commercial business parks, mixed-use residential/commercial developments, and tourist centers.
The sections below further summarize the 2012–2020 bridge lift data by vessel type.

2.8 Marine Facilities

The Columbia River near the program area has a high concentration of marine facilities. These include many marinas and services for recreational vessels, as well as a number of ship maintenance facilities. There is a higher concentration on Oregon Slough than on the main Columbia River channel. Recreational facilities are concentrated upstream of the I-5 bridges while cargo terminals are concentrated downstream. Figure 2.8-1 shows the location of the facilities within 3 miles and Table 2.8-1 contains details on the name, contact information and type of facility.

Figure 2.8-1. Marine Facilities within 3 Miles of the Interstate 5 Bridge

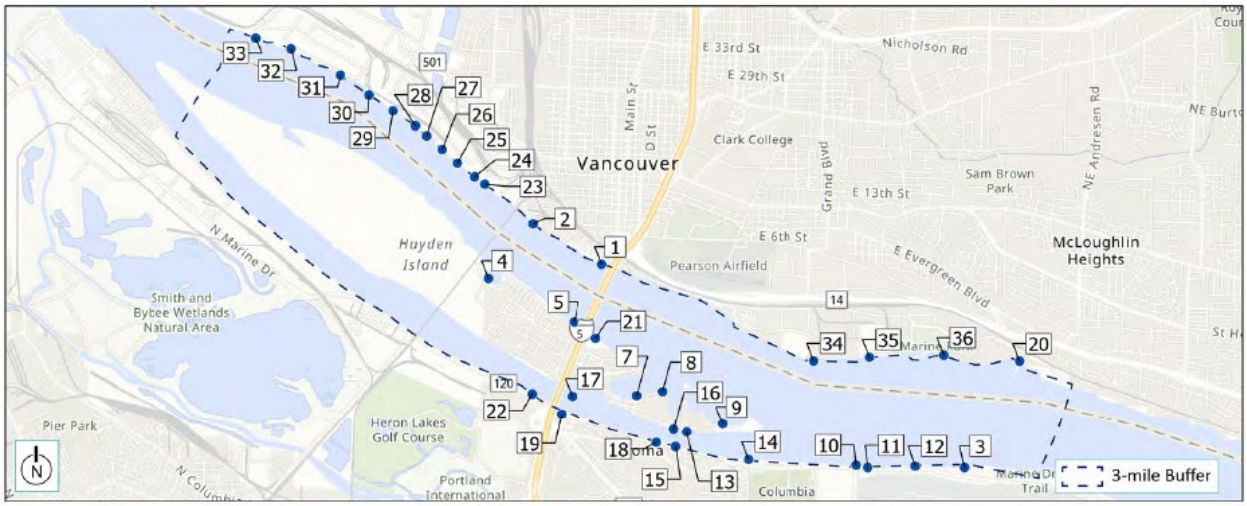


Table 2.8-1. Marine Facilities within 3 Miles of the Interstate 5 Bridge

Map ID	Name	Type of Facility	Contact Information
1	Terminal 1	Public dock, cruise vessels and small craft	info@portvanusa.com, 360-693-3611
2	Lafarge Terminal	Private cement terminal	nicholas.stevens@lafargeholcim.com 360-695-9208
3	James M Gleeson Boat Ramp	Boat launch (small craft)	parksguestservices@oregonmetro.gov, 503-665-4995
4	Schooner Creek Boat Works	Vessel services	Info@schoonercreek.com, 503-735-0569
5	Old Red Lion Dock	Abandoned recreation dock	N/A
6	Jantzen Bay Marina	Marina	leasing@columbiacrossings.com, 503-283-2444
7	Hayden Bay Marina	Marina	leasing@columbiacrossings.com, 503-283-2444
8	Columbia River Yacht Club	Yacht club	503-289-6561
9	Tomahawk Bay Marina	Marina	leasing@columbiacrossings.com, 503-283-2444
10	McCuddy's Marina	Marina	mark@mccuddysmarina.com, 503-808-9992
11	Tyee Yacht Club	Yacht club	https://www.tyeeyc.com/contact, 503-284-4771
12	Rose City Yacht Club	Yacht club	https://rosecityyachtclub.org/about, 503-652-1549
13	Tomahawk Island Marina	Marina	info@tomahawkislandmarina.com, 503-289-5511
14	Portland Yacht Club	Yacht Club	admin@portlandyc.com, 503-285-1922
15	Columbia Way West Marina	Marina	503-839-4459
16	McCuddy's Marina	Marina	mark@mccuddysmarina.com, 503-808-9992

Table 2.8-1. Marine Facilities within 3 Miles of the Interstate 5 Bridge

Map ID	Name	Type of Facility	Contact Information
17	Jantzen Beach Fuel Dock	Fueling station	503-863-9641
18	Captain's Moorage	Floating home moorage	503-908-5995
19	Marineland at Pier 99	Marina	503-286-8221
20	Tidewater Cove Marina	Marina	360-977-2015
21	Red Lion Hotel on the River Jantzen Beach	General dock (cruise vessel use)	503-283-4466
22	Diversified Marine	Vessel services, marine contractor	kurt@dmipdx.com, 503-289-2669
23	Grain Elevator	Grains (includes barge offloading)	info@portvanusa.com, 360-693-3611
24	Berth 1	Break bulk	
25	Berth 2	Heavy lift and bulk export	
26	Berth 3	Heavy lift	
27	Berth 4	Roll on Roll off	
28	Berth 5	Liquid bulk	
29	Berth 7	Dry bulk	
30	Berth 8	Multi Use	
31	Berth 9	Multi Use	
32	Berth 10	Auto & Roll on Roll off	
33	Berth 13 and 14	Lay berth	
34	JT Marine	Vessels services, marine contractor	timo@jtmarineinc.com, 360-750-1300
35	Marine Park Boat Launch	Boat launch (small craft)	parksrecculture@cityofvancouver.us, 360-487-8311
36	City Boat Basin	Fire boat moorage, vessel launch and outfitting	Chad.eiken@cityofvancouver.us, 360-487-7882

These facilities predominantly serve small recreational craft (power and sail). Except as noted below the facilities will not be directly or indirectly impacted by the replacement bridges.

There are three existing shipyards or vessel repair facilities within 3 miles of the program area: JT Marine, Schooner Creek Boat Works, and Diversified Marine.

JT Marine is located approximately 1.5 miles upstream of I-5 in the Columbia Business Center in Vancouver. JT Marine offers a full range of shipyard services including dry dock, vessel repair, new vessel construction and vessel deconstruction. Facilities include a 1,200 ton dry dock, 1,000 feet of dock space and overhead cranes (JT Marine 2021).

Schooner Creek Boat Works is located approximately .75 miles downstream of the program area on Hayden Island between the BNSF railroad bridge and the existing Interstate Bridge. Schooner Creek provides full service boat repair and manufacturing of small recreational and commercial vessels. Facilities include in-water docks, upland yard, and 35-ton and 70-ton travel lifts (Schooner Creek 2021).

Diversified Marine is located on Oregon Slough just downstream of the existing I-5 bridge. This yard offers repair, retrofit and construction of tugs, barges and commercial steel vessels. Vessels up to 100 feet wide and 300 feet long can be accommodated. Facilities include 100 ton and 700 ton dry docks (Diversified Marine 2021).

The Port of Vancouver's Terminal 1 facility is located on the north bank of the river just downstream of the existing I-5 bridges. This facility is partially within the bridge footprint and would potentially require portions of the existing dock and building to be removed. This site consists of a timber dock occupied by a vacant restaurant and hotel buildings. Currently, the timber dock and portions of an adjacent downstream concrete dock are used by river cruise vessels. Only a portion of the dock is anticipated to be impacted and would not impact the ability to use the dock for its current purpose. In addition, the Port of Vancouver has plans to remove the existing buildings on the dock and rebuild the dock with a modern structure and redevelop the upland elements (Port of Vancouver 2021).

Just downstream of the bridge on the Oregon side of the river is a facility that used to serve as a dock for a hotel that has since been demolished. This dock is not serviceable, and several abandoned vessels are located just offshore. This facility will likely be removed to accommodate the replacement bridges. Since it does not provide any marine services, the removal will not impact navigation or services.

On the Oregon Slough, the I-5 bridge is flanked by private moorage facilities for floating homes and recreational vessels. Portions of these facilities may be impacted by the replacement bridge over Oregon Slough, but details have not been determined (FHWA and FTA 2011). They do not provide any critical marine services such as fuel or repair activities and would not reduce available marine services on the waterway.

2.9 Local Service Facilities

The proposed bridge will not block access to any of the facilities noted in the prior section. The JT Marine facility is located upstream of the bridge and offers shipyard services. Vessels that are not able to transit under a bridge height of 116 feet would not be able to access the facility. Based on the size of the shipyard facility and information on past jobs provided on the companies' website, the shipyard primarily serves smaller vessels such as tugs, fishing vessels and barges. Vessels within these categories were not shown to be impacted by the proposed bridge. Larger shipyards such as Vigor on Swan Island are located downstream of I-5 and are available to serve larger vessels.

2.10 Alternate Routes

Alternate routes can provide vessels that are restricted from transiting the bridge location a way to avoid the restriction. The main Columbia River does not have an alternate route available. However, vessels that may be restricted by the proposed bridges over the Oregon Slough can use the main Columbia River as an alternate route, as it has greater horizontal and vertical clearances. Because of the existing clearances on the Oregon Slough bridge, there will be no change in the number of vessels that will need to use this alternative route.

2.11 Harbor Refuge

Harbors of refuge can play a critical safety role by allowing craft to seek shelter in protected waters during weather events or flooding .A harbor of refuge is defined as a naturally or artificially protected water area that provides a place of relative safety or refuge for commercial and recreational vessels traveling along the coast or operating in a region (USCG 2016). The Columbia River is not an open ocean or a coastal area and is therefore not subject to the same type of conditions that require harbors of refuge. Wind and wave conditions on the river do not affect vessels the same way as the conditions would in coastal areas near the mouth of the Columbia River.

Nearby marinas and the Oregon Slough can provide refuge for small craft during extreme weather events. There are several boating facilities located upriver from the project bridge, such as Donaldson Marina, Steamboat Landing, and the M. James Gleason Ramp, which can provide small craft refuge (OSMB 2007). The project would not block access to these sites, and small craft are not likely to be affected by changes to vertical or horizonal clearances. Commercial vessels are not generally impacted by weather conditions on the Columbia River and Oregon Slough and are too large to find refuge outside the channel. These larger vessels would either seek dock space or anchor as needed, should weather conditions dictate.

2.12 Waterway Bends

NOAA Chart 18526 (NOAA) shows the nature of the waterway and navigation channel within the project vicinity. This chart indicates that there are not bends in the waterway within .5 mile of the I-5 bridge. However, under the I-5 bridges, vessels pass through one of three channels: the primary channel, the barge channel, or the alternate barge channel. The primary channel lies under the bridges' lift spans and has a horizontal clearance of 263 feet and a vertical clearance of 39 feet in the closed position and 178 feet in the raised position.

The highest clearance of these alternate channels provides a vertical clearance of 72 feet. Typically, vessels require bridge openings either because they are too tall to pass under the alternate channel fixed spans or because the location of the primary channel provides a safer line for navigating between the I-5 bridges and the bridge opening in the BNSF bridge just downriver. The primary channel under the I-5 bridges lines up with the opening in the BNSF bridge, while the alternate channels under the I-5 bridges are located toward the center and south bank of the river, thus requiring vessels to make an S-curve maneuver between the I-5 bridges and the BNSF bridge opening.

2.13 Other Factors

Factors such as dockages, lightering areas, and existing bridges located within 0.5 miles of the proposed bridges may create hazardous passage through the proposed structure. There are not existing bridges within 0.5 miles of either crossing. However, BNSF railroad bridges are located approximately 1 mile downstream.

Marine facilities and dockages are addressed in Section 8. There are three facilities within 0.5 miles of the bridge. There are two facilities on the Oregon shoreline that do not impact navigation as they are located away from the navigation channel and areas where most navigation occurs. The Port of Vancouver's Terminal 1 is located just downstream of the I-5 bridges. The dock face is close the navigation channel and when cruise or other vessels are moored at the facility, they may come close to or infringe on the primary channel. This situation may require special consideration when vessels are transiting the primary channel.

According to USACE navigation project information and NOAA charts, there are no designated anchorages or lightering areas within the vicinity of either bridge on the main Columbia River or in the Oregon Slough. USCG regulations do not establish any regulated navigation areas proximate to the replacement bridge locations. Oregon Slough is subject to "Slow-No Wake" requirements by the State of Oregon which limits vessel speed within 200 feet of marinas and/or floating home moorages and 5 mph speed limit from west of the BNSF bridge east to the eastern entrance to the waterway from the Columbia River.

2.14 Hydraulic Conditions

Currents at the bridge location are generated by flows released at Bonneville dam. According to the Federal Emergency Management Agency Flood Insurance Study for Portland, Multnomah County, Oregon dated November 26, 2010, the average cross-sectional velocity for the 100 year flood near the I5 bridge is 3.8 feet/sec (2.25 knots) (FEMA 2018). Note that this velocity is the average of the entire cross section. Localized velocities, especially near the center of the channel, could be greater. During low flow periods the current is affected by tides, such that slack tide can result in very little to no current. Currents used in the simulation effort are shown in Table 2.14-1. No current information was found for the Oregon Slough.

Table 2.14-1. Columbia River Currents

Designation	Discharge at The Dalles (KCFS)	River Gage @I-5 Bridge (CRD)	Current Magnitude (fps/knots)
Normal	140	2.8	1.84/1.09
Transition	400	14.5	3.65/2.16
10-Year	540	19.1	4.35/2.58

Key:
CRD = Columbia River Datum
fps = feet per second
I-5 = Interstate 5
KCFS = 1,000 cubic feet per second

When traveling with a river current, vessels need to maintain a faster speed than the current to provide steerage. Consequently, at higher river velocities, speed over ground is increased and the required distance to negotiate turns becomes greater. Should the vessel need to stop for any reason, it must compensate for the river flow by backing down. If the vessel is towing a non-self-propelled barge or other vessel, the tow can lose control and the only chance to stop the tow would be to turn around. Barges being towed often have a tug alongside them while transiting under bridges and along other parts of the river to provide greater control.

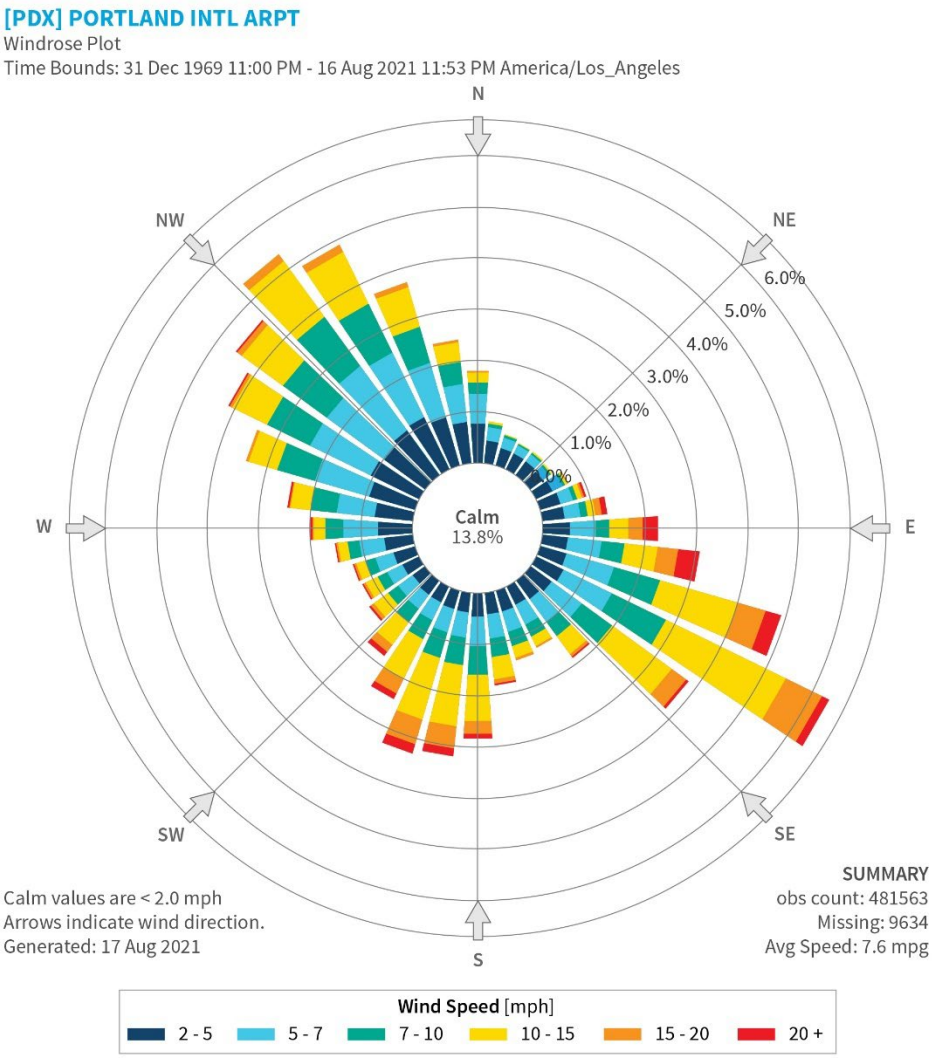
2.15 Atmospheric Conditions

2.15.1 Wind and Wave Environment

Wind forces on a vessel produce two impacts: a sideways drift and a turning moment. The degree to which wind affects a vessel depends on the relative direction of the wind, the ratio of wind speed to vessel speed, the depth to draught ratio, the vessel profile and whether the vessel is in a light or loaded condition. The impacts of waves and when they should be considered in navigation channel design is discussed at length in USACE EM 1110-2-1613, Chapter 5-2 and 6-4 (USACE 1995). For large ships and tows, waves must have a length of approximately half the length of the vessel. This would require swell waves that occur near the entrance of the river to the ocean. In the program area, the waves that would be present would be local wind-generated waves that have a much shorter wavelength than would be required to affect the vessel's behavior.

Winds from the bow are generally not a concern for wind speeds less than 10 times the vessel speed. However, winds become a greater concern as they increase or shift abeam. The maximum impact occurs when the wind direction is perpendicular to the ship's beam. Transiting in a strong wind or through a curve requires more skills and room for navigational tolerance than transiting in a light wind. Wind observations from the Portland airport weather station show that when strong winds occur they are predominantly from the northwest and southeast, in general alignment with the river and channel. Winds can occur from the south but are not the predominant direction (see Figure 2.15-1).

Figure 2.15-1. Portland Airport Windrose Plot



Source: Iowa State University (2021)

Wind waves are not a hazard to navigation in rivers except during storms (USACE 1980). Studies completed in the area have evaluated wave conditions (Coast & Harbor Engineering 2012). Waves in this stretch of the river are generated by passing ships and windstorm events. Waves of this size would not be expected to affect tugs and tows and larger commercial vessels due to their weight and length at the waterline, which serve to reduce the impacts of waves on the vessels. For smaller vessels, the specified air gap should provide adequate margins to accommodate vessel movements based on the height of waves in the area.

No wave information was found for the Oregon Slough. Because of the narrowness of the waterbody, the limited fetch, and the many shoreline restrictions, only very small waves would be expected in the area of the proposed replacement bridge and would not be expected to impact available vertical clearances.

2.15.2 Visibility

Fog, rain and transiting at night reduce visibility. The net result is that there is less time to react should a vessel need to maneuver quickly. Even with radar, vessels will travel slower than they normally would during periods of good visibility. This affects vessel steerage and maneuverability. In addition, knowing the bridge clearance and the vessel's height becomes extremely important because it may not be possible to simply "eyeball" whether the vessel will clear a bridge height. Users may want a greater air gap while transiting during these conditions. Fog is most prevalent in the area during the fall and winter when visibility can be reduced to 0.5 miles or less on four to eight days per month (DOC et al. 2021).

2.15.3 Guide Clearances

The USCG publishes bridge guide clearances for certain navigable waters of the U.S., and compliance with these guide clearances will ordinarily receive favorable consideration under the bridge permitting process as providing for the reasonable needs of navigation. According to the clearance guide[1] for the Columbia River from the BNSF railroad bridge at Vancouver (RM 105.6) to The Dalles, the horizontal navigational clearance is indicated as 450 feet, and the vertical navigational clearance is indicated as 135 feet as measured from a river stage of 600,000 cubic feet per second. Upriver of The Dalles, the horizontal clearance is indicated as 400 feet and the vertical clearance as 60 feet (based on 2% flowline). No guide clearance is provided for the Oregon Slough. The USCG notes that guide clearances are not intended to be regulatory, and greater or lesser clearances may be required or approved as necessary to meet the navigation needs at a particular location.

A bridge height of 116 feet or 121 feet would be less than the published guide clearance. The 400 feet of horizontal clearance would also be less than what is published in the guide clearance.

2.15.4 Other Natural or Human-made Conditions

There are no known natural or human-made conditions that affect navigation that are not addressed elsewhere in this NIR.

[1] https://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Prevention-Policy-CG-5P/Marine-Transportation-Systems-CG-5PW/Office-of-Bridge-Programs/Bridge-Guide-Clearances/

2.16 Additional Factors

Vertical clearance is just one of the factors that vessels transiting in a channel or under a bridge must consider when determining whether a passage can be accomplished safely. These factors are both operational and physical. The major operational factors considered by the USACE that affect the vessel transits in channels include the following:

> "Wind, wave, and current conditions; visibility (day, night, fog, and haze), water level (including possible use of tidal advantage for additional water depth), traffic conditions (one- or two-way, pushtows, cross traffic), speed restrictions, tug assistance and pilots, under keel clearance, and ice" (USACE 1984, 1995, 1999).

Physical factors affecting safe transit include vertical and horizontal clearance of human-made structures, as well as natural obstacles. For the I-5 bridge, the human-made physical factors include the bridge height and the width between piers. The proximity of, and channel alignment with, other human-made structures (such as other bridges) may also impact safe transit. Before proceeding into the details of vessel clearance, this section discusses operational factors because changes in the physical surroundings may result in users having to address the operational factors differently, even though the factors themselves do not change.

This navigation technical analysis does not include a discussion of operator skills or experience. Vessel operators are assumed to have sufficient training and qualifications to transit the Columbia River. This includes an understanding of the factors that affect their vessels, knowledge of the aids-to-navigation in the area, and knowledge of the presence of natural and human-made river obstacles.

From a navigation perspective, vessel operators consider the following when transiting between bridge piers:

1. Vessel size and maneuverability
2. Dredged channel width and distance to bridge piers
3. Operational factors
4. Risk of collisions
5. Vessel operator's experience

Bridge piers should be placed outside the top of the dredged channel's slopes. Any width greater than that increases the safety margin of the transit. The USACE Engineering Manual for shallow-draft navigation projects indicates that the span should be somewhat wider that than the designed width of the channel and depends on the alignment and velocity of currents, channel alignment approaching the bridge particularly from the upstream direction and impacts of the prevailing winds (USACE 1980).

To accommodate the proposed replacement bridges, the program proposes to modify the federal navigation projects authorized in the program. These changes will modify the way that vessels that are restricted to the channel navigate the area, and the potential impacts of those changes on navigation are discussed in this section. While the authority to modify these channels is through the USACE, the

changes are considered applicable to the preliminary navigation clearance determination to the extent that they affect navigation.

The analysis in this section is based primarily on vessel simulation efforts completed in 2014 by Waterway Simulation Technology, Inc., for the CRC Project. Simulation efforts were completed for deep-draft vessel use of the UVTB and the primary channel and for tug and tow use of the three navigation channels at the bridge location. The simulations were completed in support of the Section 408 process with the USACE to determine the impacts on navigation of the proposed channel modifications in accordance with EM 1110-2-1643 and EM 1110-2-1611. These manuals require that all proposed modifications to a new or authorized federal navigation channel be modeled for the final design, either with a physical model or ship and/or tow maneuvering model study, to ensure safe and efficient navigation. USACE ER 1110-2-1403 regulates this modeling. During the completion of this effort, the CRC Project was halted, and the simulation efforts were not finalized. All modeling was completed, and draft final reports were issued. The remaining tasks prior to finalization and submittal were limited to review by the USACE and an Independent Expert Panel Review process. The ship simulation studies and reports will be reviewed and finalized prior to issuance of Section 408 authorization by the USACE but the effort and reports completed to date provide a detailed analysis of navigation conditions suitable to support the IBR program NIR and preliminary navigation clearance determination.

Shallow-draft vessel navigation simulations were conducted based on the existing conditions and practices, interim conditions during construction based on the construction sequencing discussed in Section 8.5.1 and on the proposed conditions following construction. The shallow-draft vessel navigation simulations resulted in the following conclusions and recommendations:

Conclusions:

- The existing I-5 bridge spans and navigation channels are considered safe by the pilots, and this was demonstrated by the simulations.
- The pilots were able to make successful transits for all conditions without any accidents or collisions, under all conditions tested.
- The pilots were pleased with the navigation conditions with the proposed project.
- The proposed conditions for navigation will be better and safer than the existing conditions.
- Based on simulation results and pilot input, the proposed layouts of the navigation channels are safe for transits in this reach of the Columbia River.
- The proposed replacement bridges will aid in navigation and should be completed as soon as possible.
- The BNSF railroad bridge will continue to be critical and the most difficult location to transit this reach of the river.

Recommendations:

- Proposed Conditions (Post-Construction):

- The pile caps of the piers near the water level should have the corners marked with directional lighting since they extend out further into the navigation channel than the upper part of the pier.
- Mark the bridge piers on either side of each navigation span with red lights on the pier, lights on each corner of the wide portion of the pier near the waterline, three vertical green lights on the center of each navigation span, and buoys upstream and downstream of the piers on either side of a navigation channel, separated by approximately 200 feet to allow identification on radar during fog.
- Interim Conditions (During Construction)
- Provide all tows an assist tug with 2500- to 3000-horsepower (hp) Z-drive between the United Grain Terminal to upriver of the I-5 bridges.
- Develop guidance on the operation of the lift span so that pilots know what the operating rules will be.
- Provide tie-off or mooring facilities between the Junction Buoy and Ryan Point on both sides of the river.
- Restrict recreational and fishing boats from the construction area navigation channels; marked by buoys and enforced—there is no allowance for interfering traffic while the tows are maneuvering through this restricted area.
- Provide a point of contact during construction to provide information about the operations and location of equipment to pilots upon request using radio or phone and post conditions on the internet for access by towing companies and pilots.
- Operations will be suspended during fog.
- Construction equipment must be well lighted during night operations.
- Provide training for all pilots prior to beginning construction using the simulation models developed and improved to increase realism. Improve the empty tow models by making measurements of the tows in operations on the river and modifying the tow models to respond appropriately in the wind.

Because the Vancouver to The Dalles channel was authorized as a deep-draft (27-foot) channel, simulations were conducted for deep-draft vessel transits even though the USACE only maintains the channel for shallow-draft vessels and no deep-draft vessels currently navigate this stretch of the Columbia River. Since no deep-draft vessels pass under the I-5 bridge presently, simulations were conducted only in the proposed channel configuration and limited to the use of the UVTB and the primary channel. The deep-draft vessel navigation simulations resulted in the following conclusions and recommendations:

Conclusions:

- Two distinct scenarios for approaching the UVTB and performing a tug-assisted turn of the design ships (580 by 101 feet) were tested. The simulations showed that both scenarios were safe for the design ships using two 3,000-hp tractor tugs. These two scenarios were (a)

transiting directly through the BNSF railroad bridge into the turning basin and (b) coming off the Lafarge dock and driving into the turning basin.

- Both loaded and ships in ballast were tested and found to be safely turned in the UVTB and aligned for departure through the BNSF railroad bridge.
- The scenario in which the design ship departed the Lafarge dock (port-side-to) and backed through the BNSF railroad bridge with tug assist was not shown to be safe. However, restricted capabilities of the simulator visuals and tug operations limited the ability of the pilots to direct this maneuver; therefore, definitive evaluation was not possible based on the limited number of runs completed. The pilots did note that they do the backing through the bridge at other sites and that this is a common practice, and they did not expect that there would be a problem in real life if the ship beams were in the range of 88 to 96 feet rather than the test ship's beam of 101 feet.
- Transit of the deep-draft design vessel for the primary channel was shown to be safe for upbound and downbound transits. The controlling factor for these maneuvers was passing through the BNSF railroad bridge.
- The pilots thought that an assist tug should be used to slow a downbound ship after the I-5 bridge and then passing through the BNSF railroad bridge.
- Based on ship simulation results and input from the pilots, the proposed layouts for the primary channel and the UVTB are safe for navigation of the deep-draft design vessel.

Recommendations:

- Two 3,000-hp tractor tugs are recommended for turning the design ship in the UVTB.
- Navigation markers are needed to mark the southern (Oregon side) edge of the UVTB.
- For transits of deep-draft ships under the proposed I-5 bridge, navigation markers are needed above and below the two bridge piers bordering the primary channel. The channel upriver of the bridge should have un-gated buoys marking the channel bends.

Based on the results of the tug and two and ship simulation efforts the proposed channel modifications will increase navigation safety and will not impact the reasonable needs of existing and prospective navigation on the waterway.

The program team also conducted a focus group meeting with key members of the navigation community representing barge companies, a marine contractor and cruise vessels to explain the program and obtain feedback on the navigation conditions during construction and following completion of the I-5 bridges. The members attending indicated that conditions would improve with the project consistent with the findings of the simulation efforts. They also indicated that conditions during construction would present some difficult navigations conditions but could be addressed with careful planning and implementation of mitigation measures.

2.17 Impacts to Navigation

2.17.1 Temporary Impacts

2.17.1.1 Columbia River

The replacement bridges over the Columbia River must be constructed in stages because they occupy some of the same area occupied by the existing bridges and the need to maintain navigation. Over the existing navigation channel, the pier locations for the new bridges will be further apart than the existing bridges. Although vessels will navigate, temporarily, through a longer clearance envelope, it is not anticipated that this will create an adverse impact to navigation or safety levels that cannot be mitigated.

Due to an anticipated length of construction of several years, it is imperative to accommodate frequent users, such as tugs and tows, during construction. Most vessels that currently use the navigation channel would be able to continue to use the channel throughout most of the construction period. If necessary, it may be possible to temporarily restrict infrequent or recreational vessels.

During construction, the height and width of the navigation envelope will be reduced due to construction equipment and pier placement prior to removal of the existing I-5 bridges. A temporary construction navigation envelope (height and width of unobstructed clearance for navigation) will be maintained during construction with a minimum clearance of 75 feet (vertical) by 200 feet (horizontal)that meets the vessel clearance needs of the majority of waterway users including tugs and tows, passenger cruise vessels, and the majority of other vessel use on the waterway. However, there could be some temporary restrictions due to blockages from barges and cranes used to construct piers and lift bridge segments into place. Navigation on the river upriver of Bonneville is subject to yearly lock maintenance closures and anticipated closures for the bridge construction would be much shorter than what already occurs on the river. The length of the navigation channel underneath structures will temporarily increase when the new I-5 bridges are under construction and the existing I-5 bridges are still in use.

A potential construction staging sequence is presented in Section 2.18.2 that maintains the required temporary construction clearance envelope. The replacement bridges would not overlap the existing bridges' adjacent piers, enabling the piers of adjacent bridges to be constructed together, reducing construction time.

During construction, some of the new bridge piers, outside of the navigation channel, would not line up with the existing bridge piers. While the new crossing is under construction and the existing crossing is still operational, this would result in more obstacles in the river and more difficulty in navigation for vessels that may not utilize the main channel. Also during construction, the program will establish navigational haul routes on the river for the movement of construction materials and equipment.

The Tug and Two simulation discussed in Section 2.17.3 included simulation runs for different construction staging scenarios where were completed safely with no incidents. Under these scenarios the pilots often commented that even though they made the run successfully, there was no room for

error, misjudgment, or mechanical failures or for unexpected situations that might develop, and therefore, they considered these conditions unsafe. Providing an assist tug on the front of the tow gave the conning pilot control of the front of the tow and allowed the safe movement of tows through the temporary navigation channels in the construction zone with good control under all conditions. Additional recommendations are summarized in Section 2.17.3.

See Section 18 for discussion of construction methods and staging schemes to minimize and mitigate temporary navigation impacts.

2.17.1.2 Oregon Slough

The bridge(s) that will be built over the Oregon Slough will match or exceed, in height, the vertical clearance of the existing bridge over the harbor. Short duration in-water work windows and constructability issues suggest that the new structures over the Oregon Slough would most likely incorporate bridge elements that use prefabricated superstructure elements such as steel girders or precast segmental girders. These types of construction would eliminate the need for extensive supports in the Oregon Slough. However, some temporary restrictions may be necessary due to barges and cranes used to lift bridge segments into place and during demolition of the existing bridge. Since extensive temporary supports are not likely, the navigation clearance will not be significantly reduced from today's clearance envelope. In addition, the Columbia River provides for an alternative route that provides greater navigational clearance than what is provided on Oregon Slough. Therefore, navigation on Oregon Slough will not be adversely affected during construction.

2.17.2 Long-Term Impacts

The IBR program proposes to replace the existing lift span that is 178 feet above) CRD in the raised position with a fixed span providing 116 feet or 121 feet of vertical clearance and 400 feet of horizontal clearance. On average, about 2,600 commercial vessel trips occur each year, and more than 230,000 recreational activity days per year occurred in the Columbia River in Multnomah County. As described in earlier sections of this NIR the proposed bridge height accommodates the majority of users. With a 116-foot bridge, a total of eight vessels/users would be unable to pass with a 10-foot air gap when the river level is 16 feet above 0 CRD as shown in Table 2.17-1. A bridge height of 121 feet would reduce the number of impacted vessels/users to five.

Table 2.17-1. Vessels Restricted by a 116-foot Bridge Under Assumed Conditions

Vessel	Owner	Vessel Type	Air Draft (feet)	Trip Frequency
TBD (fabricator's tallest future shipment)	Greenberry Industrial	Barge with fabricated materials	136	Any time of the year

Vessel	Owner	Vessel Type	Air Draft (feet)	Trip Frequency
TBD (fabricator's tallest future shipment)	Vigor	Barge with fabricated materials	130	Any time of the year
TBD (fabricator's tallest reported shipment)	Thompson Metal Fab	Barge with fabricated materials	165	Any time of the year
DB Taylor	JT Marine	Marine contractor vessel	131	Up to 10 trips per month at all times of the year
DB Freedom	Diversified Marine	Marine contractor vessel	119	10 trips/year
DB 4100	Advanced American Construction	Marine contractor vessel	92	1–2 times per month, all months of the year
DB General	General Construction	Marine contractor vessel	93	Varies; can be any month of the year
Yaquina	U.S. Army Corps of Engineers	Hopper dredge	92	Twice a month October through July; 4 times a month August and September

As noted, these impacts are based on reasonable assumptions regarding river level and vessel air gap. While the impacted vessels would not have unrestricted, year-round access under the bridge height analyzed, some of those impacted vessels would be able to pass under that height, and lower bridge heights, for most or at least part of the year. This and other factors are important when considering the reasonable needs of navigation.

It is also worth noting that the identified navigation impacts all relate to restricting the frequency of passage; they do not adversely affect navigation safety, and they impact the passage of a very small portion of marine traffic. Of those impacted, a share could not pass for some days of the year and a smaller portion could not pass at any time, without mitigation. This is an important point for

permitting considerations, as described above. The USCG Bridge Administration Manual states that "the safety of navigation is a paramount consideration that cannot be compromised when addressing bridge program issues" (USCG 2004, Chapter 2 E.1). Navigation safety was an important factor when developing and screening alternatives during the CRC Project's NEPA process. As discussed in the ROD, under existing conditions "[m]arine vessels traveling this section of the Columbia River must navigate under one of the fixed spans or through the lift span of the I-5 bridges, and must also navigate through the swing span of the Burlington Northern Santa Fe (BNSF) railroad bridge one mile downstream. Navigation safety for these vessels, especially when traveling downstream (with the current), would be substantially improved with a replacement river crossing." While navigation safety is not part of the basic purpose and need for the project, navigation safety would benefit from the project as defined in the ROD.

The propose horizontal clearance would not result in any impacts vessels or river users.

2.17.2.1 Columbia River Bridges

To determine whether a vessel had the potential to be impacted by the proposed replacement bridges that are part of the IBR program, vessel air draft and air gap were compared to the proposed vertical clearance of the replacement bridges. A vessel was determined to be "impacted" if it could not pass under the replacement bridges with a 10-foot air gap (vertical clearance between the highest point of the vessel and the lowest point of the underside of the bridge) while the river water level is at 16 feet CRD or higher. This combination of air gap and 16-foot river stage is called the "assumed condition." The 16-foot river stage is known as the ordinary high water level and represents a near-worst-case analysis. The Columbia River level fluctuates in this area but is lower than 16 feet CRD more than 98% of the time. Since the river level fluctuates daily as well as seasonally, there can be months during the course of a year when a vessel that would be impacted at 16 feet CRD is not impacted at all. In addition, the inclusion of a 10-foot air gap in the analysis is a worst-case assumption of impacts because many vessels can safely pass with less air gap.

User heights were determined during the user identification and data-gathering phase of the work described in Section 1. Once vessel heights were confirmed, an impact analysis was conducted with a proposed bridge height of 116 feet. If a vessel was impacted based on the assumed conditions further analysis was done to determine the percentage of time it was impacted based on water levels or whether or conditions influenced its ability to transit under the proposed bridge height. To consider the potential for design refinements to allow for increased vertical clearance an additional assessment was done for a bridge height of 121 feet.

While extensive work was performed to identify vessels that could be impacted by the bridge heights studied, there may be other vessels that have not yet been identified. Some local vessel owners may not have responded to the program's outreach efforts. Some vessels noted in the I-5 bridge logs could not be verified. Also, vessels from out of the area that have transited in the past may not be aware of the IBR program. Marine contractors from out of the area may come into the area if they are awarded a contract.

There are other factors besides vertical clearance that also affect safe passage, including horizontal clearance between bridge piers and channel configuration and alignment. Horizontal clearance was evaluated by comparing the propose horizontal clearance with the authorized navigation channel widths and channel widths from USACE engineering manuals. Channel configuration and alignment were assessed by evaluating previously completed ship and tug and tow simulation efforts.

2.17.2.2 Oregon Slough Bridge

The proposed replacement bridge(s) over the Oregon Slough will provide the same or greater vertical and horizontal clearances compared to the existing bridge. Limited information was provided by users on use of this waterway through the data-gathering phase. Because users of Oregon Slough are already constrained by the existing bridge and the Columbia River will provide an alternative route, no additional impacts to users will occur and a vessel-specific analysis of impacts was not conducted.

2.18 Potential Mitigation for Impacted Users

2.18.1 Mitigation for Unavoidable Short-term Impacts

Mitigation for temporary impacts on navigation will be addressed, in large part, by the construction methods and staging. The following sections describe several of many possible construction staging schemes that could be used to construct the bridges while maintaining sufficient clearance to minimize adverse impacts on navigation.

2.18.1.1 Main Span Columbia River

A construction staging scheme will be developed to provide a 200-foot-wide and 75-foot-tall navigation clearance envelop at nearly all times, which meets the vessel clearance needs of the tugs and tows, passenger vessels, and the majority of sailboat and construction equipment identified.

The construction staging and impacts on navigation will be generally as follows:

Phase I – Construct the new I-5 bridges to the west of the existing bridges. Figure 2.18-1 illustrates the construction sequence.

Stage 1 – Construct Piers 2, 3, and 4 for all bridges.

- Existing primary channel – In service, no navigation encroachment.
- Existing barge channel – In service, no navigation encroachment.
- Existing alternate barge channel – Out of service due to adjacent pier construction.

The alternate barge channel is out of service due to the adjacent construction of Pier 4. This may cause some inconvenience; however, both the existing primary and barge channels are in full service. The impact to vessel navigation is considered minimal. It may require more frequent operation of the lift span due the reduced clearance in the barge channel but that will not impact navigation.

Stage 2 – Construct Piers 6, 7, Spans at Piers 2, 3, 4, and 7 for all bridges.

- Existing primary channel – In service, some navigation encroachment.
- Existing barge channel – In service, no navigation encroachment.
- Existing alternate barge channel – In service, some navigation encroachment.

Both the existing primary and alternate barge channels have construction activity overhead, and vessels may experience some inconvenience. With the barge channel in full service, the impact to vessel navigation is considered minimal.

Stage 3 – Construct the remainder of the piers and spans: Pier 5, Spans at Piers 5 and 6 for all bridges.

- Existing primary channel – In service, some navigation encroachment.
- Existing barge channel – Out of service, significant navigation encroachment.
- Existing alternate barge channel – In service; existing piers are in line with new Pier 4, but vessels should be angling away from Pier 4 as they start to align with the BNSF railroad swing span.

Both the existing primary and alternate barge channels are in service. The existing primary channel has some overhead construction activity, but it is not anticipated to interrupt service. The construction of Pier 5 eliminates the use of the barge channel. Vessels that cannot (or choose not to) use the alternate barge channel may experience some delays, as the lift span restriction periods are still present.

At the conclusion of Stage 3, the new bridges are fully constructed.

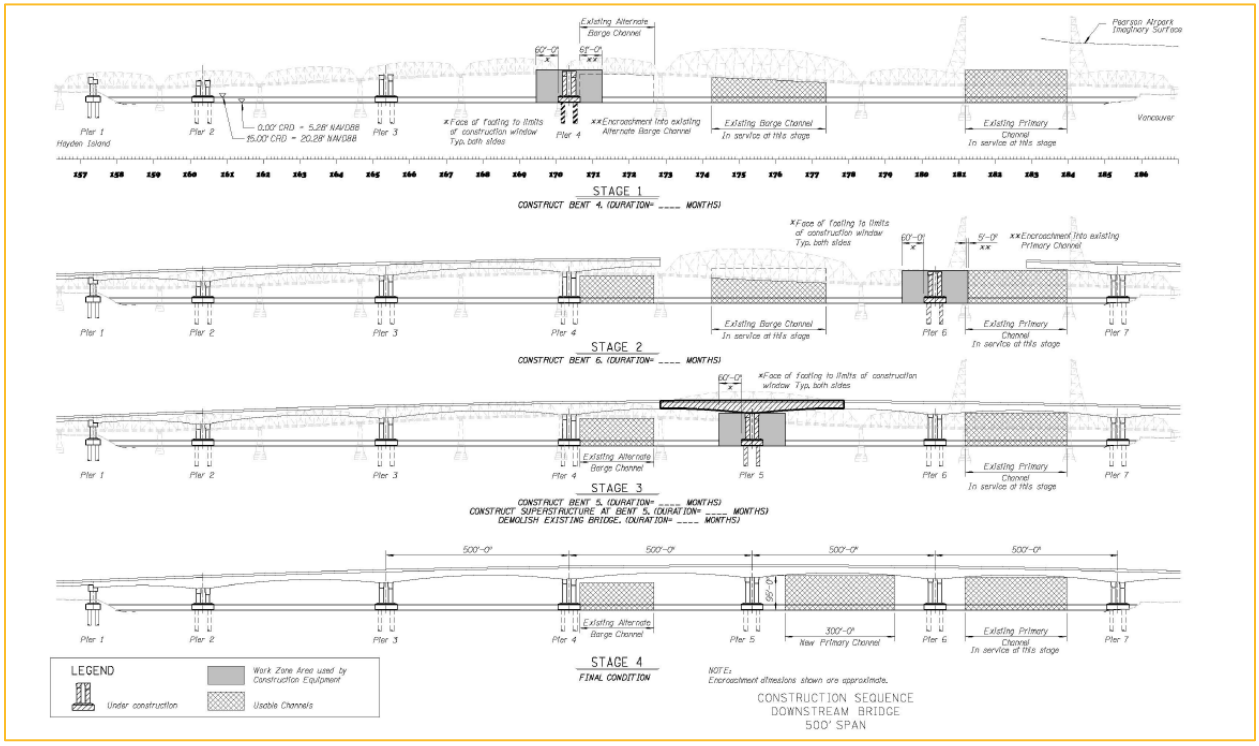
Phase II – Traffic switched to new bridges, remove existing bridges.

Stage 4 – Demolition and removal of existing I-5 bridges' piers between new Piers 5 and 6.

- Until the existing piers between the new Piers 5 and 6 are completely removed, the impact to vessel navigation is the same as construction Stage 3.
- Once the existing piers between the new Piers 5 and 6 are removed, the new primary channel is in full service and the existing channels can be removed from "official" service.

In summary, the locations of the proposed piers cause no apparent significant adverse impact to the route that vessel pilots must take to traverse this portion of the Columbia River during the construction of the permanent bridges. This is possible because all the in-water work could be completed at once without complicated staging.

Figure 2.18-1. Construction Staging



In addition to construction staging, communication of closures and clearance restrictions to users will be critical to reduce impacts on users.

Additional tugs may be needed to assist vessels through areas of reduced clearance, especially during times of high water. The USCG would review construction plans to determine potential impacts.

2.18.1.2 Oregon Slough

Construction staging schemes will be devised that minimize adverse impacts to navigation on Oregon Slough. Construction activities could temporarily reduce available clearances at due to the need for work bridges and platforms or from floating construction equipment and barges. The main Columbia River channel provides an alternate navigation route that can be used by vessels impacted by the reduced clearances. This results in an inconvenience due to the longer transit but will result in no impacts to navigation. Timing of the construction in Oregon Slough in relation to the main channel construction is unknown but is not expected to occur at the same time. It will be essential to communicate restrictions or temporary closures of the navigation channel and the availability of the alternate route to the marinas and moorages on the waterway as these are the primary users of North Portland Harbor at this crossing.

2.18.2 Mitigation for Unavoidable Long-Term Impacts

This section identifies potential mitigation measures for the affected users. Mitigation can include modifications to vessels, modification to cargo or how cargo is handled, the availability of alternative routes, transiting at lower water levels and other efforts. A prime consideration is the economic feasibility of the mitigation and whether users can adjust operations without economic loss. The mitigation measures identified herein are not final and would be subject to future decisions and agreements between the program and the affected users that would be finalized prior to issuance of the USCG bridge permit and/or construction of the project. Some of the mitigation measures identified are based on discussions with affected users that occurred for the CRC Project. Because the project was stopped those mitigation measures were never finalized nor was the mitigation undertaken. However, the mitigation that was identified and the status is included in the discussion below.

2.18.2.1 Avoidance and Minimization Overview

Avoidance and minimization measures typically precede the consideration or at least commitment of mitigation measures. Most of the impacted vessels could still pass at some time of the year although some would be too tall to pass at any time of year without mitigation. The 2012 CRC examined several bridge heights ranging from 95 to 178 feet in vertical clearance based on the findings in the ROD. The selected (at the time) bridge height of 116 feet had the most minimal impact to both vessel users and car traffic and thus was the preferred option moving forward. In addition, constructing a higher level bridge would not significantly reduce the number of impacted vessels or users.

Other minimization considered included modifying the “impact threshold,” as defined by river level and air gap. A less conservative air gap (5 feet rather than 10 feet) would reduce the number of impacted vessels to two pieces of floating construction equipment but would not change potential impacts to the three businesses.

2.18.2.2 Mitigation Timeline and Overview

The IBR program will further explore the mitigation measures with affected vessel owners and develop commitments as the program advances through the environmental review and design process. Mitigation discussions with affected owners and commitments to mitigation will advance through the re-evaluation and permitting processes. For each impacted vessel owner or business, mitigation discussions and documentation will include the following:

- Identify proposed clearance being discussed for mitigation.
- Describe the proposed mitigation for impacted users.
- Evaluate the viability of the mitigation.
- Develop statements from both parties to document status of mitigation discussions at key milestones.

The coordination and documentation would lead to specific mitigation commitments and mitigation work plans.

For this analysis, mitigation options are discussed for each vessel group rather than each individual vessel. Individual vessel mitigation requires understanding more about the specific vessel's operations, navigating constraints and vessel architecture, and is not generally included for each impacted vessel. However, there are several exceptions where this chapter describes mitigation specific to individual vessels. No recommendation is made at this time as to who would be responsible for funding or executing the mitigation. It is assumed that this would be determined as part of the negotiation process with impacted vessels and the permitting process.

The mitigation described below is for impacts associated with vessel transit on the Columbia River under the proposed I-5 bridges. No mitigation is identified for the proposed Oregon Slough bridges as no impacts were identified or concerns raised by river users. The vertical and horizontal clearances for the proposed bridges over Oregon Slough meet or exceed the clearance of the existing Oregon Slough bridge. In addition, users in the vicinity of the proposed Oregon Slough bridges are primarily recreational with clearance requirements that would not be impacted, and it is also possible to avoid the Oregon Slough bridges by utilizing the Columbia River. Oregon Slough bridges may be required to have navigation aids such as vertical clearance gages, lighting, or other navigation aids, as determined by the USCG through the bridge permit process.

Emergency Operation, National Defense and Channel Maintenance Vessels

The USACE hopper dredge Yaquina was the only federal vessel identified as being potentially impacted by the proposed replacement bridges. As discussed in Section 4, the USACE has indicated that a bridge height of 116 feet is adequate to allow the Yaquina to transit and none of the mitigation options are necessary. However, because this would not meet the assumed condition (minimum air gap of 10 feet), mitigation options are discussed here. Mitigation would not be necessary for a bridge height of 121 feet.

Mitigation Option 1 – Modify the mast structure and appurtenances.

Modifying the antenna and mast so that it could be lowered would reduce the air draft of the Yaquina. Everything higher than the crow's nest would need to be removed; the mast would then need to be outfitted with a hinge, then reinstalled. Whenever the Yaquina transits under the bridge, the mast could be unhinged and lowered either manually or electrically.

Mitigation Option 2 – Purchase a new dredge.

This option involves replacing the hopper dredge with one that has a smaller air draft than that required to pass under the bridge, considering the 16-foot river level and 10-foot air gap. To replace the Yaquina, the new dredge would, at a minimum, require the same capacity and capabilities as the existing dredge.

Mitigation Option 3 – Contract dredging to private dredges.

Contracting with private dredging contractors to perform upstream maintenance dredging that can be conducted with smaller dredges would eliminate the need for the Yaquina to pass under the new I-5 bridges. Due to occasional emergency situations, the contractors would have to be available on short

notice and have the properly sized hopper dredge. In addition, the USACE would need to have expedited contracting methods to select and contract with a contractor on short notice.

Mitigation Option 4 – Travel during times when river level permits.

The Yaquina's full height is 92 feet. With a 10-foot safety gap, up to a 14-foot river stage would allow safe passage for the vessel through the replacement bridges. The river stage is at or below 14 feet approximately 75% of the year, so trips could be scheduled based on historical river levels. However, this may not correspond with the times that dredging is needed.

Commercial Vessels

Marine Contractors

The analysis identified four contractor vessels as not being able to transit year round under the proposed bridge height of 116 feet or 121 feet. Marine contractors transit under the bridge while traveling to work sites. Of the vessels identified as being potentially impacted, some may not transit under the bridge in a given year, whereas others may transit multiple times. Given that there are numerous contractors and that marine construction services will continue to be needed on both sides of the bridge, acquisition of crane barges is not considered a mitigation option.

Ballasting the barge, while possible, will not provide enough additional air gap to make a significant height difference. Ballasting can be used when only a couple of feet are all that is needed to clear the bridge. Ballasting is usually performed on the end of the barge that supports the crane, so the height of the crane is lowered along with the freeboard.

Mitigation Option 1 – Remove the spuds.

Some crane barges have height limitations caused by traveling with raised spuds. The spuds need to be raised high enough to prevent grounding during transit, not only in the navigational channel but along the route to the desired destination. The spud heights are typically 70 to 90 feet. Removing the spuds prior to transit will reduce the vessel height to the next lowest point on the crane barge, typically a gantry or slightly elevated boom. A number of users indicated that it would take one-half to one day to remove the spuds and similar time to replace them. Removing spuds is an activity that is possible, although not always preferred by the operator, especially for those users that cannot self-remove them or need to travel only short distances. For instance, if the barge's own crane cannot lift the spuds out and lay them on the deck, another crane would be needed to perform this work. If the barge is not tied up to a dock or to shore when the spuds are removed, the barge will have to either anchor or have a tug assist it by holding the barge in place.

Mitigation Option 2 – Remove the boom.

If the boom tip is the highest point of the vessel, the boom can be removed prior to transit. This requires a considerable amount of work because all of the rigging needs to be removed, and another crane needs to be used to lift off the boom. If the boom is especially long and the barge it is removed from is too short, the boom may need to be transported on a separate barge.

Mitigation Option 3 – Remove the gantry.

If the gantry is the highest point of the vessel, it can be removed prior to the transit. It can take up to a week to lower the gantry and another week to raise it. It is a labor- and equipment-intensive activity and cannot be done frequently. It is not feasible for crane barges that need to transit under the bridge several times a month or more.

Mitigation Option 4 – Reconfigure the crane.

The crane gantry may be modified to reduce its height. The modification would require the services of a naval architect working with the crane barge owner to redesign the crane to ensure it can achieve the same lifting capacity and reach.

Mitigation Option 5 – Use mobile cranes mounted on barges upriver of the bridge.

If crane barges cannot transit under the bridge, it may be possible to transport a deck barge upriver, then load a land-based mobile crane from shore once the deck barge is upriver of the bridge. This is not a solution to getting an existing floating crane barge under the bridge, but rather an alternate method of getting equipment to work locations. Depending on the size of the mobile crane needed, there may be issues transporting the mobile crane over the highways and to the loading area.

Mitigation Options by Impacted Vessels

DB 4100 is constrained by the height of the spuds and mitigation Option 1 would be available for this vessel assuming an air draft of less than 10 feet cannot be accommodated or water levels are within 3 feet of the ordinary high water mark. Because of the limited time in which the vessel is height constrained, the ability to utilize a lesser air draft and the ability to remove or lower the spuds a small amount to accommodate a transit no specific mitigation for this vessel is anticipated.

The *DB General* is height constrained by the gantry and Mitigation Option 3 and 4 would be available to this vessel assuming an air draft of less than 10 feet cannot be accommodated or water levels are within 3 feet of the ordinary high water mark. Because of the limited time in which the vessel is height constrained and the ability to utilize a lesser air draft no specific mitigation for this vessel is anticipated. Another important consideration is that due to the width of this vessel it is not able to transit upriver of Bonneville dam in its present configuration and therefore is only constrained from a shorter stretch of the Columbia River system. The IBR program would not propose to undertake any mitigation of this vessel.

DB Freedom is constrained by height of the boom during transit. Mitigation Options 2 or 4 could be available for this vessel if it cannot operate as described earlier with the boom stationed temporarily to the side of the tug pushing the barge. The CRC program was working with the vessel owner to develop a plan for a temporary cradle to allow the vessel to transit more securely when placed to the side of the tug. Because of ability to transit in a manner that eliminates the height constraint no specific mitigation for this vessel is anticipated. The IBR program will consult with the vessel owner to confirm operating conditions and evaluate mitigation options if needed.

DB Taylor is constrained by height of the boom during transit when the longer of two booms available for this vessel is in use. Mitigation Options 2 or 4 could be available for this vessel. The CRC Project engaged in negotiations with the owner of this vessel. An analysis of options to retrofit the vessel was conducted and a solution was identified to allow the boom to be lowered further during transit by installing a new boom. A draft mitigation agreement to provide compensation in the amount equal to the estimated retrofit costs was presented to the vessel owner by the CRC. During the mitigation process the vessel owner made a decision to terminate negotiations and the agreement was never finalized.

Marine Industries and Fabricators

Occasional historical and anticipated future shipments from the three major upriver fabricators (Thompson Metal Fab, Vigor, and Greenberry) would not be able to pass under the bridge height of 116 feet under the assumed conditions year round. Increasing the bridge height to 121 feet would not change the impact. Discussions would be conducted with each fabricator to identify and evaluate mitigation options to address potential impacts to their operations and to reach formal agreement on mitigation prior to beginning construction of the project.

Negotiations with Thompson Metal Fab and Greenberry occurred in support of the CRC Project. The CRC Project worked separately with the two companies to identify appropriate mitigation strategies to allow them to continue to pursue current and future anticipated markets following construction of the bridge. Negotiations occurred under confidentiality agreements for the purposes of preserving proprietary company financial information. Work included the evaluation of potential business losses resulting from lost market opportunities, and also the consideration of opportunities and potential costs for relocation of their operations. The anticipated mitigation agreements would have resulted in payments to the companies that would be used by the companies at their business direction and control. One potential outcome would be a decision by the companies to relocate downstream of the bridge at a site of their choosing.

Vigor did not have any operations in the area at the time of the CRC Project that would have been impacted and no discussions occurred with them.

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APPENDIX A FUTURE LAND USE ANALYSIS DETAILS

Interstate BRIDGE Replacement Program

A modern connection for a growing community

Appendix A

Future Use Analysis

October 2021

Interstate BRIDGE Replacement Program

Appendix A

Future Use Analysis

Prepared for:

Oregon Department of Transportation

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ACRONYMS AND ABBREVIATIONS

CBC	Columbia Business Center
GI	Greenberry Industrial
I-5	Interstate 5
I-84	Interstate 84
IBR	Interstate Bridge Replacement
MLLW	Mean Low Low Water
NIR	Navigation Impact Report
NSA	National Scenic Area
OIW	Oregon Iron Works
SMA	Shoreline Management Act
SR	State Route
Vigor	Vigor Industrial
WKO	Wilkins, Kaiser & Olsen Inc.

1. INTRODUCTION AND METHODOLOGY

1.1 Purpose

Federal law prohibits the construction of any bridge across the navigable waters of the U.S. unless first authorized by the U.S. Coast Guard. The Bridge Permit Application Guide (COMDTPUB P16591.3D) requires the development of Navigation Impact Report (NIR) to identify the current and prospective navigation on the waterway. This includes the potential for future navigation needs from the development of land uses along the waterway. This appendix includes an analysis of existing and potential commercial/industrial development and examines the likelihood of creating additional navigation activities that could be impacted by the proposed Interstate Bridge Replacement (IBR) program.

This appendix is an update of the work completed in support of the Columbia River Crossing NIR completed in 2012.

1.2 Subject Area

The geographical extent analyzed extends from the proposed new Interstate 5 (I-5) bridge to the BNSF Railway rail bridge at Celilo Falls. The geographical extent analyzed landward from the river is approximately 0.5 miles. Together, these geographical extents compose the "subject area." Land uses farther inland may generate marine traffic; however, those cargoes would be transported to waterfront facilities for transfer to barges or other vessels within the project area.

Locations upriver of the BNSF Railway rail bridge at Celilo Falls would not be expected to generate vessels or cargoes that would be impacted by the I-5 bridges due to existing height (79 feet when raised) and width restrictions imposed by the Celilo Falls bridge and others located upstream (see Section 3.1 in the main report). Areas downstream of the I-5 bridge and the BNSF Railway would also not be expected to generate vessels or cargo that would be impacted by the I-5 bridge because most vessel transit is generated from upstream of the I-5 bridge. Furthermore, there is minimal cargo generation or transit from downstream locations that are not already limited by upstream height or width restrictions.

1.3 Data Sources

The land use assessment is an update to the land use assessment completed for the 2012 Columbia River Crossing NIR, Appendix A. Using aerial imagery, planning documents (e.g., Comprehensive Plans), and interviews with staff, the marine-dependent uses within each county were updated to reflect current land uses. This update relied on the following information:

- 2012 Columbia River Crossing NIR, Appendix A: Future Land Use Analysis, prepared by David Evans and Associates, Inc.
- Google Earth aerial imagery.

- Interviews: WSP USA Inc. interviewed city/county planning departments by telephone to confirm the key findings and identify potential concerns related to river traffic.

1.4 Land Use Assumptions

Comprehensive plan land use designations and policies and zoning and development regulations state what types of land uses can be set in each zoning area. Some uses are allowed "by right," which means they are permitted through a simple application process. Other uses are often referred to as "conditional" or "limited uses" and are subject to extra requirements and additional review. Base zone requirements, which developments may have to meet regardless of whether they are permitted outright, typically include dimensional regulations such as height and setbacks. Zoning overlays are additional designations that may further restrict uses or developments, such as requiring additional and potential mitigation related to floodplain, riparian, wetlands, and wildlife habitat. The land use permitting process ensures that development is compatible with the designated uses and standards of the zone.

In the subject area, zoning is typically industrial, residential, commercial, and open space/parks/recreation. Each jurisdiction typically will have variations in uses allowed in each zoning designation. For analysis purposes, the following assumptions are made regarding the various uses and their potential to generate marine-dependent uses:

- Industrial: Typically allows for varying levels of manufacturing and production. Marine-dependent uses can include ship building, metal fabricating, timber processing, and boat building. These sites may also have the capability of generating large objects, such as oil rigs.
- Commercial: These uses include restaurants, stores, and offices. Commercial uses may include commercial marinas; however, most commercial uses are unlikely to generate marine traffic. The marine traffic that could be generated by commercial uses is likely individually owned recreational boats, which could include sailboats, touring boats, or passenger (cruise) vessels.
- Residential: Residences with various tax lot sizes and accessory structures such as docks. The marine traffic that would be generated by residential uses is likely privately owned recreational boats. This could include sailboats.
- Open space/parks/recreation: Areas designated as open space/parks/recreation are typically used for habitat conservation and/or passive and active recreation. Public docks and marinas may be included with these uses for recreation purposes. Sailboats may use the docks and marinas.
- Zoning overlays: It is assumed that, depending on the local jurisdiction, floodplain, riparian, and other natural resource overlay standards may apply to all sites along the river.

1.5 Other Assumptions

There may be land uses outside of the project area, specifically agricultural, that may generate or be supported by marine traffic. However, because the goods would have to be transported by another

freight method to the riverfront, they could be accommodated by barge or shipped on boats that would not have any vertical clearance issues. Additionally, businesses outside of the area may provide service to the area. For example, marine contractors are likely needed upriver in the future for a variety of projects.

1.6 Site Suitability

Although lots may be zoned for use along the Columbia River, there may be additional factors that limit or leverage development potential. These include:

- Plotted tax lot size and dimensions can reduce development potential by limiting the necessary space to accommodate development and meet zoning setback requirements.
- Lots can be constrained by roads, freeways (such as Interstate 84 [I-84]), railroad (Union Pacific Railroad or BNSF line), or other public infrastructure (such as power lines). In addition, easements, particularly recreational trail easements, may create a buffer between a development and the riverfront.
- Regulated natural resources, such as wetlands or Endangered Species Act habitat, can prohibit development or make development cost-prohibitive because of the fees and mitigation requirements for environmental permitting, as well as local, state, and federal permitting (see following sections).
- Bathymetric and other river conditions may prohibit or restrict access to the navigable portions of the river from the shoreline.
- Sites with existing infrastructure, especially docks (see Section A.2.7), are more conducive to uses and redevelopment that may generate varying degrees of marine traffic. Depending on the development, these sites also would likely not be subject to as stringent environmental permitting requirements.

1.7 State and Federal Environmental Permitting Requirements

Water-dependent uses need access to the water, which typically involves a structure into the river. Depending on the type of development, where exactly development would occur in proximity to the river, and whether there is work below ordinary high water in the Columbia River, state and federal permits could potentially be required. This document does not cover whether the marine uses discussed require state or federal permits.

1.7.1 Columbia Gorge National Scenic Area

The Columbia River Gorge National Scenic Area (NSA) lies to the east of Portland, Oregon, and Vancouver, Washington. It stretches about 83 miles, from the Sandy River on the west to the Deschutes River on the east in Oregon, and from Gibbons Creek in Clark County to a line 4 miles east of Wishram in Washington. The NSA covers portions of six counties: Clark, Skamania, and Klickitat Counties in Washington, and Multnomah, Hood River, and Wasco Counties in Oregon.

The Columbia River Gorge Commission, a regional commission representing local, state, and national interests, was established in 1987 to develop and implement policies and programs that protect and enhance the scenic, natural, cultural, and recreational resources of the NSA, while encouraging growth within existing urban areas and allowing development outside urban areas consistent with resource protection.

To achieve the purposes of the Columbia River Gorge NSA Act, Congress called for preparation of a management plan that would treat the two-state, six-county area as a region. Congress established a two-tiered management approach for preparing the management plan. It divided responsibility between the U.S. Forest Service and the Columbia River Gorge Commission. The six Columbia River Gorge counties were authorized to implement the management plan through their land use ordinances.

The NSA is divided into three categories of land: urban areas, the special management area, and the general management area. Congress designated 13 cities and towns as urban areas: North Bonneville, Stevenson, Carson, Home Valley, White Salmon, Bingen, Lyle, Dallesport, and Wishram on the Washington side of the river and Cascade Locks, Hood River, Mosier, and The Dalles on the Oregon side. The urban areas are exempt from the management plan, but are eligible to receive federal funds authorized to implement it. Per the management plan, the urban areas are the primary focus for growth and economic development. In addition, the management plan states that new industrial development will not be allowed in the NSA outside the urban areas.

There are five established ports within the NSA: Skamania and Klickitat on the Washington side of the river and Cascade Locks, Hood River, and The Dalles on the Oregon side. All five of these ports are within the designated urban areas. Land use regulations regarding development and redevelopment of property in the NSA are promulgated through the Columbia River Gorge Commission's Land Use Ordinance (Chapter 350, Division 81). This code defines industrial and water-dependent uses. Any future expansions or development projects that would use the established ports as a water-dependent use would need to be within a designated urban area.

The NSA does not allow industrial development outside of the urban areas. It also confines development to the relatively small urban areas, thus limiting the amount of space for industrial uses and the additional services used to support industrial uses. In addition, less developed areas could lack the skilled labor necessary for an industrial use.

The NSA promotes recreation and water-dependent recreation and protects the resources of the Columbia River Gorge, which has ideal freshwater sailing conditions from spring through fall. As a result of these conditions, the Columbia River Gorge attracts sailors, including many from outside the area. Water levels are often highest during the sail season, and the number of sailboats visiting the gorge is anticipated to increase with additional waterfront developments and population changes.

1.7.2 Washington's Shoreline Management Act

Washington's Shoreline Management Act (SMA) was passed by the state Legislature in 1971 and adopted in 1972. The goal of the SMA is "to prevent the inherent harm in an uncoordinated and

piecemeal development of the state's shorelines." The SMA applies to the counties within the affected area as they have "shorelines of the state." Each jurisdiction prepares its own Shoreline Management Plan to be in compliance with the SMA. Preferred uses include single-family residences, ports, shoreline recreational uses, water-dependent industrial and commercial developments, and other developments that provide public access opportunities. Per the SMA, to the maximum extent possible, the shorelines should be reserved for water-oriented uses, including water-dependent, water-related, and water-enjoyment uses. The SMA emphasizes accommodation of appropriate uses that require a shoreline location, protection of shoreline environmental resources, and protection of the public's right to access and use the shorelines (Revised Code of Washington 90.58.020). The SMA supports the use of the Columbia River shoreline for water-dependent industrial uses. However, development must meet the SMA's "no net loss of shoreline ecological function" basis which can add costs for mitigation.

2. REVIEW OF LAND USES IN AFFECTED COUNTIES

The following sections identify the potential land uses existing and potential future capability to generate marine traffic. This review includes an evaluation of policies in comprehensive plans and zoning designations to ascertain long-term goals for river front tax lots. The jurisdictions evaluated include the six counties and cities located in the Columbia Gorge NSA on the Columbia River between the I-5 bridges and the BNSF Bridge at Celilo Falls, per Section 6.5 of the NIR:

- Washington
  - Clark County (Vancouver, Camas, Washougal)
  - Skamania County (North Bonneville, Stevenson, Home Valley)
  - Klickitat County (Bingen, Dallesport)
- Oregon
  - Multnomah County (Portland, Fairview, Troutdale)
  - Hood River County (Cascade Locks, Hood River)
  - Wasco County (The Dalles)

A summary of regulatory standards and any key issues/areas of concern are described for each jurisdiction.

2.1 Clark County, Washington (Vancouver)

This section describes the existing and expected future land uses along the riverfront in the city of Vancouver in Clark County.

2.1.1 Existing Uses

The shoreline in Vancouver contains a wide mix of uses, including heavy industry, residential, and recreational uses.

Port of Vancouver

The Port of Vancouver is located along the Columbia River's deep-draft channel that extends from the Pacific Ocean to just downstream of the I-5 bridge. Terminals downriver from the BNSF bridge are not included in this analysis because they would not likely contribute to changes in vessel traffic not captured by the upriver analysis. For example, the grain terminal includes facilities for the receipt of grain barges. These barges originate at barge-loading facilities upstream of I-5, upriver of the BNSF rail bridge include Terminal 1, the Vancouver Waterfront, and at the La Farge property. Terminal 1 is the eastern-most portion of the Port of Vancouver's waterfront development. The Port of Vancouver's master plan for Terminal 1 includes office, residential, and retail space and will have over 950,000 square feet of new mixed-use development. This includes removal the existing structures located on the dock. Terminal 1 will also include bike and pedestrian trails and a public dock for pleasure boats.

Per the master plan, Terminal 1 will not be devoted to cargo handling and thus would not involve changes to navigation for these types of vessels. Terminal 1 will continue to be made available to cruise vessels. Cruise vessels are addressed in Section 5 of the NIR. Terminal 1 is identified for potential partial acquisition by the program but adequate dock space should remain to support continued cruise vessel use.

La Farge Site

La Farge North America operates a cement handling facility on approximately 1.83 acres immediately east of the BNSF rail line. The site includes marine access and is presently the only facility that is accessed by deep-draft traffic above the BNSF bridge.[1] The deep-draft traffic that accesses the site does not use the Upper Vancouver Turning Basin and would not be impacted by the replacement bridges. No other deep-draft traffic passes above the BNSF railroad bridge.[2]

Vancouver Waterfront

The Vancouver Waterfront is a development located along the Columbia River between the BNSF rail bridge and the existing I-5 bridge. The 32-acre site extends across the Columbia waterfront and includes a variety of mixed-use, residential, and commercial space. The site includes an expansive open space that spans the entire site. The site does not include any marine facilities or land uses that would generate vessel traffic.

Columbia Business Center

The Columbia Business Center (CBC) is an industrial parcel located approximately 1.2 miles upriver from the I-5 bridges. To the west of the CBC is a mixed-use development, which includes residential housing, retail, and restaurants. To the east of the CBC is a city park with a boat ramp and an industrial waterfront site used by facilities operating out of the CBC.[3]

The CBC includes approximately 2.3 million square feet of space in 27 buildings and approximately 1.0 million square feet of open leasable space, as shown in Figure A.2-1. In 2021, it was reported that the CBC is essentially completely occupied with approximately 54,000 square feet of leasable area available.[4]

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[1] https://books.google.com/books?id=q2qtQeTdmrkC&pg=RA4-PA92&lpg=RA4-PA92&dq=cement+dock+vancouver+washington&source=bl&ots=3fNmwkYnAO&sig=ACfU3U0mwsQMcVzxJ9Gr06PnSHL11ILJdQ&hl=en&sa=X&ved=2ahUKEwje5PycionyAhXPg-AKHbCwCvUQ6AF6BAgQEAM#v=onepage&q&f=false, page 92.

[2] Ship Navigation Study of Changes to Federal Deep-Draft Navigation Channels due to the Interstate 5 Columbia River Crossing Replacement Bridge, February 2014, David Evans and Associates and Waterway Simulation Technology, Inc., page 6.

[3] https://columbiabusinesscenter.com/.

[4] Personal conversation with Dave Brown, Senior Broker Columbia Commercial Properties LLC, September 21, 2021.

Figure A.2-1. Columbia Business Center

Source: CBC, https://columbiabusinesscenter.com/.

The CBC provides both barge and rail access. The BNSF mainline borders the north side of the property. Rail access within the CBC is provided by a private switching service, expediting transfer of goods on and off cars and reducing demurrage charges. The CBC has a barge slip accommodating river and ocean barges. The East Slip is 130 feet long with water depth at minus 10 feet Mean Low Low Water (MLLW). The East Slip is used to receive and ship fabricated steel products, construction materials, and supplies. The West Slip is not active and there are no plans to improve it. There is a dock located just to the west of the West Slip, which is used by JT Marine. JT Marine vessels and shipyard activities are addressed in the main body of the NIR.

The CBC area has the following water-dependent users:

Thompson Metal Fab, the largest tenant at the CBC, provides fabrication for a wide range of industrial uses including U.S. Army Corps of Engineers, oil and gas, nuclear, tank and vessel, marine and hydro, renewable energy, bridge and structural, and other high-tech industries. The oil rigs and some other structures (fish weirs for the U.S. ACE) are height constrained. Thompson Metal Fab has increased its presence at the CBC from approximately 200,000 square feet in 2006 to its current 717,762 square feet, which represents 30.8% of the net rentable area in the CBC. The 2011 expansion consisted of primary leasing two large older buildings (Buildings 40 and 41) and a large portion of the outside working area located between Building 40 and the Columbia River.[5]

[5] Source: Presale Report GS Mortgage Securities Trust, Series 2012-GCJ7, DBRS, May 2012, pages 17-22.

Vigor Industrial (Vigor) acquired Oregon Iron Works in 2014.[6] Vigor fabricates structures for the alternative energy industry in the Pacific Northwest (systems for tidal power and ocean-based wind energy systems), bridges and transportation equipment for state and local transportation projects, and structures for the U.S. Army Corps of Engineers (fish weirs, lock gates, and other products). Vigor leases approximately 75,000 square feet from CBC, including Building 33 and the laydown area immediately to the east of the building. Vigor owns property immediately in the CBC (a portion of the hatched area of Figure A.2-1), including Building 48 (approximately 50,000 square feet) and open working area south of the building.

Vigor also has a facility located east of the CBC that has approximately 180,000 square feet of manufacturing space. Vigor also has a lease with the city of Vancouver to use the 7-acre city boat basin at 901 SE Marine Park Way south of the facility (Figure A.2-2). The manufacturing site will be used to produce a new type of landing vessel for the U.S. Army.[7] There are no planned modifications at the site. The city of Vancouver also moors their emergency response vessel at the boat basin.[8]

Figure A.2-2. City Boat Basin 901 SE Marine Park Way

Greenberry Industrial (GI) is a full-service mechanical contractor, providing industrial fabrication and installation for various industries in the Pacific Northwest, as well as oil rigs and modules for the oil industry. GI's facilities[9] include 6 acres in Corvallis, approximately 150,000 square feet at the CBC, and a fabrication facility in Ferndale, Washington (approximately 8 acres). The oil rigs fabricated by GI are

[6] Oregon Iron Works (OIW) was acquired by Vigor Industrial (Vigor) in 2014., https://vigor.net/news-press/oregon-iron-works-vigor-merge-to-draw-larger-projects-and-more-jobs-to-the.
[7] http://choosewashingtonstate.com/vigor-to-built-new-landing-craft-in-vancouver/

[8] https://www.cityofvancouver.us/fire/page/vancouvers-quick-response-boat.

[9] Greenberry Industrial website http://www.greenberry.com/.

height constrained. GI's facilities at the CBC include a deep water, 3,000 ton loading dock and launch access for ocean-going vessels up to 400 feet.[10]

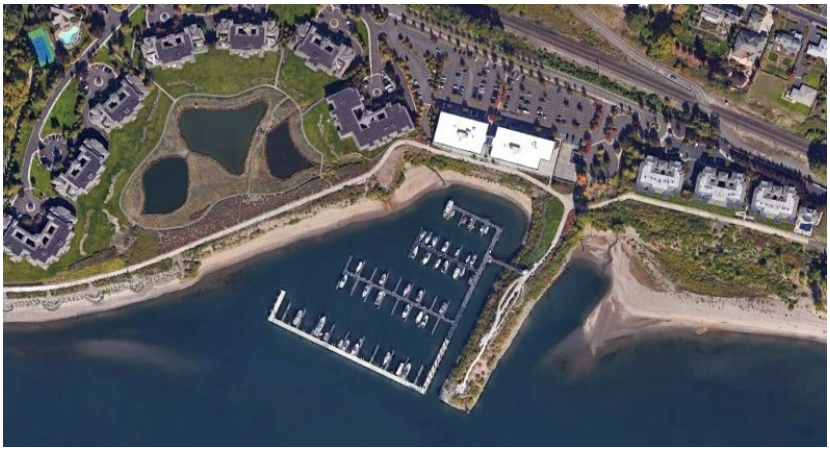
JT Marine operates a diverse array of services, including tug and barge service, shipyard services (providing mobile repair services for the tug and barge industry), and salvage services along the Columbia River. The company also acts as a marine contractor. JT Marine leases a portion of the west end waterfront from the CBC.

There are no known plans for redevelopment of the CBC.

Tidewater Cover Marina

Tidewater Cover Marina is a private marina located approximately 2 miles east of the I-5 bridge. The marina includes 87 slips, ranging in length from 40 feet to 110 feet.[11] Uplands adjacent to the marina are developed as residential condominiums and office and the city of Vancouver Columbia River Renaissance Trail.

Figure A.2-3. Tidewater Cove Marina



McCuddy's Steamboat Landing Marina[12]

McCuddy's Steamboat Landing Marina includes approximately 150 slips, ranging in length from 24 to 40 feet, and with some end-ties and side-ties for longer boats. The marina serves the general public and draws customers from across the county and beyond. However, many marina tenants are

[10] https://greenberry.com/facilities/vancouver-wa/.

[11] https://www.tidewatercovemarina.com/dmyxn64a4yh9qb52trjvvu6lstodjb.

[12] Clark County Shoreline Management Plan, Appendix D, BST Associates, page 35.

residents of the adjacent development. Sailboats that moor at the marina are typically too small to be height constrained by the proposed I-5 bridge (discussed in greater detail in Section 7.4.2 of the NIR).

Figure A.2-4. McCuddy's Steamboat Landing Marina

Western Forest Products

Western Forest Products U.S. LLC owns approximately 13 acres on the Columbia River within the City of Vancouver. Most of the site is used by Columbia Vista Corporation as a sawmill under a long-term contract. The facility has a barge dock for outbound shipment of lumber products and has capability to access log rafts.

The Vancouver Riverview Gateway Subarea Plan applies to the eastern section of Vancouver's riverfront. This plan does not include future changes of uses along the river. Within this plan there is one industrial site that is zoned industrial, corresponding with the sawmill location.

The waterfront site is zoned for heavy industry, and it is expected that heavy industrial use will continue through the long term.

Figure A.2-5. Western Forest Products Construction Property

2.1.2 Overview of Land Use Regulations

The Vancouver Comprehensive Plan does not include goals or policies specific to marine uses or land uses that would support further development of marine uses.

Much of the zoning along the Columbia River east of the I-5 bridges is residential interspersed with parks and open space uses that host waterfront trails. Where there isn't a waterfront trail, some of the residences have private boat docks. The industrially zoned tax lots discussed above in the CBC and along other portions of the river appear, from aerials, to be largely developed and provide support to marine uses. However, this does not preclude them from being further developed or redeveloped for additional marine uses. The industrial zoning classification can accommodate a wide range of uses. Additionally, the City Center zoning classification allows marinas, and the residential zoning classification includes marinas as a conditional use.

2.1.3 Key Findings

There are four existing water-dependent industrial sites within the jurisdiction of the city of Vancouver, including CBC, Vigor, Marine Park marina, and the Western Forest Products property. It is likely that these areas will continue in industrial use. Only the uses at the CBC are currently height constrained. This is detailed in the main text of the NIR.

In addition, there are two marinas (McCuddy's Steamboat Landing Marina and Tidewater Cover Marina) and several private docks associated with private residences. These marinas typically serve smaller powerboats and sailboats (up to 40 feet) and are not known to be height constrained. However, some recreational boats may experience height constraints depending on the option under consideration (this issue is discussed in greater detail in Section 7.4.2 of the NIR).

Based on existing land use regulations, there are no vacant waterfront parcels that could be placed in industrial use.

2.2 Clark County, Washington (Camas)

The following section describes the existing and expected future land uses along the riverfront in the city of Camas in Clark County.

2.2.1 Existing Uses

The existing commercial/industrial waterfront uses in Camas include a paper mill, a marine fabricator, a marina, and a boat ramp.

Georgia Pacific Camas Mill

Georgia Pacific's Camas mill, which encompasses 660 acres (including Lady Island), produces paper towel products. In 2018, Georgia Pacific reduced its operations at its facility in Camas. Georgia Pacific is demolishing 11 buildings in the Camas Business Center[13]. The sites listed below are reported as no longer supporting site operations and are currently not in use:

- A chip unloading dock that was used to receive hogged fuel and wood chips that are transferred via conveyor to an open storage area. Chips are also received by truck and rail. This dock is listed as 360 feet long with water depth of 12 to 15 feet at MLLW.
- A log lift that was used as a storage area for log rafts. This facility extends along both sides of Camas Slough and along the right bank of Columbia River to a point approximately 2.5 miles below the log lift; rafts being secured to timber and steel piling. This site is listed with water depth of 7 to 10 feet at MLLW.
- A petroleum receiving dock with a pipeline that extends from the wharf to storage tanks.
- The shipping dock has been used in the past to ship products by barge This dock is recorded as 366 feet long with a water depth of 12 to 15 feet at MLLW. There is a 30,000-square-foot warehouse located near this dock.

The Georgia Pacific site will likely be evaluated for changes in comprehensive plan designations, zoning, and shoreline designations as part of future updates to planning documents for Camas.[14] However, the Georgia Pacific site is height constrained by the bridges on U.S. 14 that provide access to Lady Island at Camas. The upstream span is fixed with a vertical clearance[15] of 37 feet and the downstream span is fixed with a vertical clearance of 69 feet. These clearances are less than the heights of the proposed I-5 bridge.

[13] Clark County Shoreline Management Plan, Appendix D, BST Associates, page 40.

[14] Personal conversation with Sarah Fox, Senior Planner Camas City Planner, City of Camas, August 2, 2021.

[15] National Oceanic and Atmospheric Administration chart 18531, Edition 24, December 2017.

Figure A.2-6. Georgia Pacific Camas Mill

City of Camas Ramp

The city of Camas owns a boat ramp located just to the south of their sewage treatment plant that has been leased to Mark Marine Service for more than 25 years. Mark Marine, which is engaged in marine construction, moors several company-owned vessels and barges at the site. The city is renewing the lease of the property for an additional five years.[16] There are no plans to improve the site. The city may consider using this site for another purpose (public access) in the future; however, changing uses would depend on future planning and funding for the proposed project. As a result, this site should be considered industrial use for the long term. Mark Marine was contacted as part of the river user survey and vessels are addressed in the main body of the NIR.

[16] Personal conversation with Sam Adams, Utility Manager, City of Camas, July 19, 2021.

Figure A.2-7. City of Camas Slip

2.2.2 Overview of Land Use Regulations

Much of the zoning along the Columbia within the jurisdiction of Camas is heavy industrial, but this is dominated by the Georgia Pacific paper mill. Other heavy industrial zoned lots appear to be undeveloped. The heavy industrial zoning classification includes boat building, boat repair and sales, metal fabrication, and assembly as uses permitted outright. The Camas Shoreline Master Program provides several economic policies in support of ensuring that land adjacent to the Columbia River is used for water-related uses, as provided below.

Shoreline Master Program Economic Development Element 3.5.2:

- Policy 3: New water-oriented industrial, commercial, and resource-based activities that will not harm the quality of the site's environment, adjacent shorelands, or water quality are encouraged along the shoreline. Limit or discourage uses that are nonwater-oriented and are not accessory to a water-oriented use.
- Policy 4: As an economic asset, the recreation industry should be encouraged along shorelines in a manner that will enhance the public enjoyment of shorelines, consistent with protection of critical areas and cultural resources.

However, according to the Trails and Open Space Plan, much of the area zoned heavy industrial area is identified as part of a proposed open space network, which includes a riverfront trail.[17]

[17] https://www.cityofcamas.us/sites/default/files/fileattachments/parks_and_recreation/page/18859/appendix_c_-_maps.pdf.

2.2.3 Key Findings

There are two existing water-dependent industrial sites within the jurisdiction of the city of Camas, including the Georgia Pacific paper mill and the Camas boat ramp. It is likely that both sites will remain in industrial.

Based on existing data and plans, it is anticipated that there will be no additional industrial uses developed in Camas. The heavy industrial zone does allow for some marine generating uses to be permitted outright.

The Georgia Pacific paper mill cannot be constrained by the proposed bridge because it already has a height constraint imposed by the bridges that connect U.S. 14 to Lady Island. Mark Marine Service vessels are addressed in the main body of the NIR.

2.3 Clark County, Washington (Washougal)

This section describes the existing and expected future land uses along the riverfront in the city of Washougal in Clark County.

2.3.1 Existing Uses

The existing waterfront sites on the shoreline of the city of Washougal include the Port of Camas-Washougal Marina, the Port of Camas-Washougal Sixth Street property, and the Port of Camas-Washougal Industrial Park (near the waterfront but not water-dependent).

Washougal Waterfront

The Washougal Waterfront consists of the Port of Camas-Washougal's Marina and Sixth Street property.

The Port of Camas-Washougal Marina has 356 moorage slips, ranging in length from 20 feet to 55 feet. Most of the moorage is covered and can only be used by powerboats, which do not have a height constraint. There are a few open slips that used by sailboats, which can be height constrained. In addition to the leased slips, the marina has 1,200 linear feet of transient moorage. The port also has a four-lane launch ramp with attendant floating docks.

The site of the former Hambleton Lumber Company, which consists of approximately 25 acres, is located directly east of the port's marina. In 2012, Killian Pacific purchased the 25 acres, of which 13.25 acres is now owned by the port.[18]

[18] https://parkerslandingwaterfront.com/.

The Sixth Street property, which includes around 14-acres, is located just east of the former Hambleton Lumber site.

Figure A.2-8. City of Washougal Waterfront

The Port of Camas-Washougal, in conjunction with a private developer (Killian Pacific), is seeking to redevelop the Washougal Waterfront. The site, Waterfront at Parker's Landing, will remain zoned as highway commercial and would be developed into a mixed-use waterfront project, featuring 13 mixed-use buildings (condos, offices, retail, and restaurants) as shown in Figure A-7.[19] There are currently no marine activities besides the marina at the Washougal Waterfront.

[19] http://portcw.com/index.php/projects/waterfront_revitalization/.

Figure A.2-9. Washougal Waterfront at Parker's Landing Proposed Master Plan

Port of Camas-Washougal Steigerwald Commerce Center

The Port of Camas-Washougal began development of the 310-acre Washougal Industrial Park in 1970. The industrial park has grown in use and currently averages above 90% occupancy rate[20]. To provide additional land for industrial development, the port is planning an area of undeveloped property east of and adjacent to the industrial park. The Steigerwald Commerce Center includes approximately 122 net acres.

The property is zoned as heavy industrial and entirely within city limits. Adjacent properties are designated as heavy industrial, industrial, and parks/open space.

A levee separates the industrial park from park and public access along the shores of the Columbia River. The levee presents significant engineering, procedural, and land ownership challenges to providing access to the Columbia River. In addition, the navigation channel is distant from the shoreline with shallow water providing a challenge to access for vessels. There are no users within the industrial park that use the Columbia River for navigation purposes, and there are no marine facilities associated with the industrial park.

[20]https://portcw.com/property/steigerwald-commerce-center/.

Figure A.2-10. Port of Camas-Washougal Industrial Park and Steigerwald Commerce Center

2.3.2 Overview of Land Use Regulations

The Washougal Comprehensive Plan Update (2016) does not include goals or policies specific to marine uses or land uses that would support further development of marine uses. It does have goals and policies related to increasing public access to shorelines for recreational purposes (parks and open space, Goal 4).

A large portion of Washougal's waterfront is zoned parks/open space, starting from the eastern edge of the urban growth boundary until 22nd Street. West of the open space is primarily residential and town center–core designations. Industrial uses abut the parks and open space to the north.

Selected goals of the Port of Camas-Washougal's to promote industrial development include:[21]

- Goal 2: Improve local economic opportunities by supporting the retention, expansion, and recruitment of preferred employers.

[21]https://mrsc.org/getmedia/d828a5e7-5a9f-43ca-b25b-27e71ff42596/s77p6c3w36CompScheme.pdf.aspx.

- Goal 3: Promote sustainable community prosperity by ensuring an ample supply of land, infrastructure, and facilities to meet the needs of potential employers.
  - Strategy 3.1 Maintain an ample supply of land and incubator space to meet the needs of preferred employers.
  - Strategy 3.2 Acquire additional property (that meet certain criteria).
  - Strategy 3.3 Consider the sale of property when doing so would better advance Goal 2.

Selected goals of the Port of Camas-Washougal's also promote mixed-use commercial development along the Washougal Waterfront, including:

- Goal 4: Lead a collaborative effort to develop a more vibrant, economically viable, and publicly accessible Columbia River waterfront.
  - Strategy 4.1 Work collaboratively with property owners, the public, and the Port's agency partners to develop a master plan for the future development and redevelopment of the Columbia River waterfront property for the area within the Port District. The master plan should provide sufficient flexibility to attract a range of employers.
  - Strategy 4.2 Prefer land uses and employers on the waterfront, that are water-dependent, -oriented, or - related.
  - Strategy 4.3 Manage marina operations, capital facilities, and lands in a manner that strives to generate sufficient revenues to offset marina operating expenses.
  - Strategy 4.4 Strongly support the provision of continuous public access along the Columbia River shoreline.
  - Strategy 4.5 Maintain Captain William Clark Park, the Parkersville Historic Park, Marina Park, and the boat launch facility as public recreation areas.

2.3.3 Key Findings

The Port of Camas-Washougal's Marina will remain an integral part of the Washougal Waterfront. Most of the moorage slips are covered and are not affected by height constraints from the proposed I-5 bridges. There may be use by sailboats at the marina that are height constrained, but most of the sailboat use is limited to boats up to 55 feet long, which would not be height constrained by the options under consideration. The port also has a four-lane launch ramp with attendant floating docks. However, the use of the boat ramp is generally by trailer-carried powerboats, which are not height constrained by the proposed bridge.

Industrial development in Washougal is centered in the Port of Washougal's industrial properties at the eastern edge of the city. The heavy industrial zoning designation allows uses that are permitted outright, such as bulk petroleum product terminals, plants, and storage facilities, which could generate marine traffic. However, the levee and recreation areas and trails that parallel the river create a buffer that inhibits marine uses along the riverfront in Washougal. Based on these conditions future marine facilities or activities are unlikely.

2.4 Skamania County, Washington

This section describes the existing and expected future land uses along the riverfront in Skamania County.

2.4.1 Existing Uses

Commercial/industrial waterfront properties in Skamania County include two former mill sites and property owned by the Port of Skamania County.

Stevenson Co-Ply Property

The Stevenson Co-Ply mill property, owned by Mountain View Property, was formerly owned by Wilkins, Kaiser & Olsen Inc. (WKO) and ceased operations in 1992.[22] The site has approximately 26 acres of uplands and is located inside the urban growth area of the city of Stevenson, but outside the city limits. It is zoned industrial (MG) by Skamania County. After its destruction by a fire in 2007. the site has been idle, and there are no current plans to redevelop this site. There are no marine facilities.

[22] Skamania County, Washington, MapSifter. https://skamaniawa-taxsifter.publicaccessnow.com/.

Figure A.2-11. Stevenson Co-Ply Property

Stevenson Waterfront

The vision for development on the Stevenson Waterfront, which includes Stevenson Landing, the Tichenor Building, and the Cascade Boat Launch, is based on fostering an active waterfront for recreation, a healthy economy, and a high quality of life.

Stevenson Landing, which is owned by the Port of Skamania County, is a cruise ship pier located on the Columbia River at river mile 150 of the Columbia River. The pier is 200 feet long, 15 feet wide and has a 55-foot-by-6.5-foot adjustable steel gangway. There are three sets of dolphins centered on gangway at various locations to allow for a range of docking possibilities. Cruise lines calling at Stevenson Landing include American Cruise Lines. American Queen Steamboat Company vessels used by these entities are addressed in the main NIR.

The Port of Skamania owns the Tichenor Building, which is located just upriver of Stevenson Landing and offers 29,000 square feet of flex-industrial space. It was built in 1992 and has experienced a successful transition from dependence on the forest products industry to a more diverse offering, serving a mix of light industrial and professional services. The Tichenor Building takes advantage of the views and amenities of the Columbia River, but it does not have facilities for water access for water-dependent businesses.

The Cascade Boat Launch is located in downtown Stevenson on the waterfront just east of the Tichenor Building. Trailer-carried power and sail boats and hand-powered craft use the boat launch. These craft are not height constrained and would likely be used locally and not transit through the IBR program area.

Figure A.2-12. Stevenson Waterfront

Home Valley

High Cascade Veneer (a subsidiary of WKO) began operating out of the former Stevenson Co-Ply peeler plant in Home Valley in the 1990s. The mill is no longer active, but WKO uses the property for storing lumber.[23] The site includes approximately 94 acres of upland area. The facility includes a barge dock, but the state of repair is unknown and access may be restricted by shoaling associated with the Wind River.

[23] Personal conversation with WKO Sawmill, July 20, 2021.

Figure A.2-13. Home Valley

Broughton Landing

The Broughton Lumber Company, which is located just west of Underwood, ceased operations in 1986 and has remained idle since. However, a plan was developed to create a destination resort called Broughton Landing. The property includes approximately 60 acres, and is inside the NSA of the gorge but outside any urban growth area. The plan calls for "a new resort comprised of approximately 250 new vacation homes, recreational amenities and retail areas serving resort guests, locals and visitors alike."[24] In 2008, petitioners appealed the decision to amend the plan allowing for this development. Ultimately, the court of appeals upheld the decision, but the proposed development has not progressed since this decision. Broughton Landing is divided by the railroad and State Route (SR) 14, creating three distinct sections. Most of the site does not have river frontage except a small portion on the far west side. This area, called Broughton Beach, is approximately 2.3 acres and is zoned for commercial recreation. The Broughton Landing Master Plan has a proposal for a pedestrian bridge spanning SR 14 and the railroad tracks to connect the beach area to other portions of the site. The site does not have any marine facilities and is unlikely to be developed for marine-dependent uses beyond recreational uses.[25]

[24] http://www.broughtonlanding.com/Overview/.

[25] Broughton Landing Master Plan, http://www.broughtonlanding.com/Documents_PDF/.

Figure A.2-14. Broughton Landing

2.4.2 Overview of Land Use Regulations

The Skamania County 2007 Comprehensive Plan Final does not include goals or policies specific to marine uses or land uses that would support further development of marine uses.

North Bonneville's riverfront is largely reserved for recreational uses or is under federal ownership because of the dam. Therefore, impacts to marine uses are not anticipated in this section of Skamania County.

However, in Stevenson, there are industrially designated lands identified along the southern portion of the riverfront (Stevenson Co-Ply). North of the industrial designations is a strip of commercial recreation, followed by commercially designated lots, one lot designated light industrial and then community commercial lots. Uses along the river include hotels, restaurants, and a kite-boarding school in the commercially zoned areas. The industrially zoned lots are used for timber-related activities. The entirety of Skamania County's southern border (approximately 90,204 acres)[26] is located within the Columbia River Gorge NSA. The NSA categorizes these areas into three categories: (1) urban areas, (2) special management areas, and (3) general management areas. Four urban areas, including North Bonneville, Stevenson, Carson, and Home Valley, are located within Skamania County. Urban areas within the NSA can grow over time and are the primary locations for any industrial or commercial uses that require vessel traffic. The NSA Management Plan limits

[26] Skamania County 2007 Comprehensive Plan, https://www.skamaniacounty.org/home/showpublisheddocument/1385/637122005286830000.

development outside of the urban areas while encouraging urban development to locate within these established urban designations.[27]

2.4.3 Key Findings

The industrial waterfront properties in Skamania County have been traditionally used by the forest products industry, including the mill sites at Stevenson, Home Valley, and Underwood. As the forest product sector declined, properties have been held by forest product firms for potential future reuse as a mill site or have been planned for redevelopment to resort or mixed-use properties. The proposed I-5 bridges do not impose a height constraint on shipping activities related to the forest products industry because log rafts or barges carrying logs, chips, or other forest products can easily pass under the bridges for destinations downriver of the bridges.

The Port of Skamania developed a business park, cruise terminal, and boat launch at Stevenson. The property at Stevenson Landing is on the waterfront and has a cruise ship dock but does not offer waterfront access for water-dependent firms requiring barge service. Within Stevenson, the movement is toward recreational waterfront with public access.

Potential impacts could occur from navigational height restrictions downstream affecting cruise vessels and sailboats. Impacts to vessels are addressed in the main body of the NIR.

The Port of Skamania County's other land holdings do not have direct access to the Columbia River (e.g., Cascades Business Park, the Lewis and Clark Business Park, and the Wind River Business Park).

2.5 Klickitat County, Washington

This section describes the existing and expected future land uses along the riverfront in Klickitat County.

2.5.1 Existing Uses

Klickitat County includes the small urban areas of Dallesport, Lyle, and Bingen.

Bingen

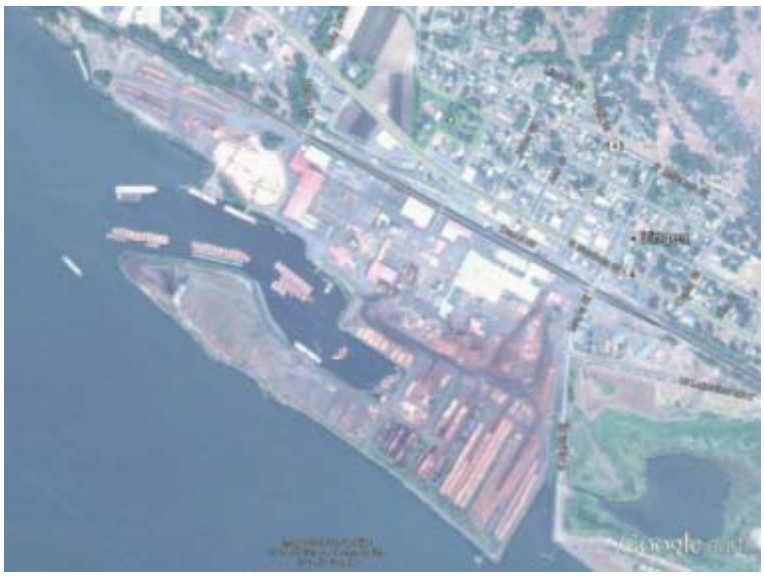
The SDS Lumber Mill and the Port of Klickitat County's Bingen Point Business Park are located in Bingen.

[27] Management Plan for the Columbia River Gorge National Scenic Area, August 2016, http://www.gorgecommission.org/images/uploads/amendments/Management_Plan_(as_revised_through_2016).pdf.

SDS Lumber Mill

The SDS Lumber Company mill site, located on the riverfront in Bingen, consists of approximately 170 acres (including uplands and in-water parcels). The mill produces lumber and plywood. The site includes a mooring area and approximately 30 acres of upland area for storage/staging of products. SDS can transload products from upland to barge, log yard, and ramp for raft/bundle preparation and load chips on barges.[28] It also has a construction fleet network with cranes up to 150 ton capacity. SDS vessels are addressed in the main NIR.

Figure A.2-15. SDS Lumber Mill



Bingen Point Business Park

The Port of Klickitat's Bingen Point Business Park, which is located just east of the SDS lumber mill, has 52 acres at Bingen Point available for light industrial and commercial uses. Bingen Point Business Park does not have direct access to the waterfront. Some of the key tenants at the business park are Insitu Group, Inc., which produces miniature unmanned aerial vehicles for military and commercial applications, and Zepher, a manufacturer specializing in defense and autonomous systems. There are no marine facilities or water-dependent tenants.

[28] SDS Lumber Mill. http://sdslumber.com/.

Figure A.2-16. Port of Klickitat Bingen Point Industrial Park

Bingen Marina

The Port of Klickitat owns the Bingen Marina, which includes a two-ramp boat launch, restrooms, and a parking area for boat trailers. Plans call for the development of additional facilities, including transitory and long-term moorage, a fuel dock, a pump-out facility, and other amenities.[29]

[29] http://www.portofklickitat.com/recreation/marina.asp.

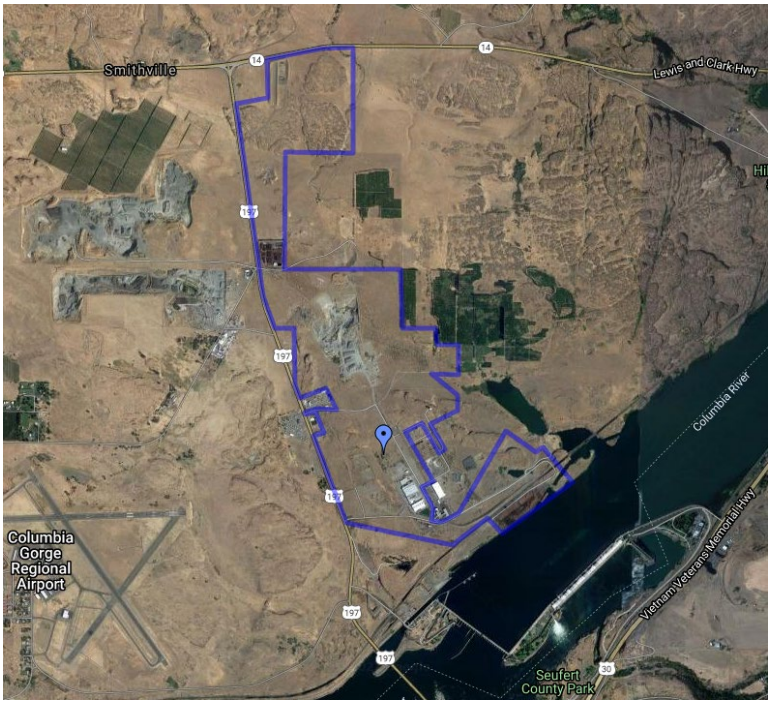
Figure A.2-17. Port of Klickitat Bingen Marina

Dallesport

The Dallesport Industrial Park is owned by the Port of Klickitat and covers approximately 660 acres east of U.S. Highway 197 and north of the Columbia River. Zoned for light and heavy industrial use, this site includes a barge terminal used for log exports immediately upstream of The Dalles Dam, which is operated by The Dallesport Log Yard. It was also used by an excursion boat that would tie up while passengers visited the Mary Hill Museum. However, this excursion boat activity has not occurred recently.[30] In addition, there is a privately owned property downstream of the dam that has dolphins and conveyor system for loading.

[30] PBPorts interview with Port of Klickitat.

Figure A.2-18. Port of Klickitat Dallesport Industrial Park



2.5.2 Overview of Land Use Regulations

The western portions of Bingen along Alpine Avenue are targeted for business, high technology, and light industry. The eastern portions along Parallel Avenue are targeted for moderate to heavy industry. Property north of Dow Road has been set aside for aggregate mining operations and future development. The Bingen Point Business Park is located along the Columbia River just outside Bingen, Washington, and across from Hood River, Oregon.

Waterfront zoning outside of White Salmon city limits includes suburban residential to the west and industrial park to the east in Bingen. From aerials, the industrial park area appears to be used for river-related and timber-related industry. Inside White Salmon, the western portion of the riverfront is designated as open space, and the eastern section is designated as the Riverfront Planned District. Not all the industrial lots are used for industrial activities; some are for residential uses, such as an RV park. Also, the railroad tracks constrain many of the industrial lots, making them shallow. Waterfront zoning in Lyle is almost entirely suburban residential.

The riverfront property in Lyle is undeveloped and the majority is owned by the Yakama Nation.

Zoning in Dallesport along the Columbia is almost entirely residential in the western portion with some areas of open space and industrially zoned areas to the east.

2.5.3 Key Findings

Most of the occupied industrial lots along the riverfront are used by the timber industry, which generates non-height-constrained cargoes (logs, wood chips, aggregates, etc.). The proposed bridge should not have any impacts to shipping related to the timber industry.

There are some undeveloped industrial lots along the river. Industrial park zoning allows for boat building, assembly, and fabrication of metal products and additional manufacturing uses as uses permitted outright. However, many of the industrially designated lots are limited by the railroad tracks that create shallow lots from the river, potentially limiting the possibility of large industrial structures on the site.

There are also vacant developable industrial lands at the Dallesport Industrial Park. However, the BNSF railroad right of way cuts through the property near the river, leaving a narrow band of land adjacent to the river that is currently used by a barge terminal. It is unlikely that future uses would be height constrained at this location.[31]

The aggregate terminal, approximately 2 miles east of Wishram, Washington, is operated by Pacific Northwest Aggregates, Inc., a produces sand, gravel, and other solid minerals used in road and other construction. The mining operations and marine facility operate on approximately 45 acres of Native American Lands property through a lease agreement. The facility includes a loading terminal used to load barges with material. Vessels transferring aggregates are addressed in the main NIR.

[31] Personal conversation with Mr. Marc Thornsbury, Executive Director, Port of Klickitat, September 11, 2012.

Figure A.2-19. Pacific Northwest Aggregates

2.6 Multnomah County, Oregon (Portland)

This section describes the existing and expected future land uses along the riverfront in Multnomah County in the city of Portland, upriver from the BNSF rail bridge.

2.6.1 Existing Uses

The portion of Portland east of the BNSF rail bridge has several waterfront uses, including marinas and houseboat communities.

Hayden Island to Government Island

There are several marinas and floating home communities in the area from east Hayden Island to Government Island, but there are no industrial uses on the riverfront east of the I-5 bridges up to the city of Fairview (see Section A.2.7).

2.6.2 Overview of Land Use Regulations

Zoning along the Columbia River east of the I-5 bridges is primarily open space that accommodates a riverfront multiuse trail. There are additional small pockets of residential zoning and areas of commercial zoning close to the bridges and on Hayden Island. There are two areas designated industrial: one on the south side of Hayden Island and one just north of 33rd Road and Marine Drive. The lots along Marine Drive are shallow in depth because they are between Marine Drive and the River. There are numerous private marinas, especially closer to the I-5 bridges. In addition, there are marine-related uses such as watercraft rentals and sales.

Manufacturing and warehouse and freight movement are permitted outright in the industrial zone.

2.6.3 Key Findings

There are many recreational marinas that are used by both powerboats and sailboats. Sailboats that are affected by the existing I-5 bridges generally had an air draft ranging from 50 to 90 feet, with an average of approximately 70 feet and are not height constrained by the replacement bridges. In 2012, there were only 48 sailboats that were 46 feet or longer that could be height constrained at 95 feet. Powerboats have an air draft that ranging from 20 feet to 25 feet and can use Oregon Slough, thus never requiring a bridge opening.

2.7 Multnomah County, Oregon (Fairview)

This section describes the existing and expected future land uses along the riverfront in Multnomah County in the city of Fairview.

2.7.1 Existing Uses

There are two barge terminal sites in Fairview.

CalPortland Blue Lake Aggregate Yard

CalPortland owns and operates the Blue Lake Aggregate Yard, a distribution facility that stocks crushed rock, washed rock, concrete sand, and dredged sand. The Blue Lake Aggregate Yard is barged to the terminal from other sites, unloaded, and then trucked to construction sites in northeast Portland.[32] The facility is served by tugs and barges that are addressed in the main NIR.

[32] CalPortland. https://www.calportland.com/locations/oregon/blue-lake-aggregate-yard/.

Figure A.2-20. CalPortland Blue Lake Aggregate Yard

Chinook Fairview – Sundial Chip Reload

Chinook Fairview owns the former Georgia Pacific West chip reload terminal in Fairview. The facility ships and receives chips by barge.

Figure A.2-21. Chinook Fairview Terminal

2.7.2 Overview of Land Use Regulations

Metro owns a large portion of land on the north side of Fairview, including Blue Lake Park, Chinook Landing Marine Park, and the Columbia River open space. Part of a 40-mile-loop trail is planned to go along the Columbia River in this area. There is also an area designated general industrial, and as noted above, there are two marine-development uses in Fairview.

The Fairview Comprehensive Plan (2004) encourages private landowners along the Columbia River to seek redevelopment options that would replace existing industrial operations with river- oriented

recreational, residential, and commercial development. The plan also recommends working with Metro to expand or develop recreational and commercial services and facilities at Blue Lake Park.

2.7.3 Key Findings

None of the existing industrial uses in Fairview would be height constrained by the proposed I-5 bridge. Although Columbia River industrial uses are permitted outright in the industrial zone, the Fairview Comprehensive Plan identifies trail planning and recreational uses for this area.

2.8 Multnomah County, Oregon (Troutdale)

This section describes the existing and expected future land uses along the riverfront in Multnomah County in the City of Troutdale.

2.8.1 Existing Uses

There is one barge terminal site in Troutdale and one former shipyard.

Sundial Marine Tug & Barge Works

The Sundial Marine site was formerly used as a ship and barge building and repair facility. The marine infrastructure is not operational with the exception of a spud barge.[33]

Tidewater operated the Sundial Tug & Barge Works at this site from 1970 until early 2011, when it closed operations. Tidewater decided to close the facility because the repair and construction business is cyclical, and Tidewater elected to focus on its core businesses of barge transportation and terminal operations. The Hickey Family Company currently owns the site, and there are no known plans to redevelop it.

[33] https://www.deq.state.or.us/Webdocs/Controls/Output/PdfHandler.ashx?p=9d2d4d6e-f45c-4464-80c7-501c9a3b561c.pdf&s=Staff-report.pdf.

Figure A.2-22. Sundial Marine Tug & Barge Works

Knife River Corporation Aggregates Terminal

Knife River Corporation operates an aggregates terminal in Troutdale. The facility consists of a ready-mix concrete plant with a dock and conveyor for sand and gravel delivery by barge and unloading-related facilities.[34]

[34] Oregon Department of Environmental Quality Permit Evaluation and Fact Sheet, 3/28/2012. https://www.deq.state.or.us/wqpr/3819_2012040200772CS01.PDF.

Figure A.2-23. Knife River Aggregates Terminal

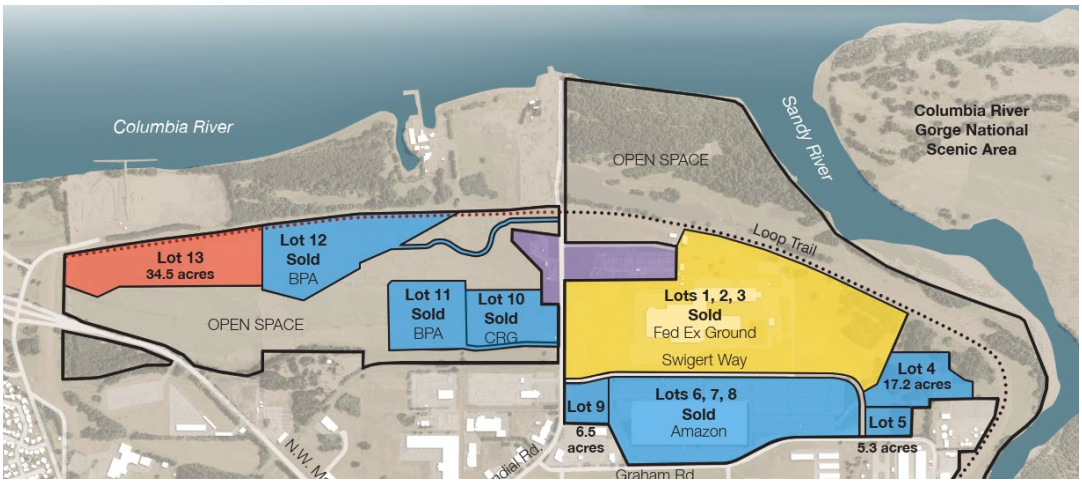
Troutdale Reynolds Industrial Park

The Port of Portland developed the Troutdale Reynolds Industrial Park, which is located on a 700-acre former brownfield site of the former Troutdale Aluminum Smelter.

Key tenets of the industrial park are FedEx and Amazon.[35] This development will respond to the need for large parcels of industrial land in the region. However, the development is not water-dependent, and significant shoaling from the Sandy River delta would make development of marine infrastructure very difficult. The Columbia and Sandy Rivers are designated open as space by the Port of Portland's master plan.[36]

[35] https://www.portofportland.com/trip.
[36] Ibid.

Figure A.2-24. Troutdale Reynolds Industrial Park



2.8.2 Overview of Land Use Regulations

Troutdale zoning along the river includes open space and general industrial uses. Some of the industrial lots are known to support uses that generate marine traffic. The general industrial designation allows for manufacturing, marinas, and marine industrial/marine service facilities to be permitted outright.

2.8.3 Key Findings

The industrially zoned sites generate marine traffic that primarily consists of tugs and barges, which are not height constrained. The Knife River terminal is not expected to change in the future. Sundial Marine is idle and could be sold or redeveloped. In either case, it is not expected that it will generate height constrained marine traffic.

2.9 Hood River County, Oregon (Cascade Locks)

2.9.1 Existing Uses

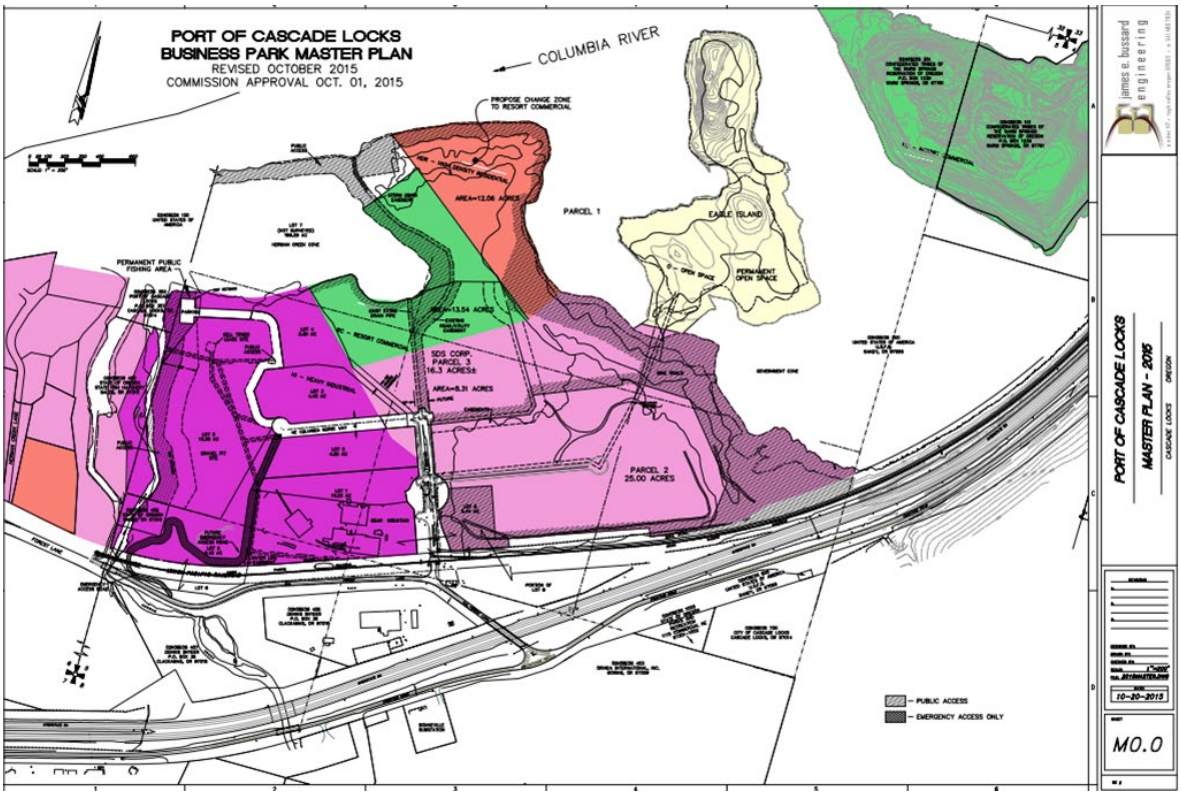
The Port of Cascade Locks operates an industrial park, marina, and a cruise facility.

Port of Cascade Locks Business Park

As shown in Figure A.2-25, the Port of Cascade Locks Business Park (North Point, Herman Creek Cove, and Lower Bench) is approximately 191 acres. There are currently vacant acres at North Point (17. 6

acres), Herman Creek Cove (4.25 acres), and Lower Bench (3.7 acres). The port listed the possibility of the development of an additional marina facility that could be located at the industrial park.[37]

Figure A.2-25. Port of Cascade Locks Business Park



Port of Cascade Locks: Herman Creek Business Complex

The Herman Creek Business Complex is located directly east of the business park and offers a variety of spaces for light industrial uses. The majority of the spaces advertised on the port's website are not available currently. There is no water access associated with the business complex.

Port of Cascade Locks Marina

The Port of Cascade Locks Marina has 36 slips. Cascade Locks is a well-established sailboat racing destination and is home to the Columbia Gorge Racing Association. The port identifies new

37 https://portofcascadelocks.org/documents/Final%20Adopted%20Port%20of%20Cascade%20Locks%20Strategic%20Business%20Plan%20December%202013%20sm.pdf.

recreational opportunities associated with sailing as part of their priorities in the 2016 Strategic Business Plan revisions, which may result in additional smaller, non-height-constrained vessels.[38]

Figure A.2-26. Port of Cascade Locks Marina

Port of Cascade Locks Cascade Locks Marine Park

The *Columbia Gorge Sternwheeler*, which is owned by the Port of Cascade Locks and operated by the Portland Spirit, is docked in the Cascade Locks Marine Park from May to October. The vessel provides daily passenger excursions. There is also a visitor center in the Cascade Locks Marine Park.

[38] Ibid.

Figure A.2-27. Port of Cascade Locks Marine Park

The port is working to further develop the northeast portion of the Marine Park to increase recreational opportunities. The improvements would enlarge the sailboat launching area, which currently hosts word-class sailing regattas.[39]

2.9.2 Overview of Land Use Regulations

Zoning along the Cascade Locks shoreline is largely open space to the west and heavy industrial, light industrial, public, resort commercial, and high on either side of Herman Creek. The eastern edge of the jurisdictional line is zoned resort commercial. The industrial designation allows manufacturing and production as a use that is permitted outright.

Within the urban area of Cascade Locks, the parcels zoned light industrial or heavy industrial are located at the northeast side of the city. There are two privately owned undeveloped heavy industrial zoned lots totaling 50 acres west of Herman Creek that are located on the Columbia River and are not constrained from water access by the railroad. Heavy industrial zoning could support land use activities that could utilize river navigation for receipt of raw material by water or shipment of finished goods. There is no marine infrastructure at the site with the exception of a series of dolphins that are of unknown condition and ownership. Steep slopes up to 60 feet in vertical relief are located along the river which would reduce the suitability of providing marine infrastructure to access the uplands.

There are three parcels identified by the Port of Cascade Locks for industrial development along the Columbia River. The three lots are zoned either light industrial, heavy industrial, high density residential, and resort commercial. Information from the Port of Cascade Locks stipulates that there are sections of these properties available for rezoning. The Cascade Locks Resort and Casino is potentially planned for adjacent lots to the south.

[39] https://portofcascadelocks.org/recreation-projects/

Based on the port's website,[40] there is availability to construct an industrial park in this area with water access. Figure A.2-25 shows the lots along the river that area available for industrial development. Existing uses south of these lots include Bear Mountain Forest Products, which has been producing premium quality forest products in Oregon since 1988, and SDS lumber. The Warm Springs Resort and Casino was a planned development south and adjacent to the available industrial lots in this area but the status of this project is unknown.

2.9.3 Key Findings

There are undeveloped industrial lots along the river. These lots have been identified for potential development that would likely not generate marine traffic, including business parks and entertainment and recreational uses.

The Cascade Locks community is positioning itself as a sailboat racing destination. In general, there is a desire to attract the international sailing community, but the sailboats using this area are typically small and are not height constrained.

The Port of Cascade Locks also homeports the *Columbia Gorge Sternwheeler* during the tourist season, but this vessel is not height constrained by the proposed I-5 bridge options.

2.10 Hood River County, Oregon (Hood River)

2.10.1 Existing Uses

The Port of Hood River operates a Business Park, marina, and a cruise facility.

Port of Hood River Business Park

The Port of Hood River owns most of the waterfront properties in Hood River. The goal of the port's Waterfront Development Strategy emphasizes preservation of and support for local light industrial businesses. In addition to job retention and business development, other Waterfront Development Strategy goals include quality development in a collaborative process, and ensuring compatibility with existing and future recreational activities. There are no marine facilities and there is no direct access to the riverfront for barge or other terminals within the business park.

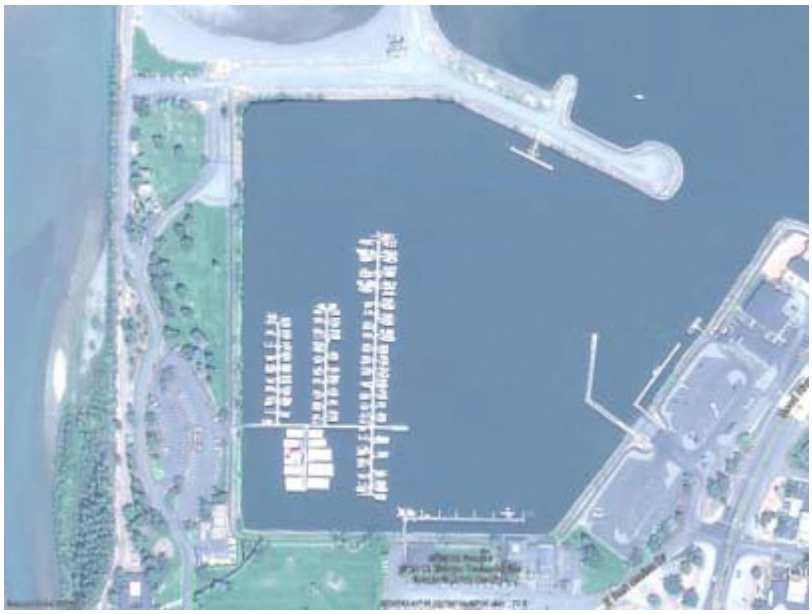
40

Figure A.2-28. Port of Hood River Business Park

Port of Hood River Marina Park

The port's marina offers moorage for over 160 vessels, with slip sizes ranging from 20 feet to 40 feet. The marina has a short-term transient dock available for travelers at river mile 169. The boats homeported or calling on a transient basis are typically less than 40 feet long, and as a result are not height constrained by the proposed I-5 bridge. Small cruise ship vessels that call Hood River in the spring and fall seasons, including: InnerSea Discoveries (*The Legacy*), Lindblad Expeditions (*Sea Bird* and *Sea Lion*), and Portland Spirit (*Columbia Gorge Sternwheeler*), among others. The dock on the north side of the marina is reserved for small cruise ship vessels. Vessels moored at the Port of Hood River are addressed in the main NIR. Other uses of the marina include kayaking, small sailing craft, community education sailing classes, and Hood River Yacht Club activities.

Figure A.2-29. Port of Hood River Marina



2.10.2 Overview of Land Use Regulations

Zoning along the Hood River shoreline consists of open space, Columbia River recreation/commercial, and light industrial. The eastern edge of the jurisdiction along the shoreline and directly adjacent to the Hood River bridge is general commercial zoning. The city of Hood River defines light industrial as industrial service (e.g. corporate laundry and cleaning, etc.), research and development, manufacturing, processing, fabrication, packaging, assembly of goods, and warehousing. The use of Columbia River recreation/commercial zoning along the shoreline is intended to be consisted with visual and pedestrian access to the area. The Union Pacific railroad tracks run along the river, creating a barrier between the river and uses on the other side of the river. Past the railroad tracks (inland) are various uses, including general commercial, urban low density, open space, industrial, and light industrial. There are several light industrial parcels that abut the river, such as along Portway Avenue.

2.10.3 Key Findings

In the Port of Hood River area, the emphasis is on recreational development and business park development rather than marine-based industrial.

The cruise ships that call or could call on Hood River are addressed in the main NIR.

The sailboats homeported in Hood River or calling on a transient basis at Hood River are typically less than 40 feet long, and are not height constrained by the proposed I-5 bridge.

There are no known existing or future activities that would be height constrained in Hood River.

2.11 Wasco County, Oregon

Wasco County waterfront facilities are located at The Port of The Dalles.

2.11.1 Existing Uses

Waterfront uses include two barge terminals and a marina.

Bernert Barge Lines provides barge towing for the transport of commodities and containers on the Columbia, Snake, and Willamette Rivers. Bernert maintains a maintenance and fabrication facility in The Dalles that has a dock, crane, and shop with capabilities for marine repairs and general metalworking.

Mid Columbia Producers is a farmer-owned cooperative serving the grain producers of the mid-Columbia region. The cooperative owns offices and grain elevators on the riverfront where barges are loaded with wheat for transit downriver, primarily for export.[41]

The port sold all its developable land, with the exception of one 85 acre tract adjacent to the Columbia River. The port developed the site into the Chenoweth Business Park. None of the sites within the business park has water access and a waterfront trail is located between the lots and the river.[42]

[41] Port of The Dalles Strategic Business Plan, https://www.portofthedalles.com/files/405660130/2013+Port+of+The+Dalles+Strategic+Plan.pdf
[42] Port of The Dalles Strategic Business Plan, https://www.portofthedalles.com/files/405660130/2013+Port+of+The+Dalles+Strategic+Plan.pdf

Figure A.2-30. Barge Terminals in The Dalles

Port of The Dalles Marina

The port's marina has space for 62 boathouses and approximately 30 open moorage slips.[43] A boat launch is located adjacent to the marina to allow for easy haul outs with trailers. The marina provides a variety of services (fuel, power, public restrooms, picnic facilities, boat holding tank pump-out and potty dump station). The Dalles Yacht Club is located at the marina.

[43] Source: Port of The Dalles https://www.portofthedalles.com/the-marina.

Figure A.2-31. Port of The Dalles Marina

The Dalles Commercial Dock and Lewis and Clark Festival Park

The floating dock serves transient recreational boats, and the fixed pier serves cruise ships, similar to the vessels calling at Hood River.[44]

[44] http://www.ci.the-dalles.or.us/node/99.

Figure A.2-32. The Dalles Commercial Dock[45]

Former Northwest Aluminum Site (3313 W 2nd St.)

The Northwest Aluminum smelter ceased operations in 2000 and cleanup operations were largely completed by 2007. The site, which is approximately 120 acres and undeveloped, is now planned for commercial and industrial development. This site is not located on the river.

[45] Ibid.

Figure A.2-33. Former Northwest Aluminum Site (3313 West 2nd Street)

2.11.2 Overview of Land Use Regulations

The western shoreline of The Dalles has a significant amount of industrially zoned land along the riverfront. This designation includes shipyards and commercial docking facilities as use is permitted outright. In addition, manufacturing and fabricating are uses permitted outright. There are also pockets of commercial recreation and general commercial along the river. Some of the industrial sites support marine traffic generating uses.

The Dalles Comprehensive Land Use Plan, Volume I (May 23, 2011) specifies that riverfront property should be reserved for riverfront use (Goal 8) and that there should be provisions to accommodate future barge traffic (Goal 12).

2.11.3 Key Findings

In the western portion of The Dalles, there are numerous industrial lots along the river, some of which support industrial, marine-dependent uses. The lots could be redeveloped for marine-related. Closer to downtown, the tourism and recreation industry is anticipated to generate increased marine traffic.

A 2011 planning study[46] found that there is a shortage of commercial lands in The Dalles: “In order to capitalize on long-range economic and employment shifts, The Dalles will need to add to its existing supply of land for commercial uses within the urban growth boundary. Similar conversions of port

[46] The Dalles Comprehensive Land Use Plan, prepared by Winterbrook Planning, May 2011, Page 29

industrial lands along the riverfront can produce a mixed-use area to accommodate a slightly different market, including freeway commercial and recreational users."

Although current marine facilities in The Dalles do not have the capacity to support deep-draft vessels it is possible for them to reach the area as shown by past activities. The deep-draft navigation channel authorized by the U.S. Army Engineers terminates in The Dalles, but it is only maintained to a depth of 17 feet. Some deep-draft navigation has occurred in the past. One example being in 1938 when the freighter the *SS Charles L. Wheeler Jr.* became the first deep-sea vessel to travel past the Bonneville Dam up to The Dalles but deep draft navigation has never occurred on frequent basis to the Dalles.[47]

None of the planned development options in The Dalles would serve or require vessels that would be constrained by the bridge height.

[47] https://historylink.org/File/9883.

3. ANALYSIS SUMMARY

The project extent from the BNSF rail line in Vancouver to the Celilo Falls BNSF bridge covers a large portion of the Columbia River but overall few properties exist that currently have marine facilities available or have the potential for future facilities. The findings above highlight the political and geographic constraints the Columbia River waterfront has including:

- Columbia River Gorge NSA Designations
- Parallel transportation routes (SR 14, I-84, Union Pacific and BNSF railroads)
- Steep Topography
- Existing recreational and open space uses

Primarily industrial uses that generate or would generate marine vessel traffic are located within urban areas and typically within established industrial parks (e.g., CBC, Port of Cascade Locks Industrial Park). There are no known planned developments within the study area that would create additional navigation activities that would be impacted by the proposed bridge heights studied in the main body of the report.

APPENDIX B IMPACTED USERS AND VESSEL DATA SUMMARY TABLES

IMPACTED USERS

Marine Contractors

- Advanced American Construction *DB 4100*
- Diversified Marine *DB Freedom*
- General Construction Company *DB General*
- JT Marine *DB Taylor*
- Manson Construction Company *Derrick No. 24*
- SDS Lumber Company *future shipment*

Federal Government

- USACE dredge *Yaquina*

Marine Industries and Fabricators

- Greenberry
- Thompson Metal Fab
- Vigor

Marine Contractors

Company: Advanced American Construction

Vessel: *DB 4100*

Company did not respond to request for information. Details provided below were included in the CRC NIR.

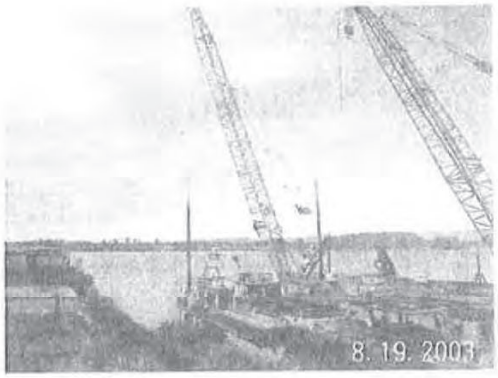
Marine Contractors

Owner: Advanced American Construction

Vessel: DB 4100

4100 DB — Equip. #3-10

Manufacturer	Model	Max Capacity	Year
Manitowoc	4100 Series 2 Vicon	225 Ton	1992



Item	Description	Unit	Quantity	Type
	Crane			
1	Line 1 (Main)	LBS	1000'	1 1/8" wire
	Line 2 (Whip)	LBS	450'	1 1/8" wire
	Line 3 (Whip)	LBS	450'	1 1/8" wire
	Boom Wire		760'	7/8" wire
2	Boom	Feet	180'	
3	Width / Outriggers	Feet	--	--
	Length / Outriggers	Feet	--	--
4	Height w/boom down	Feet	14' 2"	--
5	Shipping Weight	LBS	450,572	--
	Trucks / Ship	EA	7	--
	Barge			
1	Width	Feet	60'	--
2	Length	Feet	105'	--
3	Depth	Feet	7'	--
4	Draft	Feet		
5	Rakes		1	--
6	Spuds	Feet	78 92	--
*	Serial Number: 413419			

Notes: Equipment on barge: 4100 (#3-10), Bulldog Gen Set 5 kw mounted on crane (no equip. no.), 25 kw multi-equip. Gen Set (#9-35), Hydra-Pac 4000, hydraulic unit for spuds (#10-01), 2 winches (#14-12 and #14-24). Deutz F3L1011F engine, replaced in 7/03.

Vessel Height Verification Sheet

By: Jennifer Rabby Date: 23 July 2012

1. Company Name and/or Owner of Vessel and Contact Information

a. Name of company: Advanced American Construction

b. Name of contact: Mike Johns

c. Phone number (Office): 5053.445.9000 (Cell): 503.720.1108

d. Email: mikej@ callaac.com

e. Address: 8444 NW St Helens Road City: Portland

State: OR Zip code: 97231

2. Vessel

a. ID: Serial No. 413419 b. Name: 4100 DB

c. Type: Crane Barge d. USCG Document Number:

3. Vessel Configuration

a. Identify vessel configuration: Crane Barge

- Is a vessel specification sheet available? Yes
- Configuration shown on the sheet: No
- What is the lowest height configuration for transport? 35 feet

b. What is the gantry configuration? Estimated gantry height: 35 Feet

c. Does the barge have spuds? Yes

- Height above waterline for travel? 92 Feet
- Can the spuds be removed for travel? Only for long distances upstream for big jobs; not for work in the Portland Harbor
- Work and cost involved in removing spuds? ½-1 day

4. Vessel Location

a. Where is the vessel currently located? Kalama

b. Is it working on a job? Yes Is it tied up to shore? no

c. What is the best time to make a trip to the vessel? _____

5. Surveyed Measurements (measurements from spec sheet)

Gantry Height:	35
Water Level:	
Top of Boom:	
Height of Boom Hinge Pin:	
Boom Cradle:	
Top of Spud:	92

6. Vessel Height

Self-Reported		**Heights from Spec sheet**	
Air Draft:	90 feet (top of spuds)	Air Draft:	92
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet	Water Level:	16 feet
Total Height:	**116 feet**	**Total Height:**	**118 feet**

7. History Notes

Date	**Item**
2/20/2012	Contacted by Megan Nelson
3/8/2012	Returned River User Data Sheet for the Linde Marie via email
7/23/2012	Interviewed by Karl Krcma and Jennifer Rabby; Vessel specification sheets provided

Marine Contractors

Company: Diversified Marine

Vessel: *DB Freedom*

Company provided data sheets to the IBR Program. Data sheets are included below, followed by the information included in the CRC NIR.

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Diversified Marine, Inc.

Vessel Name:
DB Freedom

Vessel Type:
Derrick barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Commercial

USCG Document Number:
507476

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):
152.1

Beam (width; ft):
60

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

11

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

119

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

10

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Transit speed under Interstate Bridge and Load Configuration:

5 knts

Time of Year of Passage:

10

Tug Assistance Required: Choose an item.

YES

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

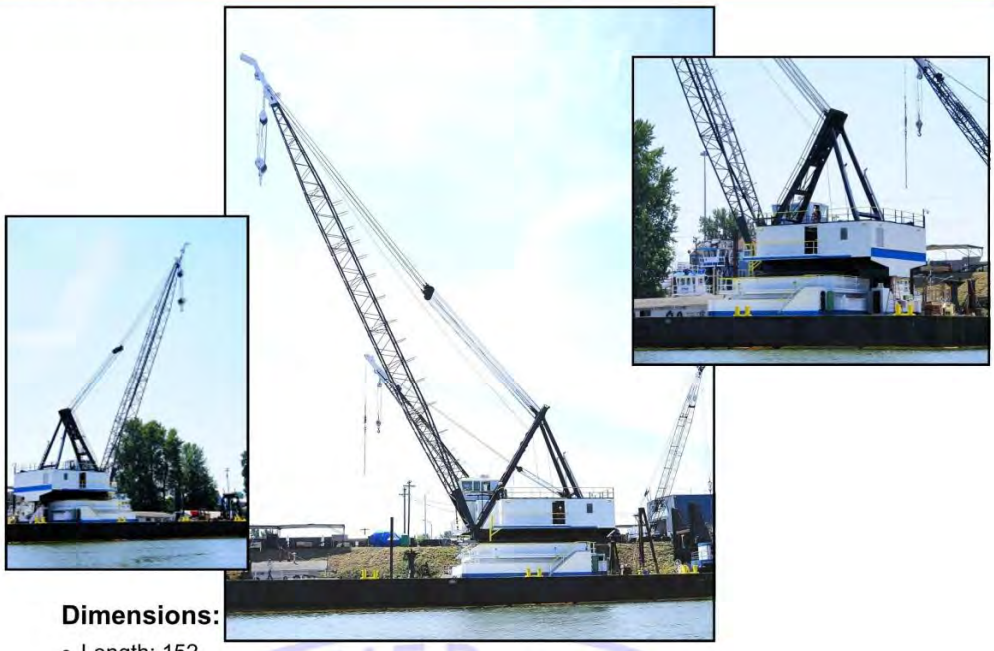
Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Marine Contractors
Owner: Diversified Marine
Vessel: DB Freedom

CRANE BARGE "DB FREEDOM"

Official No. 507476



Dimensions:

- Length: 152
- Beam: 60'
- Depth: 12"
- Draft: 4'
- Boom: 160' to main fall
- Boom: 172' to main whip line

Capacities:

- Fuel: 10,000 gallons
- Lift 123.5 tons off stern
- Lift: 87.4 tons @ 50' radius
- Lift: 81.2 tons @ 60' radius
- Lift: 67 tons @ 80' radius
- Lift: 25 tons @ 160' radius

Regulatory:

- American Hoist & Derrick Co American 305 Revolver
- Gross tonnage: 911 GRT

Machinery:

- Power: Diesel/Electric
- Generator: 375KW 480V
- Engine: C18

Auxiliaries:

- 3 drum 20,000#deck winch
- Twp (2) Aux hoist: 2 drum Skagit

Capabilities:

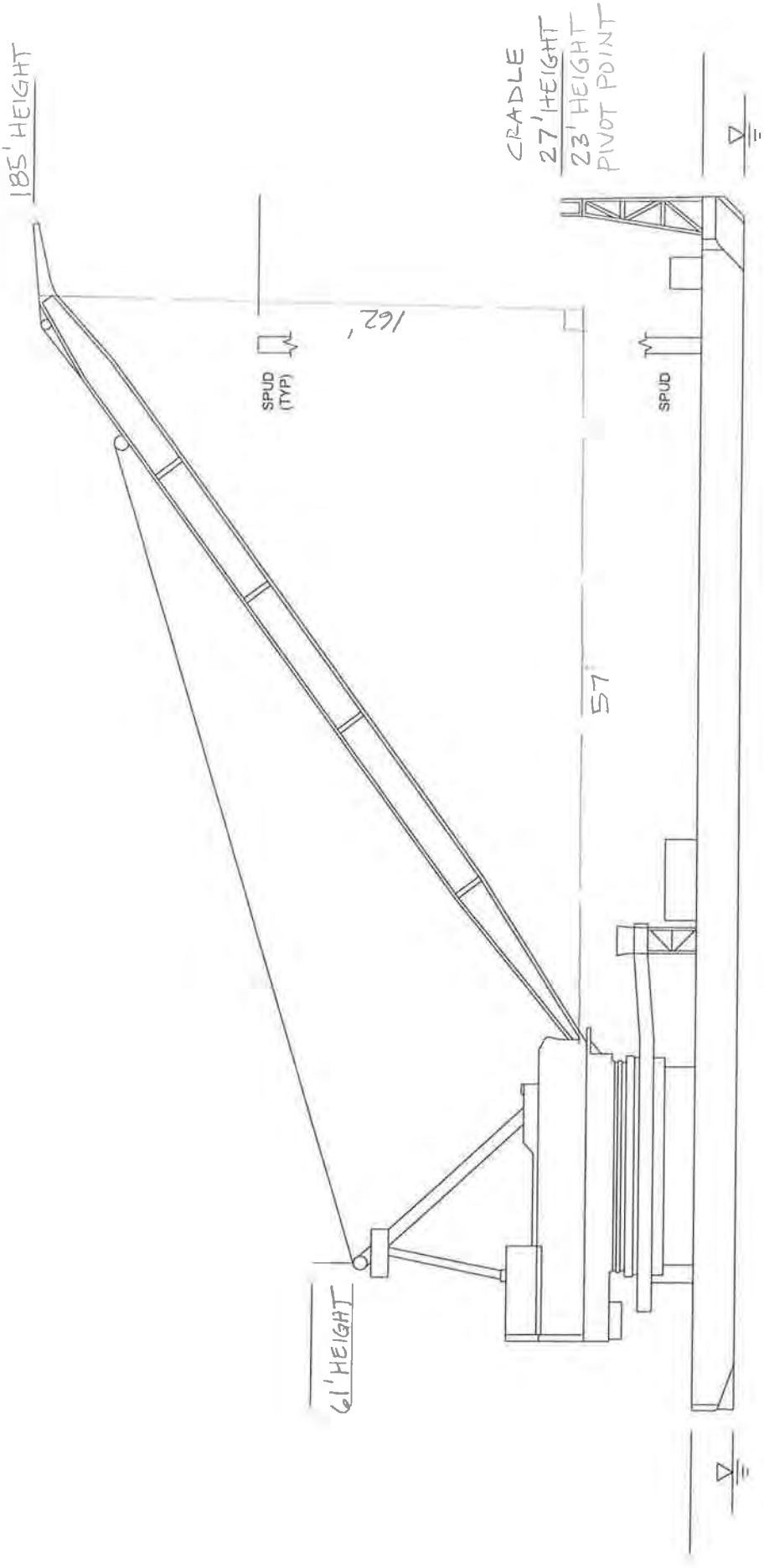
- Heavy Lifting
- Crane Service
- Salvage
- Pile Driving

DIVERSIFIED MARINE, INC.

PO Box 83723
(1801 N Marine Drive - 97217)
Portland OR 97283 USA

Phone: 503-289-2669
Fax: 503-289-2825
E-mail: kurt@dmipdx.com
Website: www.dmipdx.com

See more photos and videos of our equipment on our website.


185' HEIGHT
CRADLE
27' HEIGHT
23' HEIGHT
PIVOT POINT
162'
SPUD
(TYP)
SPUD
57'
61' HEIGHT
7-02-2012
DATE
FREEDOM
NAME
DIVERSIFIED MARINE
LOCATION

Vessel Height Verification Sheet

By: Pete Geiger Date: 2 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Diversified Marine
   b. Name of contact: Kurt Redd
   c. Phone number (Office): 503.289.2662 (Cell):
   d. Email: kurt@dmipdx.com
   e. Address: 1801 N Marine Drive City: Portland
      State: OR Zip code: 97217
2. Vessel
   a. ID: b. Name: DB Freedom
   c. Type: Crane Barge d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Crane Barge
      - Is a vessel specification sheet available? Yes
      - Configuration shown on the sheet: Crane Up
      - What is the lowest height configuration for transport? Crane down at ~ 34 Degrees above horizontal, spuds up and pinned

   b. What is the gantry configuration? Estimated gantry height: Not given
   c. Does the barge have spuds? Yes at least two forward. Spuds currently down
      - Height above waterline for travel? 85 Feet
      - Can the spuds be removed for travel? Only in very special circumstances when they travel far upriver on the Columbia
      - Work and cost involved in removing spuds? 4 hours each spud to re-install; need to tie up to a dock near the work area.

4. Vessel Location

   a. Where is the vessel currently located? Columbia River North Portland Harbor

   b. Is it working on a job? Yes while tied up Is it tied up to shore? yes

   c. What is the best time to make a trip to the vessel? Anytime just give him 1 day notice

5. Surveyed Measurements (all measurements NAVD 88)

Gantry Height:	77.3 feet
Water Level:	16.0 feet
Top of Boom:	Measured while working = 201.4 feet (71 degrees off horizontal) Estimated at travel angle (34 degrees off horizontal) = 135 feet
Height of Boom Hinge Pin:	39.1 feet
Boom Cradle:	42.9 feet
Top of Spud:	Not surveyed – spuds in down position

6. Vessel Height

Self-Reported		Surveyed (Top of Boom Estimated)	
Air Draft:	85 feet (Top of Spuds)	Air Draft:	119 Feet (Top of Crane)
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet CRD	Water Level:	16 feet CRD
Total Height:	111 feet	Total Height:	145 feet

7. History Notes

Date	Item
2/17/2012	Contacted by Megan Nelson
2/29/2012	Data sheet submitted
6/28/2012	Contacted by Pete Geiger for field measurement
7/2/2012	Field measured

Marine Contractors

Company: General Construction Company

Vessel: *DB General*

Company confirmed the information provided during the CRC NIR is still accurate (email confirmation included below). Vessel details that follow were included in the CRC NIR.

From:	Brian Carrico
To:	Nicole McDermott
Subject:	Fw: Interstate Bridge Program
Date:	Thursday, September 23, 2021 11:36:04 AM
Attachments:	image002.png image003.png image004.png image005.png

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From: Kent.Boden <Kent.Boden@kiewit.com>
Sent: Thursday, September 23, 2021 11:23 AM
To: Brian Carrico <Brian.Carrico@interstatebridge.org>
Cc: Todd.Wille <Todd.Wille@kiewit.com>
Subject: Interstate Bridge Program

Hello Brian, there are three vessels no longer in service; the Beaver, Tacoma, and Anchorage. The remainder of the information is accurate. Please feel free to call me if you have any questions.

Kiewit Infrastructure Group

Kent Boden
Pursuits Manager, Kiewit Bridge & Marine

Kiewit Infrastructure West Co.
2200 Columbia House Blvd, Vancouver, WA 98661
360.693.1478 (P) 360.721.9208 (C)
Kiewit.com An Equal Opportunity Employer

From: Brian Carrico <Brian.Carrico@interstatebridge.org>
Sent: Thursday, September 23, 2021 9:17 AM
To: Kent.Boden <Kent.Boden@kiewit.com>
Subject: [EXTERNAL] Interstate Bridge Program

Kent - Thanks for taking my call today. Attached is the information submitted for the CRC program back in 2012. We would appreciate a review of this information to confirm that it remains accurate. We would especially want to know if any of the specifications have changed, if any of the fleet are no longer in service, if other vessels should be considered and whether you have any planned or potential projects that would result in the need to transit through the I-5 bridge area.

Feel free to contact me with any questions.

Brian

Brian Carrico
Interstate Bridge Replacement Program
Environmental Program
O: 360-823-6122 | **C:** 360-433-7775
E: brian.carrico@interstatebridge.org
interstatebridge.org

Marine Contractors

Owner: General Construction

Vessel: D.B. General

GENERAL CONSTRUCTION COMPANY

D.B. GENERAL
700 TON FLOATING CRANE

SPECIFICATIONS

- Main Crane: Clyde 52
- Capacities: 700 tons @ 70′ radius over the stern
  500 tons @ 70′ radius fully revolving
  40 tons @ 243′ radius (auxiliary)
  25 tons @ 257′ radius (whip)
- Boom: 200′ to main fall (260′ available)
  230′ to auxiliary line (290′ available)
  245′ to whip line (305′ available)
- Barge Size: 300′ x 100′ x 18′
- Classification: ABS+A1, USCG
- Draft (std.): 8′-0″
- Spuds: Two 48″Ø x 90′ long
- Anchors: 6-point moorage
- Deck Loading: 2,000 psf uniform
- Bunkers: 50,000 gallons diesel fuel
  310,000 gallons fresh water

CAPABILITIES

- Heavy Lifting
- Piledriving
- Offshore Construction & Service
- Duty Cycle – Dredging
- Pipe Lay

© 2007 General Construction Company, 19472 Powder Hill Place N.E., Poulsbo, WA 98370 ♦ Phone (360) 779-3200 ♦ Fax (360) 779-3132
Please contact Pat Boyd-Equipment Manager at (206) 938-6758 or pat.boyd@kiewit.com for load charts, deck configuration, and availability.
www.generalconstructionco.com

Columbia River CROSSING

River User Data Sheet

By: RALPH PETEREIT Date: 2/27/2012

1. Company Name and/or Owner of Vessel and contact information

Name of company: GENERAL CONSTRUCTION CO.

Name of contact: PAT BOYD - EQUIPMENT MANAGER

Phone number (Office): 206-938-6750 (Cell): 206-498-8815

Email: pat.boyd@kiewit.com

Address: 3838 W. MARGINAL WAY SW

City: SEATTLE State: WA Zip code: 98106

3a. Vessel Name: D.B. GENERAL **3b. Vessel Type:** FLOATING CRANE/ DERRICK BARGE

3c. US Coast Guard Document Number:

4a. Length Overall (LOA), **feet:** 300 **4b. Beam** (width), **feet:** 105.8

5. Draft (depth of hull below waterline, fully laden), **feet:** 8

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), **feet:** 93

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 5-10

8. Frequency of one-way passage underneath I-5 main channel (typical per month):

Jan ____ Feb ____ Mar____ Apr____ May____ Jun____ Jul____ Aug____ Sep____ Oct____ Nov____ Dec____

9. Frequency of one-way passage underneath I-5 main channel (other historic events):

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month): NONE

Jan ____ Feb ____ Mar____ Apr____ May____ Jun____ Jul____ Aug____ Sep____ Oct____ Nov____ Dec____

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? NOT AVAILABLE

What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? NOTHING IN THE WORKS FOR ANYTHING LARGER THAN THIS BARGE.

May we have a copy?

13. Other miscellaneous THIS IS GENERAL'S/KIEWIT'S LARGEST CRANE BARGE. IT HAS GONE UNDER THE BRIDGE TO TAKE THE CRANE OFF THE DAVY CROCKET MANY YEARS AGO, AS WELL AS SOME PICKS UP AT THOMSEN METAL FAB. - BUT CAN'T REMEMBER WHEN

Provided by Kiewit

River User Data Sheet By:_____ Date:_____

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: GENERAL CONSTRUCTION COMPANY
   b. Name of contact: _____
   c. Phone number (Office):_____ d. (Cell):_____
   e. Email:_____
   f. Address: 33455 6TH AVE S.
   g. City: FEDERAL WAY
   h. State: WA i. Zip code: 98003

3a. Vessel Name: D.B. GENERAL 3b. Vessel Type: CRANE BARGE

3c. US Coast Guard Document Number: 1042279

4a. Length Overall (LOA), feet: 288.0 4b. Beam (width), feet: 100.0

5. Draft (depth of hull below waterline, fully laden), feet: 8'
6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 93'
7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 10'
8. Frequency of one-way passage underneath I-5 main channel (typical per month):_____

   Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___
9. Frequency of one-way passage underneath I-5 main channel (other historic events):____
10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

    Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___
11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):_____

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy?
13. Other miscellaneous

Vessel Height Verification Sheet

By: Ralph Petereit Date: July 10, 2012

1. Company Name and/or Owner of Vessel and Contact Information

a. Name of company: General Construction Co.

b. Name of contact: Pat Boyd – Equipment Manager

c. Phone number (Office): (206) 938-6758 (Cell): (206) 498-8815

d. Email: PAT.BOYD@KIEWIT.COM

e. Address: 3838 W. Marginal Way City: Seattle

State: WA Zip code: 98106

2. Vessel

a. ID: b. Name: DB General

c. Type: Crane Barge d. USCG Document Number: 1042279

3. Vessel Configuration

a. Identify vessel configuration: Crane barge

- Is a vessel specification sheet available? Yes
- Configuration shown on the sheet: Yes
- What is the lowest height configuration for transport? 93 ft

b. What is the gantry configuration? Pinned Estimated gantry height: 93 ft

c. Does the barge have spuds? Yes

- Height above waterline for travel? Gantry height
- Can the spuds be removed for travel? Yes
- Work and cost involved in removing spuds? ½ - full day

4. Vessel Location

a. Where is the vessel currently located? Terminal 105 – Doing day jobs in the Puget Sound Region

b. Is it working on a job? Yes Is it tied up to shore? Depends on the day

c. What is the best time to make a trip to the vessel? Need to call for daily schedule

5. Measurements from Spec Sheet

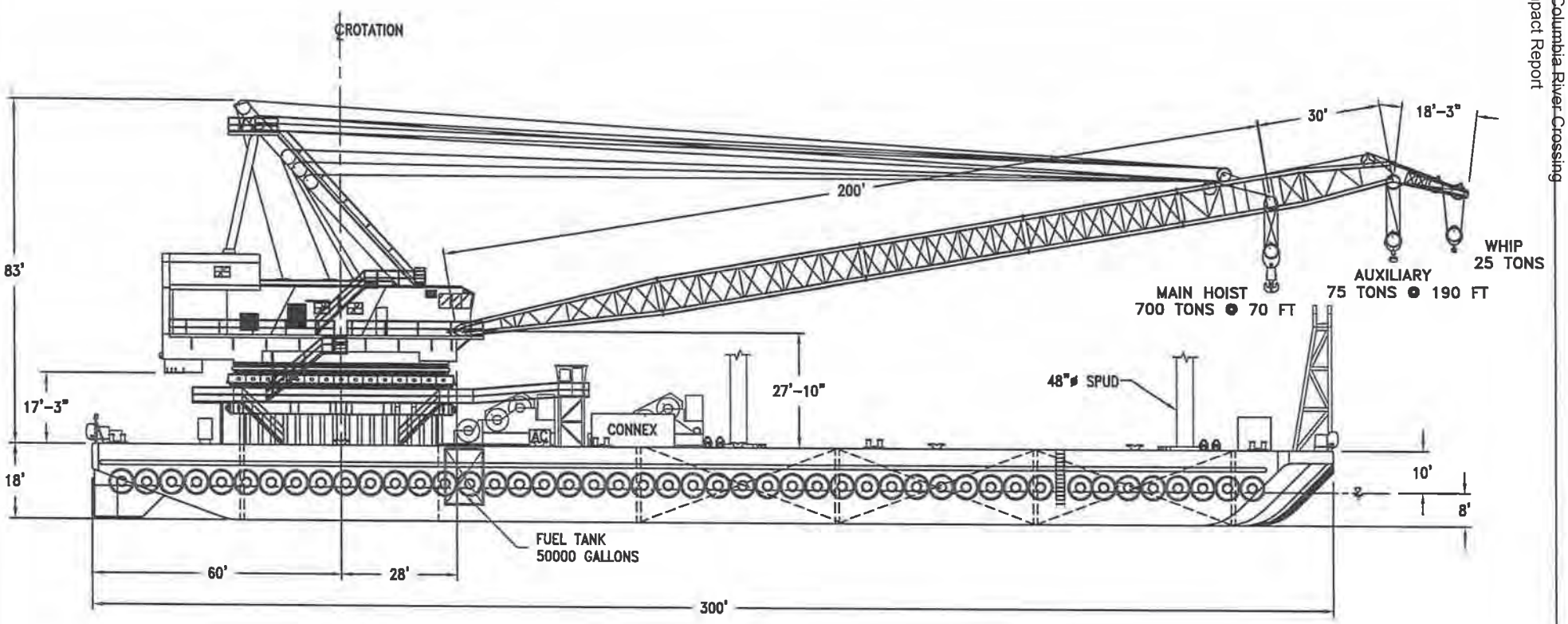
Gantry Height:	93 ft
Water Level:	
Top of Boom:	
Height of Boom Hinge Pin:	
Boom Cradle:	
Top of Spud:	

6. Vessel Height

Self-Reported		**From Spec Sheet**	
Air Draft:	93 ft	Air Draft:	93 ft
Air Gap:	5 – 10 ft	Air Gap:	10 ft
Water Level:	16	Water Level:	16
Total Height:	**119 ft**	**Total Height:**	**119 ft**

7. History Notes

Date	**Item**
6/29/2012	Contacted Pat Boyd- Equipment Manager
7/10/2012	Visited Yard to confirm vessel locations and heights



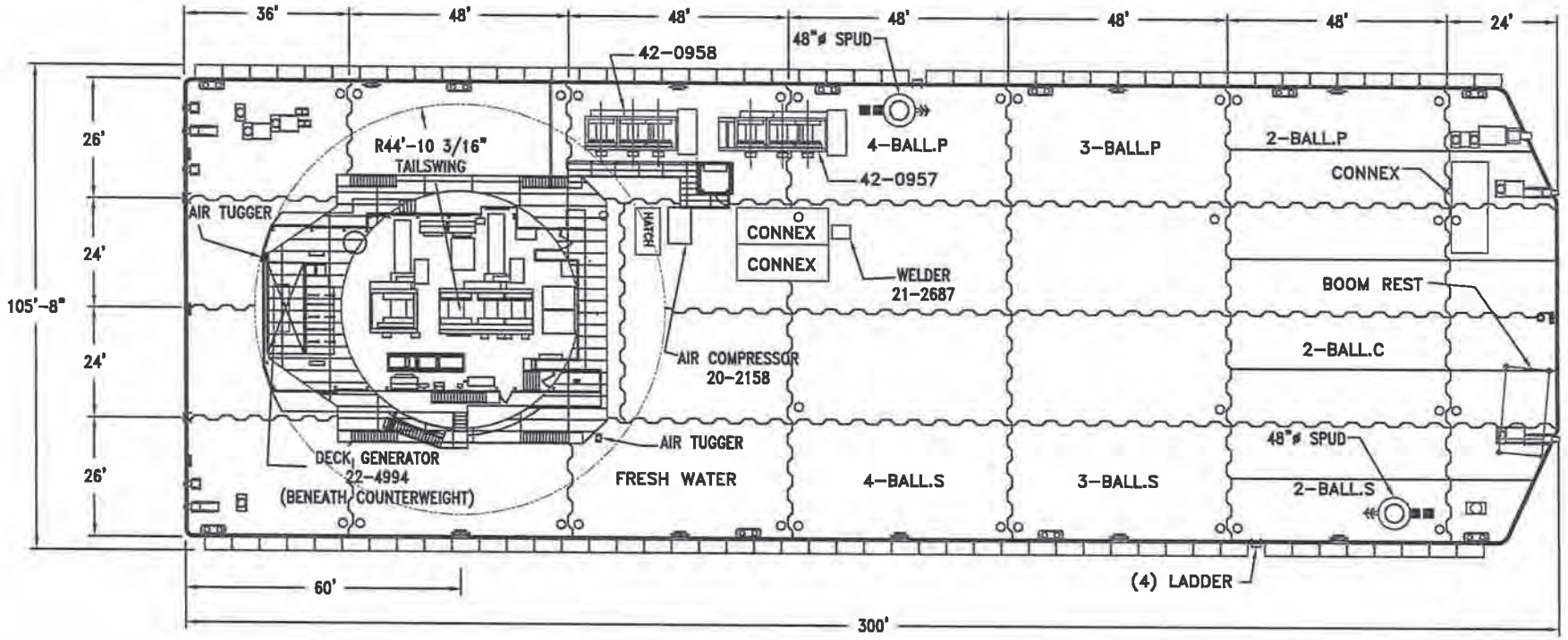
OUTBOARD PROFILE

GENERAL CONSTRUCTION COMPANY
19472 POWDER HILL PL * POULSBO, WA * 98370-7466
(360) 779-3200 * FAX (360) 779-3132

D.B. GENERAL (700 TON) - #53-0736

ISSUED: JAN 2010

FC-53-0736-2



DECK PLAN

GENERAL CONSTRUCTION COMPANY
19472 POWDER HILL PL * POULSBO, WA * 98370-7466
(360) 779-3200 * FAX (360) 779-3132

D.B. GENERAL (700 TON) - #53-0736

ISSUED: JAN 2010

FC-53-0736-3

Marine Contractors

Company: JT Marine

Vessel: *DB Taylor*

Company provided data sheets to the IBR Program. Data sheets are included below, followed by the information included in the CRC NIR.

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: JT Marine, Inc.

Vessel Name:
DB Taylor

Vessel Type:
Crane barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Commercial

USCG Document Number:
514786

Primary Mooring Location *(waterway milepoint, if known)*:

Type and quantity of cargo, if applicable:

Length (overall; ft):
148

Beam (width; ft):
50

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

5

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

90' w/ spuds 75' w/ spuds out

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

10

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

60'

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: Choose an item.

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan____10___ **Feb**____10___ **Mar**____10____ **Apr**____10___ **May**__10_____ **June**____10___

Jul___10____ **Aug**____10___ **Sep**_____10__ **Oct**___10_____ **Nov**___10____ **Dec**____10_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan___1_____ **Feb**____1_____ **Mar**____1_____ **Apr**____1_____ **May**_____1____ **June**_____1____

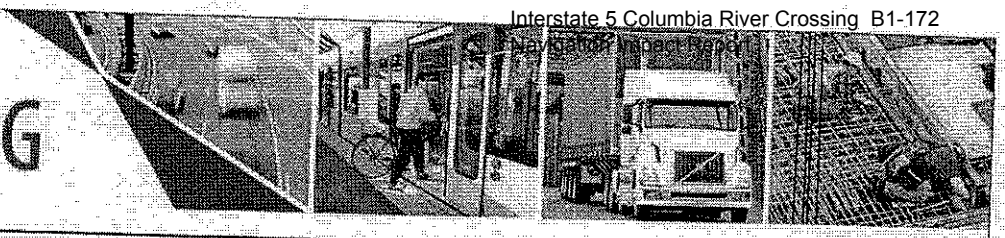
Jul_____1____ **Aug**____1_____ **Sep**_____1____ **Oct**_____1____ **Nov**_____1___ **Dec**_____1_____

Marine Contractors

Owner: JT Marine

Vessel: DB Taylor

Columbia River CROSSING



River User Data Sheet

By: Irene T Date: 3-22-2012

1. Company name and/or owner of vessel and contact information

Name of company: JT Marine Inc

Name of contact: Irene Toristoja

Phone number (Office): 360 750-1300 (Cell):

Email: irene@jtmarineinc

Address: 2301 SE Hidden town, Suite 100

City: Vancouver State: WA Zip code: 98661

3a. Vessel name: DB Taylor **3b. Vessel type:** Crane barge

3c. U.S. Coast Guard Document Number: 514786

4a. Length Overall (LOA), **feet:** 148' **4b. Beam** (width), **feet:** 50'

5. Draft (depth of hull below waterline, fully laden), **feet:** 5'

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), **feet:** ~~150~~ 143' as per Irene Toristoja 3/27/12

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 10'

8. Frequency of one-way passage underneath I-5 main channel (typical per month):

Jan 10 Feb 10 Mar 10 Apr 10 May 10 Jun 10 Jul 10 Aug 10 Sep 10 Oct 10 Nov 10 Dec 10

9. Frequency of one-way passage underneath I-5 main channel (other historic events):

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

Jan 1 Feb 1 Mar 1 Apr 1 May 1 Jun 1 Jul 1 Aug 1 Sep 1 Oct 1 Nov 1 Dec 1

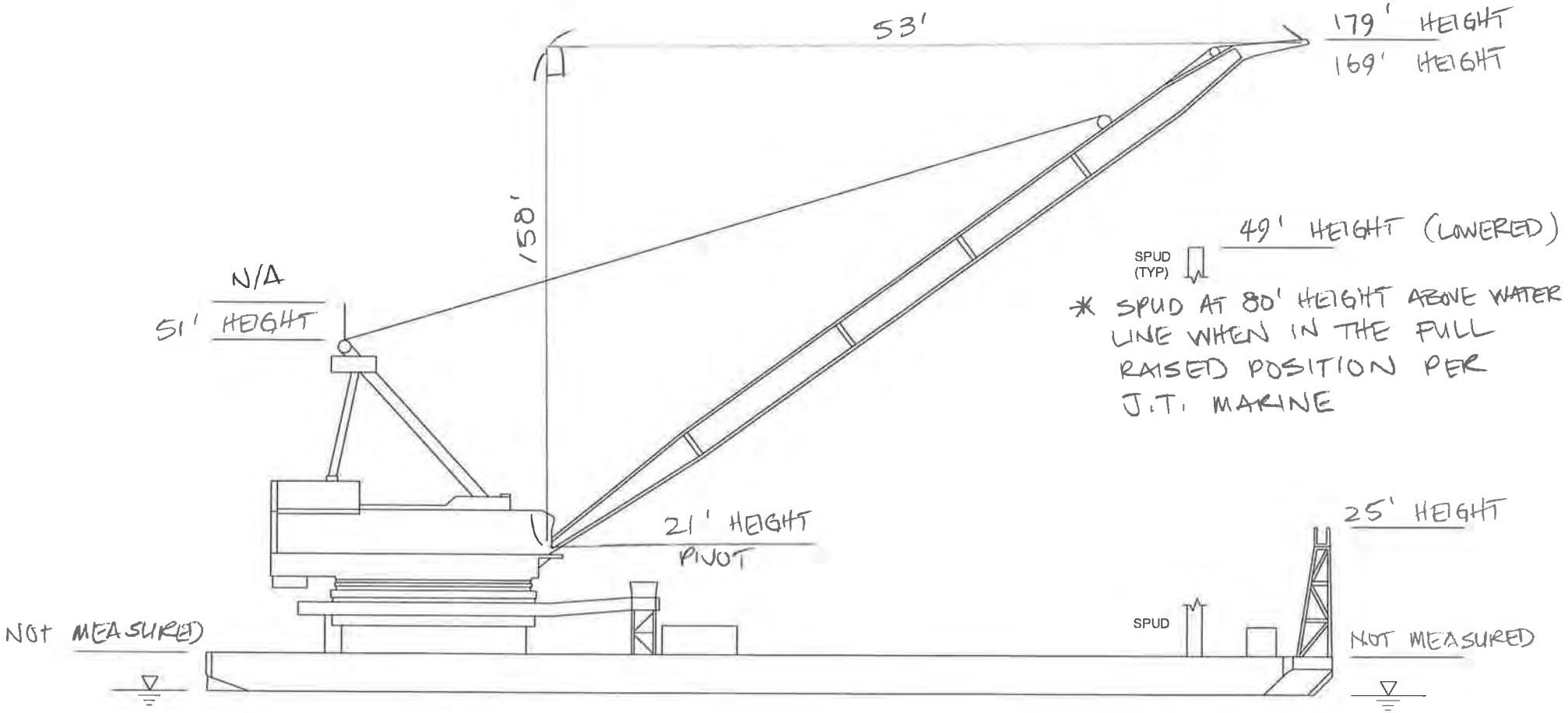
11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):

12. Do you have a business plan (e.g. 10 or 20 year plan)? NO

What does it say related to vessels traveling under the I-5 Bridge or into North Portland Harbor (Oregon Slough)?

May we have a copy?

13. Other (additional sheets may be attached.) NA



DB TAYLOR
NAME

J.T. MARINE
MEASURED AT
SELLWOOD BRIDGE, PORTLAND, OR
LOCATION

07-12-12
DATE

Vessel Height Verification Sheet

By: Pete Geiger Date: 12 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: JT Marine
   b. Name of contact: Waino Toristoja
   c. Phone number (Office): 360.750.1300 (Cell): 360.567.8382
   d. Email: waino@jtmarineinc.com
   e. Address: 2301 SW Hidden Way, #100 City: Vancouver
      State: WA Zip code: 98661
2. Vessel
   a. ID: b. Name: DB Taylor
   c. Type: Crane Barge d. USCG Document Number: 514786
3. Vessel Configuration
   a. Identify vessel configuration: Crane Barge
   - Is a vessel specification sheet available? No
   - Configuration shown on the sheet: N/A
   - What is the lowest height configuration for transport? Crane down in cradle, spuds up and pinned

   b. What is the gantry configuration? Pinned Estimated gantry height: Not given

   c. Does the barge have spuds? Yes two midpoint. Spuds currently down
   - Height above waterline for travel? 80 Feet
   - Can the spuds be removed for travel? Only in very special circumstances when they travel far upriver on the Columbia
   - Work and cost involved in removing spuds? 4 hours each spud to re-install; need to tie up to a dock near the work area. Can lift both spuds with own crane.

4. Vessel Location

   a. Where is the vessel currently located? Willamette River Sellwood Bridge

   b. Is it working on a job? Yes Is it tied up to shore? No

   c. What is the best time to make a trip to the vessel? Anytime just give him 1 day notice

5. Surveyed Measurements (all measurements NAVD 88)

Gantry Height:	65.3 feet
Water Level:	13.8 feet
Top of Boom[1]:	Measured while working = 192.7 feet (71 degrees off horizontal) Estimated height at travel angle: • 220 foot long boom: 131 feet • 166.6 foot long boom: 51 feet (limit is the gantry height)
Height of Boom Hinge Pin:	35.0 feet
Boom Cradle:	38.9 feet
Top of Spud:	62.4 feet – spuds in down position[2]

[1] Note: JT Marine reported that they use two different booms on the DB Taylor; one with a length of 220 feet and one with a length of 166.6 feet.

[2] JT Marine self reported that the height to the top of their spuds are 80 feet.

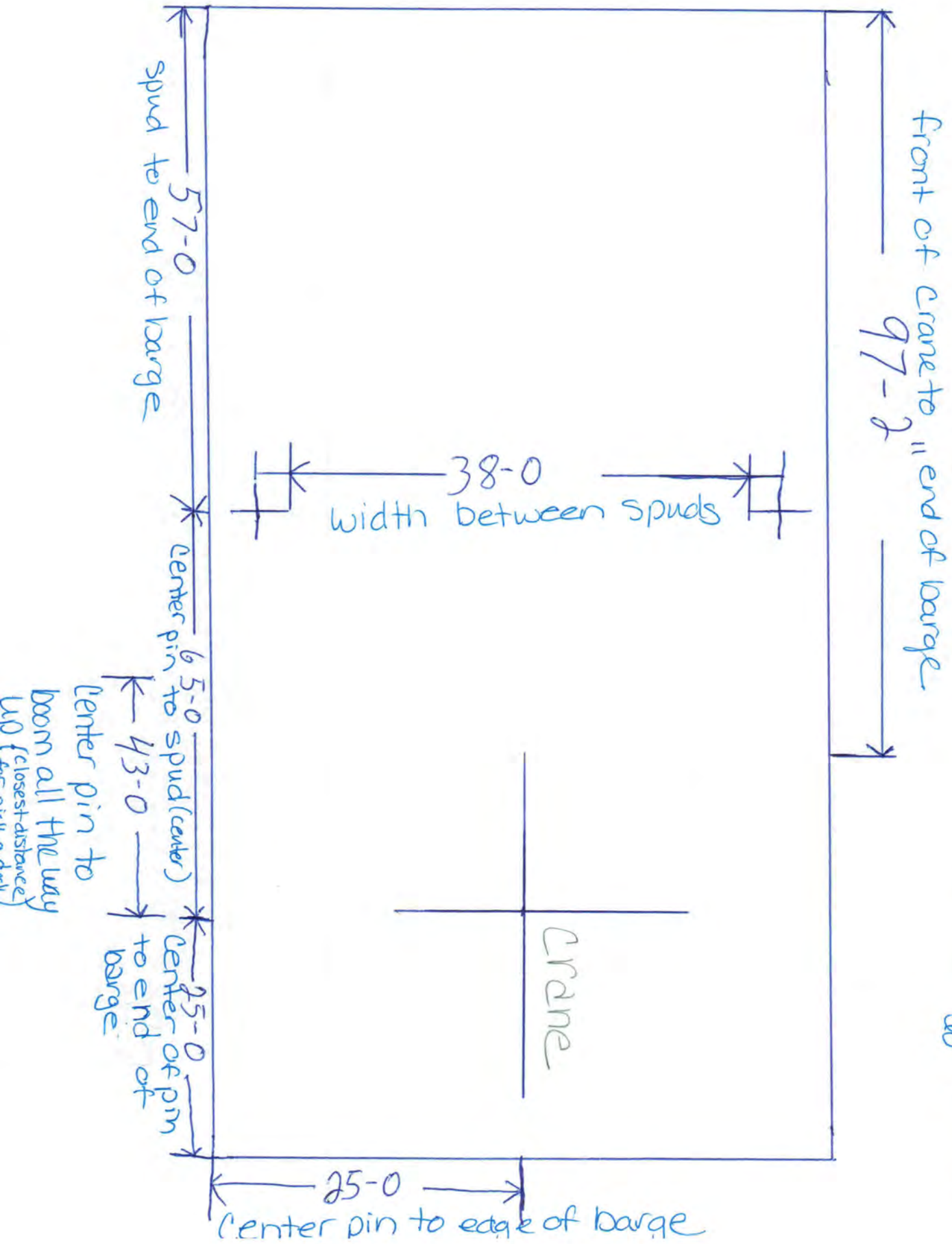
6. Vessel Height

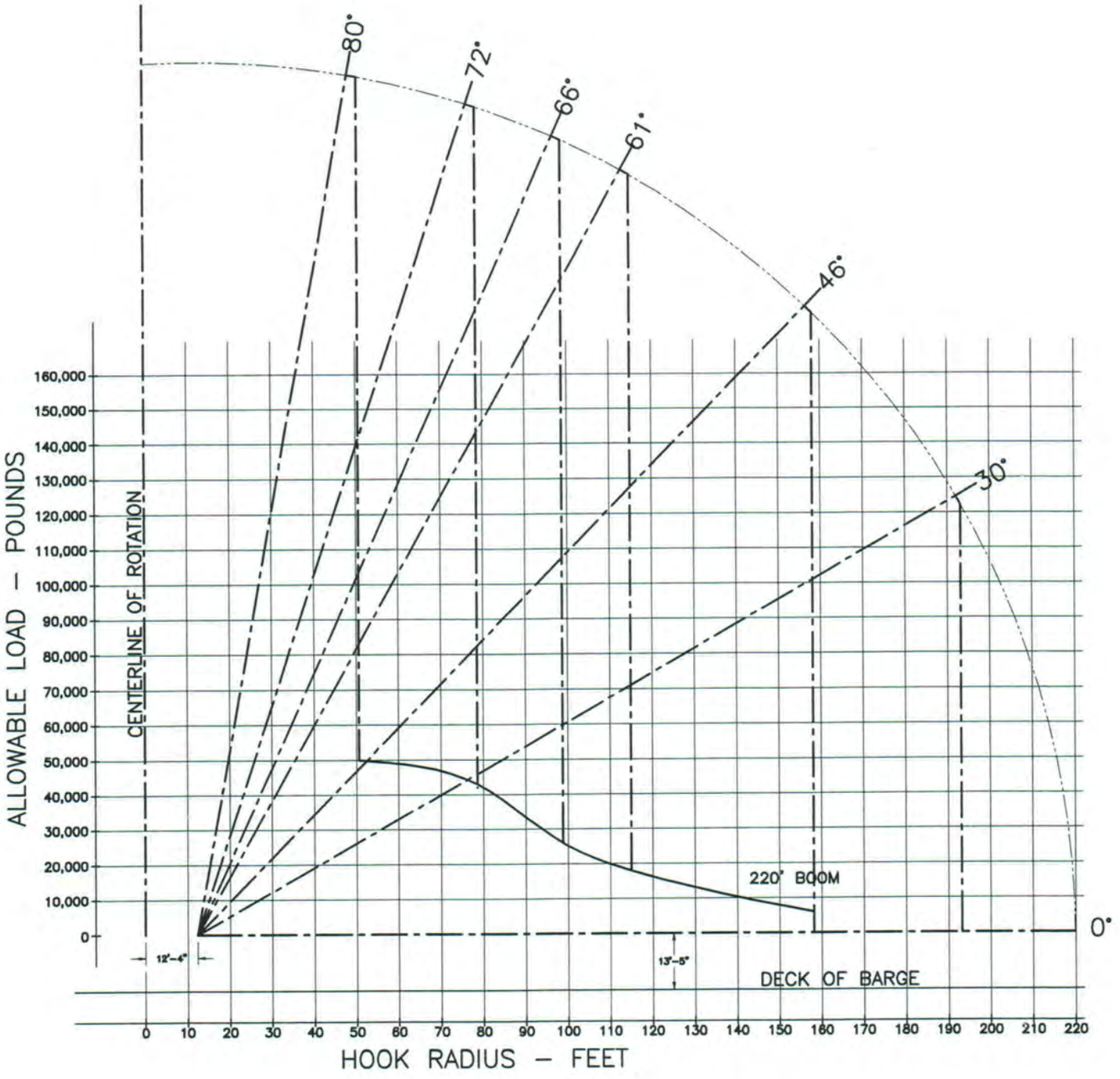
Self-Reported		Surveyed[1]	
166.6 foot boom		220 foot boom	
Air Draft:	80 feet (top of spuds)	Air Draft:	131 feet
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet CRD	Water Level:	16 feet CRD
Total Height:	106 feet	Total Height:	157 feet

[1] Note: The surveyed air draft measurement shown is the estimated travel height based on the surveyed boom length.

7. History Notes

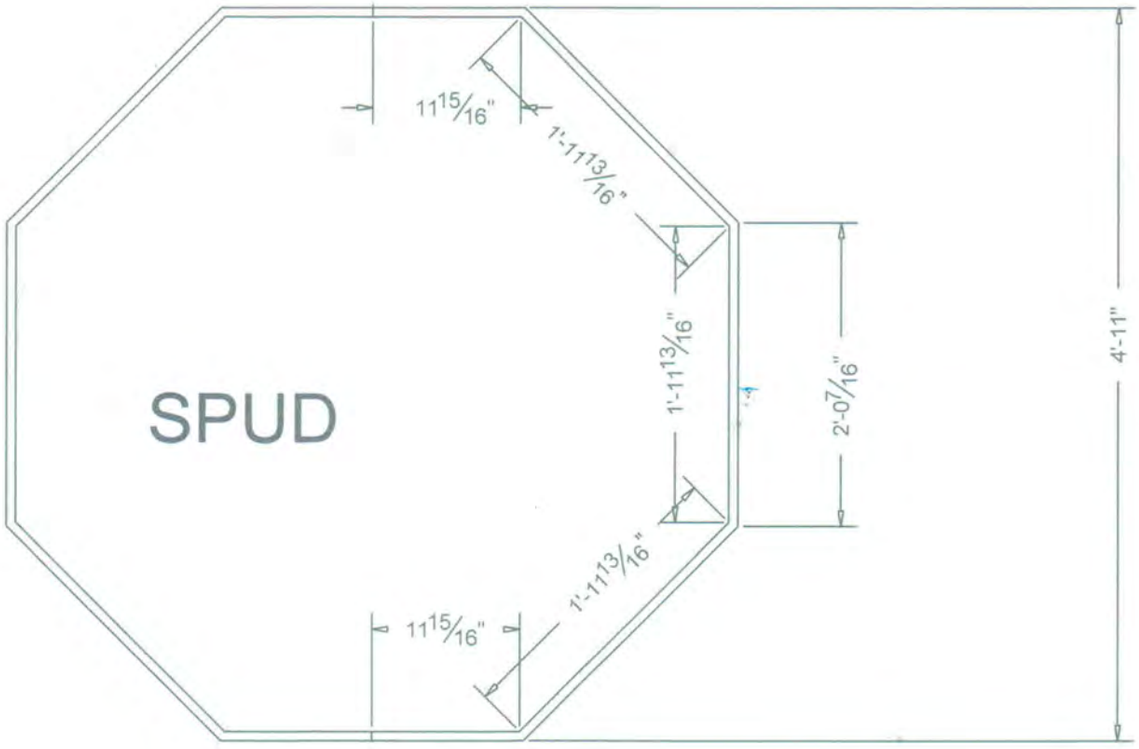
Date	Item
3/27/2012	Contacted by Ron Del Rosario
3/28/2012	Data sheet submitted
6/28/2012	Contacted by Pete Geiger for field measurement
7/12/2012	Field measured


front of crane to end of barge
97-2
57-0
spud to end of barge
38-0
width between spuds
center pin to spud (center)
65-0
43-0
center pin to boom all the way up (closest distance)
center of pin to end of barge
25-0
Crane
25-0
center pin to edge of barge
* Top of Gantry to H2O: 160'

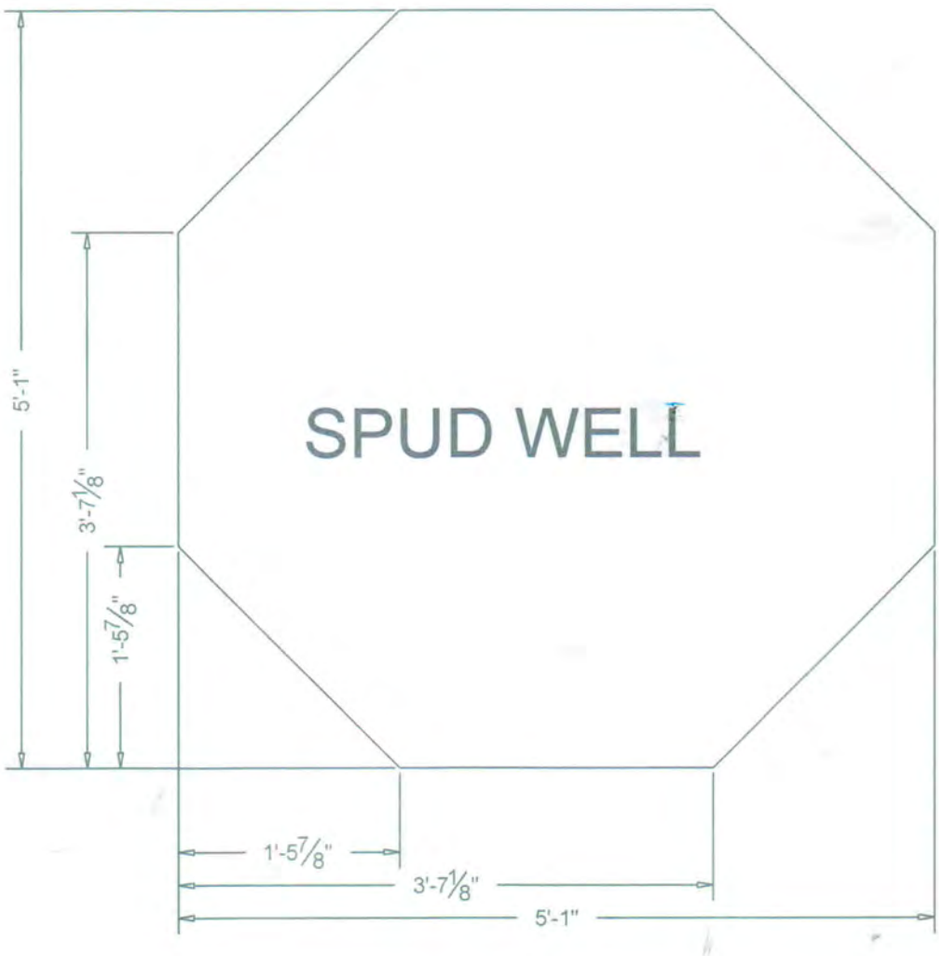


DERRICK BARGE TAYLOR
MAIN HOOK – ALLOWABLE LOAD
WITH 220 FOOT BOOM

McKERNAN FILE: P10–07
BY: JCMcK 2–12–11



Hi-Tech Metal Fabrication Inc. 2301 SE Hidden Way, Suite 100 Vancouver, WA 98661	CUSTOMER	SCALE	NA
	ADDRESS	DRAWN BY	WG
	ADDRESS	DATE	2/27/2011
		DRAWING #	
		REV	0
?		JOB #	


SPUD WELL
5'-1"
3'-7 1/8"
1'-5 7/8"
1'-5 7/8"
3'-7 1/8"
5'-1"

Marine Contractors

Company: Manson Construction Company

Vessel: *Derrick No. 24*

Company did not respond to request for information. Details provided below were included in the CRC NIR.

Marine Contractors

Owner: Manson Construction

Vessel: Derrick No. 24

MANSON CONSTRUCTION CO.

Serving the Nation's Waterways Since 1905

Fleet

Derrick Barges/Clamshell Dredges "Derrick #24"

"Derrick #24" Specifications

Dimensions

Length:
200 ft / 60.9 m

Beam:
84 ft / 25.6 m

Depth:
13 ft / 3.96 m

Draft:
6 ft / 1.8 m

Operating Parameters

Maximum Linepull w/ boom extended 65 ft (19.8 m):
800,000 lb / 3,558 kN

Fuel:
40,000 gal / 151,400

©2008 Manson Construction Co. Seattle Office (Headquarters): 5209 East Marginal Way S., Seattle, WA 98134
Phone: (206) 762-0850 • Fax: (206) 764-8590 • email@mansonconstruction.com • www.mansoncontruction.com

Columbia River CROSSING

River User Data Sheet

By: RALPH PETEREIT Date: 2/27/2012

1. Company Name and/or Owner of Vessel and contact information

Name of company: MANSON CONSTRUCTION CO.

Name of contact: RANDY THORSEN

Phone number (Office): 206-762-0850 (Cell): 206-793-2630

Email: rthorsen@mansonconstruction.com

Address: 5209 E. MARGINAL WAY S.

City: SEATTLE State: WA Zip code: 98134

3a. Vessel Name: DERRICK NO. 24 **3b. Vessel Type:** FLOATING CRANE / DERRICK BARGE

3c. US Coast Guard Document Number:

4a. Length Overall (LOA), **feet:** 200 **4b. Beam** (width), **feet:** 90

5. Draft (depth of hull below waterline, fully laden), **feet:** 6

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), **feet:** 99

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 5-10

8. Frequency of one-way passage underneath I-5 main channel (typical per month):

Jan ____ Feb ____ Mar____ Apr____ May____ Jun____ Jul____ Aug____ Sep____ Oct____ Nov____ Dec____

9. Frequency of one-way passage underneath I-5 main channel (other historic events):

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

Jan ____ Feb ____ Mar____ Apr____ May____ Jun____ Jul____ Aug____ Sep____ Oct____ Nov____ Dec____

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? NOT AVAILABLE

What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)?

May we have a copy?

13. Other miscellaneous LOCATED IN SEATTLE AND IS THE LARGEST BARGE IN THE PACIFIC NW. THIS BARGE HAS NOT BEEN UP THE COLUMBIA RIVER IN OVER 10 YEARS. NO CURRENT PLANS TO RELOCATE THIS BARGE TO THE COLUMBIA RIVER.

Vessel Height Verification Sheet

By: Ralph Petereit Date: July 21, 2012

1. Company Name and/or Owner of Vessel and Contact Information

a. Name of company: Manson Construction Co.

b. Name of contact: Randy Thorsen – Northwest Operations Manager

c. Phone number (Office): (206) 762-0850 (Cell): (206) 793-2630

d. Email: RTHORSEN@MANSONCONSTRUCTION.COM

e. Address: 5209 E. Marginal Way City: Seattle

State: WA Zip code: 98124

2. Vessel

a. ID: b. Name: Derrick 24

c. Type: Crane Barge d. USCG Document Number: 657491

3. Vessel Configuration

a. Identify vessel configuration: Crane Barge

- Is a vessel specification sheet available? Yes
- Configuration shown on the sheet: Yes
- What is the lowest height configuration for transport? Gantry Height

b. What is the gantry configuration? Estimated gantry height: 98 ft 7 in

c. Does the barge have spuds? Yes

- Height above waterline for travel? 98 ft 7 in
- Can the spuds be removed for travel? Yes
- Work and cost involved in removing spuds?

4. Vessel Location

a. Where is the vessel currently located? Lake Washington, WA.

b. Is it working on a job? Yes – 520 Bridge Replacement Is it tied up to shore? No

c. What is the best time to make a trip to the vessel? None currently

5. Measurements from Spec Sheet

Gantry Height:	98 ft 7 in
Water Level:	
Top of Boom:	
Height of Boom Hinge Pin:	
Boom Cradle:	
Top of Spud:	

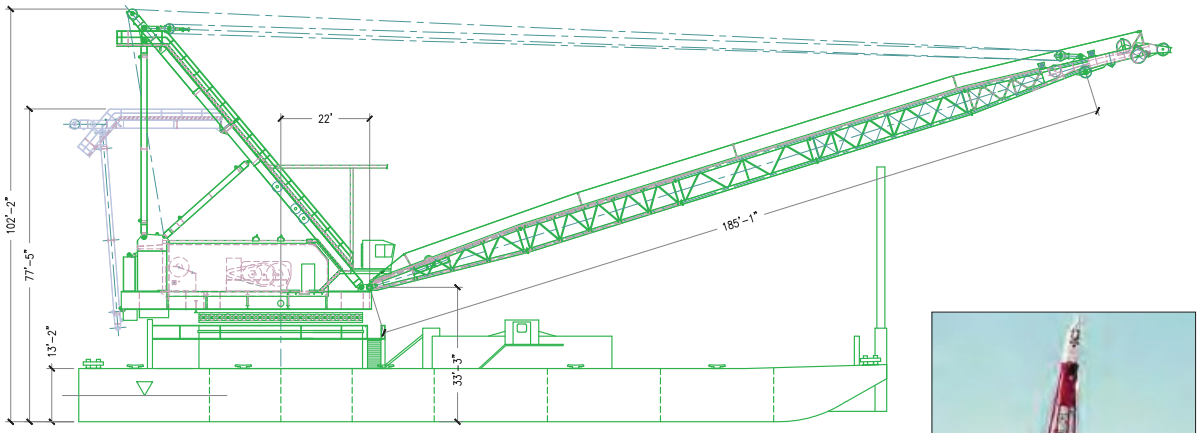
6. Vessel Height

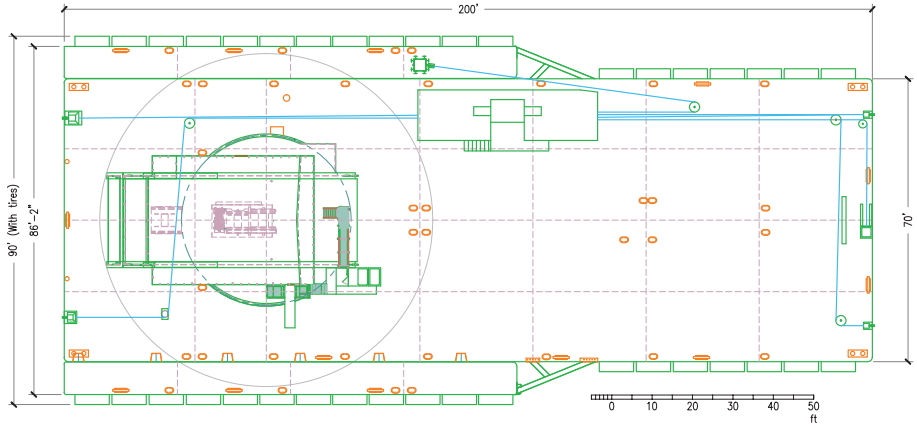
Self-Reported		**From Spec Sheet**	
Air Draft:	99 ft	Air Draft:	98 ft 7 in
Air Gap:	5 – 10 ft	Air Gap:	10
Water Level:	16	Water Level:	16
Total Height:	**125 ft**	**Total Height:**	**124 ft 7 in**

7. History Notes

Date	**Item**
6/27/2012	Called and left message for Randy Thorsen – NW Ops Manager
7/9/2012	Called Randy, was told to send e-mail
7/9/2012	Sent-mail with information request
7/21/2012	Still no reply

Manson Derrick *24*



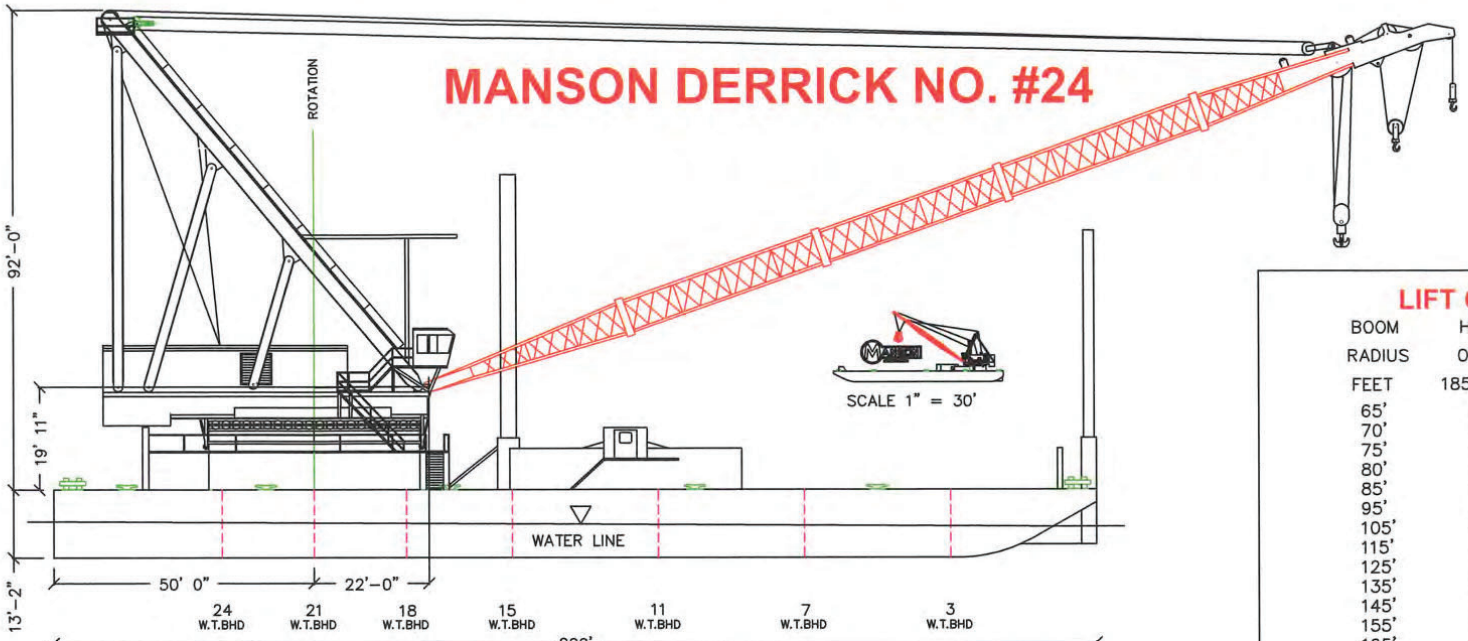


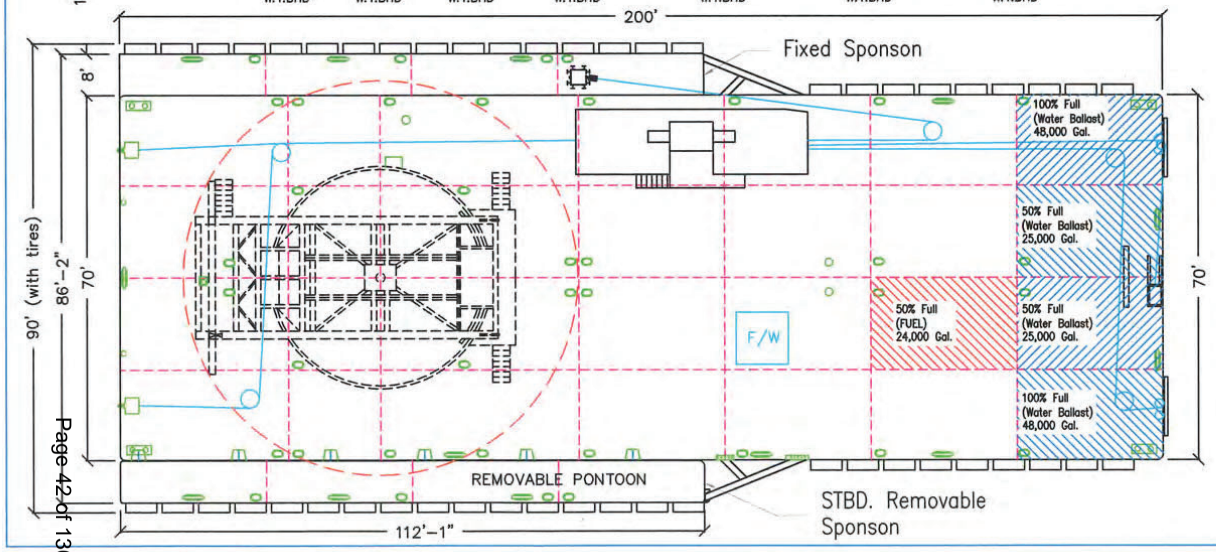
Principal Characteristics	
Length Overall	200'-0"
Beam Overall (With Pontoons & Tires)	90'-0"
Beam Overall (With Pontoons)	86'-2"
Beam Overall (W/O Pontoon)	78'-0"
Barge Depth	13'-0"
Minimum Draft	7'-0"
Distance Deck to Boom Heel	22'-3"
Boom Length to Main Block	185'-0"
Boom Length to 2-Part Whip	156'-0"
Boom Length to Whip	207'-2"
Boom Length Main to Whip	22'-0"
Spuds - 92' Each, Good to 70' Depth	2 - Each

Miscellaneous Characteristics	
Crane Manufacture	Clyde Iron Works
Model Number	42-DE-145
Serial Number	CW 3931
Circle Diameter	42' Diameter
Rigging Wire	
Main Hoist	5,150' 1 1/4" 6x26
2-Part Whip	1,150' 1 1/4" 6x26
Whip Line	550' 1" 6x26
Boom (Topping Gear)	5,250' 1 1/4" 6x26

Miscellaneous Characteristics	
Spud Wire	
Side Spud	360' 1 1/4"
Stern Spud	360' 1 1/4
Anchor Wire	
Stern Anchors (2)	1,700' 1 1/4" 6x26
Bow Anchors (2)	1,700' 1 1/4" 6x26
Normal Fues Capacity	40,000 Gallons (1"=307 Gallons)
Boom (Topping Gear)	3,000 Gallons

MANSON DERRICK NO. #24





PRINCIPAL CHARACTERISTICS

LENGTH OVERALL	200'–0"
BEAM OVERALL (WITH PONTOONS & TIRES)	90'–0"
BEAM OVERALL (WITH PONTOONS)	86'–2"
BEAM OVERALL (W/O PONTOON)	78'–0"
BARGE DEPTH	13'–0"
DRAFT FWD 6'–0" AFT	7'–0"
DISTANCE DECK TO BOOM HEEL	22'–3"
BOOM LENGTH TO MAIN BLOCK	185'–0"
BOOM LENGTH TO 2–PART WHIP	156'–0"
BOOM LENGTH TO WHIP	207'–0"
BOOM LENGTH MAIN TO WHIP	22'–0"
SPUDS – 92' EA., GOOD TO 70' DEPTH	2 EA.

LIFT CAPACITY CHART IN POUNDS

BOOM RADIUS FEET	HEAVY LIFT OVER STERN 185 FOOT BOOM	HEAVY LIFT FULL REVOLVING 185 FOOT BOOM	2 PART WHIP LINE FULL REVOLVING 185 FOOT BOOM
65'	800,000		60,000
70'	800,000		60,000
75'	800,000	600,000	60,000
80'	739,000	567,900	60,000
85'	671,700	538,000	60,000
95'	563,300	483,000	60,000
105'	479,500	434,200	60,000
115'	412,100	388,900	60,000
125'	356,500	346,500	60,000
135'	309,200	306,400	60,000
145'	268,100	268,100	60,000
155'	231,600	231,600	60,000
165'	198,400	198,400	60,000
175'	167,300	167,300	60,000
185'	137,100	137,100	60,000
195'	105,500	105,500	60,000

MISCELLANEOUS CHARACTERISTICS

CRANE MANUFACTURE	CLYDE IRON	
MODEL NUMBER	42–DE–145	
SERIAL NUMBER	CW 3931	
CIRCLE DIAMETER	42' DIAMETER	
RIGGING WIRE		
MAIN HOIST	5,350' 1 1/4"	6 X 26
2–PART WHIP	700' 1 1/4"	6 X 26
WHIP LINE	600' 1 1/8"	18 X 19 DY18
BOOM (TOPPING GEAR)	5,240' 1 1/4"	6 X 26
SPUD WIRE		
SIDE SPUD	360' 1 1/4"	
STERN SPUD	360' 1 1/4'	
ANCHOR WIRE		
STERN ANCHOR'S (2)	1,700' 1 1/4"	6 X 26
BOW ANCHOR'S (2)	1,700' 1 1/4"	6 X 26
NORMAL FUEL CAPACITY	40,000 GALS.	(1" = 307 GALS.)
NORMAL WATER CAPACITY	3,000 GALS.	

Marine Contractors

Company: SDS Lumber Company

Vessel: *Future Shipment*

Company did not respond to request for information. Details provided below were included in the CRC NIR for a potential future shipment including a barge and equipment loaded.

Commercial Tugs and Tows

Owner: SDS Lumber

Vessel: SDS Lumber Barge with Equipment

River User Data Sheet By: Gary Collins Date: 3-13-12

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: SDS Lumber Co.
   b. Name of contact: Gary Collins
   c. Phone number (Office): 509-493-2155 d. (Cell): 541-490-1370
   e. Email: Gary C @ SDS Lumber . Com
   f. Address: PO Box 266
   g. City: Bingen WA
   h. State: WA i. Zip code: 98605

3a. Vessel Name: Darby 3b. Vessel Type: Tug

3c. US Coast Guard Document Number: _____

4a. Length Overall (LOA), feet: 86 4b. Beam (width), feet: 28

5. Draft (depth of hull below waterline, fully laden), feet: 8'

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 55'

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 10'

8. Frequency of one-way passage underneath I-5 main channel (typical per month): 10

   Jan ___ Feb ___ Mar ___ Apr ___ May ___ Jun ___ Jul ___ Aug ___ Sep ___ Oct ___ Nov ___ Dec ___

9. Frequency of one-way passage underneath I-5 main channel (other historic events): ____

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

    Jan ___ Feb ___ Mar ___ Apr ___ May ___ Jun ___ Jul ___ Aug ___ Sep ___ Oct ___ Nov ___ Dec ___

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): 6

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy?

13. Other miscellaneous

Barges That might Be higher Then Tug That has Equitment Loaded on Them Could Be as high AS 100' ?

PB 100 YEARS

Telephone Conversation Memorandum

project: Columbia River Cross job no. AH.08.15 (use complete number) date: 15 Aug 2012

from: Peter M. Geiger talked to: Gary Collins
SDS Lumber
509-493-2155
541-490-1370 (Cell)

indicate department, field office, etc., "for in-house" calls.
indicate agency or firm for other than "in-house" calls.

item discussed: Status of Large Package Barges
Ability/Permission to Survey Air Draft

LW 8/15/12 1538 PDT 8/16/2012 0915 PDT via cell phone

information obtained:

9 Barges No Spuds on these Barges

Metal Fab Spud Barge Pushes

Most of their work is pushing other peoples barges including Metal Fab (eg Thompson) or Construction barges/Crane barges with Spuds. These services are on an as-needed basis with nothing scheduled in the near term.

action required:

distribution: by:

Federal Government

Agency: USACE

Vessel: *Yaquina*

USACE confirmed the information provided during the CRC NIR is still accurate (email confirmation included below). Vessel details that follow were included in the CRC NIR.

From: Hicks, Jeffrey T CIV USARMY CENWP (USA)
To: Brian Carrico
Cc: Nicole McDermott; Darlene Siegel
Subject: RE: Interstate Bridge Replacement Project - USACE vessels/Navigation needs
Date: Tuesday, June 8, 2021 8:43:19 AM
Attachments: image001.png
image002.png
image003.png
image004.png

Brian,

I did just get a response on the upcoming planned activities from our Operating Project Managers.

The Yaquina looks to be the tallest USACE vessel that we expect to transit through the area. Annual O&M dredging's in water work window is 1 August to 30 September but we need to have the ability to address shoals at any time of year. I believe that's how we landed on the river level + Yaq height clearance in our formal letter to the CRC.

As far as future work goes, our contractors often move equipment and materials via barge to construction projects. For example recent gate replacements, JD AWS electrical building, etc along with the large cranes mobilized to handle these. The largest crane I've heard coming up river was "The General" which I think Kiewit now owns.

I am trying to verify the dimensions of "the General" as well as the largest items we've moved under contract (likely The Dalles or John Day Gates). Otherwise there is nothing planned that would be impacted by the bridge height.

Thanks, Jeff

Jeff Hicks | Portland District Project Manager
☏: 503.710.8256| Jeffrey.T.Hicks@usace.army.mil

From: Brian Carrico <Brian.Carrico@interstatebridge.org>
Sent: Tuesday, June 8, 2021 8:14 AM
To: Hicks, Jeffrey T CIV USARMY CENWP (USA) <Jeffrey.T.Hicks@usace.army.mil>
Cc: Nicole McDermott <Nicole.McDermott@interstatebridge.org>; Darlene Siegel <Darlene.Siegel@interstatebridge.org>
Subject: [Non-DoD Source] Re: Interstate Bridge Replacement Project - USACE vessels/Navigation needs

Jeff, it has been a few weeks since sending this. I wanted to check in with you to see if you need further information from the team in order to complete this request and/or if you have

an estimate for when we may get the information. Thanks in advance.

Brian

From: Brian Carrico <Brian.Carrico@interstatebridge.org>
Sent: Thursday, May 13, 2021 10:22 AM
To: Hicks, Jeffrey T CIV USARMY CENWP (USA) <Jeffrey.T.Hicks@usace.army.mil>
Cc: Nicole McDermott <Nicole.McDermott@interstatebridge.org>; Darlene Siegel <Darlene.Siegel@interstatebridge.org>
Subject: Re: Interstate Bridge Replacement Project - USACE vessels/Navigation needs

Jeff - attached is the information provided for CRC.

Brian

From: Hicks, Jeffrey T CIV USARMY CENWP (USA) <Jeffrey.T.Hicks@usace.army.mil>
Sent: Thursday, May 13, 2021 10:16 AM
To: Brian Carrico <Brian.Carrico@interstatebridge.org>
Cc: Nicole McDermott <Nicole.McDermott@interstatebridge.org>; Darlene Siegel <Darlene.Siegel@interstatebridge.org>
Subject: RE: Interstate Bridge Replacement Project - USACE vessels/Navigation needs

Hey Brian,

Sorry for the slow response. I would be the correct contact to validate this information. I am working with our Navigation team to answer this question but as far as I'm tracking it was just the Yaquina. Hoping I can get you a formal response by tomorrow.

Thanks, Jeff

From: Brian Carrico <Brian.Carrico@interstatebridge.org>
Sent: Wednesday, May 12, 2021 8:01 AM
To: Hicks, Jeffrey T CIV USARMY CENWP (USA) <Jeffrey.T.Hicks@usace.army.mil>
Cc: Nicole McDermott <Nicole.McDermott@interstatebridge.org>; Darlene Siegel <Darlene.Siegel@interstatebridge.org>
Subject: [Non-DoD Source] Interstate Bridge Replacement Project - USACE vessels/Navigation needs

Jeff,

I am part of the team working on the Interstate Bridge (IBR) Program addressing the USCG permit. We are collecting information on vessel use of the Columbia River and are validating and updating the data provided by the USACE for the prior Columbia River Crossing Project.

The information at that time was provided by Marci Johnson. Would you be the best contact for validating the information? Specifically, I am looking to confirm information on the Yaquina, whether any other USACE vessels would be expected to transit through the area (either North Portland Harbor or the main channel) and whether there are any planned activities at upstream dams would require specific shipments under the bridge in the future.

Thanks in advance. Feel free to call or email if you have questions or need additional information.

Brian

Brian Carrico

Interstate Bridge Replacement Program
Environmental Program

O: 360-823-6122 | **C:** 360-433-7775

E: brian.carrico@interstatebridge.org

interstatebridge.org

Federal Government

Owner: US Army Corps of Engineers

Vessel: Yaquina

Columbia River CROSSING

River User Data Sheet

By: NWP Dredge OPS **Date:** Feb 27, 2012

1. Company Name and/or Owner of Vessel and contact information

Name of company: US Army Corps of Engineers, Portland District

Name of contact: Marci Johnson

Phone number (Office): (503) 808-4765 (Cell): _____

Email: Marci.E.Johnson@usace.army.mil

Address: 333 SW 1st Avenue, P.O. Box 2946

City: Portland State: OR Zip code: 97204

3a. Vessel Name: Yaquina **3b. Vessel Type:** Hopper Dredge

3c. US Coast Guard Document Number: CG000073

4a. Length Overall (LOA)**, feet:** 200 **4b. Beam** (width)**, feet:** 58

5. Draft (depth of hull below waterline, fully laden)**, feet:** 16

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen)**, feet:** 92

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge)**:** 8

8. Frequency of one-way passage underneath I-5 main channel (typical per month)**:** based on historical

Jan 2 **Feb** 2 **Mar** 2 **Apr** 2 **May** 2 **Jun** 2 **Jul** 2 **Aug** 4 **Sep** 4 **Oct** 2 **Nov** 2 **Dec** 2

9. Frequency of one-way passage underneath I-5 main channel (other historic events)**:** included in 8.

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month)**:**

Jan 0 **Feb** 0 **Mar** 0 **Apr** 0 **May** 0 **Jun** 0 **Jul** 0 **Aug** 0 **Sep** 0 **Oct** 0 **Nov** 0 **Dec** 0

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events)**:** none

12. Do you have a Business Plan (e.g. 10 or 20 year plan)**?** provided by letter dated Feb 23, 2012

What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)**?** _____

May we have a copy? _____

13. Other miscellaneous Historical information provided above does not represent future needs. Future needs were provided to CRC by letter dated Feb, 23 2012. As stated in Feb 23, 2012 letter, to ensure safe passage of the dredge Yaquina, the minimum bridge height required for current and future operational needs is 116 feet CRD.

B1-237 Interstate 5 Columbia River Crossing
Navigation Impact Report
Top of mast
Antenna
Top of Boom
Crow's Nest
Light Bar
WH Roof
YAQUINA
Pivot Pt
07.17.2012

Vessel Name	Owner	Antenna Elev (ft)	Mast Elev (ft)	Crow's Nest Elev (ft)	Boom Crane Elev (ft)	Light Bar Elev (ft)	Pivot Pt Elev (ft)	WH Roof Elev (ft)	Bow Deck Elev (ft)	Stern Deck Elev (ft)	Water Elev (ft)	Height Above Water
Yaquina	Army Corps of Engineers	91.3									1.3	90
			87.9								1.3	87
				70.7							3.0	68
					84.1						1.3	83
						69.7					1.3	68
							32.1				1.3	31
								46.5			1.3	45
									16.6		1.3	15
										17.1	0.9	16
		Note: At the time of measurements the bow draft was between 12-12.5 ft. and the stern draft was between 11-11.5 ft.										
		WH - Wheelhouse										

Vessel Height Verification Sheet

By: Karl Krcma Date: July 26, 2012

1. Company Name and/or Owner of Vessel and Contact Information

a. Name of company: US Army Corps of Engineers

b. Name of contact: Marci Johnson

c. Phone number (Office): (503) 808-4765 (Cell):

d. Email: Marci.E.Johnson@usace.army.mil

e. Address: 333 SW 1st Ave, PO Box 2946 City: Portland

State: OR Zip code: 97204

2. Vessel

a. ID: b. Name: Yaquina

c. Type: Hopper Dredge d. USCG Document Number: CG000073

3. Vessel Configuration

a. Identify vessel configuration: Self propelled hopper dredge

- Is a vessel specification sheet available? No
- Configuration shown on the sheet: N/A
- What is the lowest height configuration for transport? 92 feet

b. What is the gantry configuration? N/A Estimated gantry height: N/A

c. Does the barge have spuds? N/A

- Height above waterline for travel? N/A
- Can the spuds be removed for travel? N/A
- Work and cost involved in removing spuds? N/A

4. Vessel Location

a. Where is the vessel currently located? N/A

b. Is it working on a job? N/A Is it tied up to shore? N/A

c. What is the best time to make a trip to the vessel? N/A

5. Measurements from Spec Sheet

Gantry Height:	N/A
Water Level:	N/A
Top of Boom:	N/A
Height of Boom Hinge Pin:	N/A
Boom Cradle:	N/A
Top of Spud:	N/A

6. Vessel Height

Self-Reported		**Surveyed**	
Air Draft:	92	Air Draft:	90 (draft at bow 12-12.5 and draft stern 11-11.5)
Air Gap:	10	Air Gap:	10
Water Level:	16	Water Level:	16
Total Height:	**118 feet**	**Total Height:**	**116 feet**

7. History Notes

Date	**Item**
2/14/2012	Contacted by Karl Krcma
2/27/2012	River user data sheet submitted
7/17/2012	Surveyed

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, PORTLAND DISTRICT
PO BOX 2946
PORTLAND OR 97208-2946

REPLY TO
ATTENTION OF

Planning, Programs and Project
Management Division

FEB 23 2012

Ms. Heather Wills
Columbia River Crossing
700 Washington Street, Suite 300
Vancouver, Washington 98660

Dear Ms. Wills,

This letter is in response to the Columbia River Crossing (CRC), Interstate 5 (I-5) Project boat survey request for information regarding the Corps Dredges Yaquina and Essayons and our navigational needs upstream of the proposed new I-5 bridge project.

We determined that the proposed bridge height outlined in the Record of Decision would have serious impacts on our federal missions to maintain the navigation channel and provide emergency dredging upstream of the new bridge. After considering dredging requirements and potential future water release impacts to the Columbia River, we determined that the minimum prism needed for the new bridge is a height of 116 feet Columbia River Datum (121.4 NAVD88) for a width of 400 feet. A more detailed explanation of our requirements is enclosed.

We will forward a copy of this letter to Rear Admiral Keith Taylor, Commander 13th District United States Coast Guard, Jackson Federal Building, 915 Second Avenue, Seattle, WA 98174-1067, John McAvoy, FHWA, 610 East 10th Street, Vancouver, WA 98661; and Dave Hendricks, Multnomah County Drainage District No. 1, 1880 NE Elrod Dr., Portland, Oregon 97211.

We look forward to resolving these navigation concerns to ensure the CRC project does not have any unacceptable impacts to our federal projects. Please feel free to contact me at (503) 808-4500 or Ms. Marci Johnson of my staff at (503) 808-4765 or via e-mail at marci.e.johnson@usace.army.mil.

Sincerely,

John W. Eisenhauer, P.E.
Colonel, Army Corps of Engineers
District Commander

Enclosure

Printed on Recycled Paper

US Army Corps
of Engineers ®
Portland District

U. S. Army Corps of Engineers Federal Navigation Channel Maintenance Needs
Columbia River Crossing (I-5 Interstate Bridge at Vancouver, WA)
February 2012

Summary:

Minimum prism needed for new bridge is height 116 feet Columbia River Datum (CRD) (equal to 121.4 feet NAVD88) for width 400 feet (channel width of 300 feet plus 50 feet on each side of the channel).

Authorized project:

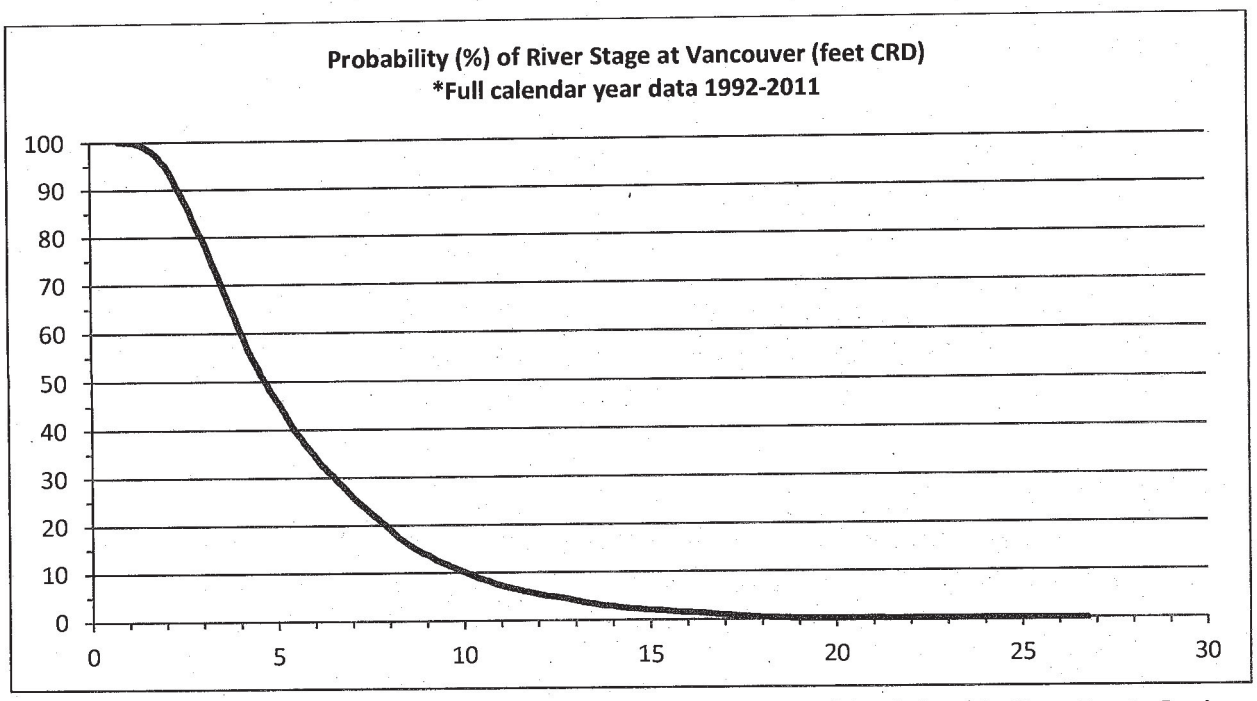
- The federal Navigation Channel immediately upstream of the Columbia River Crossing is authorized to 27 feet deep and 300 feet wide from Vancouver, WA, to The Dalles, OR. This channel supports the Columbia-Snake river system and transportation of 10 million tons of cargo annually. It is the largest wheat/barley export gateway in the U.S. and the third largest grain export gateway in the world.

Minimum bridge prism reasoning:

- The Corps' Dredge *Yaquina* performs annual channel maintenance dredging. The minimum prism needed for the new bridge is the vertical clearance required for this dredge to pass safely under the bridge at a specified river water level above CRD, and the horizontal clearance required for maintenance of the channel under the bridge.

Vertical clearance discussion:

- According to the USCG-licensed captains of the Dredge *Yaquina*, a 100-foot minimum vertical clearance from top of water to bottom of bridge is required (draft of 9 feet below the waterline gives a height of 92 feet above the waterline, plus an 8-foot minimum safety gap).
- The environmentally protective in-water work period as established by Federal and State agencies has changed in the past, and could continue to change as new species are listed, requiring work to be done during periods of higher river flow and stage.
- Year-round river flow levels must be considered as emergency operations could be required at any time. The probability of a river stage is shown below, using available data from the past 20 years.



- The uncertainty of future water levels must be considered. As part of the Columbia River Treaty Review, the Corps is collecting new data and performing studies to evaluate maintaining or potentially changing current levels of regulation for flood risk protection in this region of the Columbia River basin. The National Marine Fisheries Biological Opinion for the Federal Columbia River Power System also requires the Corps to spill water at its Columbia River dams to support salmon survival. These factors may lead to future operations resulting in elevated river levels (closer to ordinary high water) for longer durations compared with the past 20 years. Current Regulatory ordinary high water level at the Columbia River Crossing is 16 feet CRD (equivalent to 21.4 feet NAVD88).
- Bridge lift records show the lift height in feet above zero at the bridge pier elevation (39 feet CRD). Recent records show that the median lift for the Dredge *Yaquina* is 100 feet (equal to 139 feet CRD). The maximum lift shown was 136 feet (175 feet CRD). The minimum lift shown was 90 feet (129 feet CRD). Water levels shown on bridge records corresponding to these lifts ranged from 1 to 12 feet CRD.

Vertical clearance conclusion: A minimum vertical height of 116 feet CRD (121.4 feet NAVD88) is required. Year-round river level data from the past 20 years indicate that river levels were at or below 16 feet CRD approximately 98 percent of the time. Future river operations will likely increase river levels up to ordinary high water (16 feet CRD) for longer periods. Adding the 100-foot vertical clearance from waterline to bridge required for the Dredge *Yaquina* to 16 feet CRD yields a minimum vertical bridge height requirement of 116 feet CRD (121.4 NAVD88).

Horizontal clearance discussion:

- The Corps practices advanced width maintenance dredging (dredging up to 50-100 feet outside the channel width) to provide an area outside the channel for unstable side slope sloughing so that the full channel width remains clean.

Horizontal clearance conclusion: A horizontal width of 400 feet CRD is required at the vertical height specified above. This width includes the channel width (300 feet) plus 50 feet additional width on each side of the channel for advanced width maintenance dredging.

Marine Industries and Fabricators

Company: Greenberry

Company provided the following information to the IBR Program.

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Greenberry Industrial LLC

Vessel Name:
Third-party

Vessel Type:
Barge and Tug

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:**Yes**

Tugboat towing barge

Vessel Category: Commercial

USCG Document Number:
Third-party

Primary Mooring Location *(waterway milepoint, if known)*:
N/A

Type and quantity of cargo, if applicable:
Modules, Process modules, piperacks, MCC buildings, Alaska Sealift Modules, Drill Rigs, Pressure Vessels, Shiploaders, Piling Templates, Vessels, Bridge Girders, Bridge Components, Railroad Bridges, DOT Bridge Sections, Autoclaves, Slugcatcher Vessels, Port Assemblies, Material Handling Systems, Conveyor Systems, Dock Sections, Bridge Maintenance Travelers, and various other over-dimensional fabricated items.

Length (overall; ft):
650 Feet

Beam (width; ft):

VESSEL DATA SHEET, CONT.

120 Feet

Draft (ft) - *depth of hull below waterline, fully laden*:

18ft

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

136 Feet

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

1 Foot

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

10 Feet?

Transit speed under Interstate Bridge and Load Configuration:

10-12kts MAX

Time of Year of Passage:

Year round

Tug Assistance Required:Yes

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____1____ **Feb**_____1____ **Mar**____1_____ **Apr**____1_____ **May**___1_____ **June**__1_____

Jul____1_____ **Aug**_____1____ **Sep**_____1___ **Oct**_____1_____ **Nov**___1_____ **Dec**___1_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan____0_____ **Feb**_____0____ **Mar**_____0___ **Apr**_____0__ **May**_____0____ **June**____0_____

Jul____0_____ **Aug**_____0____ **Sep**_____0____ **Oct**_____0____ **Nov**_____0____ **Dec**_____0_____

Marine Industries and Fabricators

Company: Thompson Metal Fab

Company provided the following information to the IBR Program.

Interstate Bridge Replacement Project

Thompson Metal Fab – Impact Statement

May 26, 2021

Presented by John Rudi
Owner, President – Thompson Metal Fab

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INTRODUCTION

The history of Thompson Metal Fab includes two major influences, the opening of the Interstate Bridge in 1917, and the opening of the Columbia Business Center *(originally Henry Kaiser's Vancouver Shipyard)* in 1942. Over the years, Thompson Metal Fab (TMF), the Columbia Business Center (CBC) and the Interstate Bridge will see their history evolve due to the changing needs of the region, rapid population grown, and dynamic industrial development. For these same reasons, their history also begins to connect, and their futures are tied together.

The original Thompson Metal Fab facility, shown in 2018. Thompson moved from this location and to Vancouver in the early 1970's. The old facility has since been demolished, making way for the brand new Meyer Memorial Trust building.

Original span of the Interstate Bridge opened 1917 – shown here in 1931.

The original Interstate Bridge (current day northbound span) was completed and opened in February of 1917. Upon completion of this span, travelers could go from Canada to Mexico on one complete roadway. This was not only a big accomplishment for the country, but it was also an opportunity for growth, specifically in southwestern Washington. At the time the bridge was opened, there were approximately 250,000 people in Portland, compared to the 12,000 in Vancouver. The new bridge would provide opportunity for dynamic population movement, economic growth, and forever connect not only two states, but two communities. To satisfy the needs of this expanding community, a second 'twin' span was eventually completed and opened in 1958.

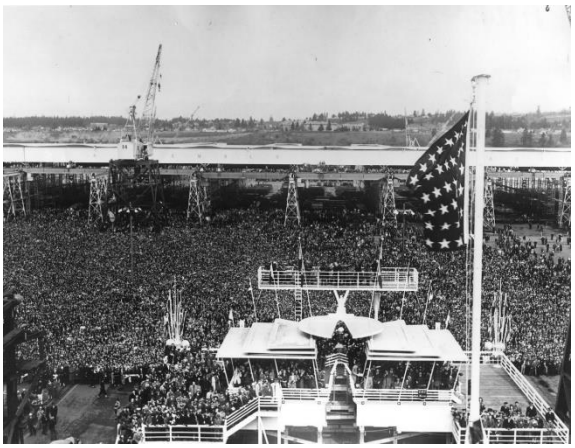
With a clearance of 72 feet, most river barges can pass under the bridge without impact when the drawbridge is closed. This is not the case with large industrial projects, like those manufactured currently by Thompson Metal Fab, or for large vessels, like the Liberty and Victory ships from the early 1940's. At full height, the current lift span can accommodate 178' from the water to the underside of the bridge. This "air gap" allows very large loads to pass upriver and downriver and has driven the development of upstream industrial areas such as the Columbia Business Center, originally known as Henry Kaiser's Vancouver Shipyard.

COLUMBIA BUSINESS CENTER *(former Kaiser Vancouver Shipyard)*

Building 40 and 41 of current day Thompson Metal Fab is shown prominently in the middle of this picture. At the time this picture was taken (circa early 1940's) the building and entire industrial area would have been known as Kaiser's Vancouver Shipyards.

[1943] Escort carriers at the Vancouver Shipyards (current day Thompson Metal Fab)

At nearly 200-acres, Kaiser's Vancouver Shipyard began production in early 1942 with an initial payroll of 38,000 workers. This facility, along with two in Portland, produced 752 ships during WWII and peaked at 97,000 workers in total. Many of these workers migrated from other parts of the country and is part of the reason why the Portland/Vancouver area saw such a big jump in population at this time. The development of these shipyards certainly contributed to the need for a new span (eventually built and completed in 1958) and the need to modify the original span, completed in 1960. For perspective on what these facilities were able to produce, the construction on the first Liberty ship took 131 days in 1941. By 1943, Kaiser workers were averaging a completed Liberty ship in 42-days and three ships were being completed each day. Record production for a completed ship was 10-days, although that production was bested by one of the Kaiser facilities in Richmond, CA *(4-days, 15-hours, 29-minutes)*.



75,000 people (largest crowd in Clark County's history) assembled on April 5, 1943 to witness first lady Eleanor Roosevelt christen the 'Alazon Bay' escort aircraft. Current day Thompson Metal Fab is seen prominently in the background.

drive opportunity to the Columbia Business Center as oil companies looked for fabricators to build "jacket liners" for new offshore wells. The facility could support the work on the massive infrastructure and the bridge was high enough to allow the jacket liners to be shipped downstream.

The 1960's and 1970's saw the construction of new dams on the Columbia River and Snake River in addition to the development of major oil fields in Alaska (i.e. Prudhoe Bay). Ongoing work on the US Interstate Highway System also provided opportunity for new bridges, including four highly visible bridges in Portland: Morrison Bridge (1958), Marquam Bridge (1966), Freemont Bridge (1973), and the Glenn L. Jackson Memorial Bridge (1982). These would be opened to accommodate a shifting population and to relieve pressure on traffic crossing the Interstate Bridge.

After the war ended and the need for shipbuilding diminished, learning how to leverage these 'abandoned' facilities for future industrial growth was important. The size of the facility at the Vancouver Shipyard was simply greater than most fabrication shops of the day. Even now, it remains one of the largest fabrication facilities on the West Coast. The sheer size of the building, access to a large yard, and location to a major waterway made the facility at the future Columbia Business Center an extremely attractive option for the large infrastructure needs that were coming.

The Portland/Vancouver Metro area became highly industrialized by the 1960's, driven by the ability of the Columbia Business Center and companies such as Thompson Metal Fab. This strong local economy centered around logging, pulp & paper products, and maritime transport on the Columbia River; and stimulated additional growth in the region. The California oil boom would also

Infrastructure for the California offshore oil fields being manufactured at the Columbia Business Center in 1967. Thompson Metal Fab would begin operations here a few years later in 1973.

THOMPSON METAL FAB

In 1937, "Pudge" Thompson opens 'Thompson Metal Fab' at 2405 Vancouver Avenue in Portland, OR. The opening of his facility comes 20-years after the opening of the Interstate Bridge while also pre-dating the second span by 20-years.

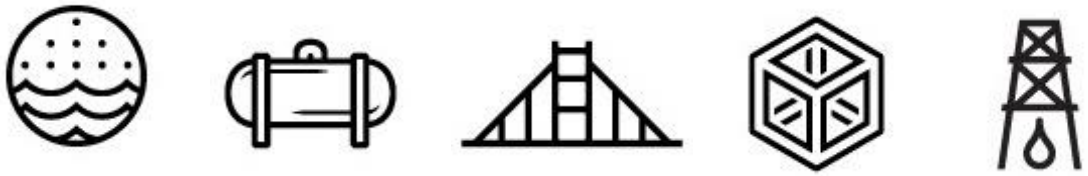
Original marketing display of the Thompson Ice Tongs

The origin story of Thompson Metal Fab is a humble one, especially compared to the work they do today. Pudge and his craftsmen manufactured lightweight metal products for the dairy and timber industries. One product, the Thompson Ice Tongs, held US patient #D206,091 and a quick Google search shows that the Thompson Ice Tongs are still selling online to this day. Thanks in part to the WWII war effort, expansion of TMF continued during the 1940's and 1950's; mirroring the growth of the community it served and the new industrial opportunities.

In 1973, after 36 years, Pudge Thompson sold his company to Harder Mechanical, whose story is like TMF's. Harder began as a small local plumbing contractor who was founded in 1934. A few years later they reinvented themselves so they could build housing for the workers at the Portland area shipyards during WWII. As the region continued to see growth, so did Harder who saw the acquisition of Thompson Metal Fab as a way to expand their capabilities and stake a claim on some of these emerging industries (i.e. hydroelectric dams). Shortly after the acquisition, the original Thompson Metal Fab facility (Portland, OR) was closed for good, and all operations were moved to the old Kaiser Shipyard in Vancouver, WA – a facility well suited to support the large projects Harder Mechanical would earn as they grew and expanded.

Thompson Metal Fab would transfer ownership again in the early 2000's with even more emphasis on how to maximize the capacity. The size of the facility requires TMF to be a diversified business and one with experience in multiple disciplines, including:

Marine/Hydro **Tanks/Vessels** **Bridges** **Modular/Structural** **Oil & Gas**



Since the early 1970's, TMF has completed countless projects while working over 10-Million man-hours *(estimated)*. The following list showcases some of the completed projects over the last 40+ years. In each case, transportation by barge was required (either by design or necessity), and in many cases the load passed under the Interstate Bridge.

Projects noted with (*) were not completed by Thompson Metal Fab but are on this list to showcase examples of other mega projects where a facility like Thompson's was required (Big shop, assembly yard, barge loading capabilities)

MARINE/HYDRO

<u>The Dalles Dam, Downstream Navigation Lock Miter Gates, Columbia River, WA/OR, USA [2011]</u>

Two Miter Gates were manufactured, where each gate measured 52' W x 106' L and weighed 1-Million pounds each. Due to navigational lock closures on the Columbia River, an aggressive fabrication and delivery schedule was required which required a fabricator with ample space and ability to load a barge. Picture to the right shows one gate getting ready to be loaded on the barge. Seen in the background is Parker Drilling Rig 272 & 273. Those rigs would ship just a few months after this load.

<u>Lower Monumental Dam, Downstream Navigation Lock Lift Gate, Snake River, WA, USA [2010]</u>

The finished weight of this structure was 1.5-Million pounds and would ship to the jobsite by barge in three segments. The final gate is 88' W x 84' H

<u>Ice Harbor Dam, Removable Spillway Weir, Snake River, WA, USA [2005]</u>

This removable spillway weir is designed to move juvenile fish more efficiently through the dam spillways. The unit measured 70' in width x 68' in height x 105' in length. It weighed 950-tons and is taller than Thompson's facility! The weir was completely fabricated at TMF and then transported by barge to Cascade General for repositioning before shipping to the jobsite on the Snake River.

Lower Granite Dam, Removable Spillway Weir, Snake River, WA, USA [2001]

The removable spillway weir is designed to move juvenile fish more efficiently downstream through the dam spillways. The weir was 83' wide x 61' deep x 115' long and weighed approximately 1,000-tons. The weir was completely fabricated at TMF and then transported by barge to Cascade General for repositioning before shipping to the jobsite on the Snake River.

Esperanza 124 MW Power Barge [1999]

Recently retrofitted in 2017 in Panama, it was originally fabricated in 1999 by Thompson Metal Fab, and transported to Cascade General in Portland, OR for final assembly and functional testing. The barge measured 105' wide x 30' deep x 284' long with a weight of 1,800-tons. The completed barge was loaded on a 400' L x 100' W barge for delivery to Cascade General.

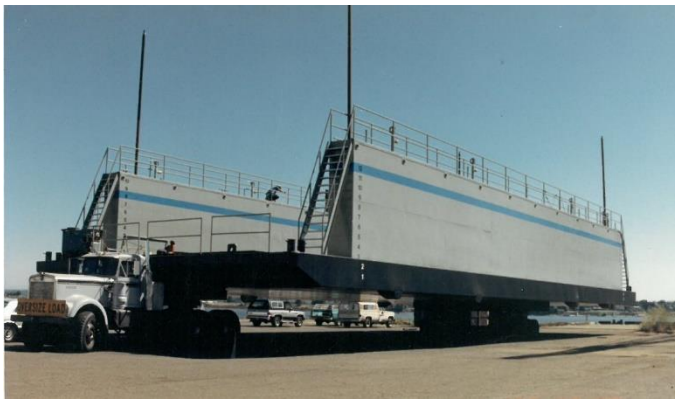
Golmar Explorer Ship Conversion [1997]

In 1997, Thompson fabricated multiple items for the infamous Golmar Explorer ship which was developed for the CIA and at the direction of Howard Hughes. By the mid-1990's the ship had changed hands a few times over and was in the process of being converted into an oil drilling vessel. TMF fabricated two double-bottom sections, four thruster tubs, vessel exhaust stacks, and manifold systems for this project. Completed components were transported by barge from TMF to Cascade General Shipyard.

John Day Dam, Upstream Navigation Lock Gate, Columbia River, WA/OR, USA [1991]
This gate was fabricated at the Columbia Business Center. The gate measured 28' deep x 80' high x 120' wide and weighed 105-tons. It was transported standing (80' high) for installation purposes.

Pacific Marine Hull Fabrication, Honolulu, HI, USA [1989]
TMF fabricated a 365-ton "SWATH" (Small Waterplane Area Twin Hull) excursion vessel. The fabrication consisted of twin cigar-shaped hulls that were 9' in diameter and 132' in length with vessel beams measuring 53'. Thompson's location adjacent to the Columbia River proved valuable for launching the vessel. After sea trials, the "Navatek" vessel headed to Hawaii. The vessel is still operating today.

Christensen Shipbuilders, Dry Dock, Vancouver, WA, USA [1987]
210' long dry dock was fabricated by TMF, including all walls, deck, ballast tanks and piping



Columbia River Barge Conversions [1979-1971]
Thompson converted barges to carry wood chips in support of the pulp and paper mills. The converted barges were fabricated to ABS and USCG standards. Projects were installed at our adjacent dock and barge facilities.

Alaska Ferry Conversion [1973]
Thompson Metal Fab supplied an exhaust funnel, solarium structure and modular subcomponents for the passenger ferry that travels the Inland Passage to Alaska. The existing ferry was cut in half and lengthened, with TMF fabricating all components for this major renovation. All items delivered by barge to the shipyard.

Other Examples Include:

- WSDOT Coleman Dock Improvements [2023] *
- Ballard Lock & Dam, Navigation Lock Center Miter Gates, Lake Washington, WA, USA [2022] *

- John Day Dam, 150-Ton Gantry Crane, Columbia River, OR/WA, USA [2022] *
- McNary Dam, Intake Bulkhead Gates, Columbia River, OR/WA, USA [2022] *
- Port of Alaska Petroleum & Cement Terminal Expansion, Anchorage, Alaska, USA [2021]
- Ward Cove Ferry Dock Expansion, Ward Cove, Alaska, USA [2020]
- WSDOT Mukilteo Dock Improvements, Mukilteo, WA, USA [2020] *
- The Dalles Dam, Upstream Navigation Lock Radial Gate, Columbia River, OR/WA, USA [2016] *
- Lower Granite Dam Expansion, Snake River, Washington, USA [1987]
- Revelstoke Dam, Columbia River, British Columbia, Canada [1984] *
- Bonneville Dam Expansion, Columbia River, Oregon, USA [1981] *
- Brownlee Dam Expansion, Snake River, ID/OR, USA [1980] *
- American Falls Dam Replacement, Snake River, ID, USA [1978] *
- Ice Harbor Dam Expansion, Snake River, Washington, USA [1976] *
- Grand Coulee Dam Expansion, Columbia River, Washington, USA [1974] *
- Mica Dam, Columbia River, British Columbia, Canada [1973] *
- John Day Dam, Columbia River, WA/OR, USA [1971] *
- Little Goose Dam, Snake River, Washington, USA [1970] *
- Lower Monumental Dam, Snake River, Washington, USA [1969] *

TANKS/VESSELS

<u>Phillips 66 Prefractioner Tower, Rodeo, CA, USA [2015]</u>

The 200-ton tower stretched 126’ Long and transitions from 10’-6” diameter at the smallest to 17’-0” at the largest. The vessel was manufactured in three separate sections before being married together at Thompson’s shop. The vessel shell and heads are made from clad plate which provides the necessary strength while also providing the required corrosion protection on the interior. For final acceptance, nearly 120,000 gallons of water was pumped into the vessel for a leak test. The vessel was pressurized over a period to ensure that all welds were water-tight.

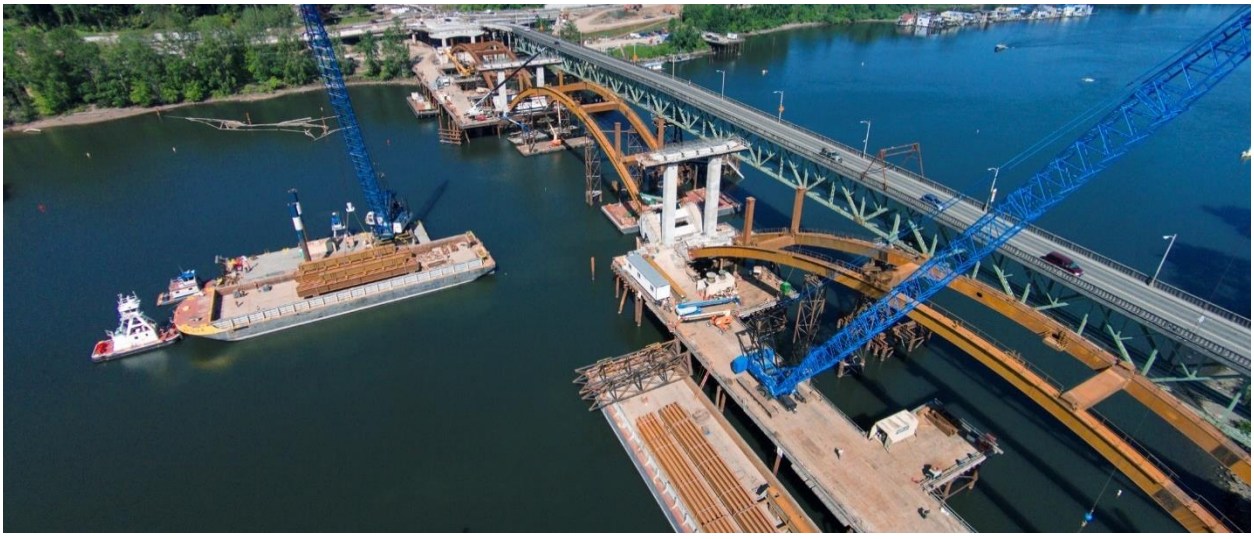
REC Solar Grade Silicon Project, Moses Lake, WA, USA [2007]

Thompson Metal Fab manufactured a total of 10 process vessels for the solar grade silicon industry. The project included four vessels which required barge transportation due to their size. Those vessels were 150" ID x nearly 120'-0" L and weighed over 200,000 LBS/ea. Vessels were barged to Pasco, WA and then shipped over the road to Moses Lake.

BRIDGE

Sellwood Bridge, Portland, OR, USA [2016]

Thompson's scope of supply included fabrication of all major bridge components: Arches, Arch Cross-frames, Vertical Spandrels, and the Bridge Deck Steel. Over 5,000-tons in total. The distinctive feature of the bridge are the three arches which cover 1,275' of the total 1,976' crossing. Each arch was fabricated in segments, with each segment 100' long. Because of the project's location on the Willamette River, steel was delivered to the jobsite with seven barge loads. Multiple barges can be seen here with incoming steel deliveries.



Bay Bridge Connector, Bay Area, CA, USA [2006]

TMF painted two orthotropic tub girders that were fabricated at the Columbia Business Center. Each weighed more than 1,600-tons and measured over 200' L x 80' W. Girders were transported by barge to the Bay Area for erection.

Richmond San Rafael Bridge, Bay Area, CA, USA [2004]

10,000 tons of structural bridge steel for the substructure was supplied for a seismic retrofit. Total fabrication took three years to complete. Larger components were transported by barge and direct to the jobsite.

Tri-Met Terry Moore Pedestrian Bridge, Portland, OR, USA [1996]

Fabricated at the Columbia Business Center, TMF painted the pedestrian bridge spanning HWY 26 near the HWY 217 junction. Completed sections were shipped by barge to a nearby location before being trucked to the jobsite.

1st Ave & Duwamish Bascule Bridge, Seattle, WA, USA [1996]

Completed truss sections for this project were fabricated at the Columbia Business Center, painted by Thompson, and assembled at the facility. Transportation to the jobsite in Seattle was done over the water, by barge.

Nimitz Freeway, Bay Area, CA, USA [1995]

This project consisted of (13) curved tub girders for the reconstruction of the Nimitz Freeway in the Bay Area. Girders were fabricated at the Columbia Business Center and painted by TMF. The total project weighed 6,000-tons with the largest girders weighing 450-tons; 50' W x 250' L. This project required four barges for delivery to jobsite..

I-90 East Channel Bridge, Seattle, WA, USA [1986]

Trapezoidal tub girders that varied from 98' to 198' in length and weighed between 60 and 200-tons each were fabricated at the Columbia Business Center and painted by Thompson Metal Fab. Girders were pre-assembled and completed sections loaded on a barge for transport to Lake Washington.

Other Examples Include:

- BNSF Bridge 66.4 Replacement, Cook, WA, USA [2020] *
- BNSF Bridge 58.8 Replacement, Home Valley, WA, USA [2019] *
- Wittpenn Bridge, Jersey City, NJ, USA [2017] *
- Sauvie Island Bridge, Portland, OR, USA [2004] *
- Glenn L. Jackson Bridge, WA/OR, USA [1982] *
- Freemont Bridge, Portland, OR, USA [1973] *

MODULAR/STRUCTURAL

Intel Expansion, Hillsboro, OR, USA [2010's - Present]

Expansion at the Intel facility in Hillsboro has been going on for some time and Thompson has supplied numerous modular structures in support of their effort. In 2020, TMF shipped the largest modules to date, buildings that were 44' W x 97' L x 16' H. Due to their size, the buildings could break apart in half, but still required a barge to get from TMF's facility to the jobsite as shipping over the road was not an option.

Caltrans, East Tie-In Project, Bay Area, CA, USA [2008-2009]

Thompson was selected by Caltrans (owner) to work with TY-Lin (designer), CC Myers (contractor) and DCCI (erector) to fabricate 3,100-tons of temporary steel to provide detour for the Oakland Bay Bridge at Yerba Vista Island. Thanks to the size of their facility TMF could meet the 'expedited' schedule requirement for this project. Major components required four barge loads from TMF's facility to the job-site in California. Project was completed in 2009.

OHSU Tram, Portland, OR, USA [2006]

TMF fabricated the center support tower, the lower station, and the upper station for the tram project. The major components were transported by barge from TMF to the jobsite in Portland, OR where they were offloaded and erected.

The team at Thompson Metal Fab standing in front of base of the iconic Portland Aerial Tram mid-tower. The tram is located at the OHSU hospital in Portland and spans across I-405. The tower base is over 40' high as shown in this picture.

Alaska Gold Mining Project, Nome, Alaska, USA [2005]

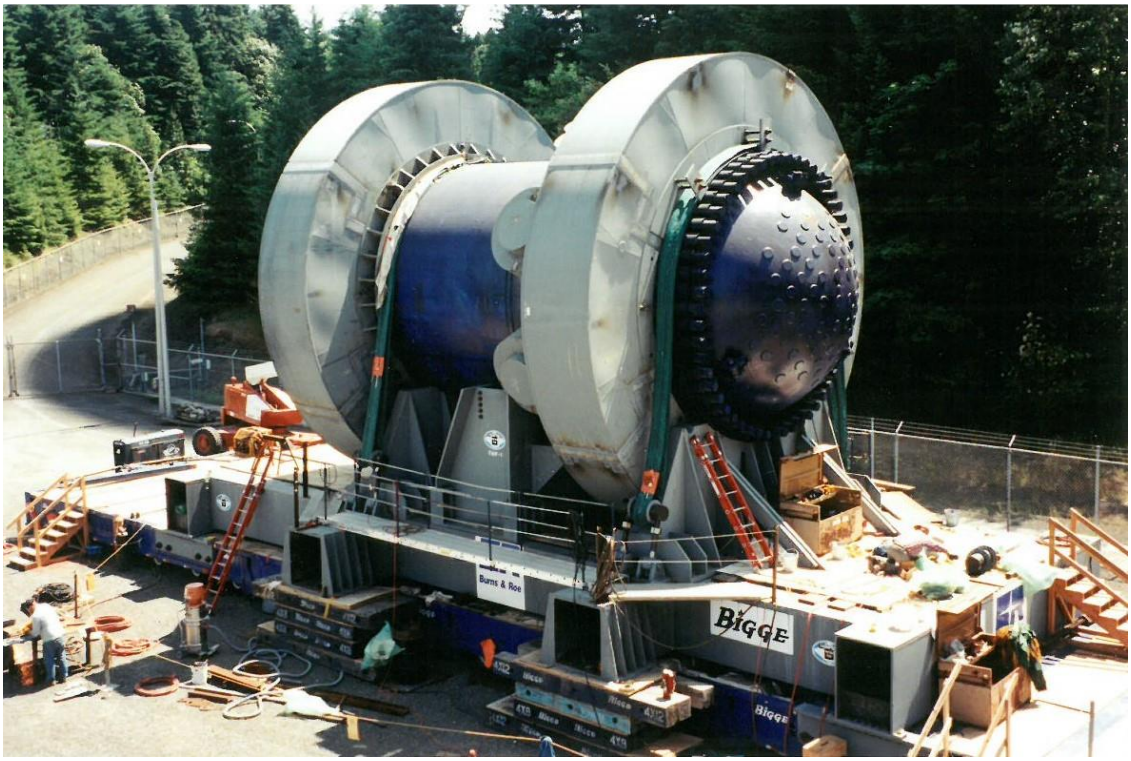
Thompson fabricated hoppers, grizzly grates, ball mill chutes, structural supports, modification of the ball mill, and other mining equipment for this project. TMF's facility was used for the marshaling yard and the load out point for all equipment and structures. Delivery was made via barge to Nome, AK.

Boeing Delta IV Launch Table, Vandenberg AFB, CA, USA [2003]

The 98' long x 33' high x 46' wide launch table weighed 580-tons. The project also included large flame deflector components which weighed up to 120-tons. The launch table and flame deflectors were fully assembled at the TMF facility and transported by barge to Vandenberg Air Force Base in California. It was then off-loaded an installed at the launch site.

PGE Decommissioning Trojan Nuclear Reactor Project, Rainier, OR, USA [1998]

TMF fabricated a 120-ton transport structure and 5" THK shielding enclosures. The completed structures were shipped by barge to the jobsite where the decommissioned reactor was loaded. The entire load was then shipped by barge to the final storage location at Hanford – Richland, WA.



Powell River Paper Company, British Columba, CANADA [1991]

Thompson supplied the fabricated steel for a Chlorine Dioxide Module that measured 35' wide x 76' high x 35' long. This module weighed 350-tons and was transported by barge in the vertical position from TMF's facility in Vancouver, WA to the Power River Paper Company in British Columbia, Canada.

Georgia Pacific Wood Chip Material Handling System, Toledo, OR, USA [1973]

TMF fabricated six 280' tube conveyor sections and all support towers for this project. The completed structures were transported by barge to Toledo, OR and installed.

Other Examples Include:

- Data Centers, The Dalles, OR, USA [2010's – Present] *
- Data Centers, Hermiston, OR, USA [2010's – Present] *
- Pre-Heater Tower, Richmond, British Columbia, CANADA [1997]
- Portland Expo Center, Portland, OR, USA [1995]
- Bulk Material Handling System, Sacramento, CA, USA [1993]
- Newport Bay Floating Restaurant, Portland, OR, USA [1986]

OIL & GAS

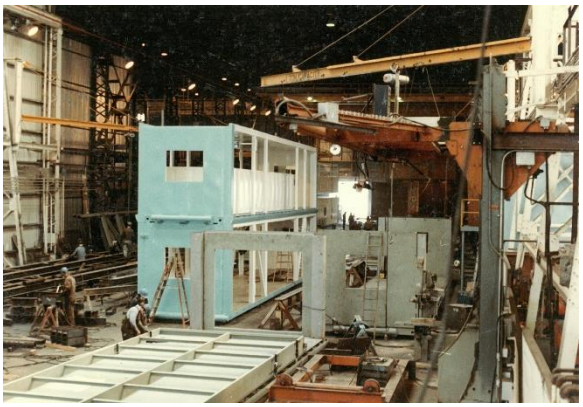
The turnkey modular service TMF offers today reflects what kicked off in the 1980's. By that point work at Prudhoe Bay was ongoing, but the infrastructure needed to support the development was still in process. In 1984, Thompson supported ARCO by manufacturing two 96-room housing modules. Each module was 40' wide x 46' high x 80' long. In addition, two Utilidor Modules were manufactured *(each 10' W x 22' H x 24 L)*. In 1985, more infrastructure was sent to ARCO; these 'bases' were 33' wide x 100' long x 10' high. Thompson also supported Conoco's Milne Point unit in 1985 with the supply of (10) module bases and (11) skids. These structures weighed anywhere from 20 to 270 tons each, with a max dimension of 64' W x 123' L x 12' H. Manufacturing structures of this size and delivering complete to the jobsite seems strange in the lower-48, but given the expanse of the North Slope, it's well suited to receive large infrastructure without other physical limitations to navigate. Additionally, with as fast as the development was happening, there was a value placed on 'set it and leave it' projects; things that could be installed and immediately put-to-use.

Massive platforms for the Alaska oilfields being fabricated at Thompson Metal Fab in the mid-1980's. The platforms nearly took up the entire width of a bay (80')

The platforms (seen left) were delivered by barge to Alaska where high capacity trucks and dollies (shown above) off loaded the structures for delivery to the jobsite.

Thompson's experience in supplying the oil fields eventually led to connections with the drilling contractors. The drilling contractors work on behalf of the owners to drill production wells and test holes as part of the exploration process. Drillers operate large equipment (known as rigs) to drill the holes. Thompson's first experience with rigs started in the late 1980's with Pool Arctic *(now Nabors Drilling)* who was a drilling contractor working on Alaska's North Slope. At one point, Pool Arctic operated the largest fleet of drill rigs on the North Slope. When TMF began working for Pool, they were looking to expand their fleet to meet market demand. This required retrofitting current rigs due to advances in equipment technology and drilling conditions that surpassed the capability of their rigs. Retrofitting works the same way as a new-build, only backwards. In a retrofit, the rig is placed on the barge and then shipped to a location large enough to receive it over the water and with enough yard space to accommodate the work. There are very few facilities on the West Coast who can accommodate this. Retrofits are just as attractive to TMF as new-builds. During a retrofit it is not unusual for some level of "rigging down" to happen and for structures to be placed in the shop. In that circumstance, it is very attractive to contractors to work with a facility large enough to handle these structures and keep them under the roof and out of the elements.

AADCO merged with Pool Arctic in 1983 and provided the rig shown above as part of the merger. This rig would be retrofitted by TMF.



Modular fabrication at Thompson Metal Fab for a Pool Arctic retrofit. The modules shown here represent the scale of a 'truckable' module, typically 12' H x 10' W x 40' L

Traditionally, drill rigs are built by manufacturing a series of truckable modules. These modules are fully assembled at the manufacturer's yard for verification, testing, and commissioning. Upon approval, the rig is completely disassembled for transportation to the jobsite. "Rigging up" is the process by which all these truckable modules are then reconnected together and recommissioned. Depending on the size of the rig, it is not unusual for 200 truckloads to be needed to move from the manufacturing location to jobsite. The process of putting a rig back together in remote locations can take months and cuts into production time. The ability to offer a turnkey service and integrate work in Thompson's shop and in their yard ultimately saves money in the long run – and contractors and owners have come to expect the capacity TMF can offer. During the early development of Prudhoe Bay in the Arctic, machinery and field services were limited and getting the required equipment to the jobsite required creative solutions. Field work is expensive and risky; and often there is limitations to what can be performed. Thompson can build larger modules for delivery, which provides a distinct advantage by minimizing costs in the field and minimizing risk.

Parker Drilling was one of the first contractors who recognized that one solution to the problems on the North Slope was to simply to deliver a *bigger* rig. A bigger rig would be capable of holding more robust equipment which would allow for drilling longer, bigger holes for greater production. The benefit of drilling longer holes is that you do not need to move the rig from pad to pad as frequently; you can cover a lot more ground from just one spot. They understood the importance of downtime and the full capacity of what TMF could offer with regards to turnkey modular fabrication. The design for Parker Drilling's Rig 245 swapped out the multiple, smaller, truckable

A large module for Parker Drilling Rig 245 moving from TMF's shop to their yard for assembly. Seen in the background is the mast and substructure of this massive drilling rig.

Rig 245 shown here at the assembly yard. When fully raised, the mast hangs high in the Vancouver, WA skyline.

modules and consolidated them into fewer 'mega modules.' Less modules simply take less time to put back together in the field. What could be 4-6 months in field work could now be up and running in weeks. Also, by eliminating trucks, the risk of loads being damaged during transport is reduced dramatically. Parkers' vision of 'mega modules' required a facility that offered a few things: a big shop, big yard, skilled workforce, access to water for shipping, and a logistically friendly location.

Parker Drilling Rig 245 being 'rigged up' at Thompson Metal Fab's yard. This yard space is immediately adjacent to the manufacturing facility and to the roll-on/roll-off barge slip. The ability to offer turnkey projects and delivery via water has given Thompson Metal Fab an advantage in the marketplace.

Drilling equipment has long been manufactured in Houston, Louisiana, and other Gulf state locations. These facilities manufacture the truckable modules and often the large offshore platforms. They certainly have the shop, yard, workforce, and access to water – but they do not have a strategic location to Alaska when it comes to logistics. To get a barge from the Gulf to the North Slope requires passage through the Panama Canal just to get from one side of the continent to the other. The added time for shipping and the added cost of voyage does not justify the mega module concept. What is needed is a manufacturer in the Pacific Northwest. TMF's location at the old Kaiser shipyard in Vancouver, WA provides the space and direct access to a deep-water barge slip with roll-on/roll-off access. The combination of a heavy-industrial construction facility and a support yard with marine transportation capability is an important asset to the region's industrial job base and has potential to attract large job producing projects. This capability has enabled TMF to stay competitive in a business that has largely moved overseas.

Becoming a proven West Coast manufacturer of drilling equipment gave drilling contractors an option that was not there previously. By entering the market, engineers could now extend the limits of their design and present solutions that were attractive to both contractors and owners who were seeking to replicate what Parker did with Rig 245, the first mega-rig on the North Slope. Among the design variables that has always been taken into consideration are the shipping clearances between our facility and the North Slope of Alaska. In that distance, there are three bridges which loads must pass under: The Interstate Bridge, the Lewis & Clark Bridge, and the Astoria-Megler Bridge. Of those three, the Interstate has the lowest total clearance, but is currently sufficient to meet the requirements of transporting mega modules.

Doyon Drilling Rig 25 shown on the barge in the foreground. Due to the size of the rig and its six mega-modules, two barges were required for delivery to Alaska's North Slope. The background shows the remaining modules for Rig 25, in addition to Parker Drilling's AADU Rigs (Rig 272 and Rig 273)

Thompson's greatest competitive advantage in earning business with the drilling contractors is their ability to ship completed, commissioned, turn-key 'mega modules' to the jobsite. If that advantage is eliminated, they will be priced out of the market. In addition to competing against the Gulf states, they actively compete with Canadian shops in Alberta. Because of the exchange rate, those facilities have a 30% pricing advantage, all other things being equal. That is the magnitude of the shipping advantage they have at Thompson. Contractors are willing to pay a

Picture of the Interstate Bridge in 2011 showing both the original Northbound span (background) and the second span (foreground) which opened in 1958 to traffic in both directions. In 1960, the second span was dedicated to Southbound traffic only. (Photo shows TMF manufactured drill rigs, AADU Rig 272 & 273 for Parker Drilling)

premium to avoid truckable modules manufactured in interior Canada or in the Gulf. It is the Contractor's advantage in the long term to have mega modules as their risk is lower, their down time is lower, field erection and trucking costs diminish, etc. Please note, these mega modules can only have their loads diminished so much (because of shipping clearance issues, etc.) before the concept no longer makes sense and the design is forced back to a more traditional build plan.

PROJECT EXAMPLES:

Hilcorp Innovation Rig, North Slope, Alaska, USA [2016]

The Innovation Rig is the next generation of drilling equipment. At nearly 1.5-Million LBS of steel, this rig consists of multiple modules and was built up to 50' H in TMF's shop before moving to their yard for final fit-up. At 9-months, this was the fastest rig build in Thompson's history, a true testament to their size and capability.

Parker Drilling AADU Rig 272 & 273, North Slope, Alaska, USA [2011]

Each drilling rig was comprised of three main modules. The Mud Modules weigh 600-tons, the Drill Modules weigh 700-tons, and the Utility Modules weigh 460-tons. The Mud and Utility Modules are 48' wide x 55' high x 99' long. The Drill Module is 76' high with the mast in the lay-down position.

Doyon Drilling Rig 25, North Slope, Alaska, USA [2010]

4-million LBS of steel and aluminum fabricated for Rig 25, a project where TMF also acted as the General Contractor. TMF managed all rig-up activities including mechanical, electrical, and functional checkout. This rig consisted of six primary modules: Power Complex (550-tons, 56' L x 40' W x 42' H); Drill Complex (560-tons, 96' L x 37' W x 40' H); Pipe Complex (560-tons, 68' L x 47' W x 25' H); Mud Complex (550-tons, 68' L x 40' W x 49' H); Pump Complex (560-tons, 64' L x 40' W x 52' H); Casing Complex (500-tons, 60' L x 56' W x 40' H). The 26' x 25' Mast extends to 148' L.

Parker Drilling/British Petroleum Liberty Rig, North Slope, Alaska, USA [2009]

This drilling rig shipped from our facility to the North Slope of Alaska in July 2009. TMF furnished approximately 5.5-milion pounds of fabricated steel. The rig was the world's largest land-based rig at the time of manufacturing and consisted of three large modules. The Drill Module was 58' W x 98' H x 68' L, weighing 900-tons. The Pipe Barn module was 158' W x 45' H x 170' L, weighing 2,560-tons. The Drill Service Module was 50' W x 48' H x 177' L, weighing 2,600-tons.

Pool Arctic Rig 6, North Slope, Alaska, USA [1998]

The Rig 6 project was a retrofit of the existing rig and included all new structural framing in addition to new mechanical components for the moving system. At the time of manufacturing, it was reported by the tire manufacturer to be the largest rubber tire vehicle in the world. Nicknamed 'Radio Flyer', this backbone of this rig is twin 6' x 10' box girders which support the drill floor and mast, and transfers load to the substructure.

Nordic Calista Rig 3, North Slope, Alaska, USA [1998]

In 1998, TMF completed and delivered Modular Mobile Oil Drilling Rig 3 to Nordic Calista. The rig includes 850-tons of fabricated steel, it measures 45' wide x 78' high x 110' long. The rig was transported by barge to the North Slope of Alaska.

Parker Drilling Rig 245, North Slope, Alaska, USA [1990]

In 1990, TMF fabricated a self-propelled mobile oil drilling rig. The drilling module was 43' wide x 78' high x 150' long and weighed 3,000-tons. The utility module was 40' wide x 58' high and 130' long, weighing 1,500-tons. The cutting module is 30' wide x 30' high x 40' L, weighing 350-tons. The completed drilling rig was transported by ocean-going barge from TMF's facility to the North Slope.

ConocoPhillips Milne Point, North Slope, Alaska, USA [1987]

3,400-tons of fabricated modular steel structures were supplied to ConocoPhillips. This took three ocean-going barge loads to deliver to Alaska.

ARCO Operation Center Housing Expansion, North Slope, Alaska, USA [1985]

Modular superstructures (40' W x 65' H x 80' L) were fabricated along with bases and decking housing modules. Completed modules were loaded onto a barge and transported direct to the North Slope.

Other Examples Include:

- Crowley, Monopod Pile, Cook Inlet, Alaska, USA [2014]
- Saxon Rig 147 Retrofit, Cook Inlet, Alaska, USA [2013]
- Saxon Rig 169 Retrofit, Cook Inlet, Alaska, USA [2013]
- Kuukpik Rig 5 Retrofit, North Slope, Alaska, USA [2005]
- Pool Arctic Rig 9, North Slope, Alaska, USA [1999]
- Nordic-Calista Rig 1 Retrofit, North Slope, Alaska, USA [1997]
- Pool Arctic Rig 4, North Slope, Alaska, USA [1994]
- Petro Star Refinery (Valdez), Alaska, USA [1993] *
- Pool Arctic Rig 3, North Slope, Alaska, USA [1990]
- Petro Star Refinery (North Star), Alaska, USA [1985] *
- Trans Alaska Pipeline System (TAPS), Alaska, USA [1977]
- Prudhoe Bay, Alaska, USA
    - *Discovered (1968), Start of Production (1977), Peak Production (1988)*
- Cherry Point Refinery, Washington, USA [1971] *
- Cook Inlet Monopod, Cook Inlet, Alaska, USA [1970's] *
- Kenai Refinery, Alaska, USA [1969] *
- Maintenance on California refining facilities
- Maintenance on Washington refining facilities

With a structural height of 126', this pile template for a monopod in the Cook Inlet (Alaska) is one of the largest structures to ship from the Columbia Business Center in the last 40-years. Thompson Metal Fab manufactured piling for this project, delivered in 2014.

Taken in the early 1970's, the photo above shows Thompson Metal Fab shortly after closing the original facility in Portland and moving to Vancouver. Thompson added fiberglass roofing and walls to bays 5 through 9 to create an enclosed space. The land has been developed quite a bit in the last 40-years (including improvements to the roll-on/roll-off barge slip), but the building remains virtually the same.

LOCAL BENEFIT & LOOKING AHEAD

Because of Thompson's 40-year reputation, logistical advantage and modern quality programs required, they have a distinct benefit. Loss of that logistical advantage due to a diminished shipping clearance (or other) is not something they could replace. Earning this business is a tremendous benefit to Thompson, their employees, and their local community. For example, any one rig project is equivalent to one year of revenues, in addition to hundreds of direct high wage jobs, as well as work for hundreds of local small businesses.

Due to the magnitude of work, contractors often mobilize to Vancouver to manage the construction. This includes management, engineers, and other personnel to ensure that projects are delivered on time. This staff of people stay long-term in local hotels, rent from local citizens, spend entertainment dollars with local small businesses, and are an economic benefit. They not only employ the staff at TMF, but they also employ local electricians, machinists, painters, millwrights, pipe fitters, hydraulic operators, boilermakers, sheet metal workers, and other trades. This work also supports various apprentice programs which train the next generation of trade workers. Loss of this total benefit cannot be replaced.

Local businesses see boosts in revenues when major job producing projects are brought to the Columbia Business Center. Due to the nature of these large projects, stakeholders often move management teams to Vancouver to oversee manufacturing.

History has shown us that building a new link between Vancouver and Portland will bond our communities together and provide opportunity for economic growth and expansion. We also see that there is a correlation between the bridge, the growth of our community, and Thompson Metal Fab. The need for large-scale fabrication remains and markets that require TMF's services show no sign of slowing. There is potential for an industrial rebirth, one that mimics the industrial expansion of the 1950's through 1970's. While it is yet to be seen at the time of this writing, the federal government will at some point pass an infrastructure spending bill, which intends to replace our aging and deteriorating bridges, dams, and other critical works. Just as building these original structures kept generations of people working, so will the effort to replace these structures.

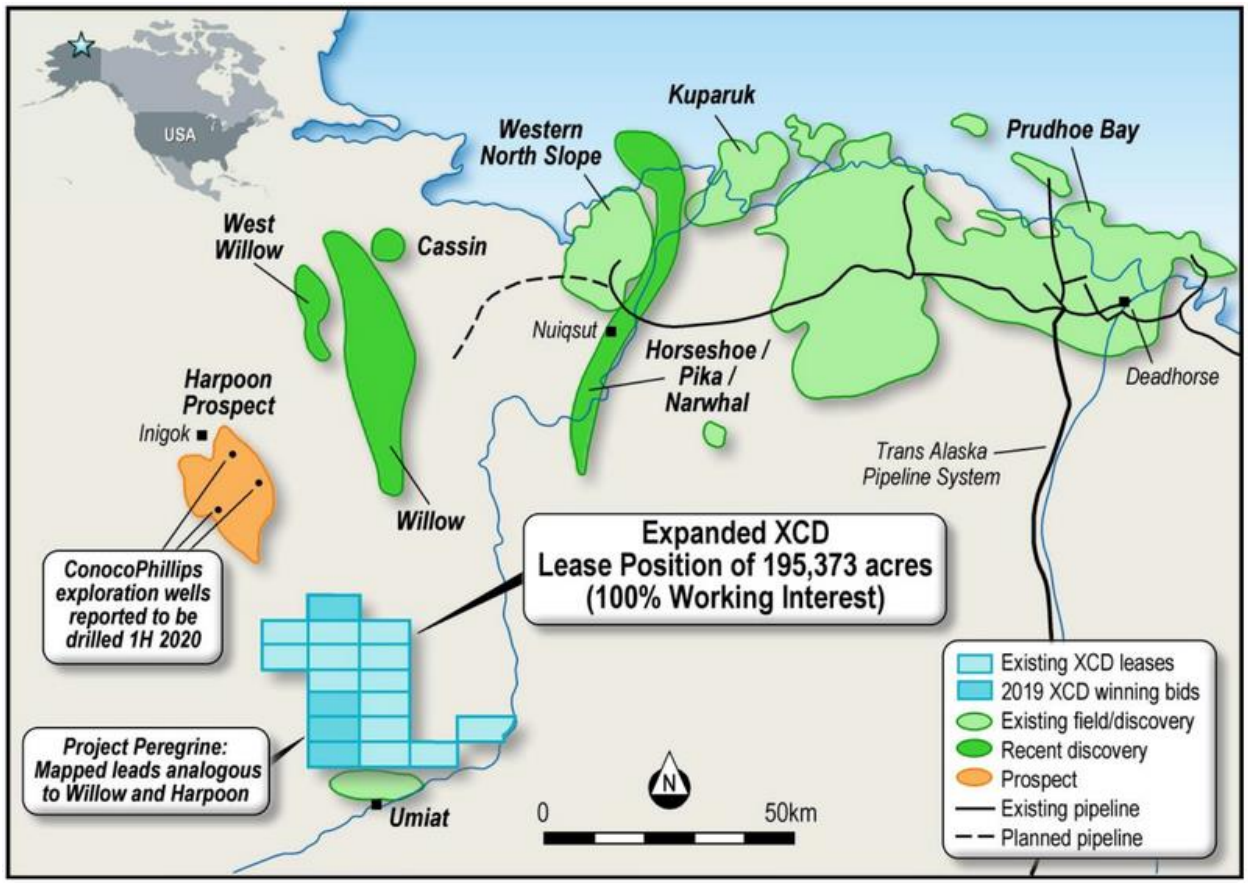
Thompson is encouraged by the commitment made to develop renewable energy sources. TMF has directly supported this effort for decades by manufacturing equipment that grows polysilicon crystals used in the development of solar panels. They have even been successful exporting domestically manufactured polysilicon equipment to countries such as China. Being a part of clean and renewable projects is something TMF does every day, thanks to the nature of their business. Steel is the most recycled material on Earth and steel products are 100% recyclable at the end of their useful life. Once produced, steel can be continually recycled into a new steel product without deterioration in product quality. Even the byproducts of steel work can be reused. Weld slag is used in cement, road construction, fertilizers, and hydraulic engineering. Process gasses are used to produce heat and electricity. Metal oxides can be recovered from steel making dust. Steel's inherent durability and recyclability make it an ideal fit for a circular economy. Allowing Thompson Metal Fab to continue producing steel products in the manner they do currently is a critical component in the continued development of clean energy and in effort to reduce America's carbon footprint.

As Thompson looks ahead to the future, they are currently tracking several projects and emerging markets which will certainly require a shop of their size and skill set. These projects will likely require delivery by barge and be of scale greater than or equal to what has been demonstrated. As noted, TMF has a competitive advantage with projects that require delivery by water and there is no other comparable, active facility with a roll-on/roll-off barge slip on the West Coast. Future opportunities include:

- ConocoPhillips – Willow expansion *(drill rigs, modules)*
- Oil Search – Pikka expansion *(drill rigs, modules)*

- Horseshoe Unit – Future North Slope Expansion *(drill rigs, modules)*
- Aerospace
- Offshore Wind and Wave power generators
- Burnside Bridge
- Golden Gate Bridge Seismic Retrofit
- West Coast Movable Bridges
- Hydroelectric Maintenance Projects
- Desalination in California
- Port of Nome - Expansion

Willow Expansion/Pikka Expansion/Horseshoe Unit



In many regards, the original Prudhoe Bay development has reached the end of its useful life. In 2020 original Owner, BP, sold their Prudhoe rights to ConocoPhillips and Hilcorp. Hilcorp is renowned for their ability to acquire 'legacy wells' and get a high level of production thanks to their ability to match modern technology with lean processes. What bigger companies might steer away from or flat out abandon due to high overheads, Hilcorp (a smaller independent company) can come in and still make profits for many years. The sale of Prudhoe and acquisition by Hilcorp signals the end of an era at Prudhoe, but it also marks the beginning of Alaska's next chapter in oil production.

In 2016, discovery wells were drilled in the Willow unit, owned by ConocoPhillips. The Willow unit is immediately west of Prudhoe and other large operating units but is on land that is largely under-developed. During the expansion of Prudhoe Bay facilities were tied into one another (Alpine, Kuparuk, Oooguruk, Milne Point, North Star, Endicott), man camps often shared, and roads and bridges integrated into one logistical network. Willow is far enough outside of this integrated network that relying on the existing infrastructure to support further expansion is not feasible. New piping systems would be needed, new roads would be required, new processing modules installed, and essentially a 'mini Prudhoe' would need to be built from scratch. After a successful exploration and appraisal season in 2018 it is estimated that Willow could contain up to 750-million barrels of oil and the infrastructure that would support Willow could produce approximately 100,000 barrels per day. Assuming full production each day of the year, Willow would be 'on-line' for 20-years.

This massive process module is being loaded out for delivery to the North Slope of Alaska in July 1990. This industrial equipment rivals the size of most downtown buildings and is representative of the equipment currently being requested for North Slope expansion projects. Due to scale and complex nature of work, this sort of equipment cannot be manufactured at the remote jobsite or accomplished at all in Alaska.

This massive process module is being loaded out for delivery to the North Slope of Alaska in July 1990. This industrial equipment rivals the size of most downtown buildings and is representative of the equipment currently being requested for North Slope expansion projects.

Flanked by existing units, Alpine and Kuparuk, sits Pikka. The Pikka unit is part of the Nanushuk Field which is estimated to hold as much as 1.5-billion barrels of oil. This is considered to be the biggest conventional onshore oil discovery in the US in the last 30-years. Upon full development, it is anticipated that Pikka will produce 120,000 barrels per day, and on some accounts up to 160,000 barrels per day. Conservatively, there is enough oil here to keep Pikka online for nearly 35-years.

Like Willow, there's just no infrastructure in Pikka despite being sandwiched by two existing fields. Early planning on Pikka included budgetary Requests for Proposal which were submitted by Pikka's Owner, Oil Search. One RFP requested multiple modules nearly 80' H x 200' L x 80' W, a fairly typical example of the infrastructure which is required.

Finally, early testing has been going on in the Horseshoe unit of the North Slope (south of the Willow and Pikka unit) and early indication is that Horseshoe will also be a high volume area, with volume of over 1-billion barrels. Combined with Willow and Pikka, the makings of a modern day Prudhoe Bay is in the works and could be a generational project.

Aerospace

Vandenberg Air Force Base is home to the US Air Force, United Launch Alliance, Space X, and now home of the Space Force, a branch of the US Air Force. Blue Origin is looking at Vandenberg as well and this will produce new opportunities for launch facilities. The western range is advantageous and continues to serve the needs of the industry. All these groups are getting a boost from "REACH" (Regional Economic Action Coalition). Currently, Vandenberg has the only Space Launch Complex (SLC) to launch for polar orbit. The Cape is working on a program for this, but currently the capability does not exist.

(Report from 'REACH' available for online viewing at https://reachcentralcoast.org/wp-content/uploads/Phase-0-Report.pdf)

Excerpt from the referenced report:

"Driven in large part by commercial enterprises, space is now a $425-billion industry that's expected to grow to $3-trillion over the next three decades…It's a huge opportunity and why REACH adopted building a thriving space enterprise as a core initiative in our 2030 plan."

This bold plan by the State in collaboration with all the stake holders will result in the construction of new facilities to support launch efforts at Vandenberg. Launch towers and/or mobile assemble buildings will be major projects that will require work on very large structures within this decade. The work on these facilities in the past been done by NW Oregon/SW Washington fabricators – including Thompson Metal Fab. This work requires facilities with large yard areas and heavy fabrication capabilities as well as a barge loading facility that is capable of supporting ocean going barges. There are very few of these types of facilities on the West Coast. The Columbia Business Center is one of those few spaces and represents a location that has both barge loading capabilities and the manufacturing capacity through groups like Thompson Metal Fab.

Pictures from Space Launch Complex-6 on April 26, 2021 show before and during launch of United Launch Alliance Delta IV Heavy rocket carrying a classified spy satellite. The launch table was manufactured by Thompson Metal Fab and delivered to the jobsite in 2003.

Past work in California dating back to the 1960's has been done at the Columbia Business Center. Jacket Liners for the Santa Barbara oil field were built at this location. Work for both Space Launch Complex 3 (SLC 3) and SLC 6 were done at Columbia Business Center. Much of this work required a full bridge raise to facilitate passage of the cargo on board a barge.

In addition to this planning at Vandenberg, Space X is now under contract for two more launches from there.

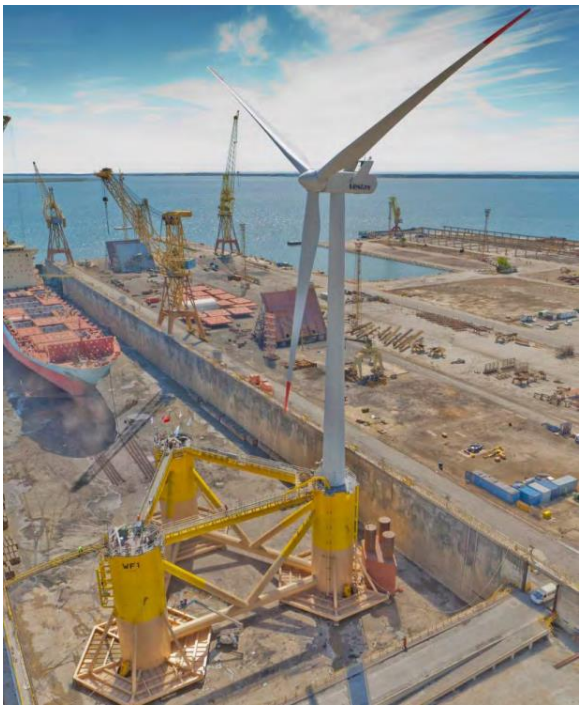
(https://www.noozhawk.com/article/defense_department_awards_contract_to_spacex_for_2_vandenberg_afb_launches)

Excerpt from NOOZHAWK Santa Barbara:

"The Department of Defense awarded Space Exploration Technologies a pair of missions that will involve two rocket launches from Vandenberg Air Force Base for the military's next-generation of space-based tools for warfighters….The announcement in the final hours of 2020 put the firm-fixed-price contract cost for SpaceX at $150,450,000…The first launch will occur in September 2022, and the second mission will take place no later than March 31, 2023, to complete putting the constellation in space, according to the award by the Space Development Agency in Washington, D.C."

SpaceX and United Launch Alliance have been awarded a 40%/60% split for launching DOD payloads. This award was made in August of 2020. For work at Vandenberg, SpaceX will have to add the capability of vertical integration of DOD payloads. This will require Space X to build a Mobile Service Tower (MST) or a similar structure to facilitate vertical integration of their vehicles. Currently SpaceX does all integration horizontally, installing satellites and rockets onto Falcon 9 and Falcon Heavy inside hangars near the company's launch pads. But some of the of the US Government's most sensitive and expensive intelligence-gathering satellites are designed to be mounted on their launch vehicles vertically. SpaceX officials have indicated that vertical integration capability is required of participants in the National Security Space Launch Phase 2 Launch Service Procurement.

Offshore Wind and Wave



Currently there are no independent organizations/companies willing to make the upfront investment into this emerging market. The land based wind industry grew because of federal tax credits that made it profitable, and without federal assistance it is unlikely that offshore systems will get the boost needed.

Recently, the administration under President Biden cited their plan to expand the use of off-shore wind farms in effort to develop renewable energy sources. The goal of the Biden Administration is to increase capacity of the current off-shore systems to power 10-Million homes by the year 2030. To meet that target, the administration intends to accelerate the permitting of projects along the coastlines and to open waters for development. $3-Billion in federal loan guarantees are available for offshore wind projects and for investing in the nation's port properties to support wind construction.

Mirroring this goal to develop offshore wind energy, the states of California and Oregon have introduced bills to develop wind energy along their coastlines. California bill AB525 sets a goal of 10GW of offshore wind by 2040,

3GW of which to be established by 2030. Oregon's HB3375 also sets a goal of 3GW by 2030. Oregon's effort is sponsored by a Republican (Rep. David Brock Smith) who has positioned the states bill as an opportunity to stimulate economic development and resiliency.

Currently there is not a facility on the West Coast that is set up to assemble these massive offshore wind systems. Thompson Metal Fab certainly has the capacity to manufacture the floating bases, and the facility/space to receive the wind towers and turbines. We also have the space to perform all assembly required. All opportunity to participate with this emerging market is gone however if the new bridge is not at a suitable height. Our current plan to participate with this emerging market is to manufacture the bases at TMF and float them downstream to a satellite yard where the towers and turbines can be assembled and installed on our bases. With that plan in place, we can utilize our current facility for all the heavy manufacturing, and provided that we are not impacted by the height of the I-5 bridge, we can ship these structures to wherever the assembly yard is located. The Biden administration keys in on one important factor, most coastal port properties are not currently set up to handle this massive manufacturing and investment in the properties must be made.

Most of the current facilities manufacturing offshore structures are on the American East Coast, or in the Gulf. Even though these facilities have the capacity, they are not well positioned to support the manufacturing of offshore systems for the West Coast. To reach the West Cost, all cargo must travel through the Panama Canal and the distance associated with voyage makes the transportation very expensive and further defines the reason why developing a manufacturer on the West Coast is so important.

Figure A-20 Vancouver

Image above comes from BOEM report in 2016 which evaluates various sites on the West Coast that would be suitable for the development of offshore wind power manufacturing. The far right shows the Columbia Business Center, and predominantly in middle is Thompson Metal Fab.

Thompson Metal Fab is one of possibly two manufacturers on the West Coast who has the size of facility, yard space and direct access to water to make our company a very attractive option for full-scale manufacturing of offshore systems. When you look at the total capacity of the Columbia Business Park, there is more than enough space and infrastructure to use our location in a dynamic way. If the new bridge does not at least accommodate this emerging market, it will be very difficult to develop the required infrastructure at all on the West Coast. Let us not lose what we currently have.

On March 3rd, 2016, the Bureau of Ocean Energy Management published a 256-page report that names the Columbia Business Park as a viable option for manufacturing offshore wind systems, but also notes that if the new height of the I-5 bridge is lowered below its current air gap it will severely restrict this type of manufacturing for any facility that is upstream of the bridge (i.e. Thompson Metal Fab).

To download a PDF file of the Environmental Studies Program report, go to the US Department of the Interior, Bureau of Ocean Energy Management, Environmental Studies Program Information System website and search for OCS Study BOEM 2016-011.

Images above comes from the 2016 BOEM report which shows the manufacturing and shipping capabilities of the Columbia Business Center for the wave power industry.

Burnside Bridge

The Burnside Bridge is scheduled for start of construction in 2024. There are two alternatives to the movable portion of the bridge: Replace the existing double-leaf bascule bridge with a vertical lift bridge – or – replace the bridge with a modern double-leaf bascule. The replacement of the approaches is difficult and would be best with a long span alternative. The option of a Tied-Arch, Cable-Stayed or Truss Span is attractive.

Image above shows the Sauvie Island Bridge being shipped to the jobsite via barge on the Willamette River and passing under the Burlington Northern RR Bridge in Portland, OR. Delivery of steel for the new Burnside Bridge would take a similar approach, due to the limited area for construction at the jobsite in downtown Portland, OR. Bridge steel coming from the Columbia Business Center would pass under the Interstate Bridge to reach the jobsite.

Due to congestion at the job site, moving the major spans into place will be done by water. Similar work has been done in the past on the Freemont Bridge, Sauvie Island Bridge and Sellwood Bridge.

Golden Gate Bridge Seismic Retrofit

The Golden Gate Bridge has an upcoming project that is one of the largest projects on a single bridge that is not new construction. The iconic towers on the Golden Gate Bridge will be retrofitted in addition to the deck steel between the two towers. This project was due to be completed by 2024 but has been delayed by other projects *(currently scheduled to be complete in 2023)*.

West Coast Movable Bridges

California has 36 movable (non-railroad) bridges. Of that group, four are in poor condition and 25 are in fair. Replacement will be recommended for some of these bridges and most will be shipped to the job-site by barge.

Oregon has the previously mentioned Burnside Bridge coming up. Additionally, the Rose Quarter Improvement project which will include the manufacturing of major steel spans.

Washington has 51 movable bridges (non-railroad). 10 are in poor condition and 34 are in fair condition. These bridges will be slow to replace due to budget issues but most of the poor condition bridges will be replace.

Hydroelectric Maintenance Projects

The current 2021 (fiscal year) budget work plan for the US Army Corps of Engineers is $2.7-Billion. Much of this work will be on the Columbia River system. Applicable work for TMF is as follows:

<u>Portland District</u>

- Bonneville Dam
    - Powerhouse 2, 65-Ton Tailrace Gantry Crane Replacement
    - Headgate Repair Pit Rehab
    - Powerhouse 1 Trash Racks
    - Fish Guidance Efficiency
- John Day Dam
    - Navigation Lock Downstream Gate Bearing Shoe Replacement
    - Trash Racks Replacement
- Cougar Dam:
    - Spillway Gate Rehab
    - Butterfly Valves

- Foster Dam:
    - Oil Spill Prevention
    - Oil Water Separator
    - Fish Weir Follow-on
- Detroit Dam:
    - Spillway Gate Rehab
- Dexter Dam:
    - Trash racks
    - Intake Gates
    - 25-Ton Intake Gantry Crane Replacement
- Green Peter Dam:
    - 180-Ton Bridge Crane Rehab
- Big Cliff Dam:
    - 40-Ton Intake Gantry Crane
    - Trash Racks and Gates Rehab

Seattle District

- Libby Dam
    - 75-Ton Intake Gantry Crane Rehab
- Albeni Falls Dam
    - Turbine Maintenance Platform
- Chief Joseph Dam
    - Intake Gates Rehab or Replacement
    - Turbine Maintenance Platform
    - 50-Ton Intake Gantry Crane Rehab
    - 18-Ton Tailrace Gantry Crane Rehab

Walla Walla District

- Ice Harbor Dam
    - Intake Gate Hydraulic System Upgrades
- Lower Monumental Dam
    - Turbine Maintenance Platform
- Lower Granite Dam
    - Turbine Maintenance Platforms

Desalination in California

California is always in a water crisis. They have new reservoirs planned that will require outlet works, gates, etc. Most of this work will ship by truck/train, but shipping over the water (by barge) will be the modular structures for new equipment in the planned Desalination facilities that California needs to sustain the population growth.

30-miles north of San Diego is the Claude "Bud" Lewis Carlsbad Desalination Plant, the largest effort in North America to turn salt water into fresh water. Each day 100-million gallons of seawater are pushed through semi permeable membranes to create 50-million gallons of fresh water that is piped to municipal users. Carlsbad, which became fully operational in 2015, creates about 10% of the fresh water the 3.1-million people in the region use, at about twice the cost of the other main source of water. This is a real issue for California and will require the state to build more of these desalination plants.

Wartime Efforts

Henry Kaiser's Vancouver Shipyard, shown in development in 1942. Eventually becoming the Columbia Business Center, this facility would become a strategic West Coast manufacturing facility.

It is important to plan for the unforeseen as well. Contingency comes in many forms; but let us not lose sight of the reason why the facility exists to begin with. Kaiser built the facility as part of the war effort in WWII. Because of the shipping clearances allowed when the drawbridge was at full height, the Vancouver Shipyards could produce Liberty and Victory war ships despite being upstream from the bridge. If that height is impacted by a fixed structure at a *lower* clearance, the ability for Thompson to support major wartime efforts is certainly diminished especially when compared to the capacity we could offer today. As noted previously, we are one of only a handful of facilities on the West Coast who has facility large enough to manufacture the structures we do and ship over the water. Reducing shipping clearances will certainly limit Thompson's ability to be a strategic West Coast manufacturer if a major wartime event occurs.

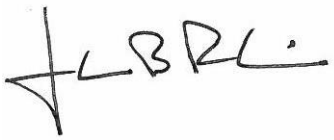
IN CLOSING

Thompson Metal Fab supports the new Interstate Bridge Replacement project. The region has outgrown the capacity of the current span and a new bridge is needed to reflect current and future needs. Innovations in transportation have changed the way people travel and move goods since 1917; and modern engineering, materials, manufacturing, and construction should allow for a beautiful, robust structure that will serve the needs for future generations. Currently the lift span on the Interstate Bridge is 178' at maximum clearance, any reduction

on a new span will have significant impact on TMF's industrial competitiveness. Less clearance will inhibit Thompson's ability to attract job-producing industrial projects to the region. Lower bridge clearance will also cause constraints for current and future energy infrastructure needs where TMF is counted on to be a major supplier to energy producers. Impacts to clearance could also affect the development of renewable energy sources, such as offshore wind. A facility, like that at Thompson Metal Fab in the current configuration, will be critical in the success of offshore wind programs on the West Coast. Additionally, users such as the US Army Corps of Engineers, will be impacted as they depend on TMF to deliver structures by barge to support our region's dams and ports East of I-5.

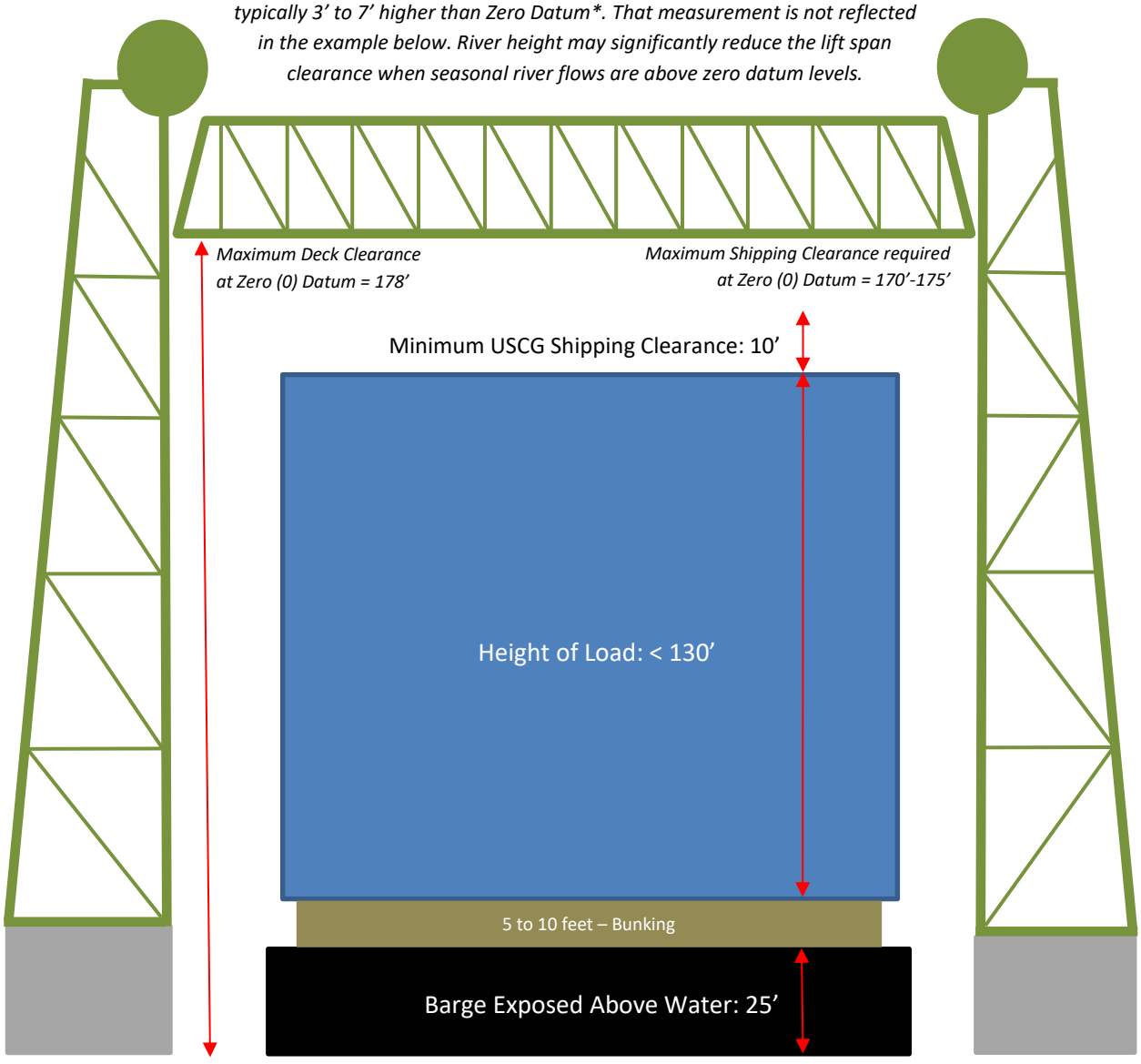
We recognize a new Interstate Bridge replacement needs to meet the requirements of all modern and future modes of transportation, and that requirement will most likely impact our historical, current, and future usage of river transit. However, Thompson also recognizes the importance of a new, safe, and modern bridge to the region, and is willing to work with the Interstate Bridge Replacement project team to preserve Thompson Metal Fab and hundreds of family wage jobs, while at the same time advancing a much needed new bridge to the future.

Sincerely,



John B. Rudi
Owner/President
Thompson Metal Fab

Clearance information assumes Zero (0) Datum. The Columbia River is typically 3' to 7' higher than Zero Datum. That measurement is not reflected in the example below. River height may significantly reduce the lift span clearance when seasonal river flows are above zero datum levels.*

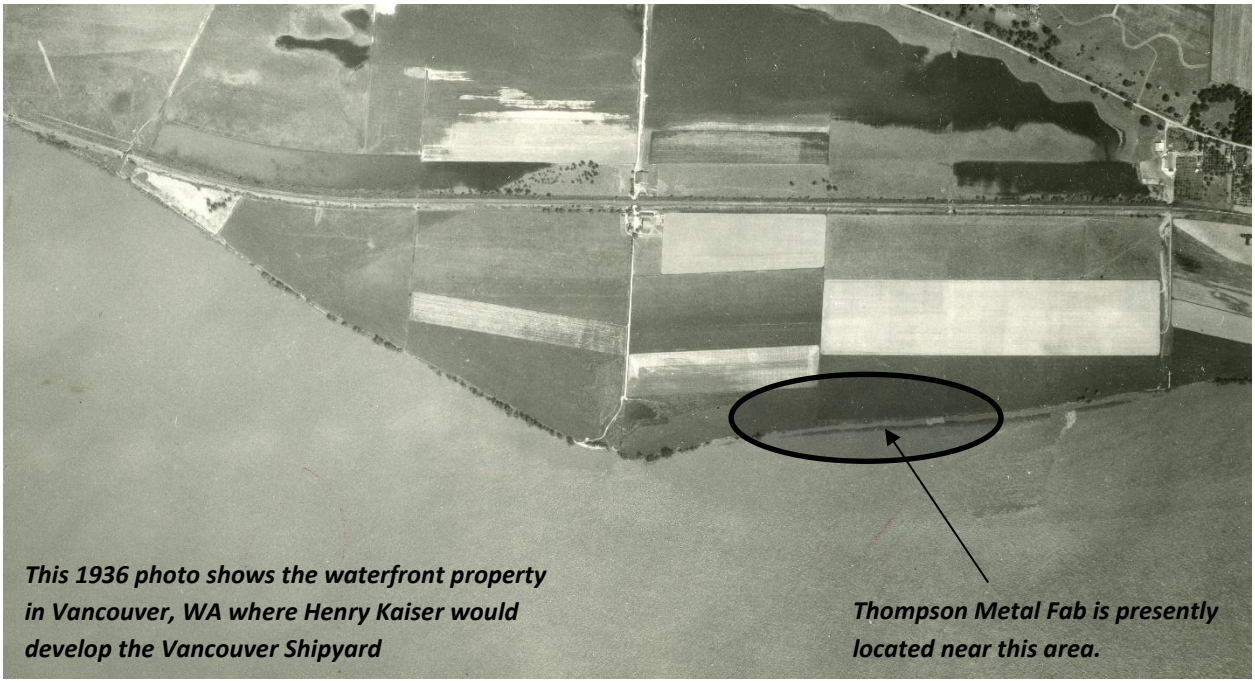


* https://water.weather.gov/ahps2/hydrograph.php?wfo=pqr&gage=vapw1

EXAMPLES OF THOMPSON METAL FAB PROJECTS WHICH REQUIRED BRIDGE LIFT

Owner	Project Name	Shipping Date	Shipping Destination	Number of Barges	Barge List, FT *(height exposed above waterline)*	Dunnage/Blocking Height (ft)	Height of tallest structure (ft)	USGC Minimum Gap (ft)	Total Required Clearance, FT *(Assumes Zero Datum)*
AKDOT	Ward Cove Ferry Dock Expansion	2020	Ketchikan, AK	1	25	5	14	10	**54**
Intel	LARK E-Houses	2020	Hillsboro, OR	1	25	5	16	10	**56**
ASE	Wind Tunnel Retrofit	2019	Tongue Point, OR	1	25	5	18	10	**58**
Hilcorp	Innovation Rig	July 2016	North Slope, AK	1	25	10	50	10	**95**
Multnomah County	Sellwood Bridge	2015-2016	Portland, OR	7	25	5	20	10	**60**
Furie	Monopod Pile	July 2014	Cook Inlet, AK	1	25	0	126	10	**161**
Saxon Drilling	Rig 147	July 2013	Kenai, AK	1	25	10	40	10	**85**
Saxon Drilling	Rig 169	July 2013	Kenai, AK	1	25	10	40	10	**85**
Parker Drilling	Rig 272	July 2011	North Slople, Alaska	1	25	10	113	10	**158**
Parker Drilling	Rig 273	July 2011	North Slople, Alaska	1	25	10	113	10	**158**
Doyon Drilling	Rig 25	July 2010	North Slople, Alaska	2	25	10	70	10	**115**
British Petroleum (BP)	Liberty Rig	July 2009	North Slople, Alaska	2	25	10	100	10	**145**
CalTrans	East Tie-In	2008-09	Bay Area, CA	2	25	5	40	10	**80**
OHSU	Portland Aerial Tram	2006	Portland, OR	1	25	10	33	10	**78**
CalTrans	Bay Bridge Retrofit	2006	Portland, OR	3	25	5	60	10	**100**
US Army Corps of Engineers	Ice Harbor RSW	March 2005	Portland, OR (Swan Island) and then to Ice Harbor Dam	1	25	5	68	10	**108**
Samuel Engineering	Alaska Gold Mining	2005	Nome, AK	1	25	5	50	10	**90**
CalTrans	Richmond San Rafael Retrofit	2004	Bay Area, CA	1	25	5	40	10	**80**
Boeing	Delta IV Launch Table	2003	Vandenberg AFB, CA	1	25	10	33	10	**78**
US Army Corps of Engineers	Lower Granite RSW	March 2001	Portland, OR (Swan Island) and then to Lower Granite Dam	1	25	5	61	10	**101**
Pool Arctic	Rig 9	1999	North Slope Alaska	1	25	10	60	10	**105**
Cascade General	Esperanza Power Barge	1999	Portland, OR	1	25	10	30	10	**75**
Pool Arctic	Rig 6	1998	North Slope, AK	1	25	10	60	10	**105**
PGE	Trojan Decommissioning	1998	Hanford, WA	1	25	5	40	10	**80**
Nordic-Calista	Rig 3	July 1997	North Slople, Alaska	1	25	10	78	10	**123**
LaFarge Cement	Pre-Heater Tower	1997	Richmond, BC, Canada	1	25	5	60	10	**100**
Cascade General	Golmar Explorer Ship Conversion	1997	Portland, OR	1	25	5	30	10	**70**
TriMet	Terry Moore Pedestrain Bridge	1996	Portland, OR	1	25	5	30	10	**70**
WSDOT	Duwamish Bascule Bridge	1996	Seattle, WA	1	25	5	30	10	**70**
CalTrans	Nimitz Freeway	1995	Bay Area, CA	4	25	5	70	10	**110**
Port of Sacramento	Bulk Material Handling System	1993	Sacramento, CA	1	25	5	50	10	**90**
Powell River Paper Company	Chlorine Dioxide Module	November 1991	British Columbia, Canada	1	25	5	76	10	**116**
Parker Drilling	Rig 245	July 1990	North Slople, Alaska	1	25	10	78	10	**123**
Pacific Marine	SWATH Hull	1989	Honolulu, HI	1	25	10	60	10	**105**
Christenesn Marine	Dry Dock	1987	Vancouver, WA	1	25	10	40	10	**85**
ConocoPhillips	Milne Point Modules	1987	North Slope, AK	3	25	10	30	10	**75**
	Newport Bay Floating Foundation	1986	Portland, OR	1	25	5	20	10	**60**
WSDOT	I-90 East Channel Bridge	1986	Seattle, WA	1	25	5	30	10	**70**
ARCO	Housing Expansion	July 1985	North Slople, Alaska	1	25	5	65	10	**105**
Georgia Pacific	Wood Chip Material Handling System	1973	Toledo, OR	1	25	5	60	10	**100**

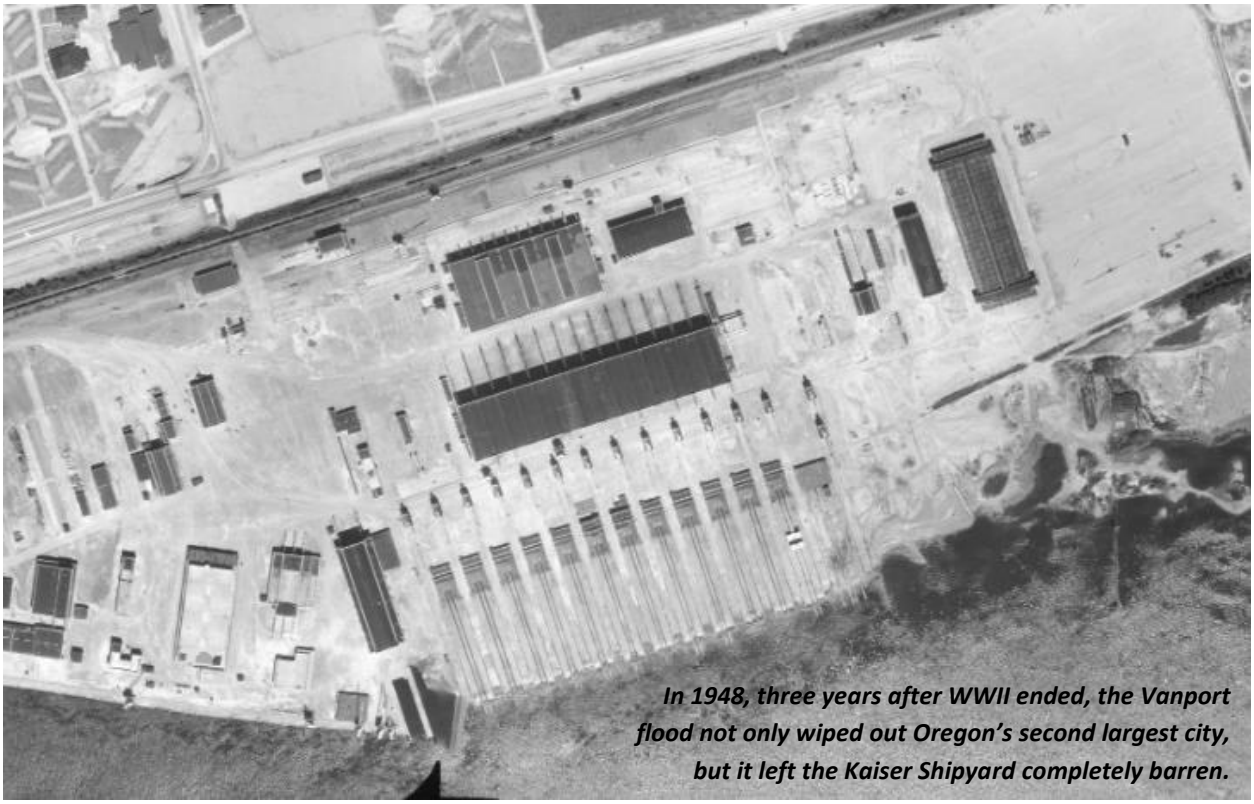
Bridge to be opened at Captain's discretion for loads under 72' high.



This 1936 photo shows the waterfront property in Vancouver, WA where Henry Kaiser would develop the Vancouver Shipyard

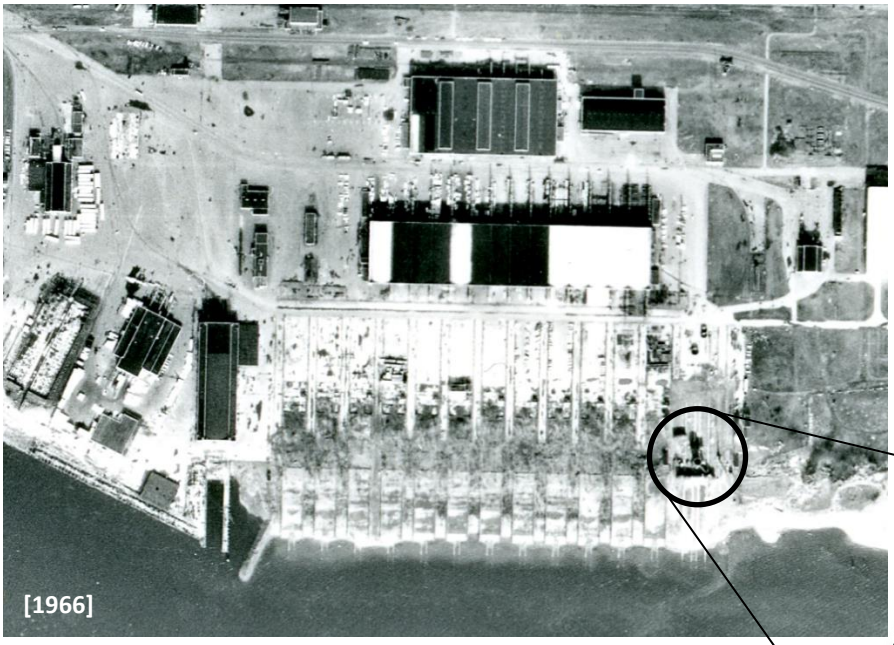
Thompson Metal Fab is presently located near this area.

In just a few years nearly 200-acres was redeveloped, providing Vancouver a major industrial waterfront facility. An active Kaiser Shipyard is shown here in 1943



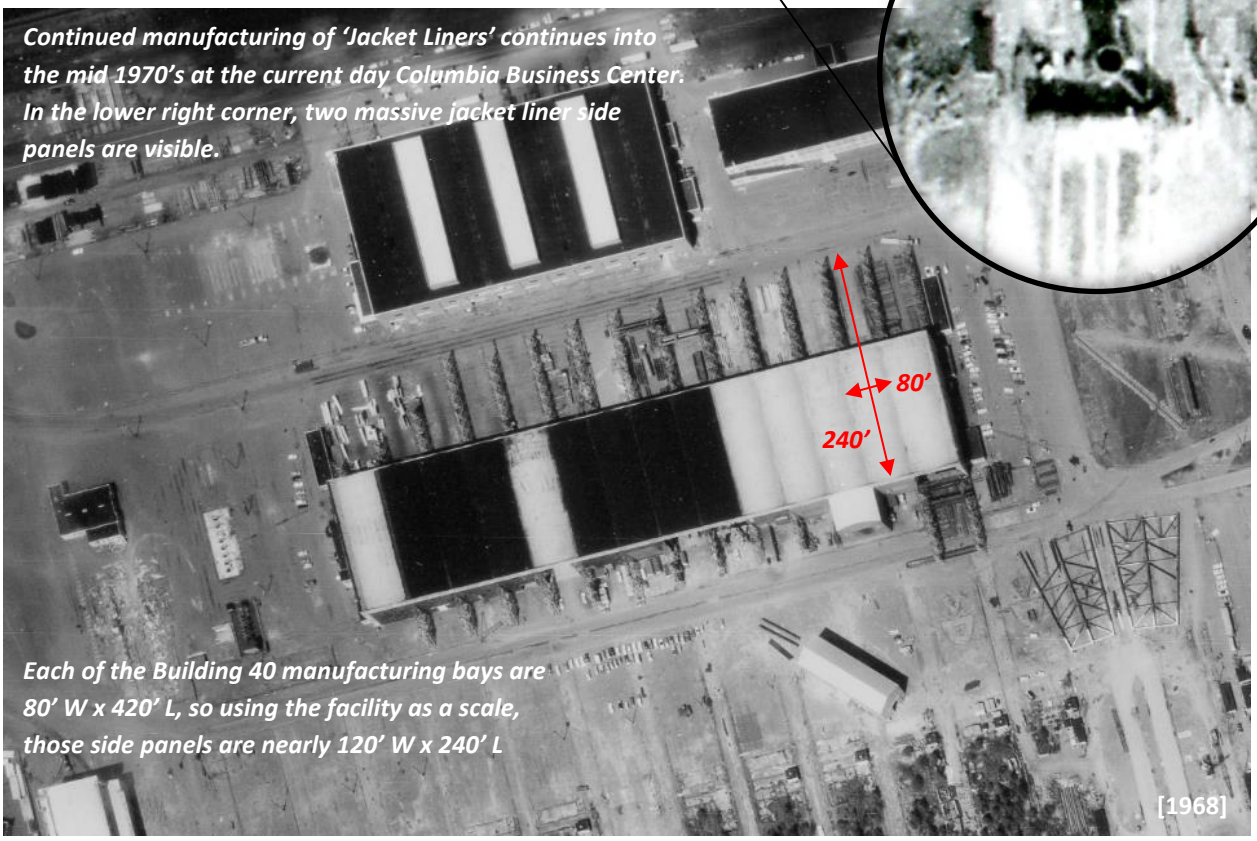
In 1948, three years after WWII ended, the Vanport flood not only wiped out Oregon's second largest city, but it left the Kaiser Shipyard completely barren.

By 1956, the facilities at the current Columbia Business Center are in full operation once more, leveraging the capacity to support the industrial needs of the time.



[1966]

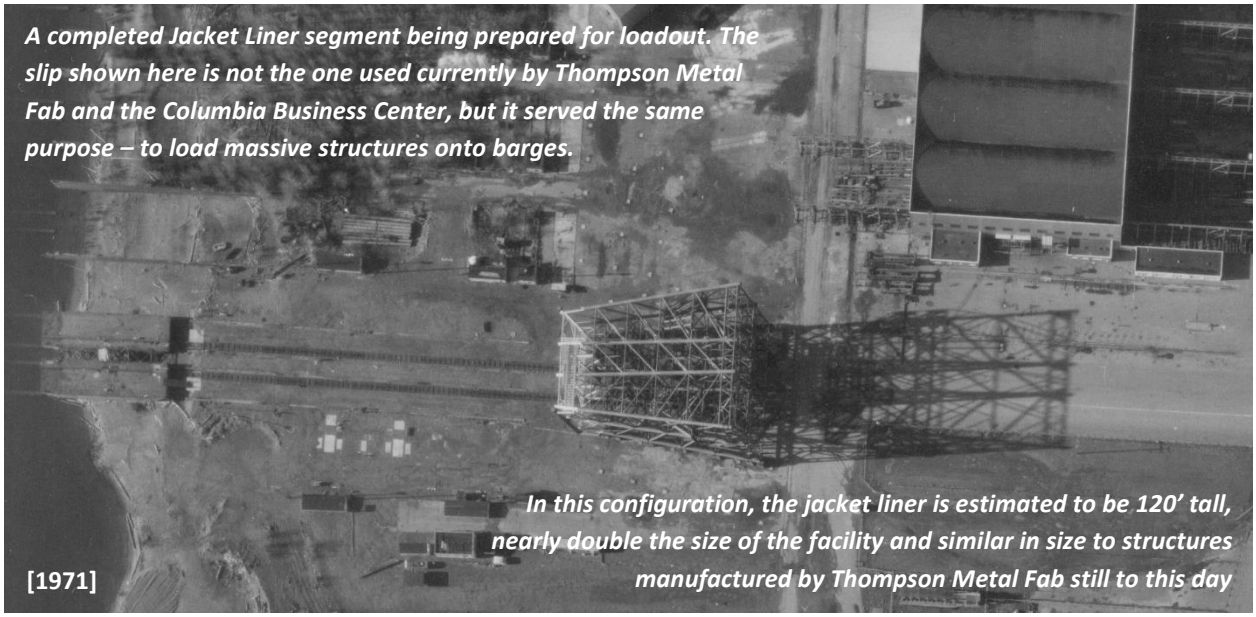
The development of offshore oil in California required the fabrication of massive infrastructure. Typically, offshore oil fabrication is done in the Gulf states, but with major oil production now on the West Coast those Gulf state areas could not lend support and a West Coast facility was required.



Continued manufacturing of 'Jacket Liners' continues into the mid 1970's at the current day Columbia Business Center. In the lower right corner, two massive jacket liner side panels are visible.

Each of the Building 40 manufacturing bays are 80' W x 420' L, so using the facility as a scale, those side panels are nearly 120' W x 240' L

[1968]



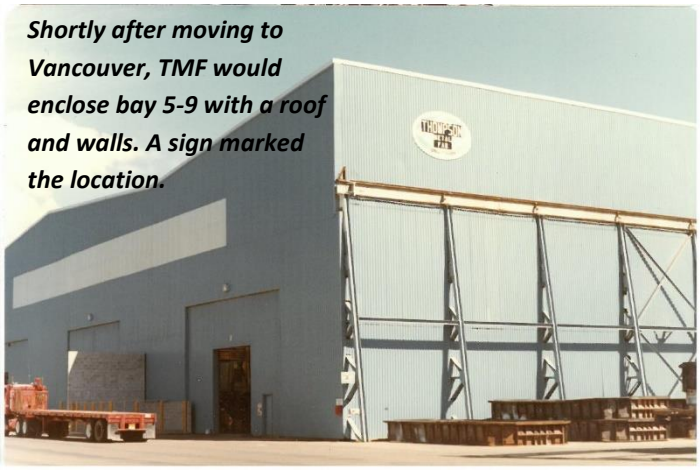
A completed Jacket Liner segment being prepared for loadout. The slip shown here is not the one used currently by Thompson Metal Fab and the Columbia Business Center, but it served the same purpose – to load massive structures onto barges.

In this configuration, the jacket liner is estimated to be 120' tall, nearly double the size of the facility and similar in size to structures manufactured by Thompson Metal Fab still to this day

[1971]

Roofing being extended to Building 40, Bay 10-12 (current Thompson Metal Fab).

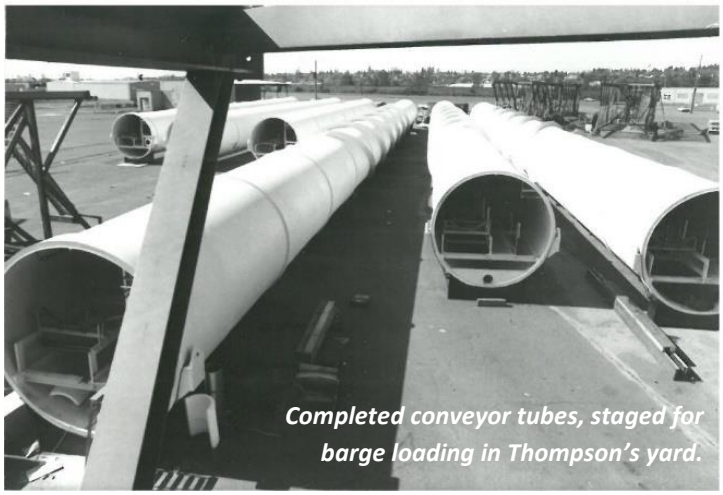
TMF Project Managers, early 1970's



Shortly after moving to Vancouver, TMF would enclose bay 5-9 with a roof and walls. A sign marked the location.

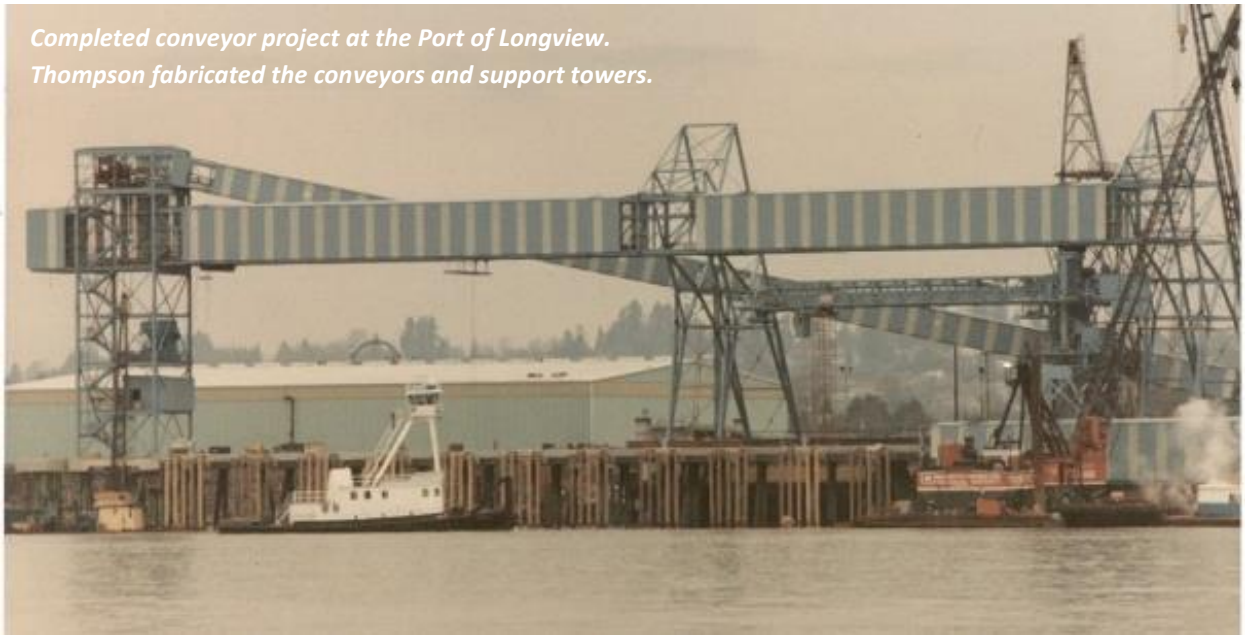
At 300' long, this conveyor nearly takes up the entire length of a bay at TMF

A barge is being loaded with conveyors for delivery to Bay Area, CA

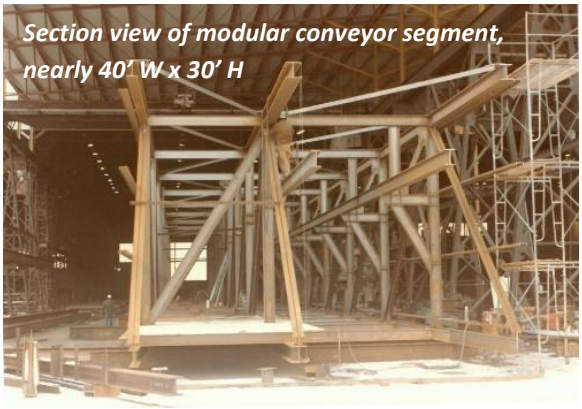


Completed conveyor tubes, staged for barge loading in Thompson's yard.

Conveyor systems and support towers were a major part of Thompson's first few decades at the Columbia Business Center. TMF's barge slip allowed for massive, modular deliveries to Ports, pulp & paper factories, and other industrial areas.



Completed conveyor project at the Port of Longview. Thompson fabricated the conveyors and support towers.



Section view of modular conveyor segment, nearly 40' W x 30' H

Conveyor being loaded on barge at Thompson Metal Fab.

There are numerous Ports on the Columbia River with large, developed properties and robust industrial activity. These Ports are critical to our region and are the hub for most incoming goods.

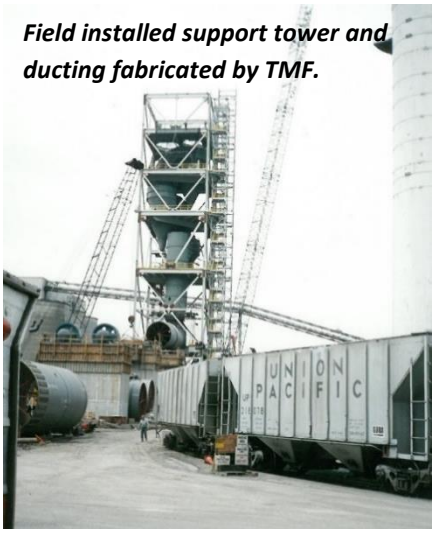
Conveyor systems are often used at Ports to quickly handle and transfer bulk materials. Thompson Metal Fab manufactured and delivered the massive conveyor system and support towers shown here and delivered to the Port of Longview.

Modular structures were loaded on a barge and erected in the field. Delivering modular units allows for quicker assembly in the field and easier integration of all mechanical components.

Conveyors come in many shapes and sizes, depending on the intended use. Shipping the structures pre-assembled saves on time and money in the long-run and is a value-add for Owners and other stakeholders. Shown here are additional examples of projects that were manufactured by Thompson and delivered all over the West Coast, from Toledo, OR to Sacramento, CA.

Heavy ducting for baghouses requires a facility like Thompson's. They can accommodate the size of the infrastructure in their shop and ship over the water by barge. The large duct section shown here is nearly 30' high and over 100' long.

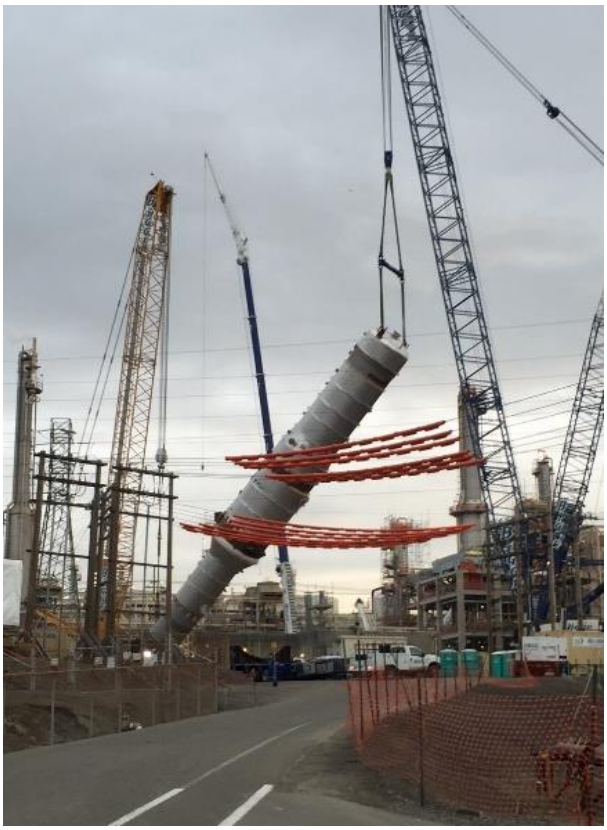
Structural tower inside Thompson's shop being outfitted with piping and ducting systems. This tower is well over 30' high.



Field installed support tower and ducting fabricated by TMF.

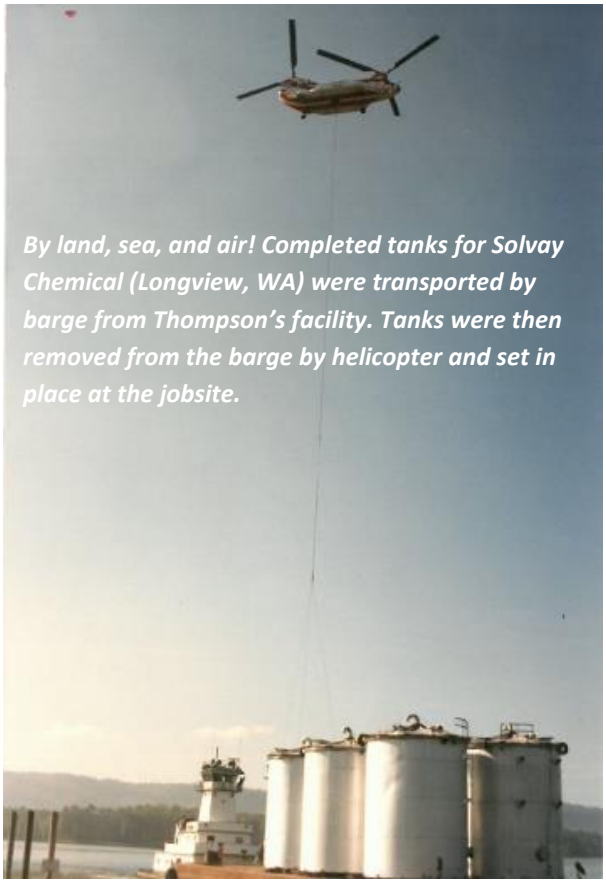
Baghouse components being loaded on a barge from Thompson Metal Fab's facility

Nearly touching the rafters, this giant structural building will soon be outfitted with mechanical items prior to load out on the barge. The size of Thompson's facility provides value to project owners who seek out modular, turn-key solutions for their infrastructure needs.



Refineries on the West Coast are typically located on coastal properties or are otherwise accessible by deep water ports. In addition to capacity expansion and improvements, these facilities have processing vessels and other equipment that wear out over time and need to be replaced.

Shown here at the Phillips 66 facility in Rodeo, CA, Thompson Metal Fab fabricated a "prefractioner" tower which was 17' diameter x 126' L. Too large and heavy to ship over the road, this vessel was delivered by barge and direct to the jobsite.

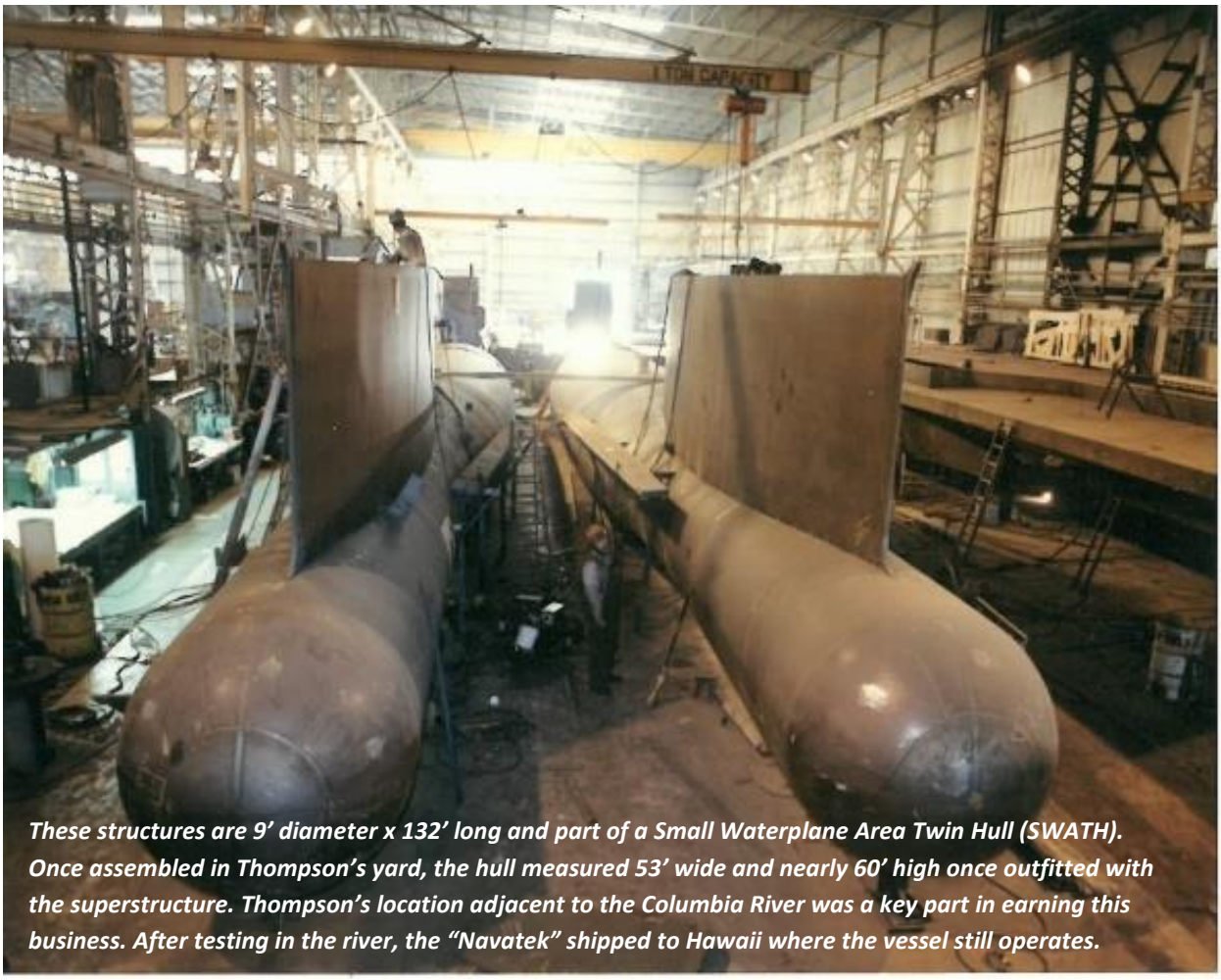


By land, sea, and air! Completed tanks for Solvay Chemical (Longview, WA) were transported by barge from Thompson's facility. Tanks were then removed from the barge by helicopter and set in place at the jobsite.

Process vessels and skids are being loaded on a barge from Thompson Metal Fab's facility. This load will be delivered to Alaska and used on the North Slope. These units are well over 20' and 40' long.

Large tanks for Amalgamated Sugar in Portland, OR. The tanks are used as part of their manufacturing process. Due to the size of the tanks, they were shipped by barge and then transloaded to a truck for final delivery.

Trunnions for the Interstate Bridge shown above in Thompson's shop. Their proximity to the bridge made TMF an ideal location when repairs were needed. Shown below are two Seattle area bridge projects that were completed at the Columbia Business Center, painted by TMF, and delivered to the jobsite by barge.



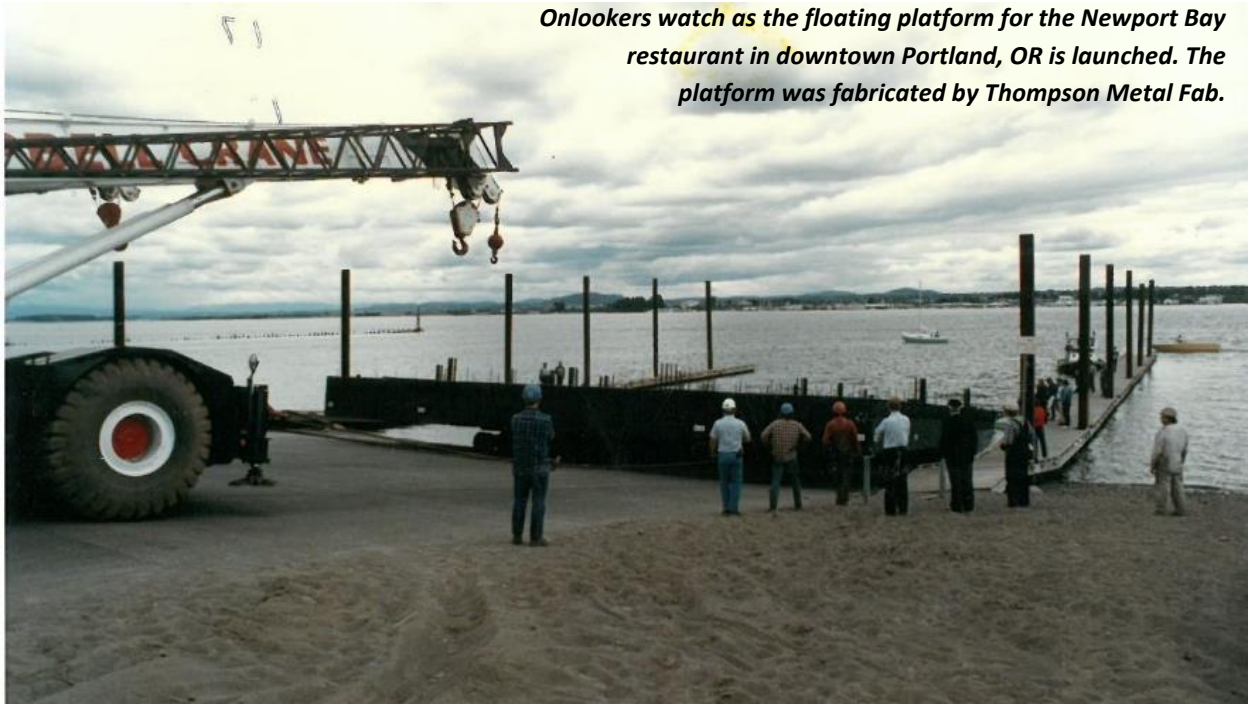
These structures are 9’ diameter x 132’ long and part of a Small Waterplane Area Twin Hull (SWATH). Once assembled in Thompson’s yard, the hull measured 53’ wide and nearly 60’ high once outfitted with the superstructure. Thompson’s location adjacent to the Columbia River was a key part in earning this business. After testing in the river, the “Navatek” shipped to Hawaii where the vessel still operates.

Barge load approaching the Interstate Bridge after leaving Thompson Metal Fab. TMF's massive facility is seen in the background.

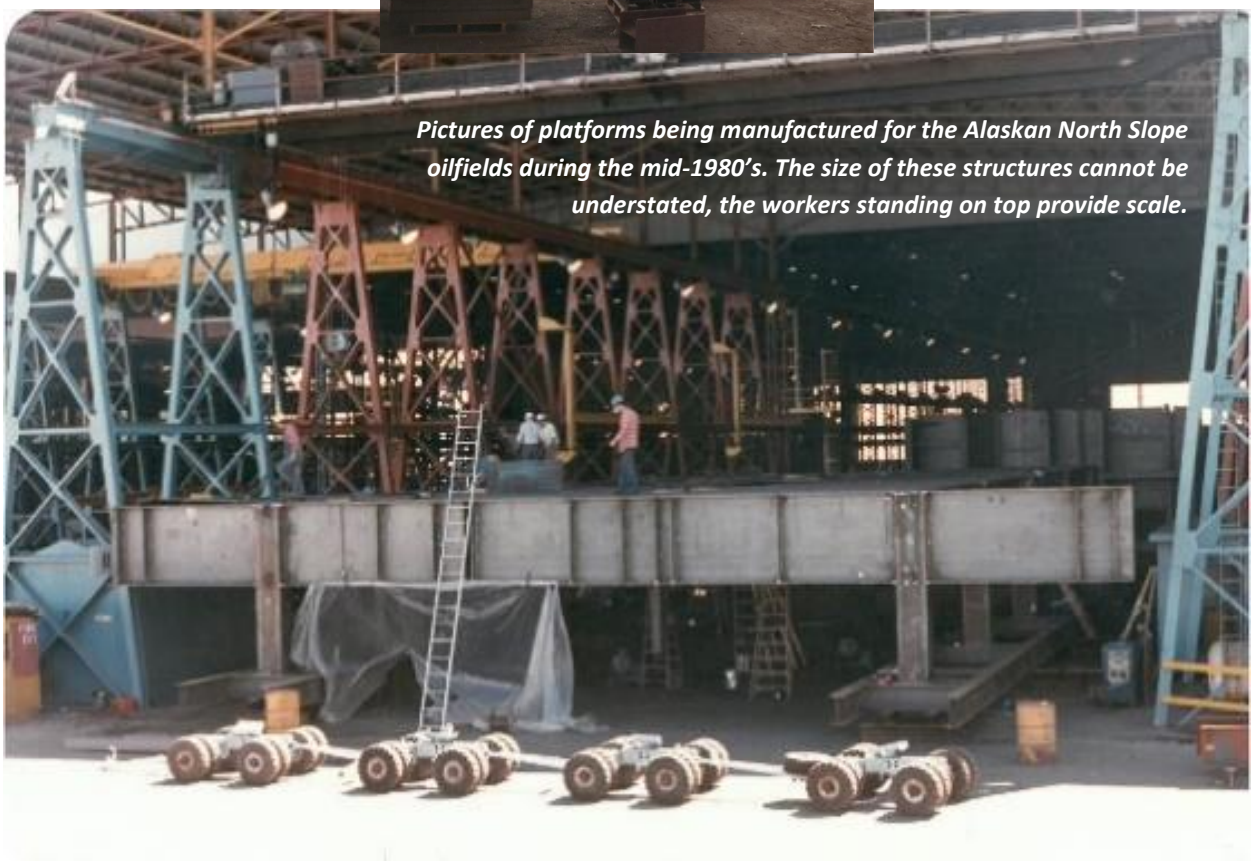
Shown above and below is a modular segment of the Power Barge fabricated by TMF. Segments were pre-fabricated in the shop before being assembled in Thompson's yard. The final assembly was 105' W x 30' H x 284' L

At left, large platform is being flipped inside Thompson Metal Fab's shop.

Thompson Metal Fab has a legacy of fabricating unique, complex, and often massive structures which require delivery by water.



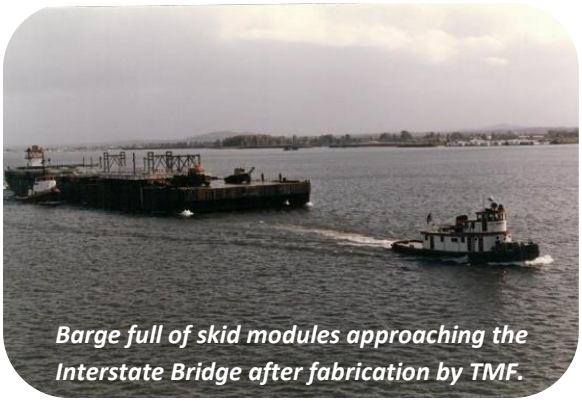
Onlookers watch as the floating platform for the Newport Bay restaurant in downtown Portland, OR is launched. The platform was fabricated by Thompson Metal Fab.



Pictures of platforms being manufactured for the Alaskan North Slope oilfields during the mid-1980's. The size of these structures cannot be understated, the workers standing on top provide scale.

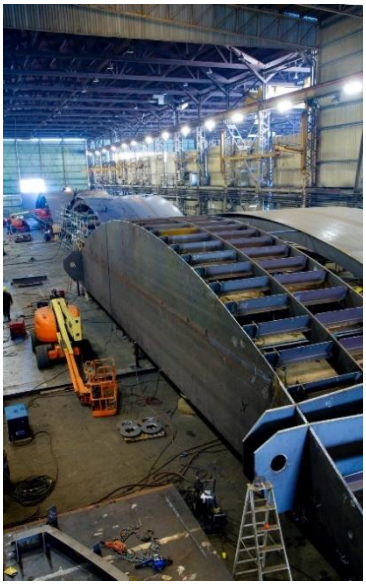
Shown below, load out of the cradle base that would carry PGE's Trojan nuclear reactor. TMF fabricated the base and the shielding enclosures.

Support towers nearing the Interstate Bridge. This load is headed for the Port of Sacramento upon completion at Thompson Metal Fab

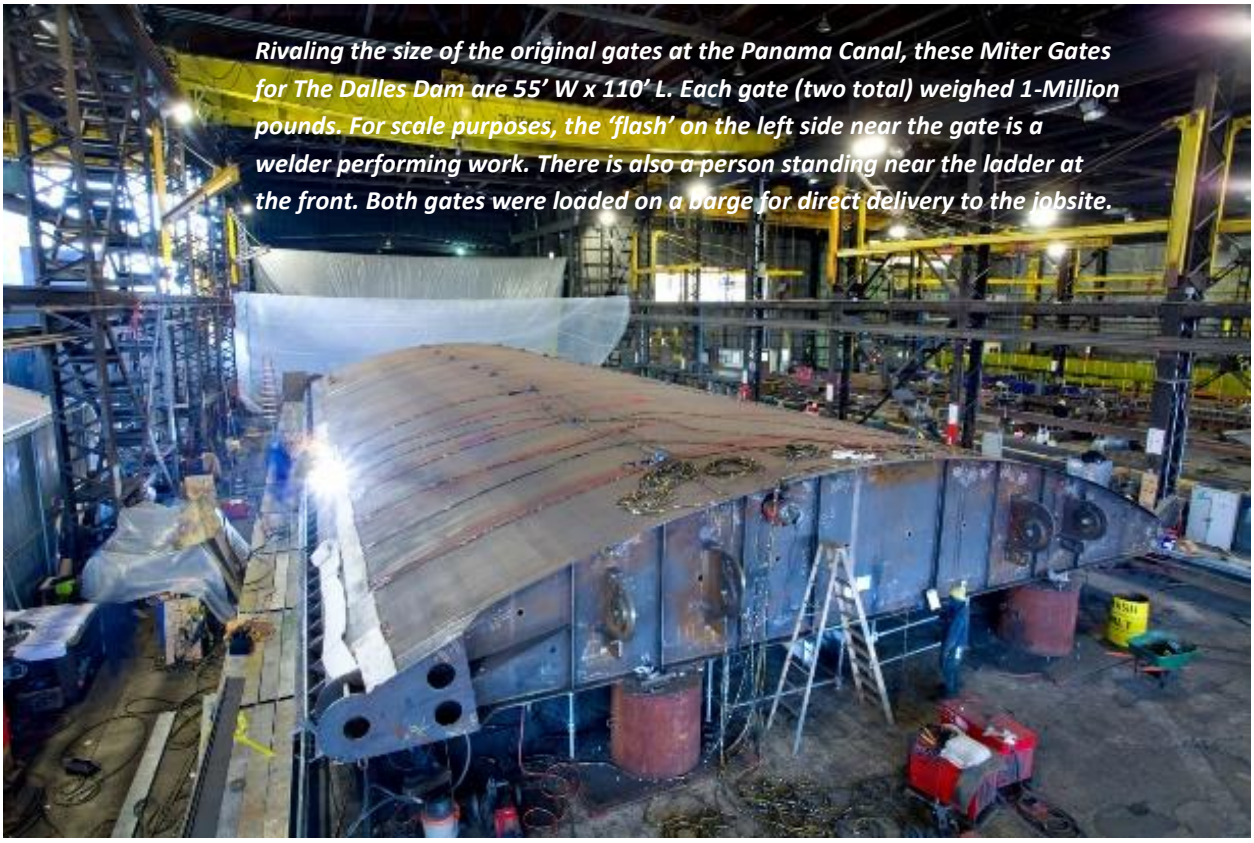


Barge full of skid modules approaching the Interstate Bridge after fabrication by TMF.

The lower segment of the iconic Portland Aerial Tram's tower is shown inside Thompson Metal Fab's shop. Including the bunking underneath, the tower is nearly 40' high and 30' wide. The completed tower can be seen at OHSU, spanning over I-405.



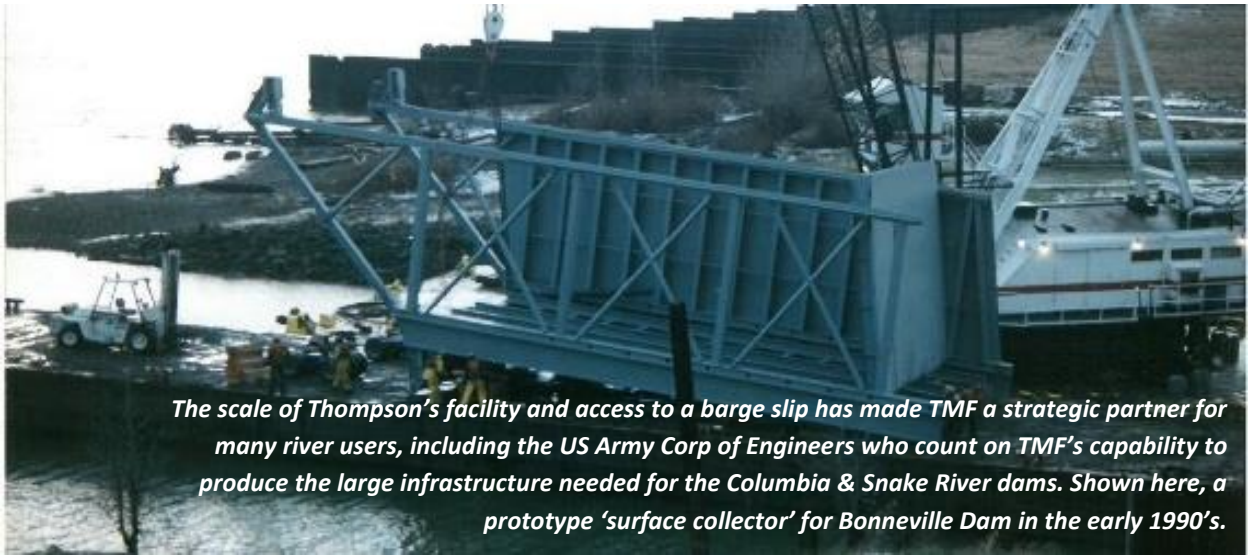
Fabrication of the Lower Monumental Dam Lift Gate is shown at left inside Thompson's shop. Due to its size (nearly 1.5-Million pounds) the gate was fabricated in three segments, loaded on a barge, and finished in the field by the General Contractor. The picture here shows the three segments be aligned for fit verification at TMF's yard. Final dimensions are 88' W x 84' H



Rivaling the size of the original gates at the Panama Canal, these Miter Gates for The Dalles Dam are 55' W x 110' L. Each gate (two total) weighed 1-Million pounds. For scale purposes, the 'flash' on the left side near the gate is a welder performing work. There is also a person standing near the ladder at the front. Both gates were loaded on a barge for direct delivery to the jobsite.

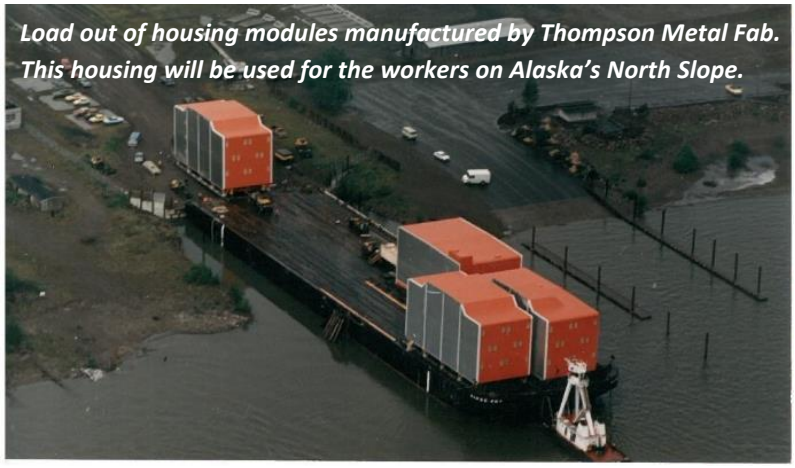
Many of the structures fabricated by TMF require the use of specialty moving systems for handling around the shop and for loading barges. Shown here, an SPMT (Self Propelled Modular Transporter) is used to move one of the Ward Cove Rection Dolphins from TMF's Bay 8 and out to the barge slip for loading. Each reaction dolphin is 30' x 30' x 12' H

Barge load out for the Ward Cove Ferry Terminal Expansion project. All structures were fabricated at the Columbia Business Center, including the Transfer Span and Reaction Dolphins which were completed by Thompson. The Transfer Span, shown near the back of the barge is 14' H x 140' L. These structures were delivered direct to the jobsite in Ketchikan, AK.



The scale of Thompson's facility and access to a barge slip has made TMF a strategic partner for many river users, including the US Army Corp of Engineers who count on TMF's capability to produce the large infrastructure needed for the Columbia & Snake River dams. Shown here, a prototype 'surface collector' for Bonneville Dam in the early 1990's.

Shown above and below are multiple barge loadings for a massive project at Lower Granite Dam in the mid-1990's. All structures were fabricated by Thompson Metal Fab and loaded out at the Columbia Business Center.



Load out of housing modules manufactured by Thompson Metal Fab. This housing will be used for the workers on Alaska's North Slope.

Enclosed modules to be used for a drilling rig, shown inside TMF's shop

Modular fabrication has long been a part of Thompson's history and success. The size of their facility at the Columbia Business Center allows TMF to offer large, turn-key, fully-operational modular systems which get used for housing, data centers, oil production/drilling, crude oil processing, technology, electrification, water treatment, chemical processing, fuel storage, pipe handling, and conveyor systems – among other uses. Remote jobsite locations and size of many of these structure require use of the barge slip, adjacent to Thompson's facility.

Example of processing modules being manufactured inside Thompson Metal Fab

Walls, roof, and equipment being installed on 44' x 97' skid shown below

Thompson's extensive experience with turn-key modular systems made it a valuable partner as a new market emerged for these products. Increase demand for technology pushed groups, like Intel, to expand their facilities. 'Cloud based' data storage requires facilities on the ground that can house servers. Increased online shopping (i.e. Amazon) requires warehouses and data centers. As the world becomes dependent on technology the demand for these custom, modular buildings has significantly increased.

Shown below in late 2019, this skid represents the largest non-oil related module manufactured by TMF. At 44' W x 97' L, this module is too large to ship over the road, and too big to be handled in the field.

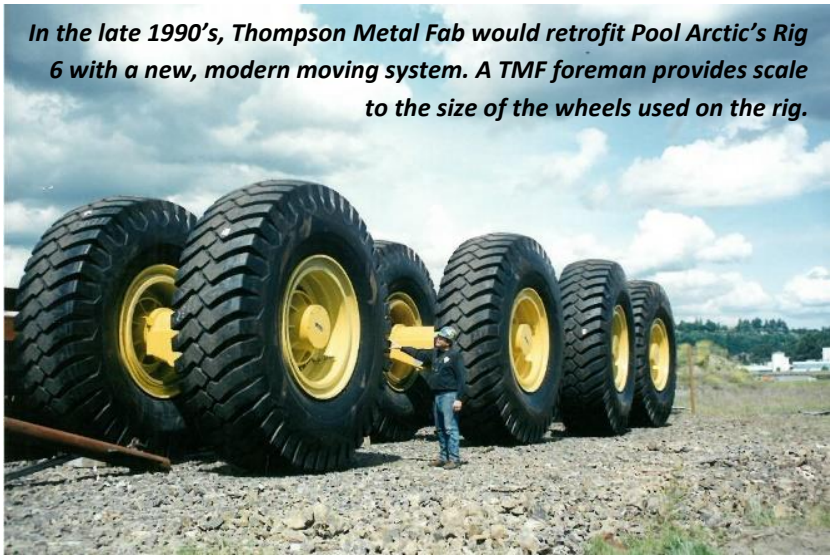
To accommodate field conditions, a shipping 'split' was engineered in the middle of the floor (shown) and in the roof trusses. The 44-ft mega module would ship via barge, and completely outfitted in two segments.

Two 44' x 97' modules were manufactured by TMF, each with a shipping split described above. Shown in the middle of this picture are two of the four total segments prior to barge loading.

Also shown is the BNSF Wind River Bridge. This was manufactured at the Columbia Business Center and would ship via barge completely assembled and installed in one-piece.

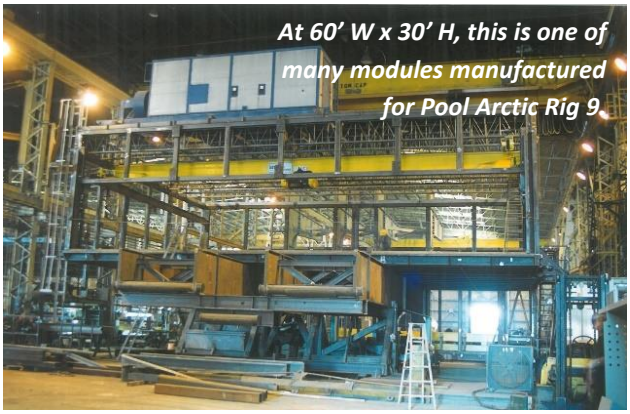
Pool Arctic Rig 3 Retrofit, performed by TMF

In the late 1990's, Thompson Metal Fab would retrofit Pool Arctic's Rig 6 with a new, modern moving system. A TMF foreman provides scale to the size of the wheels used on the rig.



Manufacturing Pool Arctic's Rig 9 inside TMF.

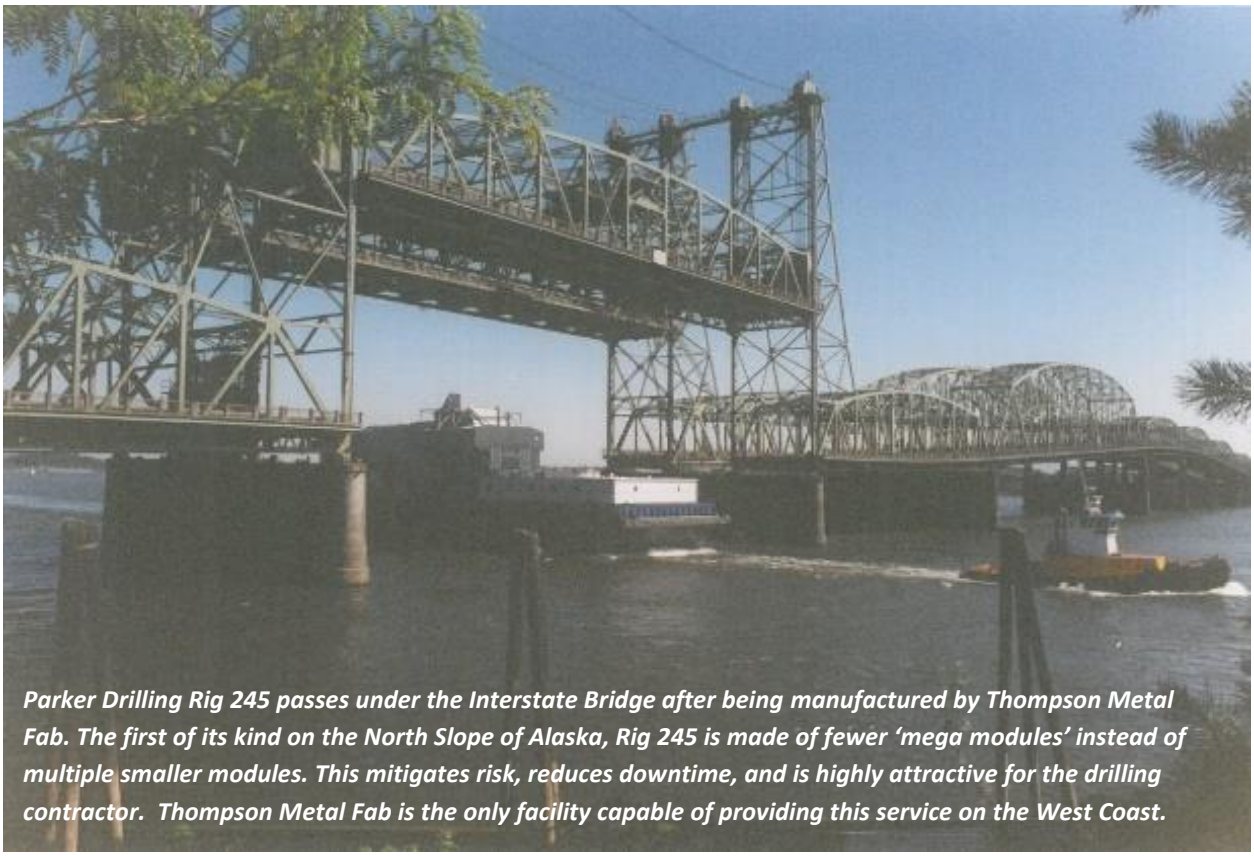
At 60' W x 30' H, this is one of many modules manufactured for Pool Arctic Rig 9.



Following some of its recent predecessors (i.e. Rig 245), Rig 9 would use the 'mega module' concept to reduce downtime on the North Slope

Over the last 30-years, 15 rig projects have been awarded to Thompson Metal Fab. Nearly 1/3rd of the rigs in Alaska have some connection to TMF.

Shown at right, Nordic-Calista's Rig 3 being 'rigged up' in Thompson's yard in 1997. This workover rig is used to restore production on exiting wells.



Parker Drilling Rig 245 passes under the Interstate Bridge after being manufactured by Thompson Metal Fab. The first of its kind on the North Slope of Alaska, Rig 245 is made of fewer 'mega modules' instead of multiple smaller modules. This mitigates risk, reduces downtime, and is highly attractive for the drilling contractor. Thompson Metal Fab is the only facility capable of providing this service on the West Coast.

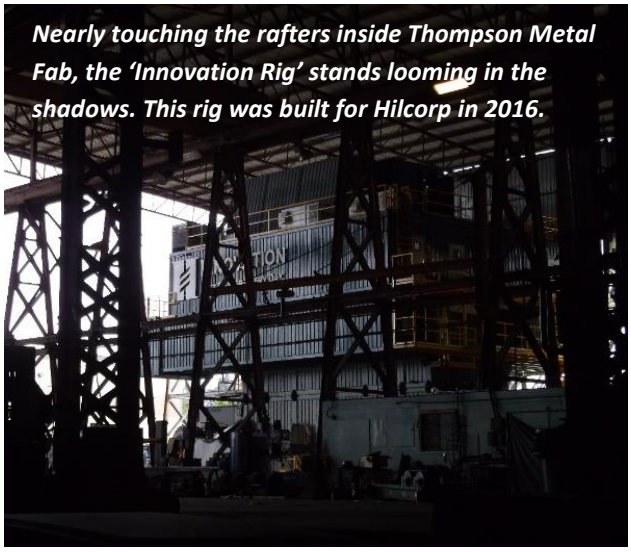
No, the picture to the right is not the inside of a 'big box' store, but it is the size of one! This is the inside of the Liberty Rig's Pipe Module (see above) and is where all production drill pipe is stored.

At the time it was manufactured, the Liberty Rig was the world's largest land-based drilling rig. Everything about this rig was supersized, including the mast shown here inside Thompson Metal Fab. Drill structures, like the one shown here, require special certification for manufacturing, and TMF is the only facility on the West Coast who holds that certification while also boasting a facility/yard of its size, in addition to roll-on/roll-off barge capabilities.

For new rig builds, drilling contractors traditionally manage the design and hire their own sub-contractors (structural, electrical, mechanical, etc.) For Doyon Drilling's Rig 25, TMF was hired as the General Contractor and managed all rig-build efforts on behalf of Doyon. As a result, Rig 25 becomes the rig built by Thompson as General Contractor.

Rig 25 is a sought after work-horse on Alaska's North Slope and is a dependable rig in Doyon's fleet. This picture shows a very proud Thompson team at the end of the project.

Shown above is the part of the substructure base for Rig 272. Its twin (Rig 273) was manufactured at the same time at TMF. Picture below shows the yard assembly of Rig 272, Rig 273, and Rig 25.



Nearly touching the rafters inside Thompson Metal Fab, the 'Innovation Rig' stands looming in the shadows. This rig was built for Hilcorp in 2016.

The Interstate Bridge looks on in the distance as Thompson Metal Fab manufactures three rig projects from their Columbia Business Center facility. Shipping clearance on Rig 272 & 273 (blue) would be nearly 160'.

Marine Industries and Fabricators

Company: Vigor

Company provided the following information to the IBR Program.

Vigor Works, LLC. is a Heavy Industrial Fabrication Company that serves the Marine, Hydro-Electric, Nuclear, Oil & Gas and Steel Bridge Industries. The wide variety of products produced by Vigor Works support private industry as well as Government Agencies (local, state, federal). Past and present projects completed from the Columbia Industrial Park include fully assembled final products: Bridges, Oil Field Modules/Platforms, Marine Vessels and other extremely large infrastructure type goods which have limited areas for fabrication due to water loadout/shipping and air draft restrictions.

Vigor Works (in and adjacent to the Columbia Industrial Park) are uniquely qualified and situated to support strategic and industrial needs, particularly our national infrastructure of dams, locks and bridges and marine vessels. The living wage trade jobs created by this work are critical to the health of the Vancouver/Portland area. Vigor currently supports ~1500 trade related jobs in the Portland Metro area which includes three separate locations in and around the Columbia Industrial Park.

Heavy investment in capital and people has occurred in all three Vancouver locations upriver of the I-5 bridge. By maintaining flexibility to pursue and provide ultra large product for customers, we can continue to pursue this type of work to support the jobs and economy of Vancouver. Our sites are unique due to their access to a large metro area with truck, rail and marine access.

The current bridge height has been important for commerce and shipments along the Columbia River for nearly a century and even more critically important since the war effort in the 1940s. In the late sixties and early seventies, offshore drilling rigs were constructed at this location and had to transit under the bridge. These offshore platforms required the bridge to be raised to its full height of 174 feet to allow them to pass under the raised span. More recently we have watched drilling equipment destined for Alaska being assembled in the Columbia Industrial Park that required 150 feet of clearance to be shipped down the river. Vigor consistently evaluates opportunities for product up to 110 feet in height. The additional height of blocking, transport barge freeboard and clearance margin, easily results in an air draft requirement of 130’ for these projects. Ideally, we recommend a height of 150 feet air draft.

Our other Portland facility located on Swan Island (Portland Shipyard) also engages in large fabrications and we have in the past, barged components to/from the Vancouver facilities. Our Marine Fabrication work has also resulted in portions of vessels being shipped via barge to Ketchikan and we are currently evaluating shipping product components to our Seattle Shipyard- the exact size of those products have not yet been determined. In the future, we would expect to ship product both upriver and down river.

The lower height of the bridge will limit Vigor Works’ ability to compete on some projects. The ability and direct access to shipping on the Pacific Ocean and subsequent trade routes to Alaska or the gulf coast and Mississippi River system (via the Panama Canal) is critical for our full and sustained operation. One recent project was delivered to New Jersey.

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In summary:

The Bridge Height is now is 174 feet; this height has been needed as follows:

- 1960 to 1975 Drilling Platforms for the California Offshore Field.
- 1980 to 1995 Various loads from the Industrial Park to locations in Alaska and elsewhere.

- 2000 to 2012 Drilling Equipment for Parker Drilling assembled in the Park and shipped to Alaska.

Current:

- We are evaluating Vancouver for long term production related to partial or all construction for upcoming work. The final bridge height could impact the amount of work completed in Vancouver.
- We anticipate there will be some opportunity for future module or drill platform work associated with Alaska as equipment requires replacement.
- We expect, although do not know what the development of offshore wind will need for industrial shore side support.

Conclusion:

This Marine Highway is used by a multitude of users with traffic going both upstream and down. We ship goods from the industrial park upstream of the bridge to Swan Island Ship Yard and from the Swan Island Ship Yard to the industrial park. The I-205 Bridge upstream of the bridge has a clearance of 144 feet and downstream of the bridge we have clearance limited only at Astoria and that is 196 feet with the Lewis and Clark (Longview) bridge over 200 feet. We believe it is critical to our business and the viability of the river system used for commerce to keep the height of this bridge at least 150 feet.

APPENDIX C OTHER USERS INVENTORIED

Appendix C includes information collected and/or referenced for all users inventoried in the IBR NIR. Information was collected through direct outreach to river users and through an online survey. Notification of the request for information and a link to the online survey was provided in the following publications:

- The IBR website and social media platforms (digital)
- USCG Local Notice to Mariners (digital)
- Sea Magazine (digital and print)
- NW Yachting (digital and print)
- 48 North (digital)
- Oregonian (digital)
- Columbian (digital)
- DJC Oregon (digital)
- DJC Seattle (digital and print)
- Daily Astorian (digital and print)
- St Helens Chronicle (digital)
- Camas-Washougal Post Record (digital)
- Pacific Northwest Waterways Association (digital)
- Merchants Exchange Newsletter (digital)
- Lewiston Morning Tribune (print)
- Columbia River Steamship Operators' Association (email listserv)

USERS INVENTORIED

The following sections identify the river users inventoried for the IBR NIR, followed by all data received as part of the IBR outreach to river users, as well as data previously included in the CRC NIR. Where a user contacted did not provide information, only the data previously included in the CRC NIR is included.

Commercial Tugs/Tows/Barges

- Bernert Barge Lines
- Mark Bernert Tugboat Co.
- Cadman
- SDS Tug & Barge
- Shaver
- Tidewater

Marine Contractors

- Advanced American Construction
- Bergerson
- Cal Portland
- Diversified Marine
- The Dutra Group

- General Construction Company
- Hickey Marine
- JE McAmis
- JT Marine
- Knife River
- Manson Construction Company
- Mark Marine Service
- NorthBank Civil and Marine
- Ross Island

Marine Industries and Fabricators

- Greenberry
- Thompson Metal Fab
- Vigor
- Schnitzer Steel

Federal/Government

- Port of Portland
- Puget Sound Naval Shipyard
- Tongue Point Job Corps (Maritime Training Program)
- USACE
- USCG, Marine Safety Unit

Passenger Cruise

- American Cruise Lines
- American Queen Steamboat Company
- American Waterways, Inc.
- Grays Harbor Historical Seaport
- Lindblad/National Geographic Expeditions

Recreational Sailboats and Powerboats

Submitted through the online survey

- Keith Thomson
- Terence L Thatcher
- Loren Beach
- Sam Shogren
- Thomas Keffer
- Roger Rosenquist

- Richard Sandefur
- Mike Jensen
- Paul Floreck
- Sean Kearns
- Elizabeth Harris
- Greg Kelly
- Rick Zimmer
- Jim Sinclair
- Sewall Dana
- Fred Hazzard
- Gary Brown
- Motor vessel with no owner identified
- Alan Boguslawski
- Richard Samuels
- Gary Whitney
- Jerry E Barnes
- James B Shaw
- Kenneth Stephens
- Alan (no last name provided)
- Janet McCormick
- Gilbert Colistro
- Julie Schumann
- Roger Jorgensen
- Pam Corey
- Liv D Ormond
- Kevin Flanigan/Schooner Creek Boat Works
- Steve Tidwell

Information submitted via email or included in the CRC NIR.

- Legendary Yachts
- Portland Yacht Club
- Rose City Yacht Club

Commercial Tugs/Tows/Barges

Owner: Bernert Barge Lines

Vessels:

- Kathryn B.
- Lori B.
- Diane B.
- Mary B.

Company provided an email confirmation of IBR data sheets. The CRC NIR did not include additional vessel survey information or images.

From: Jerry Grossnickle
To: River Navigation
Subject: Bridge Replacement Program
Date: Monday, May 17, 2021 9:07:09 AM

Greetings, Nicole & Team

On behalf of Bernert Barge Lines. Inc., I apologize for our tardy response to your request for vessel information. I reviewed the data sheets that you sent, and confirm their accuracy and that there are no additions that need to be made.

Thank you.

Jerry

Jerry Grossnickle, CFO
Bernert Barge Lines, inc.
503-289-3046

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Bernert Barge Lines, Inc.

Vessel Name: Mary B

Vessel Type: Towing

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Commercial

USCG Document Number: 516063516063

Primary Mooring Location *(waterway milepoint, if known)*:

BBL Dock at The Dalles
Shaver Dock at Rainier

Type and quantity of cargo, if applicable:

Barge loads of wood chips, logs, other commodities

Length (overall; ft):61.4

Beam (width; ft): 21.3

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Draft (ft) - *depth of hull below waterline, fully laden*: 8

Air Draft (ft) - *height of highest fixed point above waterline, unladen*: 42 (approx.)

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*: 5

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*: 200

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required:No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan____2____ **Feb**_____3____ **Mar**_____2____ **Apr**___2_____ **May**_____1____ **June**____1_____

Jul_____4____ **Aug**_____3___ **Sep**_____2____ **Oct**_____2____ **Nov**____2_____ **Dec**_____2_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ **Feb**_____ **Mar**_____ **Apr**_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**_____ **Oct**_____ **Nov**_____ **Dec**_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Bernert Barge Lines, Inc.

Vessel Name: Diane B

Vessel Type: Towing

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:

USCG Document Number: 614861

Primary Mooring Location *(waterway milepoint, if known)***:**

Shaver Dock at Rainier

Type and quantity of cargo, if applicable:

Rock, wood chips, logs, steel, etc. by barge; maximum two width 84 feet, typical tow length 350 feet

Length (overall; ft): 67.5

Beam (width; ft): 28

Draft (ft) - *depth of hull below waterline, fully laden*: 7.6

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Air Draft (ft) - *height of highest fixed point above waterline, unladen*: 52

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*: 5

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*: 200

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Bernert Barge Lines, Inc.

Vessel Name: Kathryn B

Vessel Type: Towing

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:

USCG Document Number: 568536

Primary Mooring Location *(waterway milepoint, if known)*:

Shaver Dock at Rainier

Type and quantity of cargo, if applicable:

Rock, wood chips, logs, steel, etc. by barge, maximum tow width 84 ft, typical two length 350 ft

Length (overall; ft): 99.2

Beam (width; ft): 22.1

Draft (ft) - *depth of hull below waterline, fully laden*: 7.9

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Air Draft (ft) - *height of highest fixed point above waterline, unladen*: 54

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*: 5

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*: 200

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan____6____ **Feb**____6____ **Mar**____4____ **Apr**____5____ **May**____6____ **Jun**____8____

Jul____5____ **Aug**____6____ **Sep**____5____ **Oct**____5____ **Nov**____4____ **Dec**___6____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough): None

Jan_____ **Feb**_____ **Mar**_____ **Apr**_____ **May**_____ **Jun**_____

Jul_____ **Aug**_____ **Sep**_____ **Oct**_____ **Nov**_____ **Dec**_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Bernert Barge Lines, Inc.

Vessel Name: Lori B

Vessel Type: Towing

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:

USCG Document Number: 273466

Primary Mooring Location *(waterway milepoint, if known)*:

Shaver Dock at Rainier

Type and quantity of cargo, if applicable:

Barge loads of wood chips, logs, rock, other commodities

Length (overall; ft): 57.3

Beam (width; ft): 31.2

Draft (ft) - *depth of hull below waterline, fully laden*: 10.7

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Air Draft (ft) - *height of highest fixed point above waterline, unladen*: 38

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*: 5

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*: 200

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan 6 **Feb** 5 **Mar** 4 **Apr** 7 **May** 7 **June** 5

Jul 6 **Aug** 4 **Sep** 5 **Oct** 4 **Nov** 4 **Dec** 5

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ **Feb**_____ **Mar**_____ **Apr**_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**_____ **Oct**_____ **Nov**_____ **Dec**_____

Commercial Tugs/Tows/Barges

Owner: Mark Bernert Tugboat Co. (different from Bernert Barge Lines)

Vessel:

- Claire B

Information was submitted through the online survey. Survey response follows.

#10

COMPLETE

Collector:	Web Link 1 (Web Link)
Started:	Tuesday, May 18, 2021 8:08:05 AM
Last Modified:	Tuesday, May 18, 2021 8:14:27 AM
Time Spent:	00:06:21
IP Address:	97.115.109.189

Page 1: Introduction

Q1

Company Name

Mark Bernert Tugboat Co

Q2

Contact Information

Name	**Mark Bernert**
Email	**markbernert@gmail.com**
Phone number	**5033961102**

Q3

Vessel Name (please complete one survey per vessel)

Claire B

Q4

Vessel Type

Tug

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Commercial

Q7

USCG Document Number

1067508

Q8

Primary Mooring Location (waterway milepoint, if known)

Scappoose

Q9

Type and quantity of cargo, if applicable

Sand and Gravel, 3,000 tons

Q10

Length (total feet)

260

Q11

Beam (width in feet)

60

Q12

Draft (feet) - depth of hull below waterline, fully laden

12

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

48

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

4

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

4

Q16

Frequency of passage under Interstate Bridge (main channel)

March	**4**
April	**4**
May	**4**
June	**4**
July	**4**
August	**4**
September	**4**
October	**4**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

Respondent skipped this question

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

Oregon

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22	No
Do you have another vessel?	

Commercial Tugs/Tows/Barges

Owner: Cadman

Vessel:

- Inland Conveyor Barge

Company provide information through the online survey. Survey response is included below.

#15

COMPLETE

Collector:	Web Link 1 (Web Link)
Started:	Monday, May 24, 2021 7:42:35 AM
Last Modified:	Monday, May 24, 2021 8:04:17 AM
Time Spent:	00:21:41
IP Address:	165.225.35.5

Page 1: Introduction

Q1

Company Name

Cadman Materials, Inc

Q2

Contact Information

Name	**Chuck Rose**
Email	**charles.rose@lehighhanson.com**
Phone number	**2067350574**

Q3

Vessel Name (please complete one survey per vessel)

Inland Conveyor Barge

Q4

Vessel Type

Barge

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

Yes,
If yes, please describe:
No mechanical propulsion

Q6

Vessel Category

Commercial

Q7

USCG Document Number

1140865

Q8

Primary Mooring Location (waterway milepoint, if known)

Portland, OR

Q9

Type and quantity of cargo, if applicable

Aggregates and 8,000 tons

Q10

Length (total feet)

300 ft

Q11

Beam (width in feet)

84 ft

Q12

Draft (feet) - depth of hull below waterline, fully laden

13.5 draft fully loaded and 16.5 ft total depth

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

Offloading equipment is approx 49 ft above the waterline and a typical tug is 52 ft above the waterline

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

At least 1 ft

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

100 ft on each side of the barge

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**3**
February	**4**
March	**4**
April	**4**
May	**4**
June	**4**
July	**5**
August	**5**
September	**5**
October	**4**
November	**3**
December	**3**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**0**
August	**0**
September	**0**
October	**0**
November	**0**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

3 to 8 knots

Q19 **Yes**

Tug Assistance Required

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

None at this time

Q21

Is there anything else you would like to add about your vessel or business plans?

No, other than it is critical to allow passage under the I-5 bridge to supply our construction material business

Q22 **No**

Do you have another vessel?

Commercial Tugs/Tows/Barges

Owner: SDS Tug & Barge

Vessels:

- Dauby
- Wallace E
- Bruce M

Company did not respond to IBR request. Information below was included in the CRC NIR.

Commercial Tugs and Tows

Owner: SDS Lumber

Vessel: Dauby

River User Data Sheet By: Gary Collins Date: 3-13-12

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: SDS Lumber Co.
   b. Name of contact: Gary Collins
   c. Phone number (Office): 509-493-2155 d. (Cell): 541-490-1370
   e. Email: Gary C @ SDS Lumber . Com
   f. Address: PO Box 266
   g. City: Bingen WA
   h. State: WA i. Zip code: 98605

3a. Vessel Name: Darby 3b. Vessel Type: Tug

3c. US Coast Guard Document Number: _____

4a. Length Overall (LOA), feet: 86 4b. Beam (width), feet: 28

5. Draft (depth of hull below waterline, fully laden), feet: 8'

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 55'

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 10'

8. Frequency of one-way passage underneath I-5 main channel (typical per month): 10

   Jan ___ Feb ___ Mar ___ Apr ___ May ___ Jun ___ Jul ___ Aug ___ Sep ___ Oct ___ Nov ___ Dec ___

9. Frequency of one-way passage underneath I-5 main channel (other historic events): ____

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

    Jan ___ Feb ___ Mar ___ Apr ___ May ___ Jun ___ Jul ___ Aug ___ Sep ___ Oct ___ Nov ___ Dec ___

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): 6

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy?

13. Other miscellaneous

Barges That might Be higher Then Tug That has Equitment Loaded on Them Could Be as high AS 100' ?

Commercial Tugs and Tows

Owner: SDS Lumber

Vessel: SDS Lumber Barge with Equipment

PB 100 YEARS

Telephone Conversation Memorandum

project: Columbia River Cross job no. AH.08.15 (use complete number) date: 15 Aug 2012

from: Peter M. Geiger talked to: Gary Collins
SDS Lumber
509-493-2155
541-490-1370 (Cell)

indicate department, field office, etc., "for in-house" calls.
indicate agency or firm for other than "in-house" calls.

item discussed: Status of Large Package Barges
Ability/Permission to Survey Air Draft

LW 8/15/12 1538 PDT 8/16/2012 0915 PDT via cell phone

information obtained:

9 Barges No Spuds on these Barges

Metal Fab Spud Barge Pushes

Most of their work is pushing other peoples barges including Metal Fab (eg Thompson) or Construction barges/Crane barges with Spuds. These services are on an as-needed basis with nothing scheduled in the near term.

action required:

distribution: by:

Commercial Tugs/Tows/Barges

Owner: Shaver

Vessels:

- Cascades
- Clearwater
- Deschutes
- Lassen
- Lincoln
- Umatilla
- Willamette
- Randy S

Company completed IBR data sheets and submitted characteristics for two vessels (Randy S. and the Tug Cascades) through the online survey. A data sheet for the Tug Cascades was also provided. Data sheets and survey response are included below. No additional imagery or drawings were included in the CRC NIR.

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Shaver Transportation Company

Vessel Name:
Cascades

Vessel Type:
Push knee style tug boat

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Yes

Twin Screw Conventional Tug Multiple Main & Flank Rudders, pushing up to 4 grain barges while transiting under the bridge.

Vessel Category: Commercial

USCG Document Number:
555059

Primary Mooring Location *(waterway milepoint, if known)*:
Willamette River mile 8.3

Type and quantity of cargo, if applicable:
Grain in barges, approximately 15000 tons per 4 barge tow

Length (overall; ft):
102 ft

Beam (width; ft):
30 ft

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

9.5 ft

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

56 ft

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

24 ft

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

450 ft

Transit speed under Interstate Bridge and Load Configuration:

8 knots

Pushing ahead on 4 barges – 2 x 2 – total barge width – 84 feet total length – 650 feet

Time of Year of Passage:

Year Round

Tug Assistance Required: No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan___12____ **Feb**_____12____ **Mar**___4_____ **Apr**__12_____ **May**___12_____ **June**___12____

Jul___12____ **Aug**____12____ **Sep**__12_____ **Oct**___12_____ **Nov**___12_____ **Dec**____12___

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan____0_____ **Feb**____2_____ **Mar**_____2____ **Apr**_____0____ **May**_____0____ **June**_____0____

Jul_____0____ **Aug**____0_____ **Sep**_____2____ **Oct**_____0_____ **Nov**_____0____ **Dec**_____0____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Shaver Transportation Company

Vessel Name:
Clearwater

Vessel Type:
Push knee style tug boat

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Yes

Twin Screw Conventional Tug Multiple Main & Flank Rudders, pushing up to 4 grain barges while transiting under the bridge.

Vessel Category: Commercial

USCG Document Number:
268312

Primary Mooring Location *(waterway milepoint, if known)*:
Willamette River mile 8.3

Type and quantity of cargo, if applicable:
Grain in barges, approximately 15000 tons per 4 barge tow

Length (overall; ft):
98

Beam (width; ft):
30

Draft (ft) - *depth of hull below waterline, fully laden*:
11

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
56

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
24

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:
450

Transit speed under Interstate Bridge and Load Configuration:
8 knots
Pushing ahead on 4 barges – 2 x 2 – total barge width – 84 feet total length – 650 feet

Time of Year of Passage:
Year Round

Tug Assistance Required:No
May need tug assist during bridge construction until old bridge is removed.

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan___12____ **Feb**_____12____ **Mar**___6_____ **Apr**__12_____ **May**___12_____ **June**___12____

Jul___12____ **Aug**____12____ **Sep**__12_____ **Oct**___12_____ **Nov**____12_____ **Dec**____12___

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan____2_____ **Feb**____0_____ **Mar**_____2____ **Apr**_____0____ **May**_____0____ **June**_____0

Jul_____0____ **Aug**____0_____ **Sep**_____0____ **Oct**_____0_____ **Nov**_____0____ **Dec**_____0____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Shaver Transportation Company

Vessel Name:
Deschutes

Vessel Type:
Tractor Tug

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Yes

highly maneuverable upriver tug with 2 "Z" drives, limited maneuverability when pushing grain barges

Vessel Category: Commercial

USCG Document Number:
1052828

Primary Mooring Location *(waterway milepoint, if known)*:
Willamette River mile 8.3

Type and quantity of cargo, if applicable:
Grain in barges, approximately 15000 tons per 4 barge tow

Length (overall; ft):
91

Beam (width; ft):
36

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

14

Air Daft (ft) - *height of highest fixed point above waterline, unladen*:

58

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

22

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

450

Transit speed under Interstate Bridge and Load Configuration:

8 knots

Pushing ahead on 4 barges – 2 x 2 – total barge width – 84 feet total length – 650 feet

Time of Year of Passage:

Year round

Tug Assistance Required:No

May need tug assist during bridge construction until old bridge is removed.

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan___12____ **Feb**_____12____ **Mar**___6_____ **Apr**__12_____ **May**___12_____ **June**___12____

Jul___12____ **Aug**____12____ **Sep**__12_____ **Oct**___12_____ **Nov**____12_____ **Dec**____12___

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan____0____ **Feb**____0_____ **Mar**_____0____ **Apr**_____0____ **May**_____0____ **June**_____0____

Jul_____2____ **Aug**____0_____ **Sep**_____0____ **Oct**_____0_____ **Nov**_____0____ **Dec**_____0____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Shaver Transportation Company

Vessel Name:
Lassen

Vessel Type:
Push ahead style tug

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Yes

Twin Screw, Main & Flank Rudders

Vessel Category: Commercial

USCG Document Number:
562754

Primary Mooring Location *(waterway milepoint, if known)*:
Willamette Oregon Mile 8.3

Type and quantity of cargo, if applicable:
Grain in barges, approximately 800 tons per 2 barge tow

Length (overall; ft):
70

Beam (width; ft):
24

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

7.5

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

44

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

24

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

450

Transit speed under Interstate Bridge and Load Configuration:

8 knots

Pushing ahead on 2 barges– total barge width – 84 feet, total length – 650 feet

Time of Year of Passage:

Year round

Tug Assistance Required:No

May need tug assist during bridge construction until old bridge is removed.

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan___0____ **Feb**_____0____ **Mar**___0_____ **Apr**__4_____ **May**___4_____ **June**___4____

Jul___4____ **Aug**____4____ **Sep**__0 **Oct**_0_____ **Nov**____0_____ **Dec**____0___

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan____0_____ **Feb**____0_____ **Mar**_____0____ **Apr**_____0____ **May**_____0____ **June**_____0____

Jul_____0____ **Aug**____2_____ **Sep**_____0____ **Oct**_____0_____ **Nov**_____0____ **Dec**_____0____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Shaver Transportation Company

Vessel Name:
Lincoln

Vessel Type:
Push ahead tug

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Yes

Twin Screw, Main & Flanking Rudders

Vessel Category: Commercial

USCG Document Number:
1249989

Primary Mooring Location *(waterway milepoint, if known)*:
Willamette River mile 8.3

Type and quantity of cargo, if applicable:
Grain in barges, approximately 15000 tons per 4 barge tow

Length (overall; ft):
93

Beam (width; ft):
32

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

9.5

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

57

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

24

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

450

Transit speed under Interstate Bridge and Load Configuration:

8 knots

Pushing ahead on 4 barges – 2 x 2 – total barge width – 84 feet total length – 650 feet

Time of Year of Passage:

Year round

Tug Assistance Required:No

May need tug assist during bridge construction until old bridge is removed.

Frequency of passage under Interstate Bridge main channel (typical per month): Average for all 6

Jan___12____ **Feb**_____12____ **Mar**___12_____ **Apr**__12_____ **May**___12_____ **June**___12____

Jul___12____ **Aug**____12____ **Sep**__12_____ **Oct**___12_____ **Nov**____12_____ **Dec**____12___

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough): Average for all 6

Jan____0_____ **Feb**____0_____ **Mar**_____2____ **Apr**_____0____ **May**_____0____ **June**_____0____

Jul_____0____ **Aug**____0_____ **Sep**_____0____ **Oct**_____0_____ **Nov**_____0____ **Dec**_____0____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Shaver Transportation Company

Vessel Name:
Umatilla

Vessel Type:
Push knee tug

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Yes

Twin Screw, Main & Flanking Rudders

Vessel Category: Commercial

USCG Document Number:
613398

Primary Mooring Location *(waterway milepoint, if known)*:
Willamette River mile 8.3

Type and quantity of cargo, if applicable:

Grain in barges, approximately 8000 tons per 2 barge tow

Length (overall; ft):
65

Beam (width; ft):
24

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

9

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

57

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

24

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

450

Transit speed under Interstate Bridge and Load Configuration:

8 knots

Pushing ahead on 3 barges – total barge width – 84 feet total length – 600 feet

Time of Year of Passage:

Year round

Tug Assistance Required: No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan___0____ **Feb**_____4____ **Mar**___8_____ **Apr**__12_____ **May**___12_____ **June**___12____

Jul___12____ **Aug**____8____ **Sep**__8_____ **Oct**___8_____ **Nov**____4____ **Dec**____0___

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan____0_____ **Feb**____0_____ **Mar**_____0____ **Apr**_____0____ **May**___0_____ **June**_____0____

Jul_____0____ **Aug**____0_____ **Sep**_____0____ **Oct**_____0_____ **Nov**____2____ **Dec**____0_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company Name: Shaver Transportation Company

Vessel Name:
Willamette

Vessel Type:
Tractor Tug

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Yes

highly maneuverable upriver tug with 2 "Z" drives
Limited maneuverability when pushing barges

Vessel Category: Commercial

USCG Document Number:
1085937

Primary Mooring Location *(waterway milepoint, if known)*:
Willamette River Mile 8.3

Type and quantity of cargo, if applicable:
Grain in barges, approximately 15000 tons per 4 barge tow

Length (overall; ft):
93

Beam (width; ft):
36

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

14

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

58

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

24

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

450

Transit speed under Interstate Bridge and Load Configuration:

8 knots

Pushing ahead on 4 barges – 2 x 2 – total barge width – 84 feet total length – 650 feet

Time of Year of Passage:

Year round

Tug Assistance Required:No

May need tug assist during bridge construction until old bridge is removed.

Frequency of passage under Interstate Bridge main channel (typical per month): Average for all 6

Jan___6____ **Feb**____6____ **Mar**___4_____ **Apr**__12_____ **May**___12_____ **June**___12____

Jul___12____ **Aug**____12____ **Sep**__12_____ **Oct**___12_____ **Nov**____12_____ **Dec**____12___

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough): Average for all 6

Jan____0_____ **Feb**____2_____ **Mar**_____0____ **Apr**____0____ **May**_____0____ **June**_____0____

Jul_____0____ **Aug**____0_____ **Sep**_____2____ **Oct**_____0_____ **Nov**_____0____ **Dec**_____0____

#4

COMPLETE

Collector:	Web Link 1 (Web Link)
Started:	Tuesday, May 11, 2021 2:58:32 PM
Last Modified:	Tuesday, May 11, 2021 3:02:08 PM
Time Spent:	00:03:35
IP Address:	96.89.108.201

Page 1: Introduction

Q1

Company Name

Shaver Transportation Company

Q2

Contact Information

Name	**Mary Morgan**
Email	**mmorgan@shavertransportation.con**
Phone number	**5032288847**

Q3

Vessel Name (please complete one survey per vessel)

Randy S

Q4

Vessel Type

Tug

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

Yes,
If yes, please describe:
Limited maneuverability while pushing barges

Q6

Vessel Category

Commercial

Q7

USCG Document Number

538759

Q8

Primary Mooring Location (waterway milepoint, if known)

Willamette River Mile 8.3

Q9

Type and quantity of cargo, if applicable

Grain in barges, 15000 tons in 4 barge tow

Q10

Length (total feet)

87

Q11

Beam (width in feet)

26

Q12

Draft (feet) - depth of hull below waterline, fully laden

10

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

56

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

24

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

450

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**12**
February	**12**
March	**12**
April	**12**
May	**12**
June	**12**
July	**12**
August	**12**
September	**12**
October	**12**
November	**12**
December	**12**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**0**
August	**0**
September	**0**
October	**0**
November	**2**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

8 knots, pushing ahead on 4 barges (2 x 2) total length 650' and width 84 feet

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22

Do you have another vessel?

No

#37

INCOMPLETE

Collector:	Web Link 1 (Web Link)
Started:	Monday, July 05, 2021 2:16:32 AM
Last Modified:	Monday, July 05, 2021 2:32:03 AM
Time Spent:	00:15:30
IP Address:	174.204.210.137

Page 1: Introduction

Q1

Company Name

Shaver Transportation

Q2

Contact Information

Name	**Jeremy Brock**
Email	**jeremybrock67@yahoo.com**
Phone number	**843-901-9238**

Q3

Vessel Name (please complete one survey per vessel)

Tug Cascades

Q4

Vessel Type

Tug

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Commercial

Q7

USCG Document Number

2764312

Q8

Primary Mooring Location (waterway milepoint, if known)

Columbia River Mile 101.5 Terminal 6

Q9

Type and quantity of cargo, if applicable

Wheat

Q10

Length (total feet)

650-700

Q11

Beam (width in feet)

84

Q12

Draft (feet) - depth of hull below waterline, fully laden

13-14'

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

57'

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

5-10'

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

200-300'

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**4-8**
February	**4-8**
March	**4-8**
April	**4-8**
May	**4-8**
June	**4-8**
July	**4-8**
August	**4-8**
September	**4-8**
October	**4-8**
November	**4-8**
December	**4-8**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**rare for all months**
February	**0**
March	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

7-10mph

Q19 **No**

Tug Assistance Required

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

n/a

Q21

Is there anything else you would like to add about your vessel or business plans?

Its very rare that we use the lift span. Only special circumstances or during high water when we're unable to fit under green light widespan. If there was a bridge replacement it would be nice to make the transit a straight shot from KBM Interstate to KQ9049 Vancouver and eliminate the current S turn from I5 to KQ9049. Personally I think this project is a waste of time and would like to see a third bridge either on the east side or west side of town. This would actually alleviate some of the congestion we currently deal with. The proposed bridge will do nothing to solve the bottleneck issue in Portland.

Q22 **No**

Do you have another vessel?

Commercial Tugs/Tows/Barges

Owner: Tidewater

Vessels:

- Betty Lou
- Captain Bob
- Chief
- Clarkston
- Crown Point
- Defiance
- Granite Point
- Hurricane
- Liberty
- Maverick
- Outlaw
- Rebel
- Ryan Point
- Sundial

Company completed IBR data sheets and submitted characteristics for one vessel (Ryan Point) through the online survey. Data sheets also included characteristics for Ryan Point. Data sheets and survey response are included below. Vessel drawings provided for the CRC NIR are also included below.

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Tidewater

Vessel Name:
Betty Lou

Vessel Type:
Harbor

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial
Push Tug

USCG Document Number:
259542

Primary Mooring Location *(waterway milepoint, if known)*:
Tidewater has mooring facilities along the Columbia and Snake Rivers located at Vancouver, WA, Pasco, WA, Boardman, OR and Umatilla, OR, and Wilma, WA (near Lewiston, ID).
Primary Mooring Location, Columbia River Mile 102. Vancouver

Type and quantity of cargo, if applicable:
Types are agricultural, liquid products, wood and paper, solid waste and special products cargo.
Quantity is up to 10,500 tons of cargo on an annual basis.

Length (overall; ft):
70

Beam (width; ft):
39.7

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

9

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

58.1'

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

3

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

450

Transit speed under Interstate Bridge and Load Configuration:

5-6 mph down bound with loads

6-7 mph up bounds with empty tow

Time of Year of Passage:

Could transit any day of the year, 24 hours of the day

Tug Assistance Required: No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

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Company/Owner Name: Tidewater

Vessel Name:
Captain Bob

Vessel Type:
Push tug, line haul

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial
Push Tug

USCG Document Number:
553843

Primary Mooring Location *(waterway milepoint, if known)*:
Tidewater has mooring facilities along the Columbia and Snake Rivers located at Vancouver, WA, Pasco, WA, Boardman, OR and Umatilla, OR, and Wilma, WA (near Lewiston, ID).
Primary Mooring Location, Columbia River Mile 102. Vancouver

Type and quantity of cargo, if applicable:
Types are agricultural, liquid products, wood and paper, solid waste and special products cargo.
Quantity is up to 14,500 tons of cargo on an annual basis.

Length (overall; ft):
110

Beam (width; ft):
34.1

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:
11.6

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
56

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
3

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:
450

Transit speed under Interstate Bridge and Load Configuration:
8-10 mph down bound with loads, 4 loads
7-9 mph up bound with full tow- 3empty and one loaded barge

Time of Year of Passage:
Could transit any day of the year, 24 hours of the day

Tug Assistance Required: No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

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Company/Owner Name: Tidewater

Vessel Name:
The Chief

Vessel Type:
Push Tug-Line haul

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial
Push tug

USCG Document Number:
514987

Primary Mooring Location *(waterway milepoint, if known)*:
Tidewater has mooring facilities along the Columbia and Snake Rivers located at Vancouver, WA, Pasco, WA, Boardman, OR and Umatilla, OR, and Wilma, WA (near Lewiston, ID).
Primary Mooring Location, Columbia River Mile 102. Vancouver

Type and quantity of cargo, if applicable:
Types are agricultural, liquid products, wood and paper, solid waste and special products cargo.
Quantity is up to 14,500 tons of cargo on an annual basis.

Length (overall; ft):
121.6

Beam (width; ft):
40.0

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

11.8

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

49.9

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

3

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

450

Transit speed under Interstate Bridge and Load Configuration:

8-10 mph down bound with loads, 4 loads

7-9 mph up bound with full tow- 3 empty and one loaded barge

Time of Year of Passage:

Could transit any day of the year, 24 hours of the day

Tug Assistance Required:No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

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Company/Owner Name: Tidewater

Vessel Name:
Clarkston

Vessel Type:
Push Tug-Harbor/Line Haul

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial
Push Tug

USCG Document Number:
514250

Primary Mooring Location *(waterway milepoint, if known)***:**
Tidewater has mooring facilities along the Columbia and Snake Rivers located at Vancouver, WA, Pasco, WA, Boardman, OR and Umatilla, OR, and Wilma, WA (near Lewiston, ID).
Primary Mooring Location, Columbia River Mile 102. Vancouver

Type and quantity of cargo, if applicable:
Types are agricultural, liquid products, wood and paper, solid waste and special products cargo.
Quantity is up to 14,500 tons of cargo on an annual basis.

Length (overall; ft):
80

Beam (width; ft):
28.5

Draft (ft) - *depth of hull below waterline, fully laden*:
10.8

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
48.2

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
3

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:
450

Transit speed under Interstate Bridge and Load Configuration:

6-7 mph down bound with loads, 4 loads
6-7 mph up bound with full tow- 3 empty and one loaded barge

Time of Year of Passage:
Could transit any day of the year, 24 hours of the day

Tug Assistance Required: No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Tidewater

Vessel Name:
Crown Point

Vessel Type:
Push Tug-Line haul

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial
Push Tug

USCG Document Number:
1254584

Primary Mooring Location *(waterway milepoint, if known)*:
Tidewater has mooring facilities along the Columbia and Snake Rivers located at Vancouver, WA, Pasco, WA, Boardman, OR and Umatilla, OR, and Wilma, WA (near Lewiston, ID).
Primary Mooring Location, Columbia River Mile 102. Vancouver

Type and quantity of cargo, if applicable:
Types are agricultural, liquid products, wood and paper, solid waste and special products cargo.
Quantity is up to 14,500 tons of cargo on an annual basis.

Length (overall; ft):
104.0

Beam (width; ft):
38.0

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:
13.0

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
50.9

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
3

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:
450

Transit speed under Interstate Bridge and Load Configuration:

8-10 mph down bound with loads, 4 loads
7-9 mph up bound with full tow- 3 empty and one loaded barge

Time of Year of Passage:
Could transit any day of the year, 24 hours of the day

Tug Assistance Required: No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

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Company/Owner Name: Tidewater

Vessel Name:
Defiance

Vessel Type:
Push Tug-Line Haul

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial
Push Tug

USCG Document Number:
587247

Primary Mooring Location *(waterway milepoint, if known)***:**
Tidewater has mooring facilities along the Columbia and Snake Rivers located at Vancouver, WA, Pasco, WA, Boardman, OR and Umatilla, OR, and Wilma, WA (near Lewiston, ID).
Primary Mooring Location, Columbia River Mile 102. Vancouver

Type and quantity of cargo, if applicable:
Types are agricultural, liquid products, wood and paper, solid waste and special products cargo.
Quantity is up to 14,500 tons of cargo on an annual basis.

Length (overall; ft):
95.0

Beam (width; ft):
31

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:
11.6

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
48.6

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
3

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:
450

Transit speed under Interstate Bridge and Load Configuration:
7-9 mph down bound with loads, 4 loads
6-8 mph up bound with full tow- 3 empty and one loaded barge

Time of Year of Passage:
Could transit any day of the year, 24 hours of the day

Tug Assistance Required:No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company Name: Tidewater

Vessel Name:
Granite Point

Vessel Type:
Push Tug-Line Haul

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial
Push Tug

USCG Document Number:
1259541

Primary Mooring Location *(waterway milepoint, if known)*:
Tidewater has mooring facilities along the Columbia and Snake Rivers located at Vancouver, WA, Pasco, WA, Boardman, OR and Umatilla, OR, and Wilma, WA (near Lewiston, ID).
Primary Mooring Location, Columbia River Mile 102. Vancouver

Type and quantity of cargo, if applicable:
Types are agricultural, liquid products, wood and paper, solid waste and special products cargo.
Quantity is up to 14,500 tons of cargo on an annual basis.

Length (overall; ft):
104

Beam (width; ft):
38

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:
13

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
48.0

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
3

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:
450

Transit speed under Interstate Bridge and Load Configuration:
8-10 mph down bound with loads, 4 loads
7-9 mph up bound with full tow- 3 empty and one loaded barge

Time of Year of Passage:
Could transit any day of the year, 24 hours of the day

Tug Assistance Required:No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company Name: Tidewater

Vessel Name:
Hurricane

Vessel Type:
Push Tug-Line Haul

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial
Push Tug

USCG Document Number:
505319

Primary Mooring Location *(waterway milepoint, if known)*:
Tidewater has mooring facilities along the Columbia and Snake Rivers located at Vancouver, WA, Pasco, WA, Boardman, OR and Umatilla, OR, and Wilma, WA (near Lewiston, ID).
Primary Mooring Location, Columbia River Mile 102. Vancouver, WA

Type and quantity of cargo, if applicable:
Types are agricultural, liquid products, wood and paper, solid waste and special products cargo.
Quantity is up to 14,500 tons of cargo on an annual basis.

Length (overall; ft):
108.11

Beam (width; ft):
32

Draft (ft) - *depth of hull below waterline, fully laden*:

10.6

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

48.9

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

3

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

450

Transit speed under Interstate Bridge and Load Configuration:

7-8 mph down bound with loads, 4 loads

7-8 mph up bound with full tow- 3 empty and one loaded barge

Time of Year of Passage:

Could transit any day of the year, 24 hours of the day

Tug Assistance Required: No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

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Company Name: Tidewater

Vessel Name:
Liberty

Vessel Type:
Push Tug-Lower River, Astoria to Portland harbor

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial
Push tug

USCG Document Number:
526140

Primary Mooring Location *(waterway milepoint, if known)***:**
Tidewater has mooring facilities along the Columbia and Snake Rivers located at Vancouver, WA, Pasco, WA, Boardman, OR and Umatilla, OR, and Wilma, WA (near Lewiston, ID).
Primary Mooring Location, Columbia River Mile 102. Vancouver

Type and quantity of cargo, if applicable:
Types are agricultural, liquid products, wood and paper, solid waste and special products cargo.
Quantity is up to 14,500 tons of cargo on an annual basis.

Length (overall; ft):
108.0

Beam (width; ft):
34

Draft (ft) - *depth of hull below waterline, fully laden*:
9.5

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
44

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
3

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:
450

Transit speed under Interstate Bridge and Load Configuration:
N/A

Time of Year of Passage:
Could transit any day of the year, 24 hours of the day

Tug Assistance Required:No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

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Company Name: Tidewater

Vessel Name:
Maverick

Vessel Type:
Push Tug-Harbor/Line Haul

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial
Push Tug

USCG Document Number:
618125

Primary Mooring Location *(waterway milepoint, if known)*:
Tidewater has mooring facilities along the Columbia and Snake Rivers located at Vancouver, WA, Pasco, WA, Boardman, OR and Umatilla, OR, and Wilma, WA (near Lewiston, ID).
Primary Mooring Location, Columbia River Mile 102. Vancouver

Type and quantity of cargo, if applicable:
Types are agricultural, liquid products, wood and paper, solid waste and special products cargo.
Quantity is up to 12,500 tons of cargo on an annual basis.

Length (overall; ft):
82.0

Beam (width; ft):
26.8

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:
10.6

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
47.0

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
3

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:
450

Transit speed under Interstate Bridge and Load Configuration:

6-8 mph down bound with loads, 4 loads	
6-9 mph up bound with full tow- 3 empty and one loaded barge	

Time of Year of Passage:
Could transit any day of the year, 24 hours of the day

Tug Assistance Required:No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

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Company Name: Tidewater

Vessel Name:
Outlaw

Vessel Type:
PushTug-Line Haul

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial
Push Tug

USCG Document Number:
561814

Primary Mooring Location *(waterway milepoint, if known)***:**
Tidewater has mooring facilities along the Columbia and Snake Rivers located at Vancouver, WA, Pasco, WA, Boardman, OR and Umatilla, OR, and Wilma, WA (near Lewiston, ID).
Primary Mooring Location, Columbia River Mile 102. Vancouver

Type and quantity of cargo, if applicable:
Types are agricultural, liquid products, wood and paper, solid waste and special products cargo.
Quantity is up to 14,500 tons of cargo on an annual basis.

Length (overall; ft):
104

Beam (width; ft):
31.6

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

10

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

48

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

3

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

450

Transit speed under Interstate Bridge and Load Configuration:

7-9 mph down bound with loads, 4 loads

6-9 mph up bound with full tow- 3 empty and one loaded barge

Time of Year of Passage:

Could transit any day of the year, 24 hours of the day

Tug Assistance Required:No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company Name: Tidewater

Vessel Name:
Rebel

Vessel Type:
Push Tug-Harbor/Line Haul

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial
Push Tug

USCG Document Number:
586751

Primary Mooring Location *(waterway milepoint, if known)*:
Tidewater has mooring facilities along the Columbia and Snake Rivers located at Vancouver, WA, Pasco, WA, Boardman, OR and Umatilla, OR, and Wilma, WA (near Lewiston, ID).
Primary Mooring Location, Columbia River Mile 102. Vancouver

Type and quantity of cargo, if applicable:
Types are agricultural, liquid products, wood and paper, solid waste and special products cargo.
Quantity is up to 14,500 tons of cargo on an annual basis.

Length (overall; ft):
88.0

Beam (width; ft):
30

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:
11.6

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
50.6

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
3

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:
450

Transit speed under Interstate Bridge and Load Configuration:
6-8 mph down bound with loads, 4 loads
6-9 mph up bound with full tow- 3 empty and one loaded barge

Time of Year of Passage:
Could transit any day of the year, 24 hours of the day

Tug Assistance Required: No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company Name: Tidewater

Vessel Name:
Ryan Point

Vessel Type:
Push Tug-Line Haul

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial
Push Tug

USCG Document Number:
1259618

Primary Mooring Location *(waterway milepoint, if known)*:
Tidewater has mooring facilities along the Columbia and Snake Rivers located at Vancouver, WA, Pasco, WA, Boardman, OR and Umatilla, OR, and Wilma, WA (near Lewiston, ID).
Primary Mooring Location, Columbia River Mile 102. Vancouver

Type and quantity of cargo, if applicable:
Types are agricultural, liquid products, wood and paper, solid waste and special products cargo.
Quantity is up to 14,500 tons of cargo on an annual basis.

Length (overall; ft):
104

Beam (width; ft):
38

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

13.0

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

51.0

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

3

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

450

Transit speed under Interstate Bridge and Load Configuration:

8-10 mph down bound with loads, 4 loads

7-9 mph up bound with full tow- 3 empty and one loaded barge

Time of Year of Passage:

Could transit any day of the year, 24 hours of the day

Tug Assistance Required:No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company Name: Tidewater

Vessel Name:
Sundial

Vessel Type:
Push Tug-Line haul

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial
Push tug

USCG Document Number:
652357

Primary Mooring Location *(waterway milepoint, if known)*:
Tidewater has mooring facilities along the Columbia and Snake Rivers located at Vancouver, WA, Pasco, WA, Boardman, OR and Umatilla, OR, and Wilma, WA (near Lewiston, ID).
Primary Mooring Location, Columbia River Mile 102. Vancouver

Type and quantity of cargo, if applicable:
Types are agricultural, liquid products, wood and paper, solid waste and special products cargo.
Quantity is up to 14,500 tons of cargo on an annual basis.

Length (overall; ft):
94.0

Beam (width; ft):
31.9

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

10.6

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

48

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

3

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

450

Transit speed under Interstate Bridge and Load Configuration:

7-9 mph down bound with loads, 4 loads

6-9 mph up bound with full tow- 3 empty and one loaded barge

Time of Year of Passage:

Could transit any day of the year, 24 hours of the day

Tug Assistance Required:No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company Name: Tidewater

Vessel Name:
Tidewater Tug/Barge Maximum configuration

Vessel Type:
Tug and up to four barge configurations

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial

USCG Document Number:

Primary Mooring Location *(waterway milepoint, if known)*:
Tidewater has mooring facilities along the Columbia and Snake Rivers located at Vancouver, WA, Pasco, WA, Boardman, OR and Umatilla, OR, and Wilma, WA (near Lewiston, ID).

Type and quantity of cargo, if applicable:
Types are agricultural, liquid products, wood and paper, solid waste and special products cargo. Quantity is up to 14,500 tons of cargo on an annual basis.

Length (overall; ft):
650

Beam (width; ft):
84

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:
13.5

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
52

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
3

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:
450

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:
Could transit any day of the year, 24 hours of the day

Tug Assistance Required:No

Frequency of passage under Interstate Bridge main channel (typical per month): On the average (some months are higher, and others are lower), Tidewater vessels pass under the Interstate Bridge **70 times** per month. If you need this number broken down by vessel, please contact Jennifer Riddle for that information. Jennifer.Riddle@tidewater.com.

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

#5

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Wednesday, May 12, 2021 3:24:45 PM
Last Modified: Wednesday, May 12, 2021 3:29:01 PM
Time Spent: 00:04:16
IP Address: 69.168.123.67

Page 1: Introduction

Q1

Company Name

Tidewater

Q2

Contact Information

Name	**RANDY REINHOFER**
Email	**rv8aer@gmail.com**
Phone number	**12085820157**

Q3

Vessel Name (please complete one survey per vessel)

Ryan Point

Q4

Vessel Type

Tug

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Commercial

Q7

USCG Document Number

Respondent skipped this question

Q8

Primary Mooring Location (waterway milepoint, if known)

Vancouver, WA

Q9

Type and quantity of cargo, if applicable

Barging wheat, petroleum, waste, pulp, etc.

Q10

Length (total feet)

104

Q11

Beam (width in feet)

38

Q12

Draft (feet) - depth of hull below waterline, fully laden

10'9"

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

52'

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

30'

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

Respondent skipped this question

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**6**
February	**6**
March	**6**
April	**6**
May	**6**
June	**6**
July	**6**
August	**6**
September	**6**
October	**6**
November	**6**
December	**6**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

Respondent skipped this question

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

8-10 mph, various loading condition

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

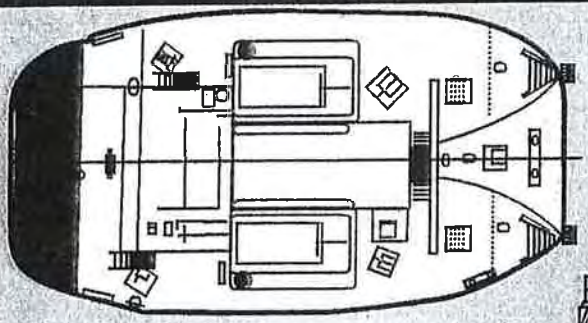
Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

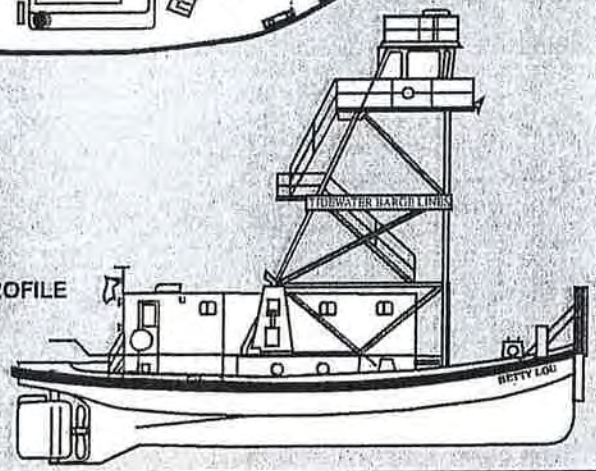
Q22	No
Do you have another vessel?	

TIDEWATER

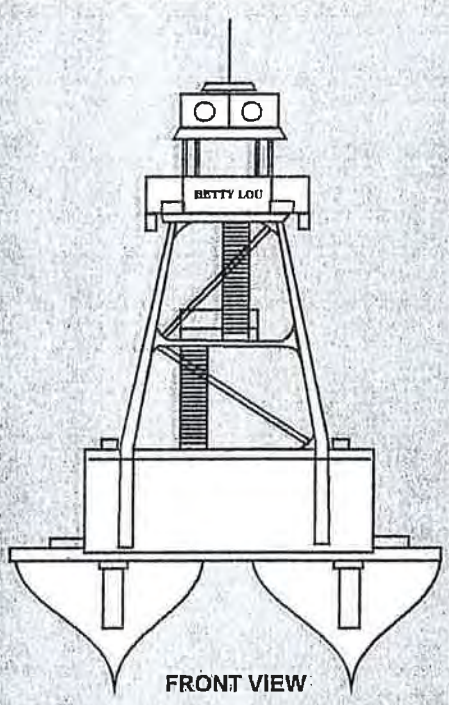
BETTY LOU



PLAN VIEW



OUTBOARD PROFILE



FRONT VIEW

Not to Scale

OWNER: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OPERATOR: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OFFICIAL NUMBER: *259542*

COFR NUMBER: *104834-10*

TIDEWATER DISPATCH
(800)562-1607

NATIONAL RESPONSE CENTER
(800)424-8802

LENGTH:	*70'*
BEAM:	*39' 7"*
DEPTH:	*9'*
HORSEPOWER:	*2,120*
PROPELLERS:	*Two 76" dia*
FUEL CAPACITY:	*10,500 gal*
LUBE OIL CAPACITY:	*580 gal*
FRESH WATER CAPACITY:	*1,000 gal*
EYE LEVEL:	*42' 6"*
FIXED HEIGHT:	*50'*
GROSS TONS:	*105*
NET TONS:	*71*
BARREL-O-BOOM:	*2*
SPILL KIT:	*1 set*

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Tug

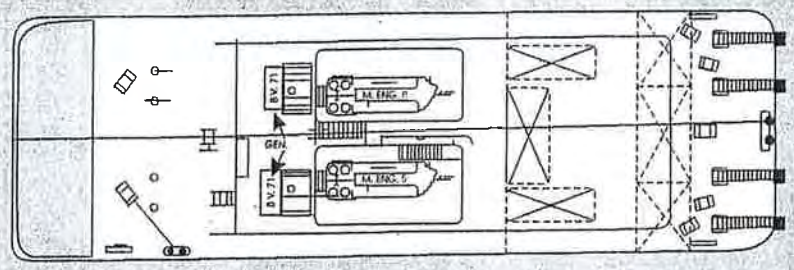
Tidewater/ICP/Graphics/Barge/Chief.cdr

4 upriver trips/year to Camas Oct-Jan. Mainly a harbor boat

TIDEWATER

CAPTAIN BOB

PLAN VIEW



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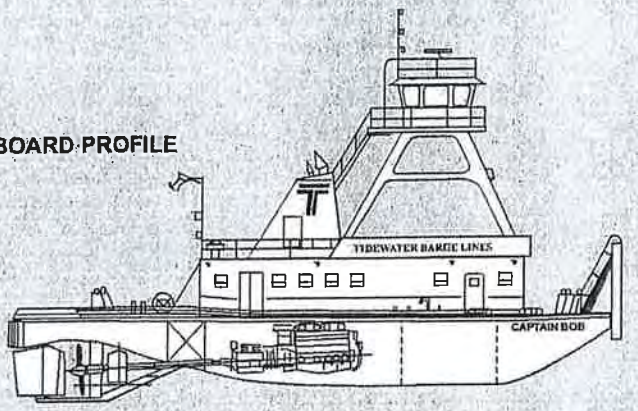

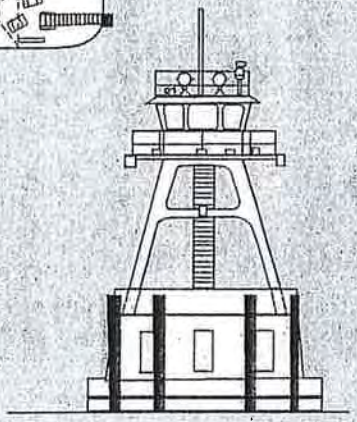

FRONT VIEW

Not to Scale

OWNER: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OPERATOR: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OFFICIAL NUMBER: *553843*

COFR NUMBER: *104834-10*

TIDEWATER DISPATCH
(800)562-1607

NATIONAL RESPONSE CENTER
(800)424-8802

LENGTH:	*110'*
BEAM:	*34'*
DEPTH:	*11' 6"*
HORSEPOWER:	*3,000*
PROPELLERS:	*Two 106" dia*
FUEL CAPACITY:	*36,265 gal*
LUBE OIL CAPACITY:	*700 gal*
FRESH WATER CAPACITY:	*3,300 gal*
EYE LEVEL:	*43' 9"*
FIXED HEIGHT:	*50' 9"*
GROSS TONS:	*304*
NET TONS:	*206*
BARREL-O-BOOM:	*1*
SPILL KIT:	*1 set*

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Tug

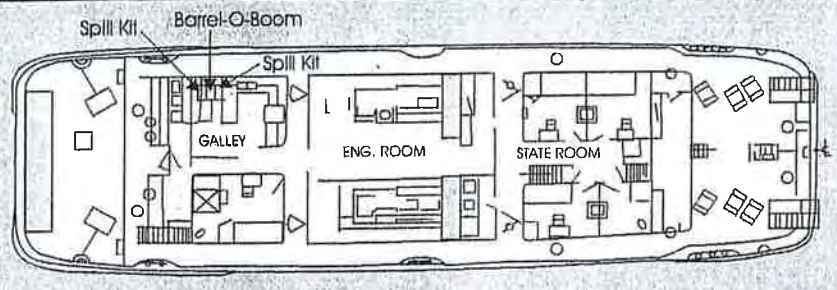
Tidewater/ICP/Graphics/Barge/Captain_Bob.cdr

8 upriver trips/year (ie Aug-Oct)

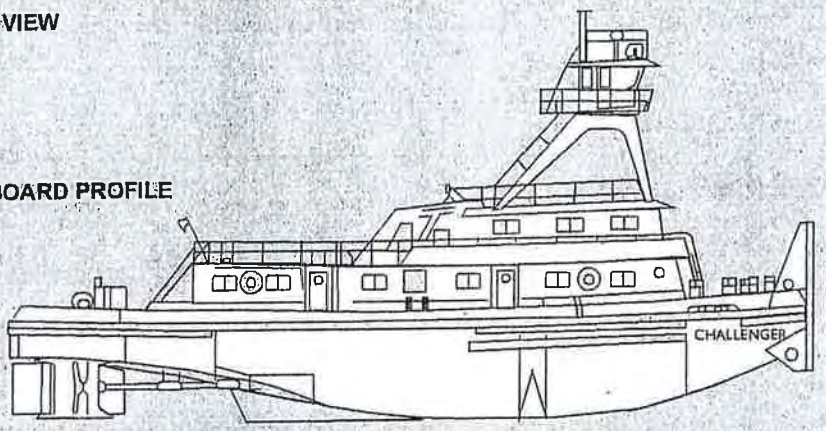
6 TRIPS

TIDEWATER

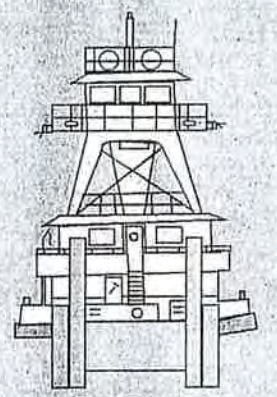
CHALLENGER



PLAN VIEW



OUTBOARD PROFILE



FRONT VIEW

Not to Scale

OWNER: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OPERATOR: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OFFICIAL NUMBER: *516611*

COFR NUMBER: *104834-10*

TIDEWATER DISPATCH
(800)562-1607

NATIONAL RESPONSE CENTER
(800)424-8802

LENGTH:	*111' 4"*
BEAM:	*33' 4"*
DEPTH:	*13' 8"*
HORSEPOWER:	*3,000*
PROPELLERS:	*Two 92" dia* *Two 93" dia Kort nozzle*
FUEL CAPACITY:	*29,000 gal*
LUBE OIL CAPACITY:	*800 gal*
FRESH WATER CAPACITY:	*3,000 gal*
EYE LEVEL:	*39'*
FIXED HEIGHT:	*48' 3"*
GROSS TONS:	*383*
NET TONS:	*260*
BARREL-O-BOOM:	*1*
SPILL KIT:	*1 set*

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Tug

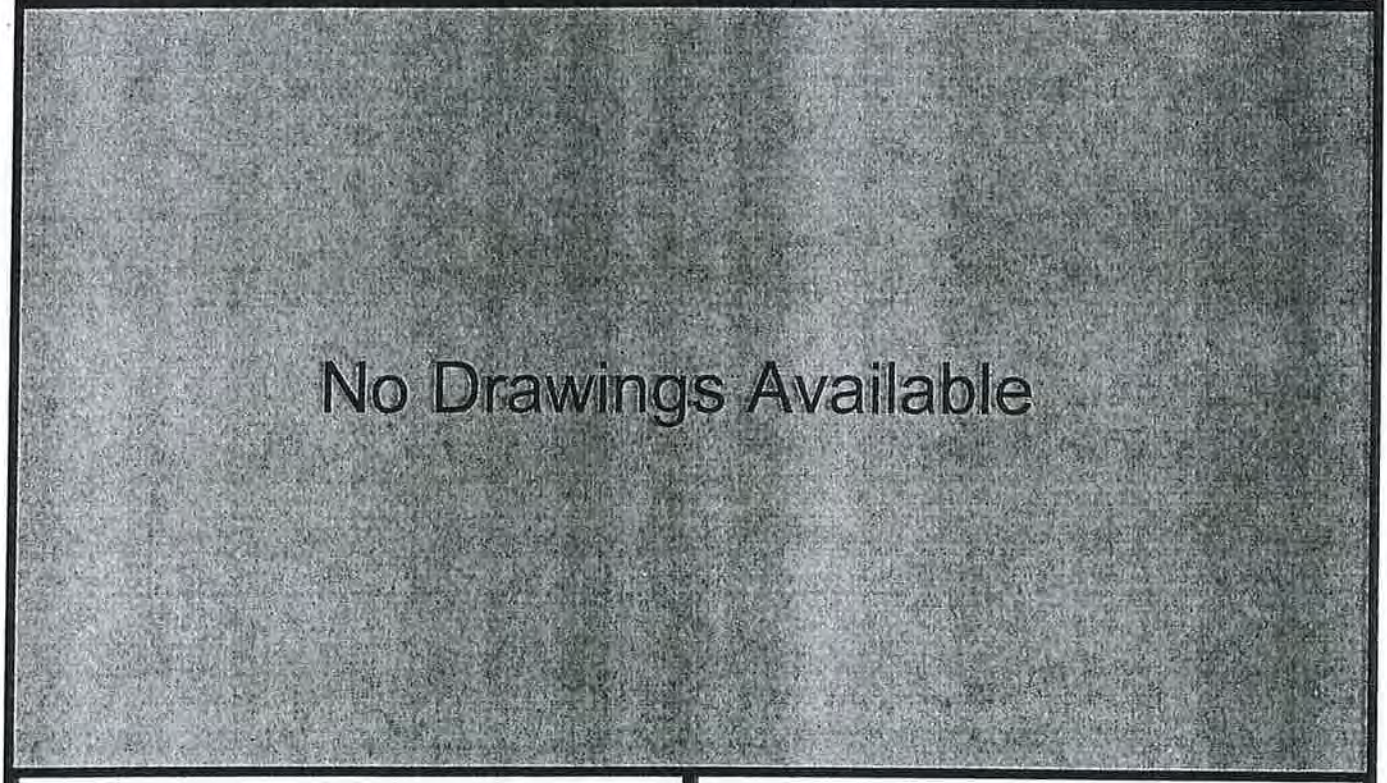
Tidewater/ICP/Graphics/Barge/challenger.cdr

Same freq. as Capt. Bob

8 Tr, PS

TIDEWATER

CLARKSTON



OWNER: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OPERATOR: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OFFICIAL NUMBER: *514250*

COFR NUMBER: *104834-14*

TIDEWATER DISPATCH
(800)562-1607

NATIONAL RESPONSE CENTER
(800)424-8802

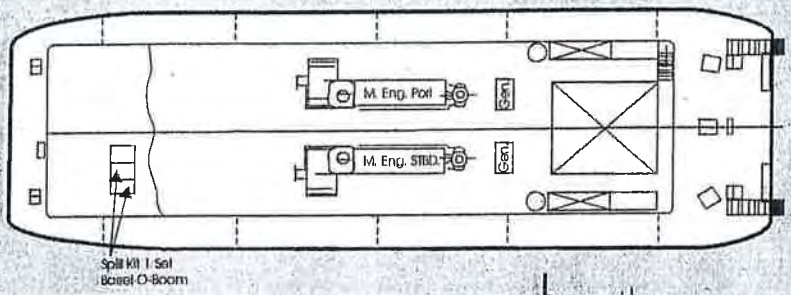
LENGTH:	*74.7'*
BEAM:	*28.5'*
DEPTH:	*10.8'*
HORSEPOWER:	3,000
PROPELLERS:	Three 72" dia.
FUEL CAPACITY:	20,000 gal
LUBE OIL CAPACITY:	*500 gal*
FRESH WATER CAPACITY:	*2,233 gal*
EYE LEVEL:	*42' 6"*
FIXED HEIGHT:	*48.2'*
GROSS TONS:	*149*
NET TONS:	*101*
BARREL-O-BOOM:	*1*
SPILL KIT:	*1 set*

Tug

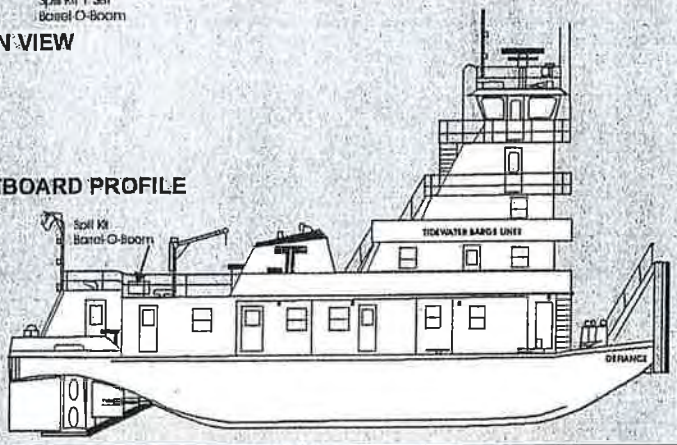
10 upriver trips/year throughout the year Harbor boat

TIDEWATER

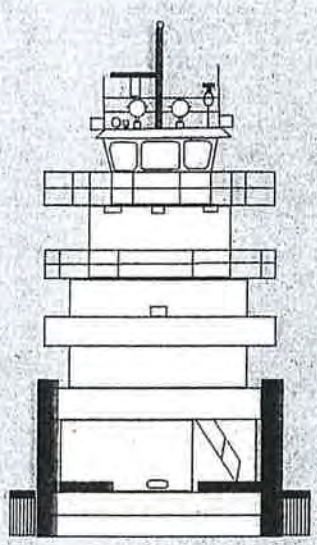
DEFIANCE



PLAN VIEW



OUTBOARD PROFILE



FRONT VIEW

Not to Scale

OWNER: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OPERATOR: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OFFICIAL NUMBER: *587247*

COFR NUMBER: *104834-10*

TIDEWATER DISPATCH
(800)562-1607

NATIONAL RESPONSE CENTER
(800)424-8802

LENGTH:	*95'*
BEAM:	*31'*
DEPTH:	*11' 6"*
HORSEPOWER:	*2,800*
PROPELLERS:	*Two 87" dia* *Two 88" dia Kort nozzles*
FUEL CAPACITY:	*38,360 gal*
LUBE OIL CAPACITY:	*1,000 gal*
FRESH WATER CAPACITY:	*5,175 gal*
EYE LEVEL:	*39' 6"*
FIXED HEIGHT:	*48' 6"*
GROSS TONS:	*295*
NET TONS:	*220*
BARREL-O-BOOM:	*1*
SPILL KIT:	*1 set*

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Tug

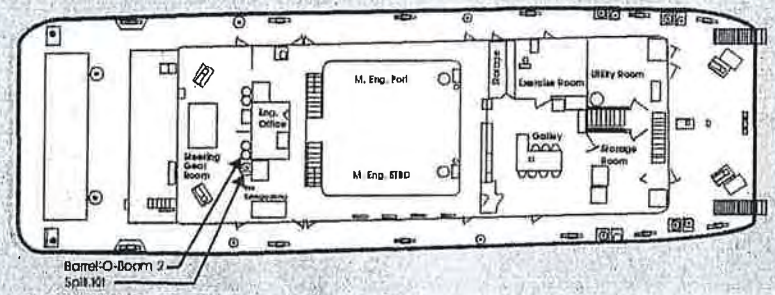
Tidewater/ICP/Graphics/Barge/Defiance.cdr

22 Trips

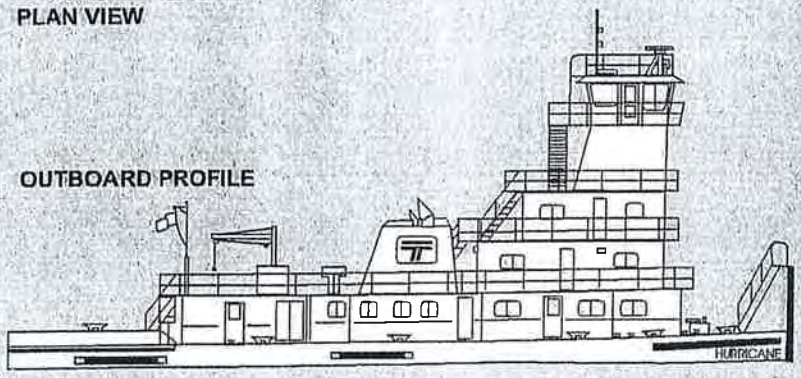
22 upriver trips / year throughout year
More during Aug-Oct (harvest season)

TIDEWATER

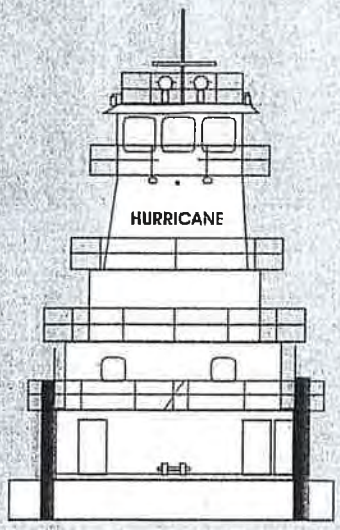
HURRICANE



PLAN VIEW



OUTBOARD PROFILE



FRONT VIEW

Not to Scale

OWNER: *Hickey Family Company*
1499 SE Tech Center Place, Suite 140
Vancouver, WA 98683 -9575

PHONE: *(360)604-4333* ***FAX:*** *(360)604-4343*

OPERATOR: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* ***FAX:*** *(360)694-89811*

OFFICIAL NUMBER: *505319*

COFR NUMBER: *104834-10*

TIDEWATER DISPATCH
(800)562-1607

NATIONAL RESPONSE CENTER
(800)424-8802

LENGTH:	*108' 11"*
BEAM:	*32'*
DEPTH:	*10' 6"*
HORSEPOWER:	*3,000*
PROPELLERS:	*Two 83" dia five blade* *Two 84" dia Kort nozzle*
FUEL CAPACITY:	*40,458 gal*
LUBE OIL CAPACITY:	*2,141 gal*
FRESH WATER CAPACITY:	*6,264 gal*
EYE LEVEL:	*41' 9.5"*
FIXED HEIGHT:	*48' 9"*
GROSS TONS:	*383*
NET TONS:	*261*
BARREL-O-BOOM:	*2*
SPILL KIT:	*1 set*

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Tug

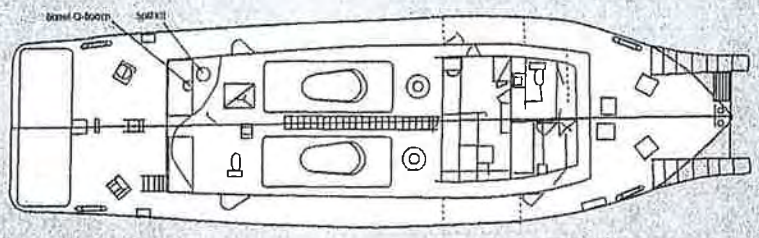
Tidewater/ICP/Graphics/Barge/Hurricane.cdr

Same frequency as Defiance

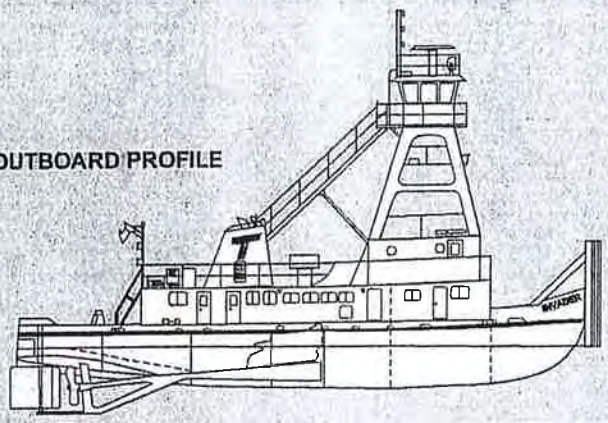
22 Trips

TIDEWATER

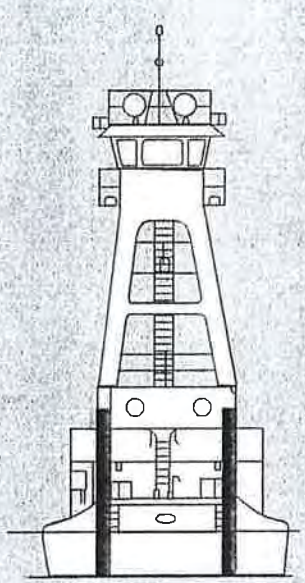
INVADER



PLAN VIEW



OUTBOARD PROFILE



FRONT VIEW

Not to Scale

OWNER: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OPERATOR: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OFFICIAL NUMBER: 239108

COFR NUMBER: *104834-10*

TIDEWATER DISPATCH
(800)562-1607

NATIONAL RESPONSE CENTER
(800)424-8802

LENGTH:	*95'*
BEAM:	*26'*
DEPTH:	*10'*
HORSEPOWER:	*1,700*
PROPELLERS:	*Two 70" dia*
FUEL CAPACITY:	*10,107 gal*
LUBE OIL CAPACITY:	*300 gal*
FRESH WATER CAPACITY:	*1,400 gal*
EYE LEVEL:	*40'*
FIXED HEIGHT:	*48'*
GROSS TONS:	*160*
NET TONS:	*108*
BARREL-O-BOOM:	*1*
SPILL KIT:	*1 set*

Developed By:
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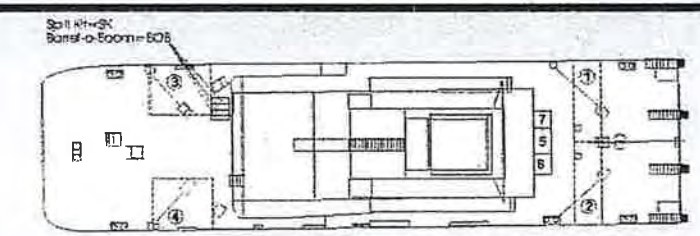
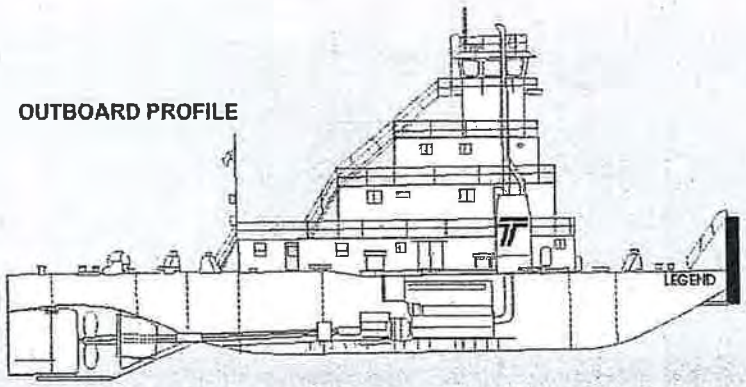
Tug

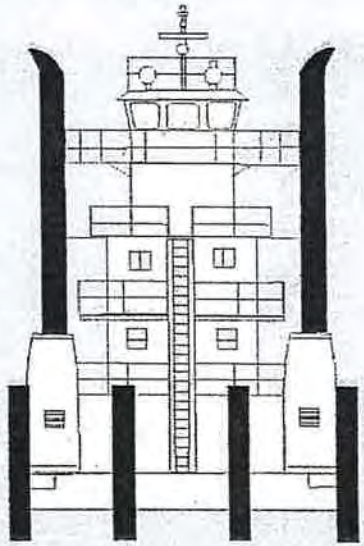
Tidewater/ICP/Graphics/Barge/invader.cdr

4 upriver trips/year April-July

TIDEWATER







Not to Scale

LEGEND

OWNER: Tidewater Barge Lines, Inc. 6305 NW Lower River Rd Vancouver, WA 98660	
PHONE: (360)683-1491 **FAX:** (360)694- 8981	
OPERATOR: Tidewater Barge Lines, Inc. 6305 NW Lower River Rd Vancouver, WA 98660	
PHONE: (360)683-1491 **FAX:** (360)694- 8981	
OFFICIAL NUMBER: 262975	
COFR NUMBER: 104864-10	
HULL MATERIAL:	Steel
ENGINE ROOM FIRE SYSTEM: Halon/CO2	
LENGTH:	127'
BEAM:	34'
DEPTH:	11' 6"
HORSEPOWER:	4,400
PROPELLERS:	Two 110" dia
FUEL CAPACITY:	37,950 gal
LUBE OIL CAPACITY:	1,980 gal
FRESH WATER CAPACITY:	3,500 gal
EYE LEVEL:	43' 6"
FIXED HEIGHT:	50' 5"
GROSS TONS:	412
NET TONS:	280
BARREL-O-BOOM:	2
SPILL KIT:	1 set

NRC INFORMATION
(800)532-1607
NATIONAL RESPONSE CENTER:
(800)424-8802

Tug

TANK CAPACITY TABLE: (CAPACITY GALS)

TANK	MAX	WORKING (95%)
Port bow	6112	5806
Starboard bow	6112	5806
Port stern	10488	9964
Starboard stern	10488	9964
Main Engine day tank	3960	3762
Generator day tank	789	750
Lube	2200	1980

Worst Case Discharge (BBLS)	Maximum Most Probable Discharge (BBLS)
956	95

FUEL
The Legend has four (4) diesel storage tanks. Two (2) are located in the bow - port and starboard and two are located in the stern - port and starboard. A main engine day tank supplies diesel to the main engines. A generator day tank supplies diesel to the generators. The ecology box is located on the starboard bow.

LUBE
The Legend has a lube oil storage tank located forward of the engine room, to the port side of the main engine day tank. The lube oil storage tank fill is a 2" deck hole in the lube oil tank cover (located aft and to port of center winch).

Detail transfer procedures are available in the Tidewater Operational Procedures notebook

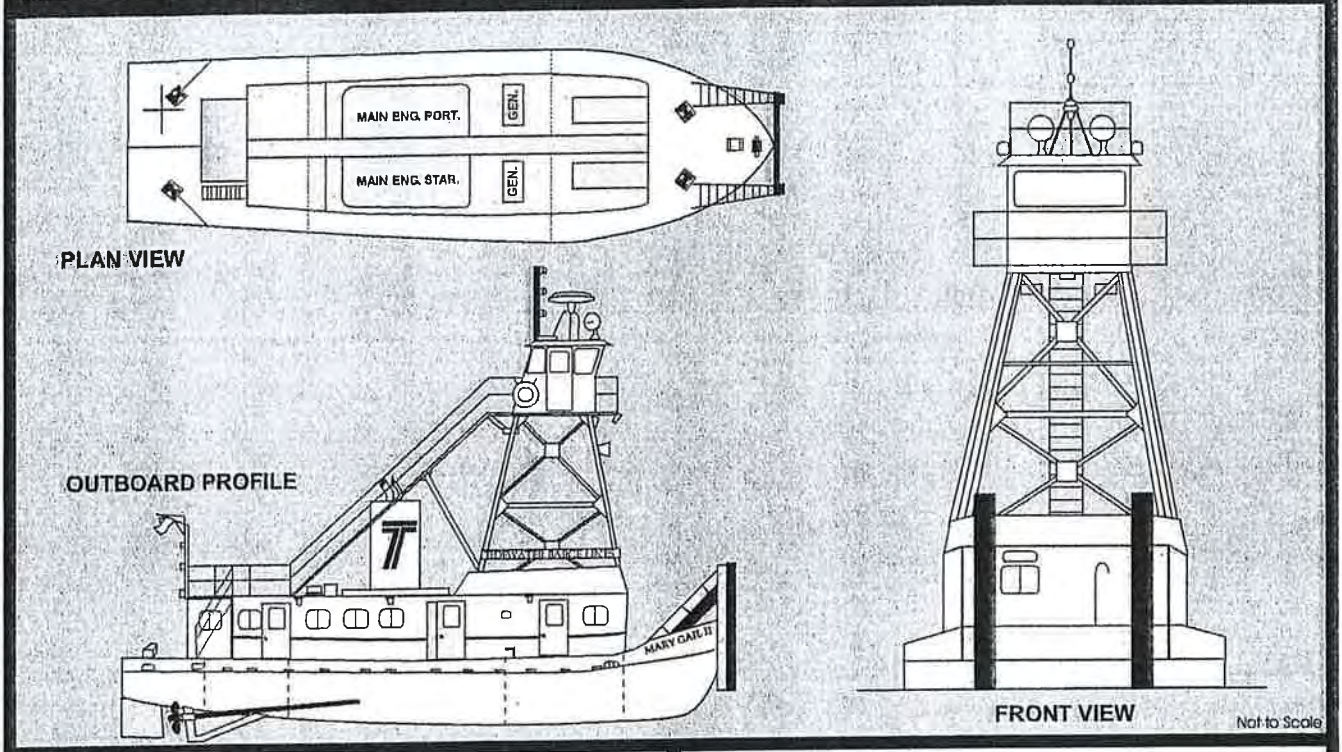
June 2005

TidewaterVCP\Graphics\Bargetidwater.cdr

Same frequency as the Defiance

TIDEWATER

MARY GAIL



OWNER: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OPERATOR: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OFFICIAL NUMBER: *247125*

COFR NUMBER: *104834-10*

TIDEWATER DISPATCH
(800)562-1607

NATIONAL RESPONSE CENTER
(800)424-8802

LENGTH:	*76'*
BEAM:	*24'*
DEPTH:	*9' 6"*
HORSEPOWER:	*1,150*
PROPELLERS:	*Two 76" dia*
FUEL CAPACITY:	*7,038 gal*
LUBE OIL CAPACITY:	*517 gal*
FRESH WATER CAPACITY:	*1,150 gal*
EYE LEVEL:	*36'*
FIXED HEIGHT:	*42'*
GROSS TONS:	*97*
NET TONS:	*66*
BARREL-O-BOOM:	*1*
SPILL KIT:	*1 set*

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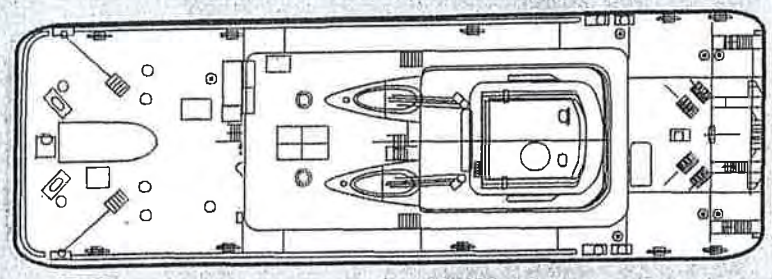
Tug

Tidewater/ICP/Graphics\Barge\Mary_Gail.cdr

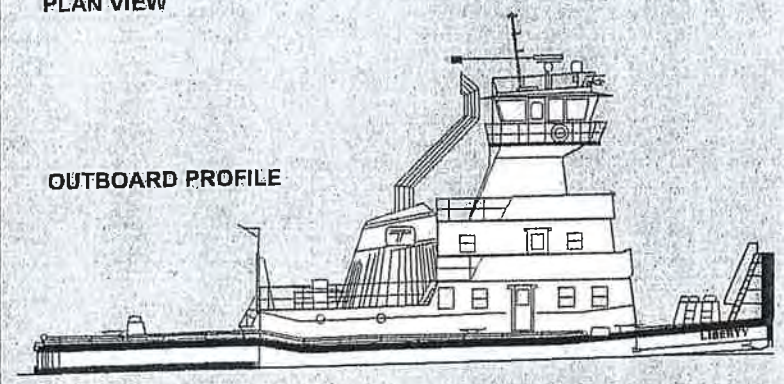
Same freaency as the Invader

TIDEWATER

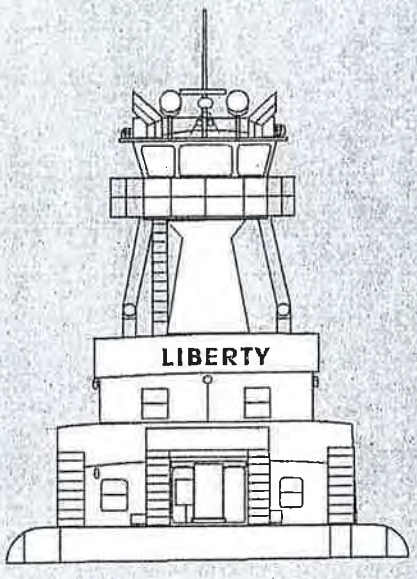
LIBERTY



PLAN VIEW



OUTBOARD PROFILE



FRONT VIEW

Not to Scale

OWNER: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OPERATOR: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OFFICIAL NUMBER: *526140*

COFR NUMBER: *104834-10*

TIDEWATER DISPATCH
(800)562-1607

NATIONAL RESPONSE CENTER
(800)424-8802

LENGTH:	*108'*
BEAM:	*34'*
DEPTH:	*9' 6"*
HORSEPOWER:	*3,000*
PROPELLORS:	*Two 84" dia*
FUEL CAPACITY:	*21,800*
LUBE OIL CAPACITY:	*300*
FRESH WATER CAPACITY:	*10,000*
EYE LEVEL:	*37'*
FIXED HEIGHT:	*44'*
GROSS TONS:	*272*
NET TONS:	*129*
BARREL-O-BOOM:	*2*
SPILL KIT:	*1 set*

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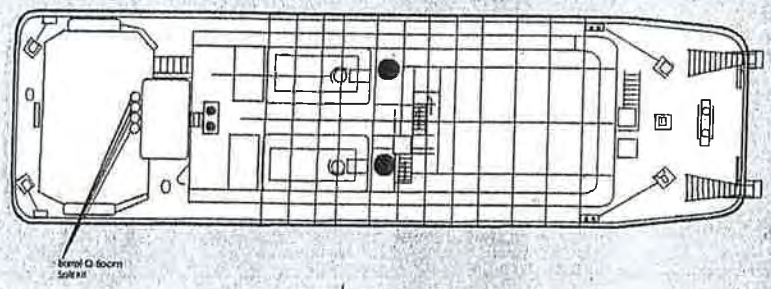
Tug

Tidewater/ICP/Graphics\Barge\liberty.cdr

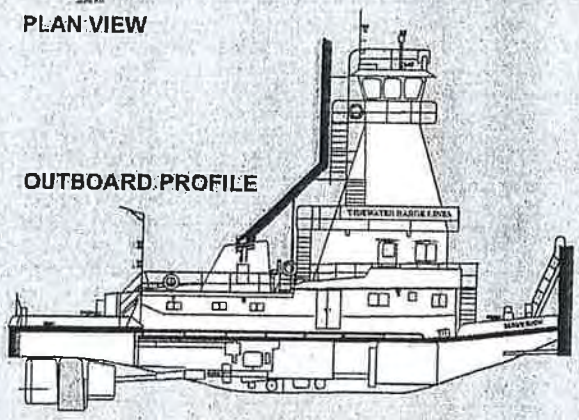
2 upriver trips/year for emergencies (anytime)
Dedicated downriver boat

TIDEWATER

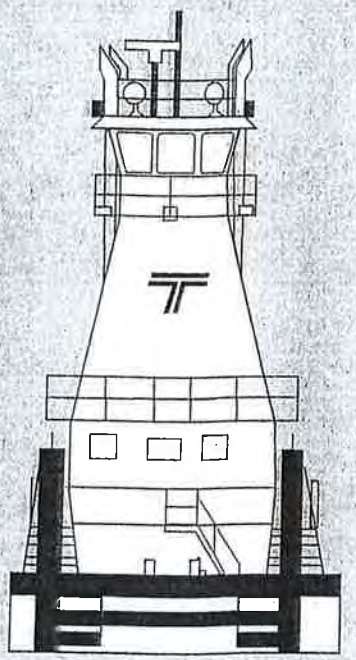
MAVERICK



PLAN VIEW



OUTBOARD PROFILE



FRONT VIEW

Not to Scale

OWNER: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OPERATOR: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OFFICIAL NUMBER: *618125*

COFR NUMBER: *104834-10*

TIDEWATER DISPATCH
(800)562-1607

NATIONAL RESPONSE CENTER
(800)424-8802

LENGTH:	*82'*
BEAM:	*26' 6"*
DEPTH:	*7' 6"*
HORSEPOWER:	*2,350*
PROPELLERS:	*Two 75" dia* *Two 76" dia Kort nozzles*
FUEL CAPACITY:	*17,664 gal*
LUBE OIL CAPACITY:	*517 gal*
FRESH WATER CAPACITY:	*1,000 gal*
EYE LEVEL:	*42'*
FIXED HEIGHT:	*52'*
GROSS TONS:	*150*
NET TONS:	*102*
BARREL-O-BOOM:	*2*
SPILL KIT:	*1 set*

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Tug

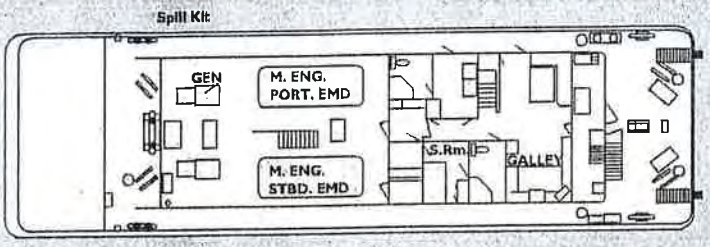
Tidewater/ICP/Graphics/Barge/Maverick.cdr

10 upriver trips/year throughout the year

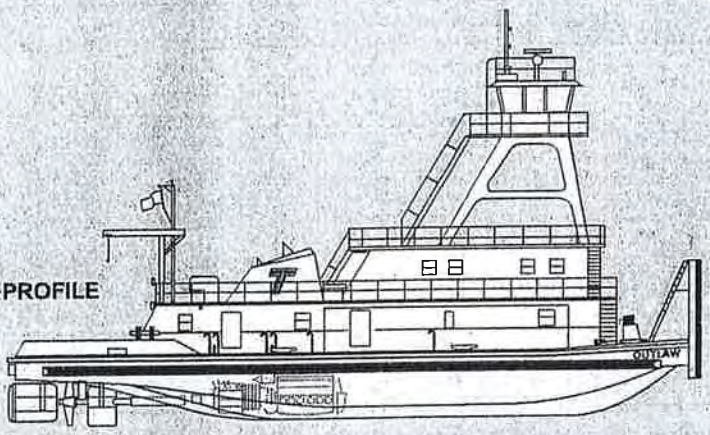
TIDEWATER

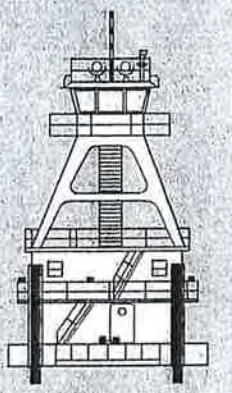
OUTLAW

PLAN VIEW



OUTBOARD PROFILE





FRONT VIEW

Not to Scale

OWNER: *Hickey Family Company*
1499 SE Tech Center Place, Suite 140
Vancouver, WA 98683 -9575

PHONE: *(360)604-4333* **FAX:** *(360)604-4343*

OPERATOR: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-89811*

OFFICIAL NUMBER: *561814*

COFR NUMBER: *104834-10*

TIDEWATER DISPATCH
(800)562-1607

NATIONAL RESPONSE CENTER
(800)424-8802

LENGTH:	*104'*
BEAM:	*31' 6"*
DEPTH:	*10'*
HORSEPOWER:	*3,000*
PROPELLERS:	*Two 87" dia* *Two 88" dia Kort nozzles*
FUEL CAPACITY:	*43,000 gal*
LUBE OIL CAPACITY:	*2,600 gal*
FRESH WATER CAPACITY:	*8,000 gal*
EYE LEVEL:	*40'0"*
FIXED HEIGHT:	*53'*
GROSS TONS:	*286*
NET TONS:	*194*
BARREL-O-BOOM:	*1*
SPILL KIT:	*1 set*

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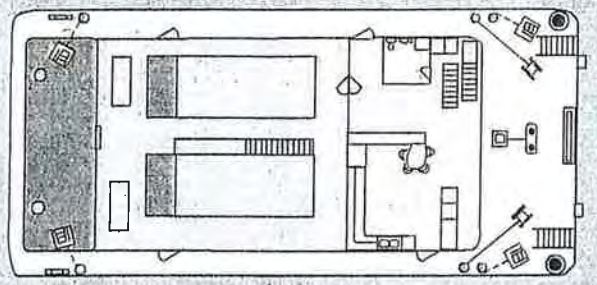
Tug

Tidewater/ICP/Graphics/Barge/outlaw.cdr

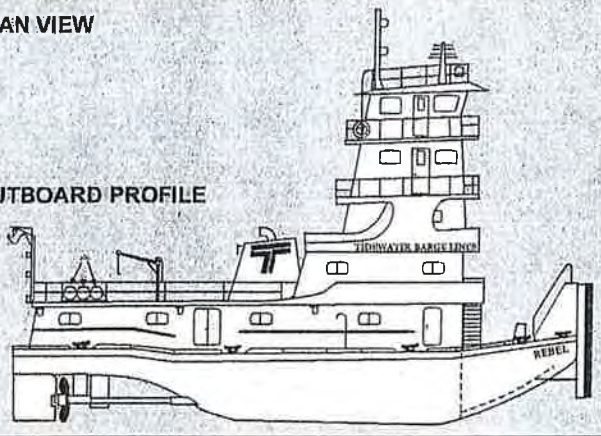
20 upriver trips/year throughout year (~W Aug-Oct)

TIDEWATER

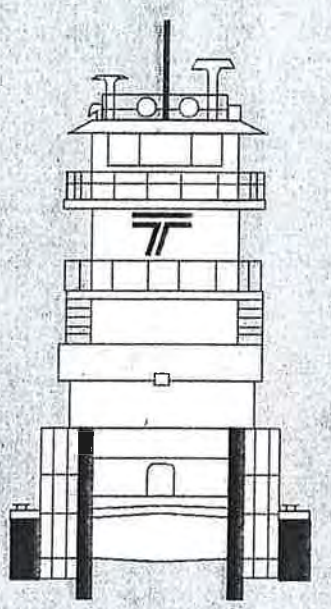
REBEL



PLAN VIEW



OUTBOARD PROFILE



FRONT VIEW

Not to Scale

OPERATOR: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OPERATOR: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-8981*

OFFICIAL NUMBER: *586751*

COFR NUMBER: *104834-10*

TIDEWATER DISPATCH
(800)562-1607

NATIONAL RESPONSE CENTER
(800)424-8802

LENGTH:	*87'*
BEAM:	*30'*
DEPTH:	*11' 6"*
HORSEPOWER:	*1,900*
PROPELLERS:	*Two 88" dia*
FUEL CAPACITY:	*37, 208 gal*
LUBE OIL CAPACITY:	*1,100 gal*
FRESH WATER CAPACITY:	*3,076 gal*
EYE LEVEL:	*43' 4"*
FIXED HEIGHT:	*48'*
GROSS TONS:	*261*
NET TONS:	*177*
BARREL-O-BOOM:	*1*
SPILL KIT:	*1 set*

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Tug

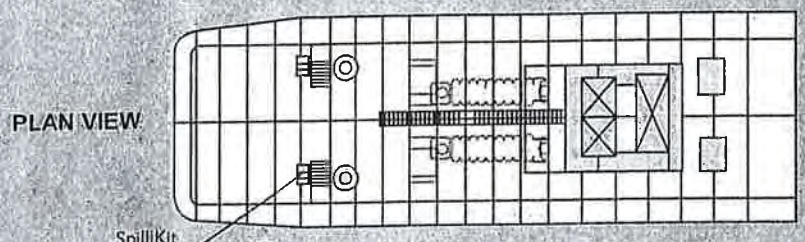
Tidewater/ICP/Graphics/Barge/Rebel.cdr

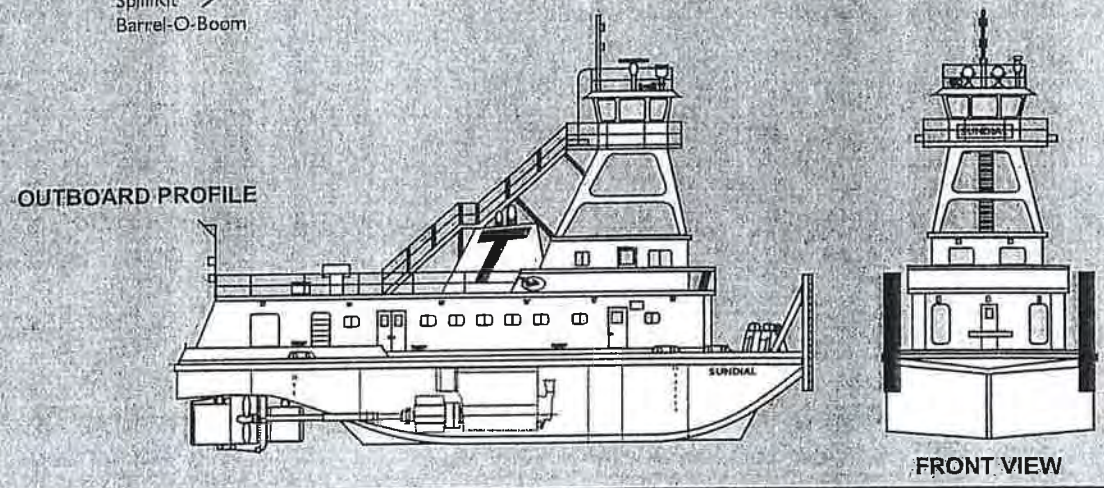
Same frequency as the Defiance

Same frequency as the Defiance

TIDEWATER

SUNDIAL





OWNER: *Hickey Family Company*
1499 SE Tech Center Place, Suite 140
Vancouver, WA 98683 -9575

PHONE: *(360)604-4333* **FAX:** *(360)604-4343*

OPERATOR: *Tidewater Barge Lines, Inc.*
6305 NW Old Lower River Rd
Vancouver, WA 98660

PHONE: *(360)693-1491* **FAX:** *(360)694-89811*

OFFICIAL NUMBER: *652357*

COFR NUMBER: *104834-10*

TIDEWATER DISPATCH
(800)562-1607

NATIONAL RESPONSE CENTER
(800)424-8802

LENGTH:	*94' 6"*
BEAM:	*31' 9"*
DEPTH:	*12' 6"*
HORSEPOWER:	*3,400*
PROPELLERS:	*Two 87" dia* *Two 88" dia Kort nozzle*
FUEL CAPACITY:	*38,000 gal*
LUBE OIL CAPACITY:	*1,496 gal*
FRESH WATER CAPACITY:	*3,500 gal*
EYE LEVEL:	*39' 6"*
FIXED HEIGHT:	*48'*
GROSS TONS:	*334'*
NET TONS:	*227*
BARREL-O-BOOM:	*1*
SPILL KIT:	*1 set*

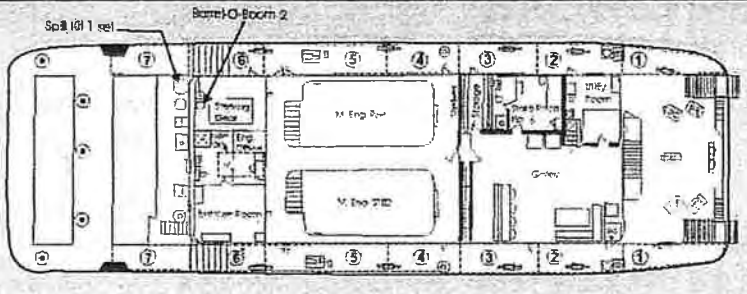
Developed By:
TRP TECHNICAL RESPONSE PLANNING CORPORATION www.trpcorp.com | (281) 955-9600

Tug

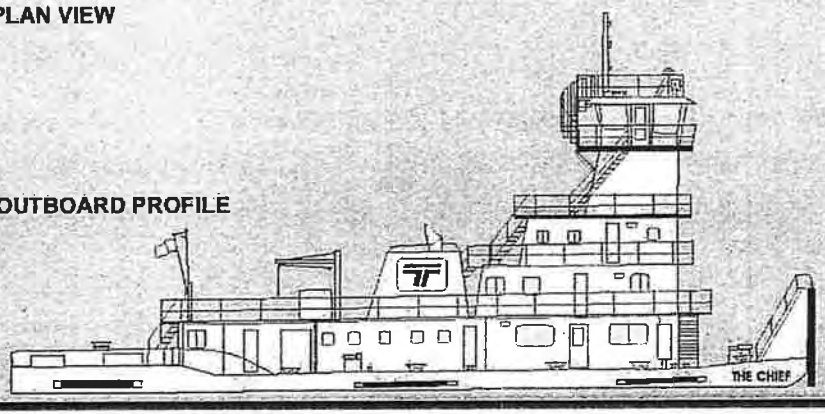
TIDEWATER

THE CHIEF

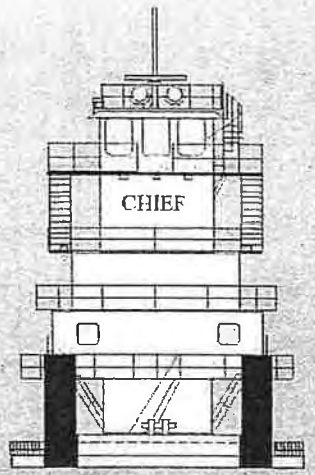
Not to Scale



PLAN VIEW



OUTBOARD PROFILE



FRONT VIEW

OWNER: Tidewater Barge Lines, Inc. 6305 NW Lower River Rd Vancouver, WA 98660	
PHONE: (360)683-1491 **FAX:** (360)694- 8981	
OPERATOR: Tidewater Barge Lines, Inc. 6305 NW Lower River Rd Vancouver, WA 98660	
PHONE: (360)683-1491 **FAX:** (360)694- 8981	
OFFICIAL NUMBER: 514987	
COFR NUMBER: 104864-10	
HULL MATERIAL:	Steel
ENGINE ROOM FIRE SYSTEM : CO2	
LENGTH:	121' 6"
BEAM:	40'
DEPTH:	11'
HORSEPOWER:	4,300
PROPELLERS:	Two 95" dia Two 96" dia Kort nozzels
FUEL CAPACITY:	63,662 gal
LUBE OIL CAPACITY:	2,280 gal
FRESH WATER CAPACITY:	8,785 gal
EYE LEVEL:	43'
FIXED HEIGHT:	49' 9"
GROSS TONS:	575
NET TONS:	365
BARREL-O-BOOM:	1
SPILL KIT:	1 set

TIDEWATER DISPATCH
(800)562-1001
NATIONAL RESPONSE CENTER:
(800)424-8802

ANK CAPACITY TABLE: (CAPACITY GALS)

ANK	MAX	WORKING (95%)
2 port & starboard (ea)	5860	5567
3 port & starboard (ea)	7340	6973
4 port & starboard (ea)	7480	7106
5 port & starboard (ea)	7175	6816
6 port & starboard (ea)	3976	3777
ube	2400	2280

Worst Case Discharge (BBLS)	Maximum Most Probable Discharge (BBLS)
1573	157

FUEL
The Chief has seven (7) tanks on each side of the hull. The #1 and #7 tanks are not used. The #4 tanks are used as day tanks for both the main and generator engines. The port and starboard systems are independent of each other. The fuel transfer pump is located in the port Generator Room.

LUBE
The Chief has a lube oil storage tank located on the aft bulkhead, center of the boat. The lube oil tank is a free drop tank. The tank fills from the header inside the ecology box at the stern of the main deck, center of house.

Detail transfer procedures are available in the Tidewater Operational Procedures notebook

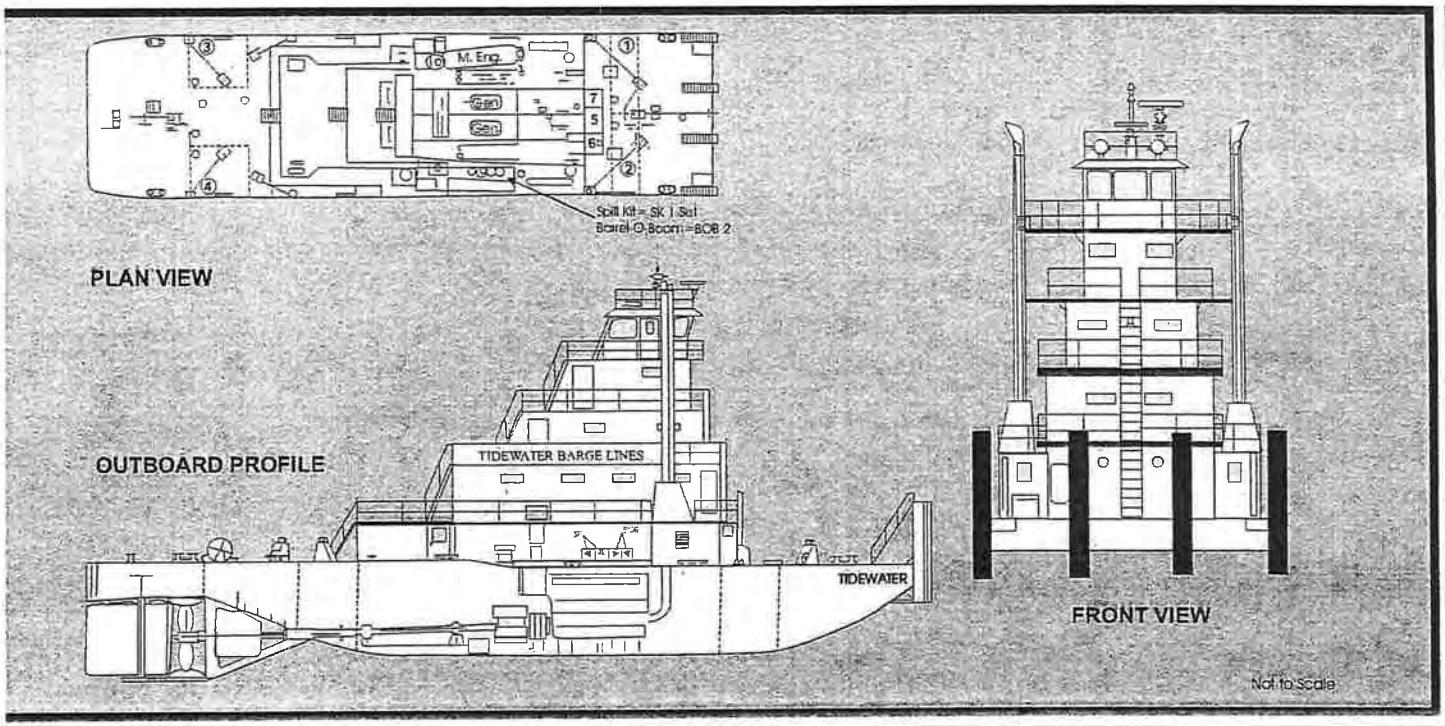
June 2005

Tug

water\TCP\Graphics\Barge\chief.cdr

Same frequency as the Defiance

TIDEWATER



TANK CAPACITY TABLE: (CAPACITY GALS)

TANK	MAX	WORKING (95%)
Port bow	7447	7075
Starboard bow	7447	7075
Port stern	10311	9795
Starboard stern	10311	9795
Main Engine day tank	3958	3760
Generator day tank	789	750
Lube	2200	1980

Worst Case Discharge (BBLS)	Maximum Most Probable Discharge (BBLS)
1011	101

FUEL
The Tidewater has four (4) diesel storage tanks. Two (2) are located in the bow - port and starboard and two are located in the stern - port and starboard. A main engine day tank supplies diesel to the main engines. A generator day tank supplies diesel to the generators. The diesel fuel header is in the starboard bow ecology box.

LUBE
The Tidewater has a lube oil storage tank located forward of the engine room, to the port side of the main engine day tank. The lube oil storage tank has a capacity of 2,200 gallons. The lube oil storage tank fill is on the bow - through a plug hole in the lube oil storage tank hatch (the hatch is painted black).

Detail transfer procedures are available in the Tidewater Operational Procedures notebook

June 2005

TIDEWATER

OWNER: Tidewater Barge Lines, Inc. 6305 NW Lower River Rd Vancouver, WA 98660	
PHONE: (360)683-1491 **FAX:** (360)694- 8981	
OPERATOR: Tidewater Barge Lines, Inc. 6305 NW Lower River Rd Vancouver, WA 98660	
PHONE: (360)683-1491 **FAX:** (360)694- 8981	
OFFICIAL NUMBER: 277141	
COFR NUMBER: 104864-10	
HULL MATERIAL:	Steel
ENGINE ROOM FIRE SYSTEM : Halon/CO2	
LENGTH:	127'
BEAM:	34'
DEPTH:	11' 6"
HORSEPOWER:	3,600
PROPELLERS:	Two 107" dia Two 108" dia Kort nozzels
FUEL CAPACITY:	40,260 gal
LUBE OIL CAPACITY:	2,200 gal
FRESH WATER CAPACITY:	3,730 gal
EYE LEVEL:	42' 6"
FIXED HEIGHT:	49' 6"
GROSS TONS:	468
NET TONS:	318
BARREL-O-BOOM:	1
SPILL KIT:	1 set

TIDEWATER DISPATCH
(800)562-1607
NATIONAL RESPONSE CENTER:
(800)424-8802

Tug

vater\ICP\Graphics\Barge\tidwater.cdr

Same frequency as the Defiance

Marine Contractors

Company: Advanced American Construction

Vessels:

- DB 125
- DB 4000
- DB 4041
- DB 4100
- Paul Bunyan
- Lindy Marie

Company did not respond to IBR request. Information below was included in the CRC NIR.

Marine Contractors

Owner: Advanced American Construction

Vessel: DB 125

DB 125 Equip. #3-18

American	R-30	125	1966
Manufacturer	Model	Max Capacity	Year

Item	Description	Unit	Quantity	Type
	Crane			
1	Line 1 (Main)	LBS	2250	1 1/8" wire
	Line 2 (Whip)	LBS	1000	1 1/8" wire
	Line 3 (Whip)	LBS		
2	Boom	Feet	130'	--
			1850'	1 1/8" wire
3	Width / Outriggers	Feet	--	--
	Length / Outriggers	Feet	--	--
4	Height w/boom down	Feet	51'	--
5	Shipping Weight	LBS	--	--
	Trucks / Ship	EA	--	--
	Barge			
	Width	Feet	53'	--
	Length	Feet	117'	--
	Depth	Feet	10'	--
	Draft	Feet		
	Rakes		78'	--
	Spuds	Feet		--
*	Serial Number: 24626			

Notes: _____

Vessel Height Verification Sheet

By: Jennifer Rabby Date: 23 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Advanced American Construction
   b. Name of contact: Mike Johns
   c. Phone number (Office): 5053.445.9000 (Cell): 503.720.1108
   d. Email: mikej@callaac.com
   e. Address: 8444 NW St Helens Road City: Portland
      State: OR Zip code: 97231
2. Vessel
   a. ID: Serial No. 24626 b. Name: DB 125
   c. Type: Crane Barge d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Crane Barge
   - Is a vessel specification sheet available? Yes
   - Configuration shown on the sheet: No
   - What is the lowest height configuration for transport? 51ft (spuds removed)

   b. What is the gantry configuration? Estimated gantry height: 51 feet

   c. Does the barge have spuds? Yes
   - Height above waterline for travel? 78 Feet
   - Can the spuds be removed for travel? Only for long distances upstream for big jobs; not for work in the Portland Harbor
   - Work and cost involved in removing spuds? ½-1 day
4. Vessel Location
   a. Where is the vessel currently located? AAC Dock in Portland
   b. Is it working on a job? No, but headed out soon Is it tied up to shore? Yes

c. What is the best time to make a trip to the vessel? _____

5. Surveyed Measurements (measurements from Spec sheets)

Gantry Height:	51
Water Level:	
Top of Boom:	
Height of Boom Hinge Pin:	
Boom Cradle:	
Top of Spud:	78

6. Vessel Height

Self-Reported		From Spec Sheet	
Air Draft:	90 feet (top of spuds)	Air Draft:	78 feet (top of spuds)
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet	Water Level:	16 feet
Total Height:	116 feet	Total Height:	104 feet

7. History Notes

Date	Item
2/20/2012	Contacted by Megan Nelson
3/8/2012	Returned River User Data Sheet for the Linde Marie via email
7/23/2012	Interviewed by Karl Krcma and Jennifer Rabby; Vessel specification sheets provided

Marine Contractors
Owner: Advanced American Construction
Vessel: DB 4000

No image available

Vessel Height Verification Sheet

By: Jennifer Rabby Date: 23 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Advanced American Construction
   b. Name of contact: Mike Johns
   c. Phone number (Office): 5053.445.9000 (Cell): 503.720.1108
   d. Email: mikej@callaac.com
   e. Address: 8444 NW St Helens Road City: Portland
      State: OR Zip code: 97231
2. Vessel
   a. ID: Serial No. 4000 b. Name: DB 4000
   c. Type: Crane Barge d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Crane Barge (portable crane on spud barge)
   - Is a vessel specification sheet available? No, however, identical to DB 4041, with different spud lengths
   - Configuration shown on the sheet: No
   - What is the lowest height configuration for transport? Estimated 35 feet

   b. What is the gantry configuration? Estimated gantry height: 35 feet
   c. Does the barge have spuds? Yes
   - Height above waterline for travel? 79.5 Feet
   - Can the spuds be removed for travel? Only for long distances upstream for big jobs; not for work in the Portland Harbor
   - Work and cost involved in removing spuds? ½-1 day
4. Vessel Location
   a. Where is the vessel currently located? Bull Run

b. Is it working on a job? Yes Is it tied up to shore? No

c. What is the best time to make a trip to the vessel? _____

5. Surveyed Measurements (measurements from Specs)

Gantry Height:	Estimated 35 feet
Water Level:	
Top of Boom:	
Height of Boom Hinge Pin:	
Boom Cradle:	
Top of Spud:	79.5 feet

6. Vessel Height

Self-Reported		Spec measurements	
Air Draft:	90 feet (top of spuds)	Air Draft:	79.5 (top of spuds)
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet	Water Level:	16 feet
Total Height:	116 feet	Total Height:	105.5 feet

7. History Notes

Date	Item
2/20/2012	Contacted by Megan Nelson
3/8/2012	Returned River User Data Sheet for the Linde Marie via email
7/23/2012	Interviewed by Karl Krcma and Jennifer Rabby; Vessel specification sheets provided

Marine Contractors

Owner: Advanced American Construction

Vessel: DB 4041

4041 Equip. #3-02

Manitowoc	4000 - 4041	100 T	1961
Manufacturer	Model	Max Capacity	Year

Item	Description	Unit	Quantity	Capacity
	Crane			
1	Line 1 (Main)	LBS	875'	1 1/8" wire
	Line 2 (Whip)	LBS	405'	1 1/8" wire
	Line 3 (Whip)	LBS	--	--
	Boom Line		450'	1" wire
2	Boom	Feet	180'	
3	Width / Outriggers	Feet	n/a	
	Length / Outriggers	Feet	n/a	
4	Height w/boom down	Feet		
5	Shipping Weight	LBS	104,398	
	Trucks / Ship	EA	1	
*	Serial Number: 4041			

4041 Notes: LENGTH 60 X 105 X 5' DRAFT SPUDS ~~78~~ 71'

4000 — LENGTH 60 X 105 X 7 DRAP SPUDS 99' 6"

Vessel Height Verification Sheet

By: Jennifer Rabby Date: 23 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Advanced American Construction
   b. Name of contact: Mike Johns
   c. Phone number (Office): 5053.445.9000 (Cell): 503.720.1108
   d. Email: mikej@callaac.com
   e. Address: 8444 NW St Helens Road City: Portland
      State: OR Zip code: 97231
2. Vessel
   a. ID: Serial No. 4041 b. Name: DB 4041
   c. Type: Crane Barge d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Crane Barge (Portable crane on spud barge)
   - Is a vessel specification sheet available? Yes
   - Configuration shown on the sheet: No
   - What is the lowest height configuration for transport? Estimated 35ft

   b. What is the gantry configuration? Estimated gantry height: 35 ft
   c. Does the barge have spuds? Yes
   - Height above waterline for travel? 71 Feet
   - Can the spuds be removed for travel? Only for long distances upstream for big jobs; not for work in the Portland Harbor
   - Work and cost involved in removing spuds? ½-1 day
4. Vessel Location
   a. Where is the vessel currently located? AAC Dock in Portland
   b. Is it working on a job? No Is it tied up to shore? Yes

c. What is the best time to make a trip to the vessel? _____

5. Surveyed Measurements (all measurements from specs)

Gantry Height:	Estimated 35 feet
Water Level:	
Top of Boom:	
Height of Boom Hinge Pin:	
Boom Cradle:	
Top of Spud:	71 feet

6. Vessel Height

Self-Reported		From spec sheet	
Air Draft:	90 feet (top of spuds)	Air Draft:	71 feet (top of spuds)
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet	Water Level:	16 feet
Total Height:	116 feet	Total Height:	97 feet

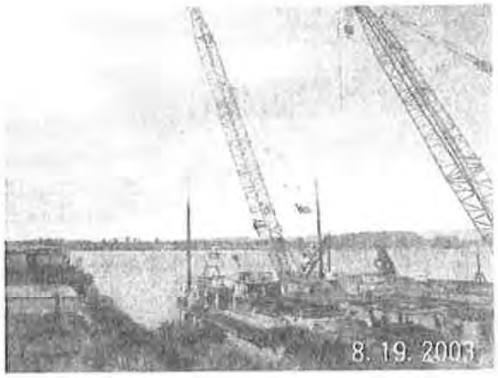
7. History Notes

Date	Item
2/20/2012	Contacted by Megan Nelson
3/8/2012	Returned River User Data Sheet for the Linde Marie via email
7/23/2012	Interviewed by Karl Krcma and Jennifer Rabby; Vessel specification sheets provided

Marine Contractors
Owner: Advanced American Construction
Vessel: DB 4100

4100 DB — Equip. #3-10

Manufacturer	Model	Max Capacity	Year
Manitowoc	4100 Series 2 Vicon	225 Ton	1992



Item	Description	Unit	Quantity	Type
	Crane			
1	Line 1 (Main)	LBS	1000'	1 1/8" wire
	Line 2 (Whip)	LBS	450'	1 1/8" wire
	Line 3 (Whip)	LBS	450'	1 1/8" wire
	Boom Wire		760'	7/8" wire
2	Boom	Feet	180'	
3	Width / Outriggers	Feet	--	--
	Length / Outriggers	Feet	--	--
4	Height w/boom down	Feet	~~53'~~ 14' 2"	--
5	Shipping Weight	LBS	450,572	--
	Trucks / Ship	EA	7	--
	Barge			
1	Width	Feet	60'	--
2	Length	Feet	105'	--
3	Depth	Feet	7'	--
4	Draft	Feet		
5	Rakes		1	--
6	Spuds	Feet	~~78~~ 92	--
*	Serial Number: 413419			

Notes: Equipment on barge: 4100 (#3-10), Bulldog Gen Set 5 kw mounted on crane (no equip. no.), 25 kw multi-equip. Gen Set (#9-35), Hydra-Pac 4000, hydraulic unit for spuds (#10-01), 2 winches (#14-12 and #14-24). Deutz F3L1011F engine, replaced in 7/03.

Vessel Height Verification Sheet

By: Jennifer Rabby Date: 23 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Advanced American Construction
   b. Name of contact: Mike Johns
   c. Phone number (Office): 5053.445.9000 (Cell): 503.720.1108
   d. Email: mikej@callaac.com
   e. Address: 8444 NW St Helens Road City: Portland
      State: OR Zip code: 97231
2. Vessel
   a. ID: Serial No. 413419 b. Name: 4100 DB
   c. Type: Crane Barge d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Crane Barge
      - Is a vessel specification sheet available? Yes
      - Configuration shown on the sheet: No
      - What is the lowest height configuration for transport? 35 feet

   b. What is the gantry configuration? Estimated gantry height: 35 Feet

   c. Does the barge have spuds? Yes
      - Height above waterline for travel? 92 Feet
      - Can the spuds be removed for travel? Only for long distances upstream for big jobs; not for work in the Portland Harbor
      - Work and cost involved in removing spuds? ½-1 day
4. Vessel Location
   a. Where is the vessel currently located? Kalama
   b. Is it working on a job? Yes Is it tied up to shore? no

c. What is the best time to make a trip to the vessel? _____

5. Surveyed Measurements (measurements from spec sheet)

Gantry Height:	35
Water Level:	
Top of Boom:	
Height of Boom Hinge Pin:	
Boom Cradle:	
Top of Spud:	92

6. Vessel Height

Self-Reported		Heights from Spec sheet	
Air Draft:	90 feet (top of spuds)	Air Draft:	92
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet	Water Level:	16 feet
Total Height:	116 feet	Total Height:	118 feet

7. History Notes

Date	Item
2/20/2012	Contacted by Megan Nelson
3/8/2012	Returned River User Data Sheet for the Linde Marie via email
7/23/2012	Interviewed by Karl Krcma and Jennifer Rabby; Vessel specification sheets provided

Marine Contractors

Owner: Advanced American Construction

Vessel: Paul Bunyan

Paul Bunyan — Equip# 3-20

US Navy — 1944

Manufacturer | Model | Max Capacity | Year

Item	Description	Unit	Quantity	Capacity
1	Width	Feet	52'	
	Length	Feet	152'	
	Depth	Feet	11'	
	Draft	Feet		
	Rakes			
	Spud Pocket(s)		2	
	Spud(s)		2	

Notes: _____

Vessel Height Verification Sheet

By: Jennifer Rabby Date: 23 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Advanced American Construction
   b. Name of contact: Mike Johns
   c. Phone number (Office): 5053.445.9000 (Cell): 503.720.1108
   d. Email: mikej@callaac.com
   e. Address: 8444 NW St Helens Road City: Portland
      State: OR Zip code: 97231
2. Vessel
   a. ID: b. Name: Paul Bunyan
   c. Type: Spud Barge d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Spud Barge
   - Is a vessel specification sheet available? Yes
   - Configuration shown on the sheet: No
   - What is the lowest height configuration for transport? 11 feet with spuds removed

   b. What is the gantry configuration? N/A Estimated gantry height: N/A

   c. Does the barge have spuds? Yes
   - Height above waterline for travel? 78 Feet
   - Can the spuds be removed for travel? Only for long distances upstream for big jobs; not for work in the Portland Harbor
   - Work and cost involved in removing spuds? ½-1 day
4. Vessel Location
   a. Where is the vessel currently located? AAC Dock in Portland
   b. Is it working on a job? No Is it tied up to shore?

c. What is the best time to make a trip to the vessel? _____

5. Spec Measurements

Gantry Height:	
Water Level:	
Top of Boom:	
Height of Boom Hinge Pin:	
Boom Cradle:	
Top of Spud:	78 feet

6. Vessel Height

Self-Reported		Spec measurements	
Air Draft:	Not previously reported	Air Draft:	78 feet (top of spuds)
Air Gap:		Air Gap:	10 feet
Water Level:		Water Level:	16 feet
Total Height:		Total Height:	104 feet

7. History Notes

Date	Item
2/20/2012	Contacted by Megan Nelson
3/8/2012	Returned River User Data Sheet for the Linde Marie via email
7/23/2012	Interviewed by Karl Krcma and Jennifer Rabby; Vessel specification sheets provided

Marine Contractors

Owner: Advanced American Construction

Vessel: Linde Marie

River User Data Sheet By:_____ Date: 3-8-12

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: ADVANCED AMERICAN CONSTRUCTION
   b. Name of contact: Mike Johns
   c. Phone number (Office): 503-445-9000 d. (Cell): 503-720-1108
   e. Email: MIKEJ@CAMAAC.com
   f. Address: P.O. Box 83599
   g. City: PORTLAND OR
   h. State: ORE i. Zip code: 97283

3a. Vessel Name: LINDE MARIE 3b. Vessel Type: TUG

3c. US Coast Guard Document Number: 265180

4a. Length Overall (LOA), feet: 58.4 4b. Beam (width), feet: 16.5

5. Draft (depth of hull below waterline, fully laden), feet: 5.5

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 35'

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 40 NOTE ITEM 13"

8. Frequency of one-way passage underneath I-5 main channel (typical per month): 1-2

   Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___

9. Frequency of one-way passage underneath I-5 main channel (other historic events):____

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

    Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): 5

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy? N/A

13. Other miscellaneous

AAC IS A MARINE CONSTRUCTION CO. HEIGHT OF VESSEL IS MAINLY DETERMINED BY A TYPICAL CRANE BARGE BEING PUSHED,

HEIGHT OF SPUDS 90' ABOVE W/L "MIN" (AIR GAP 100')

"MIN" CRANE GANTRY HEIGHT 65' "AT THIS TIME" ABOVE W/L (AIR GAP 75')

AAC PUSHES AAC OWNED EQUIPMENT ONLY (TYPICALLY) SHORT HAUL OR JOB TUGGING. LONG HAUL WE CONTRACT OUT

Mike John

Marine Contractors

Company: Bergerson

Vessels:

- Betsy Ross
- Carr Barge
- Sectional Barge
- Darryl B
- Olaf J

Company did not respond to IBR request. Information below was included in the CRC NIR.

Marine Contractors

Owner: Bergerson Construction Inc.

Vessels: Betsy Ross

Darryl B

Olaf J

Vessel: Betsy Ross

Ask for Tonnage? ✓HAS ^FOR TUGS ONLY

5 TOTAL BARGES/VESSEL

River User Data Sheet By:_____ Date:_____

1. Company Name and/or Owner of Vessel and contact information

3 cranes
2 Tugs

   a. Name of company: Bergerson Construction, Inc.
   b. Name of contact: Gregory Morrill
   c. Phone number (Office): 503-325-7130 d. (Cell): 503-440-7342
   e. Email: gmorrill@bergerson-const.com
   f. Address: 55 Portway (P.O. Box 387)
   g. City: Astoria
   h. State: OR i. Zip code: 97103

3a. Vessel Name: Betsy Ross 3b. Vessel Type: Crane Barge

3c. US Coast Guard Document Number: N/A

4a. Length Overall (LOA), feet: 120' 4b. Beam (width), feet: 63'

5. Draft (depth of hull below waterline, fully laden), feet: 5'

Clarify ↓

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 40-150'

Typ. lower for travel
Typ. to 70'

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 10'

8. Frequency of one-way passage underneath I-5 main channel (typical per month): Varies

PHONE CONV. 2/29 w/ G. MORRILL

Jan ___ Feb ___ Mar ___ Apr ___ May ___ Jun ___ Jul ___ Aug ___ Sep ___ Oct ___ Nov ___ Dec ___

9. Frequency of one-way passage underneath I-5 main channel (other historic events): Varies

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month): Varies

Jan ___ Feb ___ Mar ___ Apr ___ May ___ Jun ___ Jul ___ Aug ___ Sep ___ Oct ___ Nov ___ Dec ___

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): Varies

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy? Yes. It does not address vessel traffic in this specific area.

13. Other miscellaneous

As a construction company predicting vessel traffic in a specific area is quite difficult as it is directly related to which contracts we are awarded.

TONNAGE = 38 TONS

River User Data Sheet By:_____ Date:_____

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: Bergerson Construction, Inc.
   b. Name of contact: Gregory Morrill
   c. Phone number (Office): 503-325-7130 d. (Cell): 503-440-7342
   e. Email: gmorrill@bergerson-const.com
   f. Address: 55 Portway (P.O. Box 387)
   g. City: Astoria
   h. State: OR i. Zip code: 97103

3a. Vessel Name: Darryl B. 3b. Vessel Type: Tug

3c. US Coast Guard Document Number: N/A

4a. Length Overall (LOA), feet: 52' 4b. Beam (width), feet: 14.1'

5. Draft (depth of hull below waterline, fully laden), feet: 5.6'

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 20'

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 10'

8. Frequency of one-way passage underneath I-5 main channel (typical per month): Varies

   Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___ Aug___ Sep___ Oct___ Nov___ Dec___

9. Frequency of one-way passage underneath I-5 main channel (other historic events): Varies

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month): Varies

    Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___ Aug___ Sep___ Oct___ Nov___ Dec___

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): Varies

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy? Yes. It does not address vessel traffic in this specific area.

13. Other miscellaneous

As a construction company predicting vessel traffic in a specific area is quite difficult as it is directly related to which contracts we are awarded.

TONNAGE = 40 TONS

River User Data Sheet By:_____ Date:_____

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: Bergerson Construction, Inc.
   b. Name of contact: Gregory Morrill
   c. Phone number (Office): 503-325-7130 d. (Cell): 503-440-7342
   e. Email: gmorrill@bergerson-const.com
   f. Address: 55 Portway (P.O. Box 387)
   g. City: Astoria
   h. State: OR i. Zip code: 97103

3a. Vessel Name: Olaf J 3b. Vessel Type: Tug

3c. US Coast Guard Document Number: N/A

4a. Length Overall (LOA), feet: 48.6' 4b. Beam (width), feet: 16.1'

5. Draft (depth of hull below waterline, fully laden), feet: 5.7'

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 35'

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 10'

8. Frequency of one-way passage underneath I-5 main channel (typical per month): Varies

   Jan___ Feb___ Mar___ Apr___ May___ Jun___ Jul___ Aug___ Sep___ Oct___ Nov___ Dec___

9. Frequency of one-way passage underneath I-5 main channel (other historic events): Varies

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month): Varies

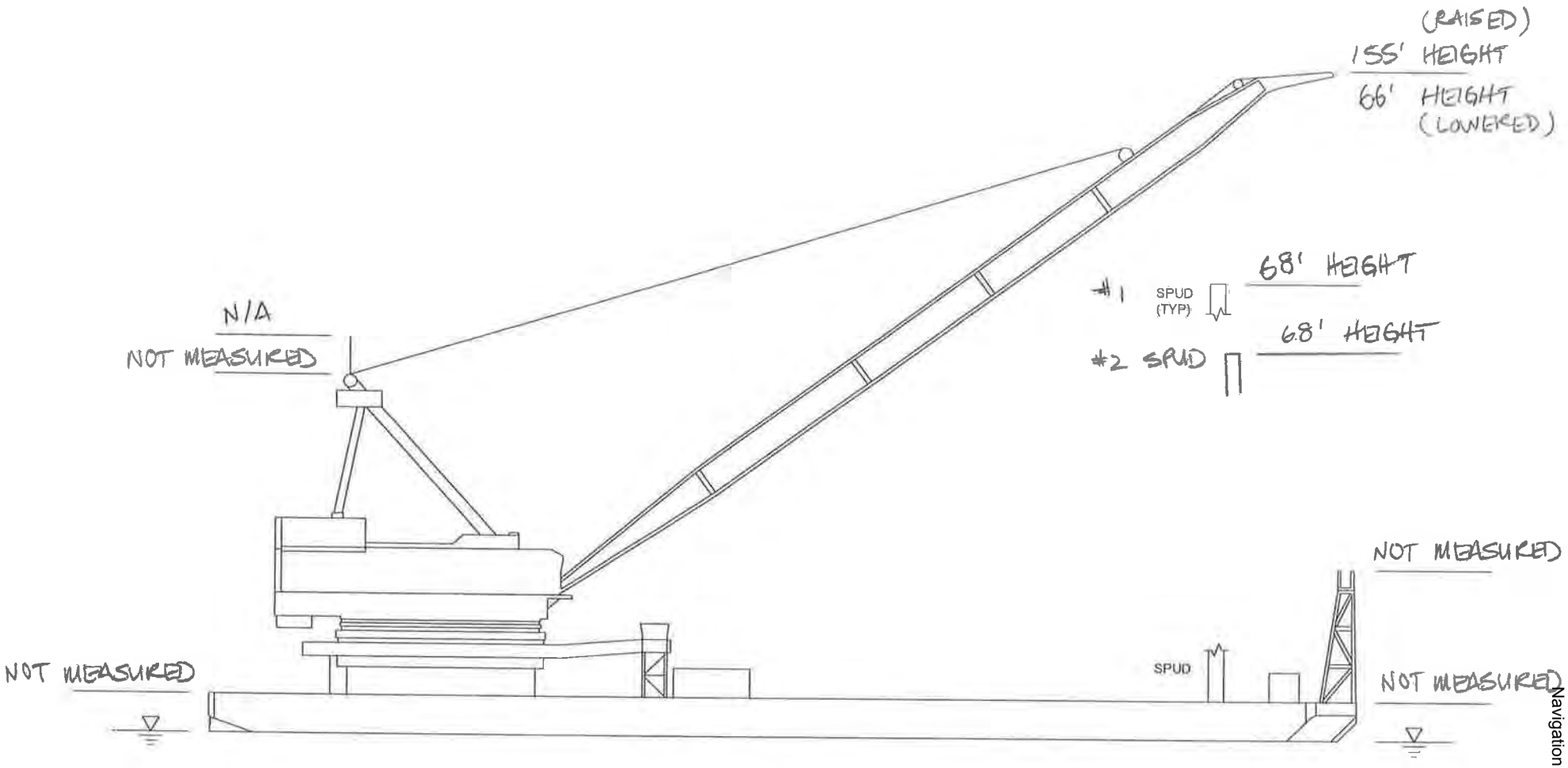
    Jan___ Feb___ Mar___ Apr___ May___ Jun___ Jul___ Aug___ Sep___ Oct___ Nov___ Dec___

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): Varies

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy? Yes. It does not address vessel traffic in this specific area.

13. Other miscellaneous

As a construction company predicting vessel traffic in a specific area is quite difficult as it is directly related to which contracts we are awarded.



BETSY ROSS

NAME

BERGERSON CONSTRUCTION INC.
MEASURED AT
PORT OF ASTORIA, OR

LOCATION

07-10-12

DATE

Vessel Name	Owner	Antenna Elev (ft)	Mast Elev (ft)	Spud Elev (ft)	Boom Crane Elev (ft)	Gantry Elev (ft)	Pivot Pt Elev (ft)	Cradle Elev (ft)	Water Elev (ft)	Height Above Water
Ironwood	Tongue Point Job Corps Maritime Training Program	60.2	N/M	N/A	N/A	N/A	N/A	N/A	3.4	57
		77.4	N/M	N/A	N/A	N/A	N/A	N/A	3.4	74
		80.5	N/M	N/A	N/A	N/A	N/A	N/A	3.4	77
Heidi Renee	J.E. McAmis	N/A	N/A	82.8	N/A	N/A	N/A	N/A	2.2	81
Carr	Bergerson Construction Inc.	N/A	N/A	79.1	N/M	N/M	N/M	N/A	1.8	77
		N/A	N/A	80.2	N/M	N/M	N/M	N/A	1.8	78
		N/A	N/A	N/M	53.5	N/M	N/M	N/A	1.8	52
		N/A	N/A	N/M	94.8	N/M	N/M	N/A	1.8	93
Betsy Ross	Bergerson Construction Inc.	N/A	N/A	71.0	NM	N/M	N/M	N/M	3.0	68
		N/A	N/A	N/M	69.3	N/M	N/M	N/M	3.0	66
		N/A	N/A	N/M	158.4	N/M	N/M	N/M	3.0	155
		N/A	N/A	71.4	NM	N/M	N/M	N/M	3.0	68

N/A - does not exist
N/M - exists but not measured

Vessel Height Verification Sheet

By: Karl Krcma Date: 10 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Bergerson Construction, Inc.
   b. Name of contact: Gregory Morrill
   c. Phone number (Office): 503.325.7130 (Cell): 503.440.7342
   d. Email: gmorrill@bergersonconst.com
   e. Address: 55 Portway (P.O. Box 387) City: Astoria
      State: OR Zip code: 97103
2. Vessel
   a. ID: b. Name: Betsy Ross
   c. Type: Crane Barge d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Crane Barge
   - Is a vessel specification sheet available? No
   - Configuration shown on the sheet: N/A
   - What is the lowest height configuration for transport? Crane down at 66 ft, spuds removed

   b. What is the gantry configuration? Estimated gantry height: Not given
   c. Does the barge have spuds? Yes, two
   - Height above waterline for travel? 68 Feet
   - Can the spuds be removed for travel? Only in very special circumstances when they travel far upriver on the Columbia
   - Work and cost involved in removing spuds? ½ day to day to remove spuds; need to tie up to a dock near the work area.
4. Vessel Location

a. Where is the vessel currently located? Astoria, OR

b. Is it working on a job? No Is it tied up to shore? yes

c. What is the best time to make a trip to the vessel? Prior to August

5. Surveyed Measurements (all measurements above water line)

Gantry Height:	N/A
Water Level:	N/A
Top of Boom:	Raised = 155 ft At travel angle = 66 feet
Height of Boom Hinge Pin:	N/A
Boom Cradle:	N/A
Top of Spud:	68 feet

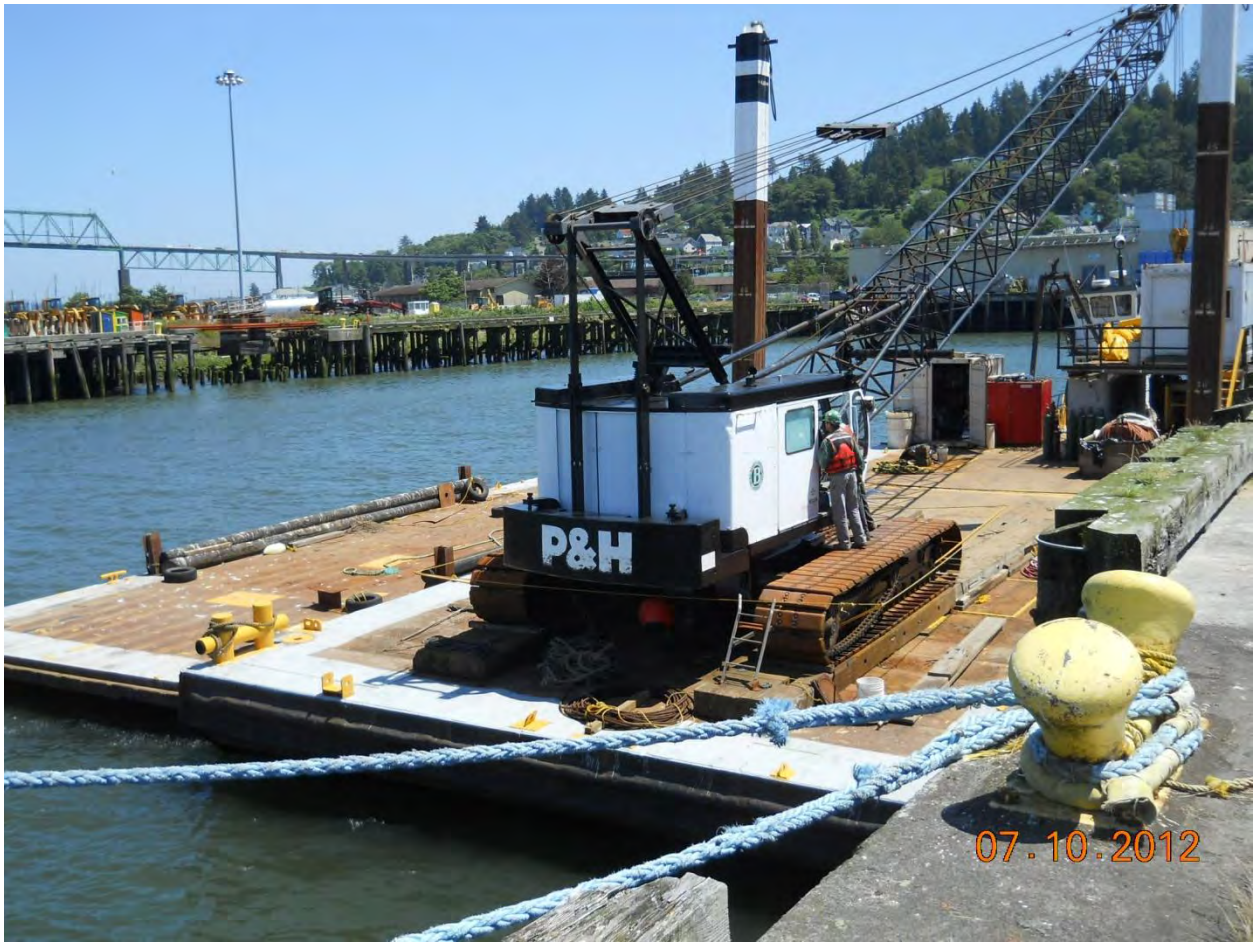
6. Vessel Height

Self-Reported		Surveyed	
Air Draft:	70 feet (Top of Spuds)	Air Draft:	68 feet
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet CRD	Water Level:	16 feet CRD
Total Height:	96 feet	Total Height:	94 feet

7. History Notes

Date	Item
2/17/2012	Contacted by Megan Nelson
2/29/2012	Data sheet submitted
7/3/2012	Contacted by Pete Geiger for field measurement
7/10/2012	Field measured
7/17/2012	New data sheet submitted

Marine Contractors
Owner: Bergerson Construction
Vessel: Carr Barge



River User Data Sheet By:_____ Date:_____

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: Bergerson Construction, Inc.
   b. Name of contact: Gregory Morrill
   c. Phone number (Office): 503-325-7130 d. (Cell): 503-440-7342
   e. Email: gmorrill@bergerson-const.com
   f. Address: 55 Portway (P.O. Box 387)
   g. City: Astoria
   h. State: OR i. Zip code: 97103

3a. Vessel Name: Carr Barge 3b. Vessel Type: Crane Barge

3c. US Coast Guard Document Number: N/A

4a. Length Overall (LOA), feet: 104' 4b. Beam (width), feet: 40'

5. Draft (depth of hull below waterline, fully laden), feet: 6'

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: ~~40~~ 120'

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 10' 70' 2/29

8. Frequency of one-way passage underneath I-5 main channel (typical per month): Varies

   Jan ___ Feb ___ Mar ___ Apr ___ May ___ Jun ___ Jul ___ Aug ___ Sep ___ Oct ___ Nov ___ Dec ___

9. Frequency of one-way passage underneath I-5 main channel (other historic events): Varies

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month): Varies

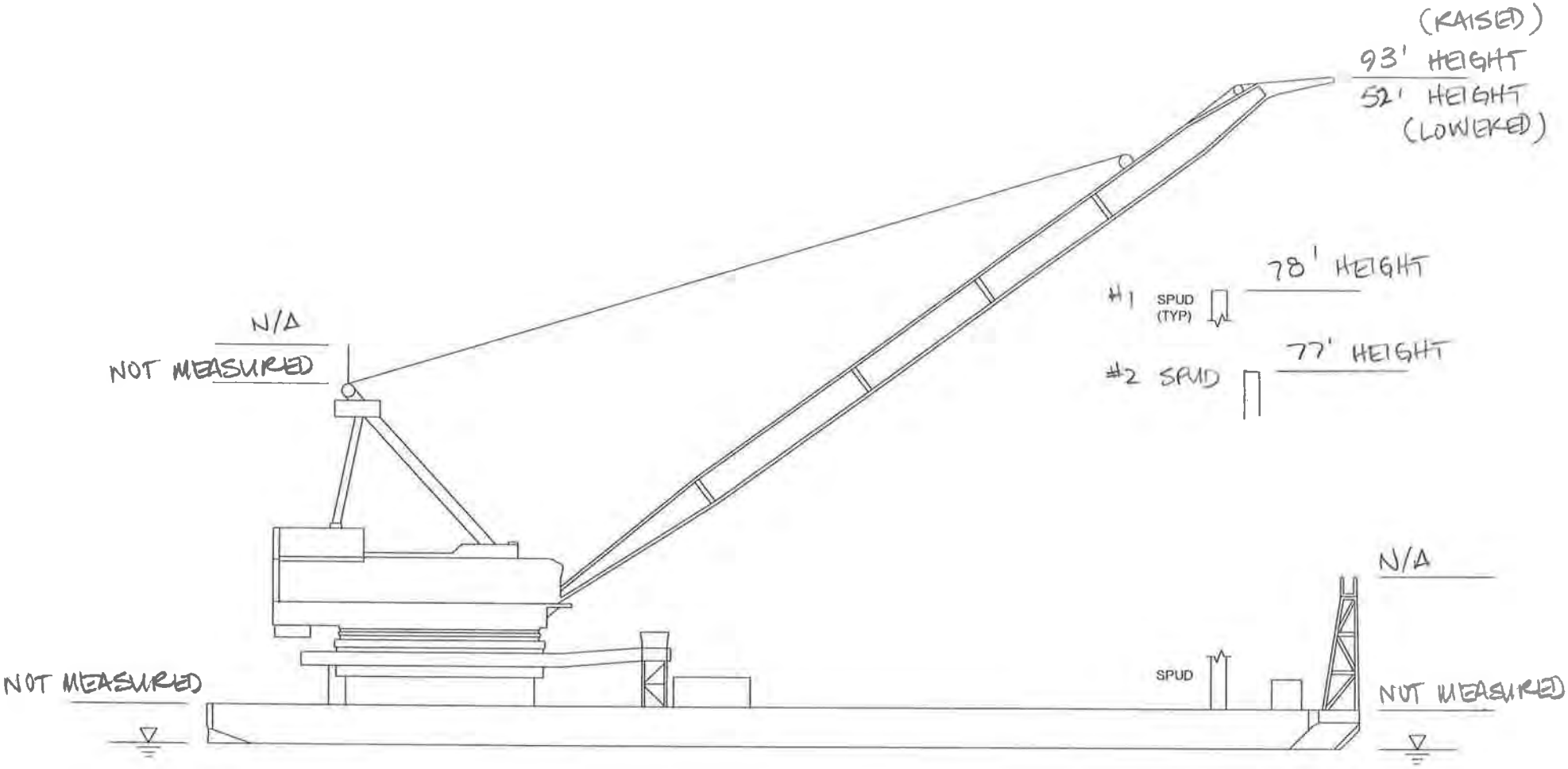
    Jan ___ Feb ___ Mar ___ Apr ___ May ___ Jun ___ Jul ___ Aug ___ Sep ___ Oct ___ Nov ___ Dec ___

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): Varies

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy? Yes. It does not address vessel traffic in this specific area.

13. Other miscellaneous

As a construction company predicting vessel traffic in a specific area is quite difficult as it is directly related to which contracts we are awarded.



CARR

NAME

BERGERSON CONSTRUCTION INC.
MEASURED AT
PORT OF ASTORIA, OR

LOCATION

07-10-12

DATE

CRC Vessel Verification
Prepared by: David Evans and Associates, Inc.

Vessel Name	Owner	Antenna Elev (ft)	Mast Elev (ft)	Spud Elev (ft)	Boom Crane Elev (ft)	Gantry Elev (ft)	Pivot Pt Elev (ft)	Cradle Elev (ft)	Water Elev (ft)	Height Above Water
Ironwood	Tongue Point Job Corps Maritime Training Program	60.2	N/M	N/A	N/A	N/A	N/A	N/A	3.4	57
		77.4	N/M	N/A	N/A	N/A	N/A	N/A	3.4	74
		80.5	N/M	N/A	N/A	N/A	N/A	N/A	3.4	77
Heidi Renee	J.E. McAmis	N/A	N/A	82.8	N/A	N/A	N/A	N/A	2.2	81
Carr	Bergerson Construction Inc.	N/A	N/A	79.1	N/M	N/M	N/M	N/A	1.8	77
		N/A	N/A	80.2	N/M	N/M	N/M	N/A	1.8	78
		N/A	N/A	N/M	53.5	N/M	N/M	N/A	1.8	52
		N/A	N/A	N/M	94.8	N/M	N/M	N/A	1.8	93
Betsy Ross	Bergerson Construction Inc.	N/A	N/A	71.0	NM	N/M	N/M	N/M	3.0	68
		N/A	N/A	N/M	69.3	N/M	N/M	N/M	3.0	66
		N/A	N/A	N/M	158.4	N/M	N/M	N/M	3.0	155
		N/A	N/A	71.4	NM	N/M	N/M	N/M	3.0	68

N/A - does not exist
N/M - exists but not measured

Vessel Height Verification Sheet

By: Karl Krcma Date: 10 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Bergerson Construction, Inc.
   b. Name of contact: Gregory Morrill
   c. Phone number (Office): 503.325.7130 (Cell): 503.440.7342
   d. Email: gmorrill@bergersonconst.com
   e. Address: 55 Portway (P.O. Box 387) City: Astoria
      State: OR Zip code: 97103
2. Vessel
   a. ID: b. Name: Carr Barge
   c. Type: Crane Barge d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Crane Barge
   - Is a vessel specification sheet available? No
   - Configuration shown on the sheet: N/A
   - What is the lowest height configuration for transport? Crane down at 52 ft, spuds removed

   b. What is the gantry configuration? Estimated gantry height: Not given
   c. Does the barge have spuds? Yes, two
   - Height above waterline for travel? 78 Feet
   - Can the spuds be removed for travel? Only in very special circumstances when they travel far upriver on the Columbia
   - Work and cost involved in removing spuds? ½ day to day to remove spuds; need to tie up to a dock near the work area.
4. Vessel Location

a. Where is the vessel currently located? Astoria, OR

b. Is it working on a job? No Is it tied up to shore? yes

c. What is the best time to make a trip to the vessel? Prior to August

5. Surveyed Measurements (all measurements above water line)

Gantry Height:	N/A
Water Level:	N/A
Top of Boom:	Raised = 93 ft At travel angle = 52 feet
Height of Boom Hinge Pin:	N/A
Boom Cradle:	N/A
Top of Spud:	78 feet

6. Vessel Height

Self-Reported		Surveyed	
Air Draft:	70 feet (Top of Spuds)	Air Draft:	78 feet
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet CRD	Water Level:	16 feet CRD
Total Height:	96 feet	Total Height:	104 feet

7. History Notes

Date	Item
2/17/2012	Contacted by Megan Nelson
2/29/2012	Data sheet submitted
7/3/2012	Contacted by Pete Geiger for field measurement
7/10/2012	Field measured
7/17/2012	New data sheet submitted

Marine Contractors

Owner: Bergerson Construction

Vessel: Sectional Barge

No image available

River User Data Sheet By:_____ Date:_____

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: Bergerson Construction, Inc.
   b. Name of contact: Gregory Morrill
   c. Phone number (Office): 503-325-7130 d. (Cell): 503-440-7342
   e. Email: gmorrill@bergerson-const.com
   f. Address: 55 Portway (P.O. Box 387)
   g. City: Astoria
   h. State: OR i. Zip code: 97103

3a. Vessel Name: Sectional Barge 3b. Vessel Type: Crane Barge

3c. US Coast Guard Document Number: N/A

4a. Length Overall (LOA), feet: 100' (Varies) 4b. Beam (width), feet: 60' (Varies)

5. Draft (depth of hull below waterline, fully laden), feet: 3'

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: ~~40~~ ~~150'~~ 70'

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 10'

2/29

8. Frequency of one-way passage underneath I-5 main channel (typical per month): Varies

   Jan___ Feb___ Mar___ Apr___ May___ Jun___ Jul___ Aug___ Sep___ Oct___ Nov___ Dec___

9. Frequency of one-way passage underneath I-5 main channel (other historic events): Varies

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month): Varies

    Jan___ Feb___ Mar___ Apr___ May___ Jun___ Jul___ Aug___ Sep___ Oct___ Nov___ Dec___

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): Varies

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy? Yes. It does not address vessel traffic in this specific area.

13. Other miscellaneous

As a construction company predicting vessel traffic in a specific area is quite difficult as it is directly related to which contracts we are awarded.

Vessel Height Verification Sheet

By: Karl Krcma Date: 10 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Bergerson Construction, Inc.
   b. Name of contact: Gregory Morrill
   c. Phone number (Office): 503.325.7130 (Cell): 503.440.7342
   d. Email: gmorrill@bergersonconst.com
   e. Address: 55 Portway (P.O. Box 387) City: Astoria
   State: OR Zip code: 97103
2. Vessel
   a. ID: b. Name: Section Barge
   c. Type: Sectional Barge d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Sectional Barge, 40 ft x 10 ft sections that can be connected together
   - Is a vessel specification sheet available? No
   - Configuration shown on the sheet: N/A
   - What is the lowest height configuration for transport? Can be transported by truck

   b. What is the gantry configuration? Estimated gantry height: N/A
   c. Does the barge have spuds? Yes
   - Height above waterline for travel? N/A
   - Can the spuds be removed for travel? Yes
   - Work and cost involved in removing spuds? ½ day to day to remove spuds; need to tie up to a dock near the work area.
4. Vessel Location
   a. Where is the vessel currently located? Aberdeen, Wa

b. Is it working on a job? Yes Is it tied up to shore? No

c. What is the best time to make a trip to the vessel? Not a good time

5. Surveyed Measurements (all measurements above water line)

Gantry Height:	N/A
Water Level:	N/A
Top of Boom:	N/A
Height of Boom Hinge Pin:	N/A
Boom Cradle:	N/A
Top of Spud:	N/A

6. Vessel Height

Self-Reported		Surveyed	
Air Draft:	70 feet (Top of Spuds)	Air Draft:	N/A
Air Gap:	10 feet	Air Gap:	N/A
Water Level:	16 feet CRD	Water Level:	N/A
Total Height:	96 feet	Total Height:	N/A

7. History Notes

Date	Item
2/17/2012	Contacted by Megan Nelson
2/29/2012	Data sheet submitted
7/3/2012	Contacted by Pete Geiger for field measurement
7/17/2012	New data sheet submitted

Marine Contractors

Company: CalPortland

Vessels:

- Johnny Peterson
- Sanderling

Company did not respond to IBR request. Information below was included in the CRC NIR.

Marine Contractors

Owner: CalPortland Co.

Vessels: Johnny Peterson

Sanderling

River User Data Sheet By: TONY CARNERA Date: 3-7-2012

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: CALPORTLAND CO.
   b. Name of contact: TONY CARNERA
   c. Phone number (Office): 360-694-1627 d. (Cell): 971-235-2527
   e. Email: TCARNERA@CALPORTLAND.COM
   f. Address: 3101 NW GATEWAY AVE
   g. City: VANCOUVER
   h. State: WASHINGTON i. Zip code: 98660

3a. Vessel Name: JOHNNY PETERSON 3b. Vessel Type: TUG

3c. US Coast Guard Document Number: 296618

4a. Length Overall (LOA), feet: 52.0 4b. Beam (width), feet: 18.5

5. Draft (depth of hull below waterline, fully laden), feet: 6.6

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 32

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 3-4 FEET ABOVE

8. Frequency of one-way passage underneath I-5 main channel (typical per month): 8

   Jan 8 Feb 8 Mar 8 Apr 8 May 8 Jun 8 Jul 8 Aug 8 Sep 8 Oct 8 Nov 8 Dec 8

9. Frequency of one-way passage underneath I-5 main channel (other historic events):

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

    Jan 0 Feb 0 Mar 0 Apr 0 May 0 Jun 0 Jul 0 Aug 0 Sep 0 Oct 0 Nov 0 Dec 0

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): 0

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy? We do plan on keeping vessels for continued operations.
13. Other miscellaneous

River User Data Sheet By: Tony Carnera Date: 3-7-2012

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: Calportland Co.
   b. Name of contact: Tony Carnera
   c. Phone number (Office): 360-694-1627 d. (Cell): 971-235-2527
   e. Email: TCarnera@Calportland.com
   f. Address: 3101 NW Gateway Ave
   g. City: Vancouver
   h. State: Washington i. Zip code: 98660

3a. Vessel Name: Sunderling 3b. Vessel Type: Dredge

3c. US Coast Guard Document Number: 521611

4a. Length Overall (LOA), feet: 220.1 4b. Beam (width), feet: 40.0

5. Draft (depth of hull below waterline, fully laden), feet: 11.6
6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 32
7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 3-4 Feet
8. Frequency of one-way passage underneath I-5 main channel (typical per month): 8

   Jan 8 Feb 8 Mar 8 Apr 8 May 8 Jun 8 Jul 8 Aug 8 Sep 8 Oct 8 Nov 8 Dec 8
9. Frequency of one-way passage underneath I-5 main channel (other historic events): ____
10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

    Jan 0 Feb 0 Mar 0 Apr 0 May 0 Jun 0 Jul 0 Aug 0 Sep 0 Oct 0 Nov 0 Dec 0
11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): 0

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy? We plan on keeping vessels for future

13. Other miscellaneous
Continued operations.

Marine Contractors

Company: Diversified Marine

Vessels:

- DB Freedom
- DB Lucy
- DB Vulcan
- BMC44
- BRG22
- DMI 100
- DMI 60
- Cougar
- Mariner
- Tiger

Company provided data sheets to the IBR Program. Data sheets are included below, followed by the information included in the CRC NIR.

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Diversified Marine, Inc.

Vessel Name:
BMC44

Vessel Type:
Spud barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Commercial

USCG Document Number:

Primary Mooring Location *(waterway milepoint, if known)*:

Type and quantity of cargo, if applicable:

Length (overall; ft):
200'

Beam (width; ft):
35'

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

6'

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

78

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

10

Tug Assistance Required: Choose an item.

YES

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Diversified Marine, Inc.

Vessel Name:
BRG22

Vessel Type:
Spud barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Commercial

USCG Document Number:

Primary Mooring Location *(waterway milepoint, if known)*:

Type and quantity of cargo, if applicable:

Length (overall; ft):
16' Long

Beam (width; ft):
40'

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

6'

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

85'

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Frequency of passage under Interstate Bridge:

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

10

Tug Assistance Required: Choose an item.

YES

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Diversified Marine, Inc.

Vessel Name:
Cougar

Vessel Type:
Tug

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Commercial

USCG Document Number:
267389

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):
58.3

Beam (width; ft):
16.7

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

5.7

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

50

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Transit speed under Interstate Bridge and Load Configuration:

5 knt

Time of Year of Passage:

10

Tug Assistance Required: Choose an item.

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Diversified Marine, Inc.

Vessel Name:
DB Freedom

Vessel Type:
Derrick barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Commercial

USCG Document Number:
507476

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):
152.1

Beam (width; ft):
60

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

11

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

119

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

10

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Transit speed under Interstate Bridge and Load Configuration:

5 knts

Time of Year of Passage:

10

Tug Assistance Required: Choose an item.

YES

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Diversified Marine, Inc.

Vessel Name:
DB Lucy

Vessel Type:
Derrick barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Commercial

USCG Document Number:

Primary Mooring Location *(waterway milepoint, if known)*:

Type and quantity of cargo, if applicable:

Length (overall; ft):
136’

Beam (width; ft):
37’

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
85

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: Choose an item.

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Diversified Marine, Inc.

Vessel Name:
DB Vulcan

Vessel Type:
Derrick barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Commercial

USCG Document Number:

Primary Mooring Location *(waterway milepoint, if known)*:

Type and quantity of cargo, if applicable:

Length (overall; ft):
101

Beam (width; ft):
45

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

6'

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

89

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

15

Tug Assistance Required: Choose an item.

YES

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company Name: Diversified Marine, Inc.

Vessel Name:
DMI 100

Vessel Type:
Barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Commercial

USCG Document Number:

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):

Beam (width; ft):

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
60

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: Choose an item.

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company Name: Diversified Marine, Inc.

Vessel Name:
DMI 60

Vessel Type:
Barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Commercial

USCG Document Number:

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):
60'

Beam (width; ft):
30'

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
60

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:
15+

Tug Assistance Required: Choose an item.
YES

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company Name: Diversified Marine, Inc.

Vessel Name:
Mariner

Vessel Type:
Tug

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Commercial

USCG Document Number:
296979

Primary Mooring Location *(waterway milepoint, if known)*:

Type and quantity of cargo, if applicable:

Length (overall; ft):
67

Beam (width; ft):
24

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

11

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

45

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: Choose an item.

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company Name: Diversified Marine, Inc.

Vessel Name:
Tiger

Vessel Type:
Tug

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Commercial

USCG Document Number:
256714

Primary Mooring Location *(waterway milepoint, if known)*:

Type and quantity of cargo, if applicable:

Length (overall; ft):
56.9

Beam (width; ft):
17.1

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

6.7

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

38

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: Choose an item.

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Marine Contractors
Owner: Diversified Marine
Vessel: BMC 44

River User Data Sheet By:_____ Date: 2/17/12

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: DIVERSIFIED MARINE INC
   b. Name of contact: KURT REED
   c. Phone number (Office): 503-289-2669 d. (Cell):_____
   e. Email: KURT@DMIPDX.COM
   f. Address: PO BOX 83723 (1801 N MARINE DR)
   g. City: PDX
   h. State: OR i. Zip code: 97283

3a. Vessel Name: SEE ATTACHED 3b. Vessel Type:_____

3c. US Coast Guard Document Number: _____

4a. Length Overall (LOA), feet:_____ 4b. Beam (width), feet:_____

5. Draft (depth of hull below waterline, fully laden), feet:_____
6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 85
7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 95' OR 10' ABOVE HIGHEST POINT
8. Frequency of one-way passage underneath I-5 main channel (typical per month):_____

   Jan 1 Feb 4 Mar 2 Apr 1 May 1 Jun 1 Jul 1 Aug 1 Sep 1 Oct 1 Nov 1 Dec 1
9. Frequency of one-way passage underneath I-5 main channel (other historic events):____
10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

    Jan 15 Feb 15 Mar 15 Apr 15 May 15 Jun 15 Jul 15 Aug 15 Sep 15 Oct 15 Nov 15 Dec 15
11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): OFTEN WE USE BRIDGE DAILY DEPENDING ON WORK FLOW. IT VARIES

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy?

13. Other miscellaneous

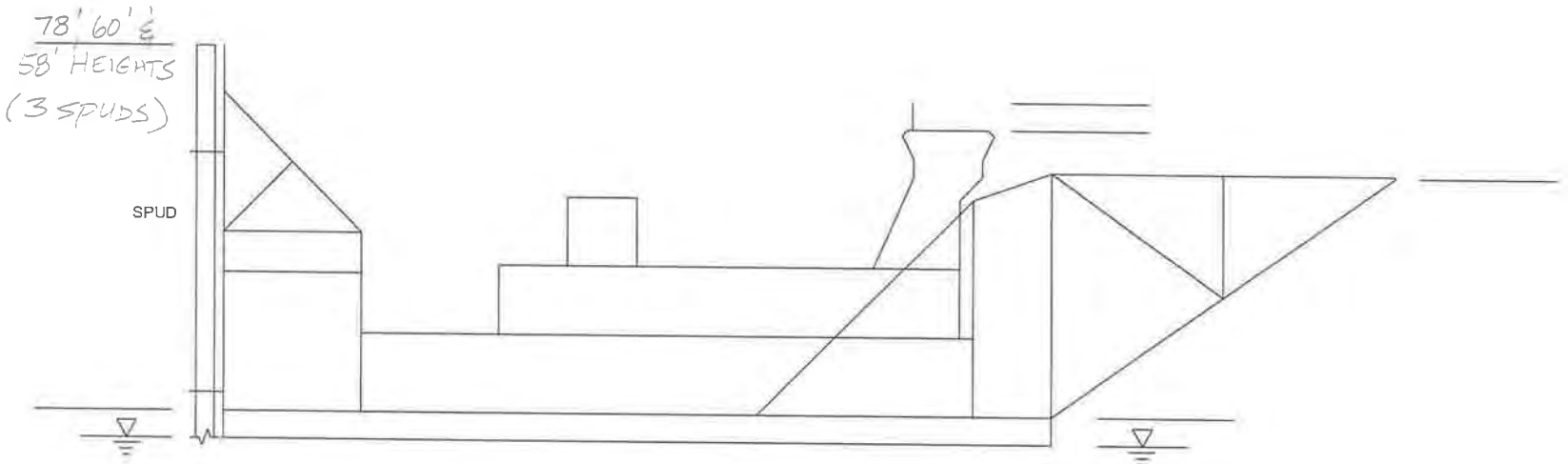
NORTH PORTLAND HARBOR BRIDGE IS "CRITICAL" TO OUR BUSINESS!

DIVERSIFIED MARINE, INC.
PO Box 83723
Portland OR 97283-0723
Phone (503) 289-2669
Fax (503) 289-2825
Email: DMI83723@aol.com
www.DiversifiedMarineInc.com

Feb, 17th 2012

Marine equipment list

Derrick barges:	Capacity	Size
DB Freedom	125 Ton	60′ x 155′ x 5′ draft (85′ tall spuds)
DB Vulcan	60 Ton	45′ x 101′ x 5′ draft (Bridge clearance 58′)
DB Lucy	25 Ton	35′ x 125′ (85′ tall spuds)
Barges:		
DMI 60	60,000#	26′ x 80′ Ramp barge with spuds x 85′ Tall
BMC 44	500 Ton	36′ x 208 Spud barge x 80′ tall
DMI 100	300 ton	60′ x 100′ Spud barge x 60′ tall
DMI 40	15 Ton	12′ x 40′ work barge
DMI 50	60,000#	26′ x 60′ Ramp barge with spuds x 60′ tall
Tugs:		
Tiger	1600 HP	18′ x 65′ x 6′ draft (Bridge clearance required 38′)
Cougar	1200 HP	22′ x 65′ x 6′ draft (Bridge clearance required 50′)
Mariner	1800 HP	25′ x 75′ x 10′ draft (Bridge clearance required 45′)
Utility:		
MV Sandwick	1050 HP	25′ x 78′ x 5′ draft Landing craft



BMC 44

NAME

DIVERSIFIED MARINE

LOCATION

7-02-2012

DATE

CRC Vessel Verification

Prepared by: David Evans and Associates, Inc.

Vessel Name	Owner	Antenna Elev (ft)	Mast Elev (ft)	Spud Elev (ft)	Boom Crane Elev (ft)	Gantry Elev (ft)	Pivot Pt Elev (ft)	Cradle Elev (ft)	Water Elev (ft)	Height Above Water (ft)
Make It So			103.7						17.0	87
		106.9							17.0	90
Wakadui	Todd Hilbelink		80.1						17.0	63
		82.8							17.0	66
DMI 60	Diversified Marine			100.2					16.0	84
Lucy	Diversified Marine				89.3				16.0	73
Freedom	Diversified Marine					77.3			16.0	61
							39.1		16.0	23
								42.9	16.0	27
					201.4				16.0	185
Vulcan	Diversified Marine					65.9			16.0	50
		74.8							16.0	59
					104.6				16.0	89
							37.0		16.0	21
R22	Diversified Marine			73.8					15.8	58
BMC44	Diversified Marine			93.5					15.8	78
				73.5					15.8	58
				75.3					15.8	60
Nancy Riley	McClure Loving Trust		86.1						17.8	68
		88.6							17.8	71

Vessel Height Verification Sheet

By: Pete Geiger Date: 2 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Diversified Marine
   b. Name of contact: Kurt Redd
   c. Phone number (Office): 503.289.2662 (Cell):
   d. Email: kurt@dmipdx.com
   e. Address: 1801 N Marine Drive City: Portland
      State: OR Zip code: 97217
2. Vessel
   a. ID: b. Name: BMC44
   c. Type: Spud Barge d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Spud Barge
      - Is a vessel specification sheet available? No
      - Configuration shown on the sheet: N/A
      - What is the lowest height configuration for transport? Spuds Up at 80 feet

   b. What is the gantry configuration? N/A Estimated gantry height: N/A

   c. Does the barge have spuds? Yes two. Midpoint at both ends. One Spud currently removed and one spud raised and pinned
      - Height above waterline for travel? 80 Feet
      - Can the spuds be removed for travel? Only in very special circumstances when they travel far upriver on the Columbia
      - Work and cost involved in removing spuds? 4 hours each spud to re-install; need to tie up to a dock near the work area. Would need to be accompanied by a crane.

4. Vessel Location
   a. Where is the vessel currently located? Columbia River North Portland Harbor, tied up to dolphins about ¼ mile downstream of Diversified Marine's Facility
   b. Is it working on a job? No Is it tied up to shore? Yes
   c. What is the best time to make a trip to the vessel? Anytime just give him 1 day notice

5. Surveyed Measurements (all measurements NAVD 88)

Gantry Height:	Not Surveyed – No Crane
Water Level:	15.8 feet
Top of Boom:	Not Surveyed – No Crane
Height of Boom Hinge Pin:	Not Surveyed – No Crane
Boom Cradle:	Not Surveyed – No Crane
Top of Spud:	93.5 Feet

6. Vessel Height

Self-Reported (Top of Spud)		Surveyed (Top of Spud)	
Air Draft:	80 feet (Top of Spud)	Air Draft:	78 Feet (Top of Spud)
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet	Water Level:	16 feet
Total Height:	106 feet	Total Height:	104 feet

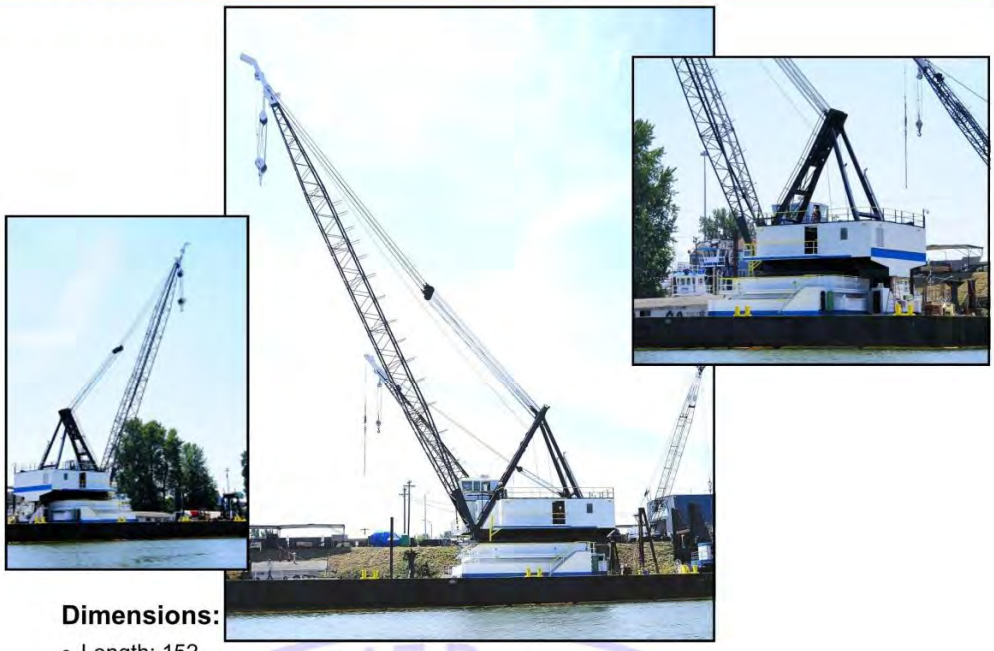
7. History Notes

Date	Item
2/17/2012	Contacted by Megan Nelson
2/29/2012	Data sheet submitted
6/28/2012	Contacted by Pete Geiger for field measurement
7/2/2012	Field measured

Marine Contractors
Owner: Diversified Marine
Vessel: DB Freedom

CRANE BARGE "DB FREEDOM"

Official No. 507476



Dimensions:

- Length: 152
- Beam: 60'
- Depth: 12"
- Draft: 4'
- Boom: 160' to main fall
- Boom: 172' to main whip line

Capacities:

- Fuel: 10,000 gallons
- Lift 123.5 tons off stern
- Lift: 87.4 tons @ 50' radius
- Lift: 81.2 tons @ 60' radius
- Lift: 67 tons @ 80' radius
- Lift: 25 tons @ 160' radius

Regulatory:

- American Hoist & Derrick Co American 305 Revolver
- Gross tonnage: 911 GRT

Machinery:

- Power: Diesel/Electric
- Generator: 375KW 480V
- Engine: C18

Auxiliaries:

- 3 drum 20,000#deck winch
- Twp (2) Aux hoist: 2 drum Skagit

Capabilities:

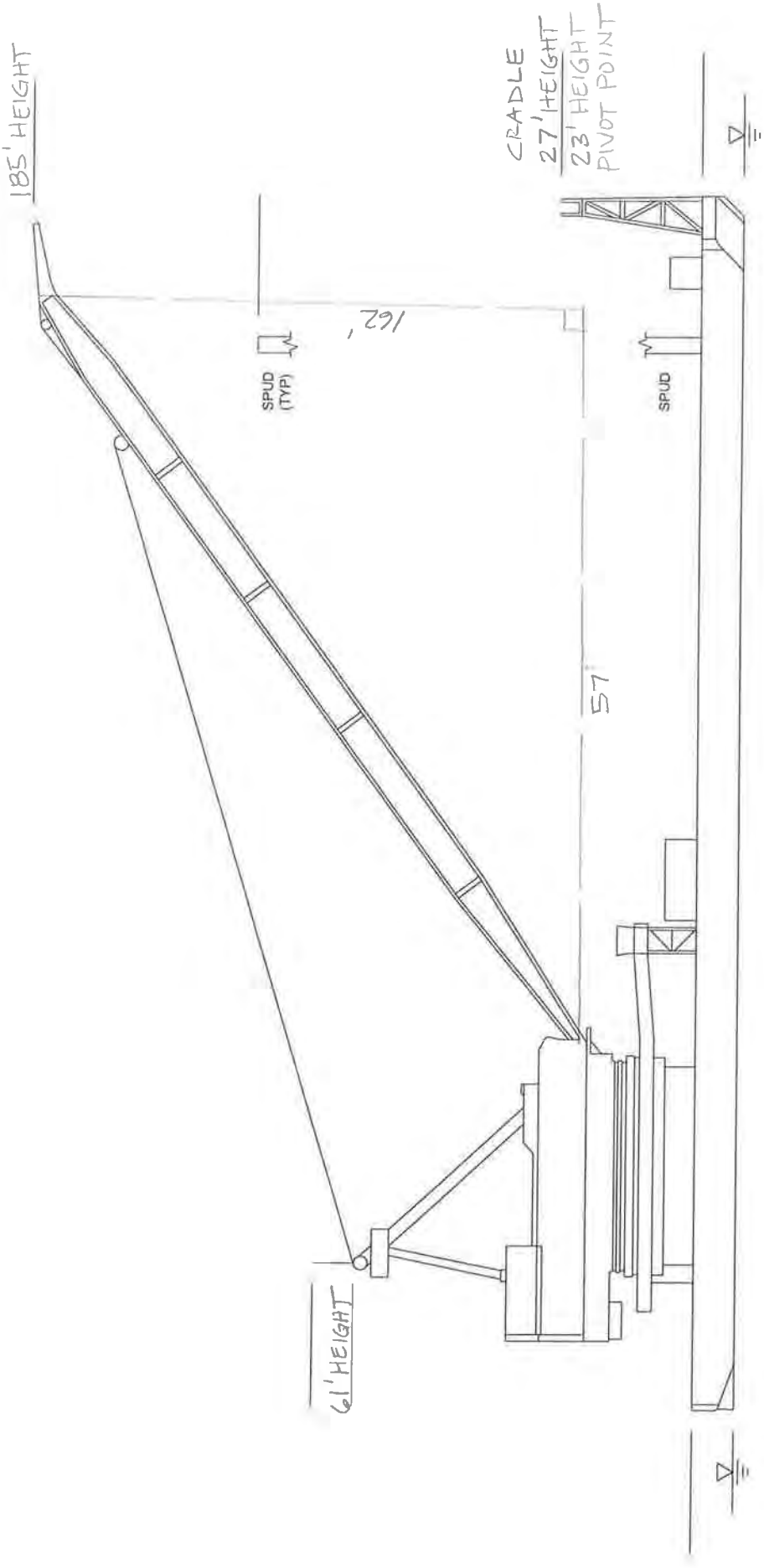
- Heavy Lifting
- Crane Service
- Salvage
- Pile Driving

DIVERSIFIED MARINE, INC.

PO Box 83723
(1801 N Marine Drive - 97217)
Portland OR 97283 USA

Phone: 503-289-2669
Fax: 503-289-2825
E-mail: kurt@dmipdx.com
Website: www.dmipdx.com

See more photos and videos of our equipment on our website.


185' HEIGHT
CRADLE
27' HEIGHT
23' HEIGHT
PIVOT POINT
162'
SPUD
(TYP)
SPUD
57'
61' HEIGHT
7-02-2012
DATE
FREEDOM
NAME
DIVERSIFIED MARINE
LOCATION

Vessel Height Verification Sheet

By: Pete Geiger Date: 2 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Diversified Marine
   b. Name of contact: Kurt Redd
   c. Phone number (Office): 503.289.2662 (Cell):
   d. Email: kurt@dmipdx.com
   e. Address: 1801 N Marine Drive City: Portland
      State: OR Zip code: 97217
2. Vessel
   a. ID: b. Name: DB Freedom
   c. Type: Crane Barge d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Crane Barge
      - Is a vessel specification sheet available? Yes
      - Configuration shown on the sheet: Crane Up
      - What is the lowest height configuration for transport? Crane down at ~ 34 Degrees above horizontal, spuds up and pinned

   b. What is the gantry configuration? Estimated gantry height: Not given
   c. Does the barge have spuds? Yes at least two forward. Spuds currently down
      - Height above waterline for travel? 85 Feet
      - Can the spuds be removed for travel? Only in very special circumstances when they travel far upriver on the Columbia
      - Work and cost involved in removing spuds? 4 hours each spud to re-install; need to tie up to a dock near the work area.

4. Vessel Location

   a. Where is the vessel currently located? Columbia River North Portland Harbor

   b. Is it working on a job? Yes while tied up Is it tied up to shore? yes

   c. What is the best time to make a trip to the vessel? Anytime just give him 1 day notice

5. Surveyed Measurements (all measurements NAVD 88)

Gantry Height:	77.3 feet
Water Level:	16.0 feet
Top of Boom:	Measured while working = 201.4 feet (71 degrees off horizontal) Estimated at travel angle (34 degrees off horizontal) = 135 feet
Height of Boom Hinge Pin:	39.1 feet
Boom Cradle:	42.9 feet
Top of Spud:	Not surveyed – spuds in down position

6. Vessel Height

Self-Reported		Surveyed (Top of Boom Estimated)	
Air Draft:	85 feet (Top of Spuds)	Air Draft:	119 Feet (Top of Crane)
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet CRD	Water Level:	16 feet CRD
Total Height:	111 feet	Total Height:	145 feet

7. History Notes

Date	Item
2/17/2012	Contacted by Megan Nelson
2/29/2012	Data sheet submitted
6/28/2012	Contacted by Pete Geiger for field measurement
7/2/2012	Field measured

Marine Contractors
Owner: Diversified Marine
Vessel: DB Lucy

CRANE BARGE "LUCY"

Dimensions:

- Length: 130'
- Beam: 35'
- Depth: 6' 6"
- Draft: 3'
- Boom: 90'

Capacities:

- Fuel: 1,000 gallons
- Lift: 25 tons

Regulatory:

- Bucyrus Erie 54B Pedestal Mounted

Machinery:

- Power: Diesel GM 6-110

Auxiliaries:

- Two (2) 80' x 20" spuds
- Aux hoist: 2 drum Skagit

Capabilities:

- Crane Service
- Salvage
- Pile Driving
- Clamshell Dredging
- Duty Cycle

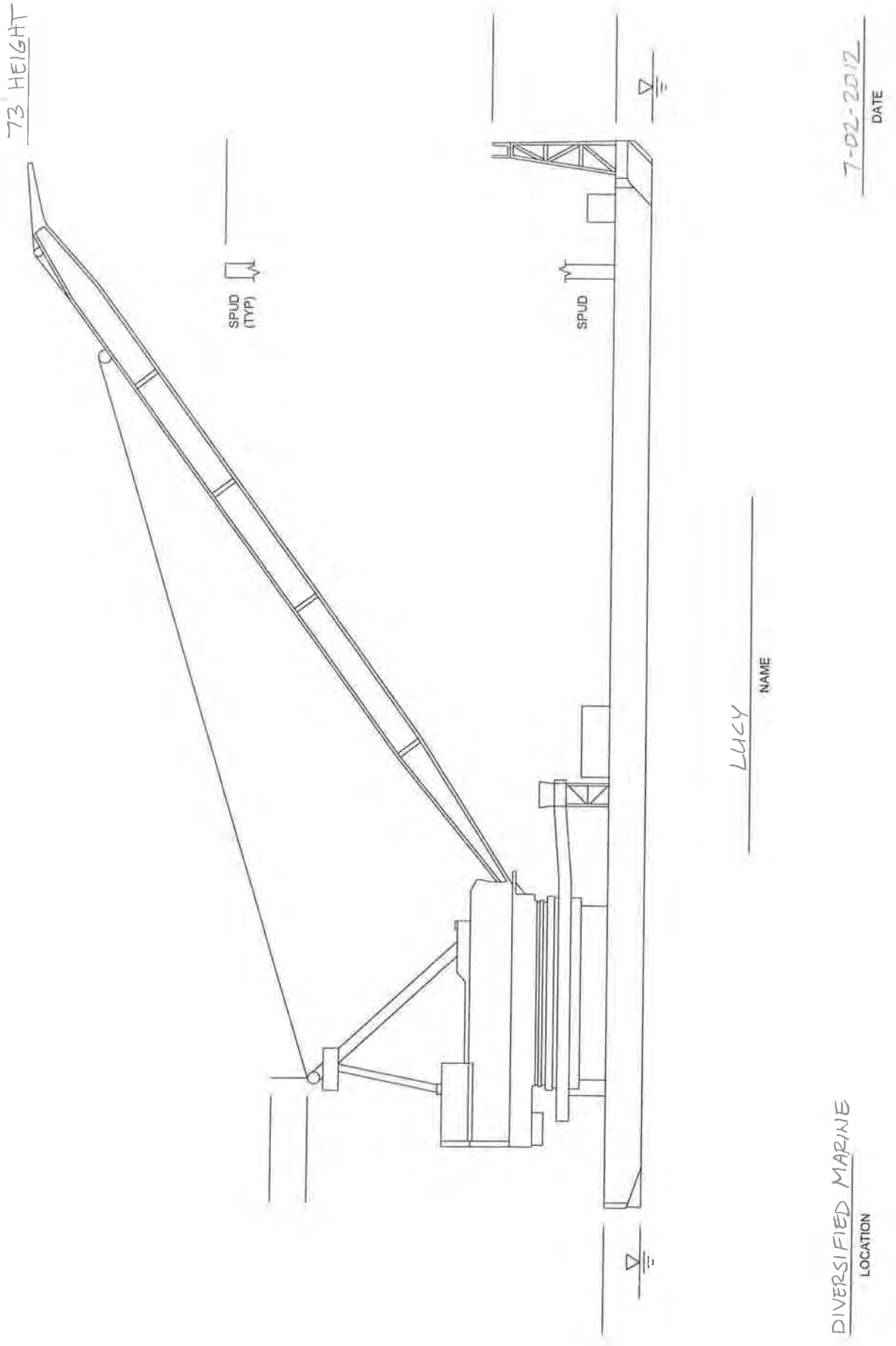
DMI MARINE INCORPORATED

DIVERSIFIED MARINE, INC.

PO Box 83723
(1801 N Marine Drive - 97217)
Portland OR 97283 USA

Phone: 503-289-2669
Fax: 503-289-2825
E-mail: kurt@dmipdx.com
Website: www.dmipdx.com

See more photos and videos of our equipment on our website.


73' HEIGHT
SPUD (TYP)
SPUD
7-02-2012
DATE
LUCY
NAME
DIVERSIFIED MARINE
LOCATION

Vessel Height Verification Sheet

By: Pete Geiger Date: 2 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Diversified Marine
   b. Name of contact: Kurt Redd
   c. Phone number (Office): 503.289.2662 (Cell):
   d. Email: kurt@dmipdx.com
   e. Address: 1801 N Marine Drive City: Portland
      State: OR Zip code: 97217
2. Vessel
   a. ID: b. Name: DB Lucy
   c. Type: Crane Barge d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Crane Barge
      - Is a vessel specification sheet available? Yes
      - Configuration shown on the sheet: Crane Down, Spuds Up
      - What is the lowest height configuration for transport? Crane down at ~ 34 Degrees above horizontal

   b. What is the gantry configuration? Estimated gantry height: Not given

   c. Does the barge have spuds? Yes Center of Barge, either edge. Spuds currently down
      - Height above waterline for travel? 85 Feet
      - Can the spuds be removed for travel? Only in very special circumstances when they travel far upriver on the Columbia
      - Work and cost involved in removing spuds? 4 hours each spud to re-install; need to tie up to a dock near the work area.

4. Vessel Location

   a. Where is the vessel currently located? Columbia River North Portland Harbor

   b. Is it working on a job? No Is it tied up to shore? Yes

   c. What is the best time to make a trip to the vessel? Anytime just give him 1 day notice

5. Surveyed Measurements (all measurements NAVD 88)

Gantry Height:	Not Surveyed – Obscured by drydock
Water Level:	16.0 feet
Top of Boom:	Measured at storage angle = 89.3 feet
Height of Boom Hinge Pin:	Not Surveyed – Obscured by drydock
Boom Cradle:	Not Surveyed – Obscured by drydock
Top of Spud:	Not surveyed – No Spuds – Anchors Only

6. Vessel Height

Self-Reported (Top of Spud)		Surveyed (Top of Boom)	
Air Draft:	85 feet (Top of Spud)	Air Draft:	73 Feet (Top of Crane Boom)
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet	Water Level:	16 feet
Total Height:	111 feet	Total Height:	99 feet

7. History Notes

Date	Item
2/17/2012	Contacted by Megan Nelson
2/29/2012	Data sheet submitted
6/28/2012	Contacted by Pete Geiger for field measurement
7/2/2012	Field measured

Marine Contractors
Owner: Diversified Marine
Vessel: DB Vulcan

CRANE BARGE "DB VULCAN"

Official No. 563327

Dimensions:

- Length: 101'
- Beam: 45'
- Depth: 8' 6"
- Draft: 3' 6"
- Boom: 113' to main fall
- Boom: 120' to main whip line

Capacities:

- Fuel: 4,500 gallons
- Lift: 60 tons @ 40' radius
- Lift: 38 tons @ 60' radius
- Lift: 14 tons @ 120' radius

Regulatory:

- RW Kaltenback Model YDH-9 Revolving Whirley
- Gross tonnage: 358 GRT

Machinery:

- Power: Diesel/Electric
- Generator: GE 125KW 230V
- Engine: Cat 3306

Auxiliaries:

- Four (4) 8000# anchors
- Aux hoist: 3 drum Skagit

Capabilities:

- Heavy Lifting
- Crane Service
- Salvage
- Pile Driving
- Clamshell Dredging
- Duty Cycle

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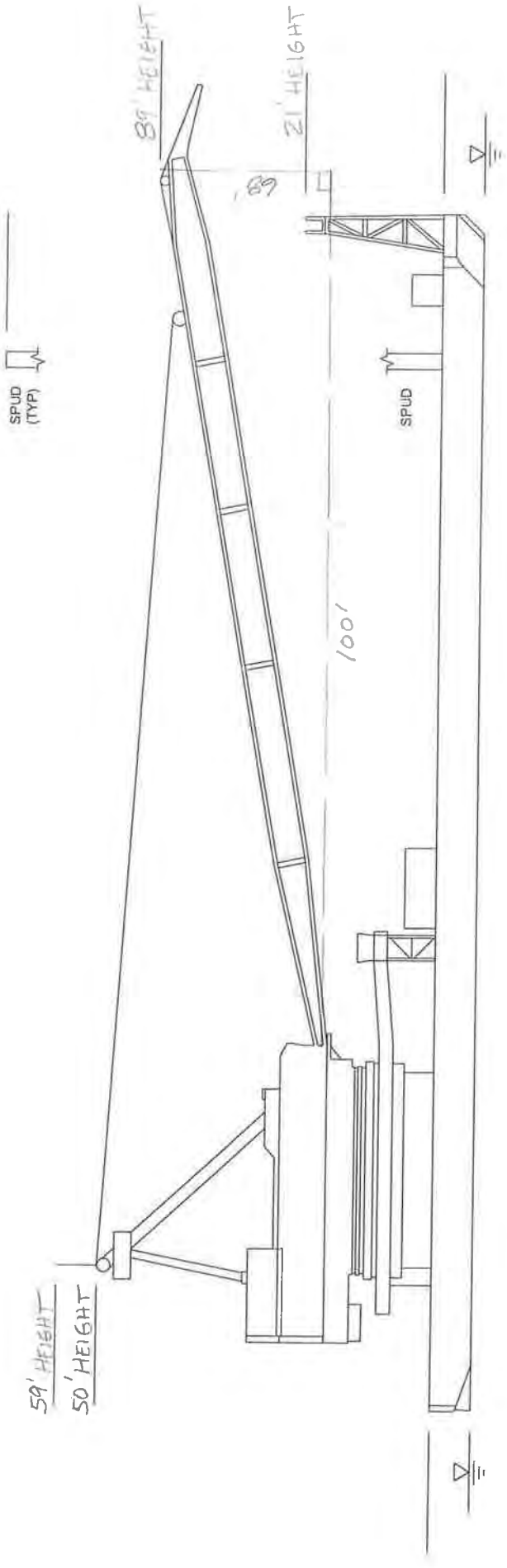

VULCAN
NAME

7-02-2012
DATE

DIVERSIFIED MARINE
LOCATION

Vessel Height Verification Sheet

By: Pete Geiger Date: 2 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Diversified Marine
   b. Name of contact: Kurt Redd
   c. Phone number (Office): 503.289.2662 (Cell):
   d. Email: kurt@dmipdx.com
   e. Address: 1801 N Marine Drive City: Portland
      State: OR Zip code: 97217
2. Vessel
   a. ID: b. Name: DB Vulcan
   c. Type: Crane Barge d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Crane Barge
   - Is a vessel specification sheet available? Yes
   - Configuration shown on the sheet: Crane Up
   - What is the lowest height configuration for transport? Crane down at ~ 34 Degrees above horizontal

   b. What is the gantry configuration? Estimated gantry height: Not given
   c. Does the barge have spuds? No (Anchors Only)
   - Height above waterline for travel? N/A
   - Can the spuds be removed for travel? N/A
   - Work and cost involved in removing spuds? N/A
4. Vessel Location
   a. Where is the vessel currently located? Columbia River North Portland Harbor
   b. Is it working on a job? No Is it tied up to shore? Yes

c. What is the best time to make a trip to the vessel? Anytime just give him 1 day notice

5. Surveyed Measurements (all measurements NAVD 88)

Gantry Height:	65.9 feet
Water Level:	16.0 feet
Top of Boom:	Measured at travel angle (34 degrees off horizontal) = 104.6 feet
Height of Boom Hinge Pin:	37.0 feet
Boom Cradle:	Not Surveyed – Obscured by tugs
Top of Spud:	Not surveyed – No Spuds – Anchors Only

6. Vessel Height

Self-Reported (Top of Gantry)		Surveyed (Top of Boom)	
Air Draft:	58 feet (Top of Gantry)	Air Draft:	89 Feet (Top of Crane Boom)
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet	Water Level:	16 feet
Total Height:	84 feet	Total Height:	115 feet

7. History Notes

Date	Item
2/17/2012	Contacted by Megan Nelson
2/29/2012	Data sheet submitted
6/28/2012	Contacted by Pete Geiger for field measurement
7/2/2012	Field measured

Marine Contractors
Owner: Diversified Marine
Vessel: DMI 60

RAMP/SPUD BARGE "DMI60"

Dimensions:

- Length: 60'
- Length (Ramps extended): 80'
- Beam: 24'
- Depth: 4'
- Draft: 1'
- Spuds: 85' x 12"

Regulatory:

- Gross tonnage: GRT 48

Machinery:

- Two (2) Pullmaster 12,000# hydraulic winches (raise and lower spuds)
- Pullmaster M25 to power ramps
- 50 HP self-contained power unit with biodegradeable hydraulic oil

Capabilities:

- Drilling support platform
- Salvage
- Floating Dock
- Bridge Inspections

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Portland OR 97283 USA

Phone: 503-289-2669
Fax: 503-289-2825
E-mail: kurt@dmipdx.com

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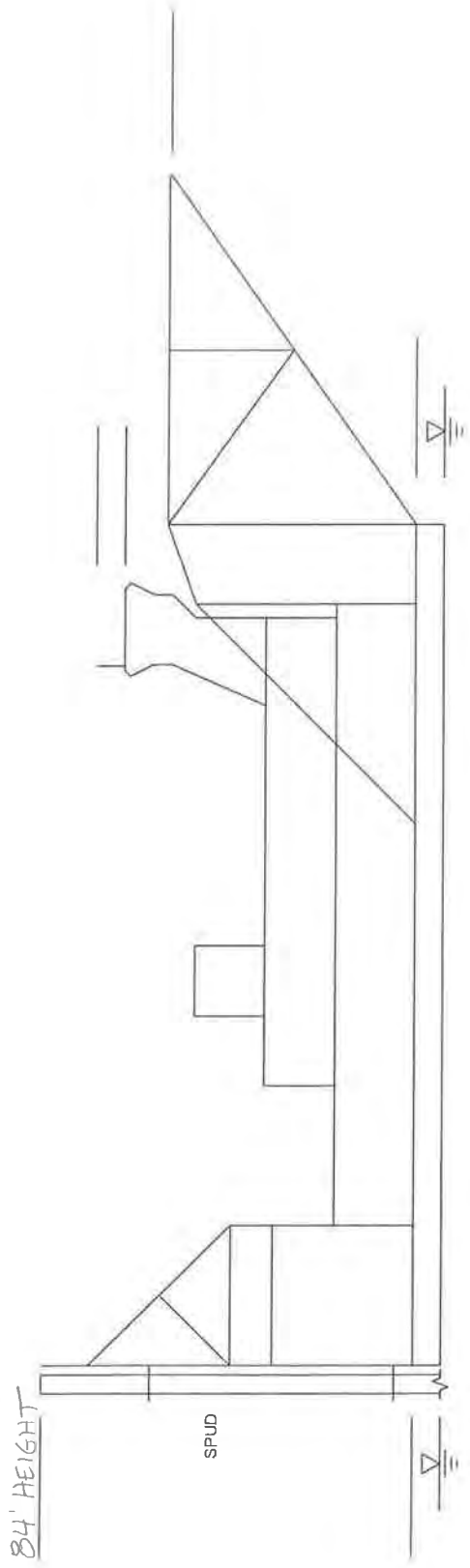


7-02-2012
DATE

DMIGO
NAME

DIVERSIFIED MARINE
LOCATION

Vessel Height Verification Sheet

By: Pete Geiger Date: 2 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Diversified Marine
   b. Name of contact: Kurt Redd
   c. Phone number (Office): 503.289.2662 (Cell):
   d. Email: kurt@dmipdx.com
   e. Address: 1801 N Marine Drive City: Portland
      State: OR Zip code: 97217
2. Vessel
   a. ID: b. Name: DMI 60
   c. Type: Spud Barge d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Spud Barge
   - Is a vessel specification sheet available? Yes
   - Configuration shown on the sheet: Spuds Up
   - What is the lowest height configuration for transport? Spuds Up at 85 feet

   b. What is the gantry configuration? N/A Estimated gantry height: N/A

   c. Does the barge have spuds? Yes Center of Barge, either edge. One Spud currently down and one spud raised and pinned for survey
   - Height above waterline for travel? 85 Feet
   - Can the spuds be removed for travel? Only in very special circumstances when they travel far upriver on the Columbia
   - Work and cost involved in removing spuds? 4 hours each spud to re-install; need to tie up to a dock near the work area. Would need to be accompanied by a crane.

4. Vessel Location

   a. Where is the vessel currently located? Columbia River North Portland Harbor

   b. Is it working on a job? No Is it tied up to shore? Yes

   c. What is the best time to make a trip to the vessel? Anytime just give him 1 day notice

5. Surveyed Measurements (all measurements NAVD 88)

Gantry Height:	Not Surveyed – No Crane
Water Level:	16.0 feet
Top of Boom:	Not Surveyed – No Crane
Height of Boom Hinge Pin:	Not Surveyed – No Crane
Boom Cradle:	Not Surveyed – No Crane
Top of Spud:	100.2 Feet

6. Vessel Height

Self-Reported (Top of Spud)		Surveyed (Top of Spud)	
Air Draft:	85 feet (Top of Spud)	Air Draft:	84 Feet (Top of Spud)
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet	Water Level:	16 feet
Total Height:	111 feet	Total Height:	110 feet

7. History Notes

Date	Item
2/17/2012	Contacted by Megan Nelson
2/29/2012	Data sheet submitted
6/28/2012	Contacted by Pete Geiger for field measurement
7/2/2012	Field measured

Marine Contractors

Owner:	Diversified Marine
Vessels:	BRG22
	Cougar
	DMI 100
	DMI 40
	DMI 50
	Mariner
	MV Sandwick
	Tiger

River User Data Sheet By:_____ Date: 2/17/12

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: DIVERSIFIED MARINE INC
   b. Name of contact: KURT REED
   c. Phone number (Office): 503-289-2669 d. (Cell):_____
   e. Email: KURT@DMIPDX.COM
   f. Address: PO BOX 83723 (1801 N MARINE DR)
   g. City: PDX
   h. State: OR i. Zip code: 97283

3a. Vessel Name: SEE ATTACHED 3b. Vessel Type:_____

3c. US Coast Guard Document Number: _____

4a. Length Overall (LOA), feet:_____ 4b. Beam (width), feet:_____

5. Draft (depth of hull below waterline, fully laden), feet:_____
6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 85
7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 95' OR 10' ABOVE HIGHEST POINT
8. Frequency of one-way passage underneath I-5 main channel (typical per month):_____

   Jan 1 Feb 4 Mar 2 Apr 1 May 1 Jun 1 Jul 1 Aug 1 Sep 1 Oct 1 Nov 1 Dec 1
9. Frequency of one-way passage underneath I-5 main channel (other historic events):____
10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

    Jan 15 Feb 15 Mar 15 Apr 15 May 15 Jun 15 Jul 15 Aug 15 Sep 15 Oct 15 Nov 15 Dec 15
11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): OFTEN WE USE BRIDGE DAILY DEPENDING ON WORK FLOW. IT VARIES

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy?

13. Other miscellaneous

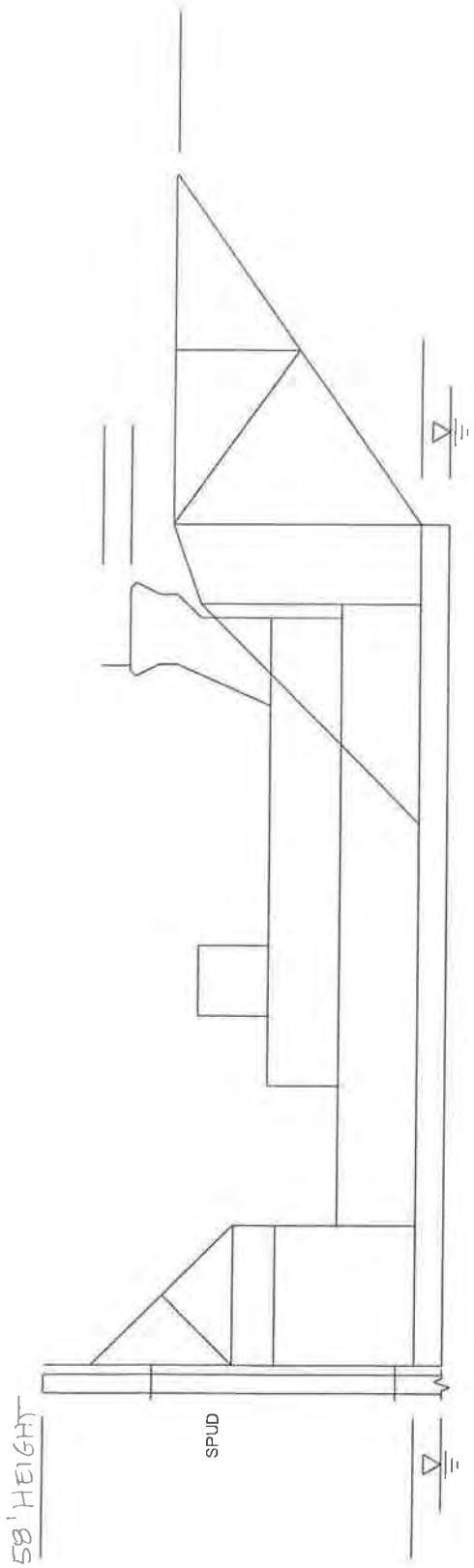
NORTH PORTLAND HARBOR BRIDGE IS "CRITICAL" TO OUR BUSINESS!

DIVERSIFIED MARINE, INC.
PO Box 83723
Portland OR 97283-0723
Phone (503) 289-2669
Fax (503) 289-2825
Email: DMI83723@aol.com
www.DiversifiedMarineInc.com

Feb, 17th 2012

Marine equipment list

Derrick barges:	Capacity	Size
DB Freedom	125 Ton	60′ x 155′ x 5′ draft (85′ tall spuds)
DB Vulcan	60 Ton	45′ x 101′ x 5′ draft (Bridge clearance 58′)
DB Lucy	25 Ton	35′ x 125′ (85′ tall spuds)
Barges:		
DMI 60	60,000#	26′ x 80′ Ramp barge with spuds x 85′ Tall
BMC 44	500 Ton	36′ x 208 Spud barge x 80′ tall
DMI 100	300 ton	60′ x 100′ Spud barge x 60′ tall
DMI 40	15 Ton	12′ x 40′ work barge
DMI 50	60,000#	26′ x 60′ Ramp barge with spuds x 60′ tall
Tugs:		
Tiger	1600 HP	18′ x 65′ x 6′ draft (Bridge clearance required 38′)
Cougar	1200 HP	22′ x 65′ x 6′ draft (Bridge clearance required 50′)
Mariner	1800 HP	25′ x 75′ x 10′ draft (Bridge clearance required 45′)
Utility:		
MV Sandwick	1050 HP	25′ x 78′ x 5′ draft Landing craft



7-02-2012
DATE

R22
NAME

DIVERSIFIED MARINE
LOCATION

Vessel Name	Owner	Antenna Elev (ft)	Mast Elev (ft)	Spud Elev (ft)	Boom Crane Elev (ft)	Gantry Elev (ft)	Pivot Pt Elev (ft)	Cradle Elev (ft)	Water Elev (ft)	Height Above Water (ft)
Make It So			103.7						17.0	87
		106.9							17.0	90
Wakadui	Todd Hilbelink		80.1						17.0	63
		82.8							17.0	66
DMI 60	Diversified Marine			100.2					16.0	84
Lucy	Diversified Marine				89.3				16.0	73
Freedom	Diversified Marine					77.3			16.0	61
							39.1		16.0	23
								42.9	16.0	27
					201.4				16.0	185
Vulcan	Diversified Marine					65.9			16.0	50
		74.8							16.0	59
					104.6				16.0	89
							37.0		16.0	21
R22	Diversified Marine			73.8					15.8	58
BMC44	Diversified Marine			93.5					15.8	78
				73.5					15.8	58
				75.3					15.8	60
Nancy Riley	McClure Loving Trust		86.1						17.8	68
		88.6							17.8	71

Vessel Height Verification Sheet

By: Pete Geiger Date: 2 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Diversified Marine
   b. Name of contact: Kurt Redd
   c. Phone number (Office): 503.289.2662 (Cell):
   d. Email: kurt@dmipdx.com
   e. Address: 1801 N Marine Drive City: Portland
      State: OR Zip code: 97217
2. Vessel
   a. ID: b. Name: BRG 22
   c. Type: Spud Barge d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Spud Barge
   - Is a vessel specification sheet available? Yes
   - Configuration shown on the sheet: Spuds Raised; being pushed by tug
   - What is the lowest height configuration for transport? Spuds Up at 60 feet

   b. What is the gantry configuration? N/A Estimated gantry height: N/A

   c. Does the barge have spuds? Yes three. Center at either side and one at stern end at corner. Middle spuds dropped/set into riverbed and corner spud raised and pinned

   - Height above waterline for travel? 60 Feet
   - Can the spuds be removed for travel? Only in very special circumstances when they travel far upriver on the Columbia
   - Work and cost involved in removing spuds? 4 hours each spud to re-install; need to tie up to a dock near the work area. Would need to be accompanied by a crane.

4. Vessel Location
   a. Where is the vessel currently located? Columbia River North Portland Harbor, tied up to dolphins about ¼ mile downstream of Diversified Marine's Facility
   b. Is it working on a job? No Is it tied up to shore? Yes
   c. What is the best time to make a trip to the vessel? Anytime just give him 1 day notice

5. Surveyed Measurements (all measurements NAVD 88)

Gantry Height:	Not Surveyed – No Crane
Water Level:	15.8 feet
Top of Boom:	Not Surveyed – No Crane
Height of Boom Hinge Pin:	Not Surveyed – No Crane
Boom Cradle:	Not Surveyed – No Crane
Top of Spud:	73.8 Feet

6. Vessel Height

Self-Reported (Top of Spud)		Surveyed (Top of Spud)	
Air Draft:	60 feet (Top of Spud)	Air Draft:	58 Feet (Top of Spud)
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet	Water Level:	16 feet
Total Height:	86 feet	Total Height:	84 feet

7. History Notes

Date	Item
2/17/2012	Contacted by Megan Nelson
2/29/2012	Data sheet submitted
6/28/2012	Contacted by Pete Geiger for field measurement
7/2/2012	Field measured

SPUD BARGE "BRG22"

Dimensions:

- Length: 160'
- Length 40'
- Depth: 9'
- Spuds: Three (3) - 60' x 20"

Regulatory:

- Gross tonnage: GRT 406

Machinery:

- Two deck winches

Capabilities:

- Transport
- Salvage
- Floating Dock
- Construction support

DIVERSIFIED MARINE, INC.

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Phone: 503-289-2669
Fax: 503-289-2825
E-mail: kurt@dmipdx.com

See more photos and videos of our equipment on our website.

Marine Contractors

Company: The Dutra Group

Vessels:

- Derrick 24
- Paula Lee

Company did not respond to IBR request. Information below was included in the CRC NIR.

Marine Contractors

Owner: The Dutra Group

Vessel: Derrick 24

PB 100 YEARS

Telephone Conversation Memorandum

project: CRC - Data Verification job no. 80312 CS (use complete number) date: 7/3/12

from: Ralph Petereit talked to: Chris Petersen

indicate department, field office, etc., "for in-house" calls.
indicate agency or firm for other than "in-house" calls.

item discussed: Dutra Dredging Marine Equipment

information obtained: Dutra has 2 large derrick barges, the Paula Lee and Derrick 24. The Paula Lee has an 80' height and the Derrick 24 has a 70' height. This includes a few feet of clearance. Both barges are currently working in Southern California. To get to the Columbia River they would remove the spuds and lay them down on deck for travel up the coast. When they had a job in Lewiston they had to remove the A-frame / gantry and the height became 52'.

The ~~heir~~ highest point on both barges is the top of the A-frame / gantry. The boom lays flat and rests in a cradle. He has full size drawings that he can make copies of and send me. DB 24 has been to Lewiston twice. (1991+?)

Chris is currently in a Dr. Appointment and will call me back.

action required: Follow-up call to obtain drawings. Call Steve Lee in the equipment department.

distribution:

by: R. Petereit

The Derrick 24 (same name as Mansons Derrick 24 but they are different) has the following dimensions.

Width = 54 ft + tires
Length = 150 ft
Draft (light) = 5 ft
Draft (heary) = 9 ft
Distance between deck and A-frame = 60 ft 10 in
Hull height = 13 ft

The A-frame is the highest point on the derrick barge while being towed.

The Paula Lee has the following dimensions

Width = 68 feet + tires
Length = 250 ft
Boom length = 140 ft
Draft (light) = 5 ft
Draft (heary) = 10 ft
Hull height = 15 ft
Distance between deck and top of A-frame = 70 ft

As with the DB 24, the A-frame is the highest point on the derrick barge while it is being towed.

Marine Contractors
Owner: The Dutra Group
Vessel: Paula Lee

No image available

Columbia River CROSSING

River User Data Sheet

By: Ralph Petereit Date: 2/23/2012

1. Company Name and/or Owner of Vessel and contact information

Name of company: Dutra Group

Name of contact: Chris Peterson

Phone number (Office): 510-703-4554 (Cell):

Email: cpeterson@dutragroup.com

Address: 2350 Kerner Blvd., Suite 200

City: San Rafael State: CA Zip code: 94901

3a. Vessel Name: Paula Lee **3b. Vessel Type:** floating crane

3c. US Coast Guard Document Number: 649607

4a. Length Overall (LOA), **feet:** 250 **4b. Beam** (width), **feet:** 68

5. Draft (depth of hull below waterline, fully laden), **feet:**

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), **feet:**

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge):

8. Frequency of one-way passage underneath I-5 main channel (typical per month): N/A

Jan ___ **Feb** ___ **Mar**___ **Apr**___ **May**___ **Jun**___ **Jul**___ **Aug**___ **Sep**___ **Oct**___ **Nov**___ **Dec**___

9. Frequency of one-way passage underneath I-5 main channel (other historic events):

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month): N/A

Jan ___ **Feb** ___ **Mar**___ **Apr**___ **May**___ **Jun**___ **Jul**___ **Aug**___ **Sep**___ **Oct**___ **Nov**___ **Dec**___

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):

12. Do you have a Business Plan (e.g. 10 or 20 year plan)?

What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)?

May we have a copy?

13. Other miscellaneous Chris stated that if we have information on General Const. Co or Manson Construction Co, that the Paula Lee would have similar navigation requirements The Paula Lee participated in the 2010 Columbia River Dredging Project downriver of the I-5 Bridge

PB 100 YEARS

Telephone Conversation Memorandum

project: CRC - Data Verification job no. 80312 CS (use complete number) date: 7/3/12

from: Ralph Petereit talked to: Chris Petersen

indicate department, field office, etc., "for in-house" calls.
indicate agency or firm for other than "in-house" calls.

item discussed: Dutra Dredging Marine Equipment

information obtained: Dutra has 2 large derrick barges, the Paula Lee and Derrick 24. The Paula Lee has an 80' height and the Derrick 24 has a 70' height. This includes a few feet of clearance. Both barges are currently working in Southern California. To get to the Columbia River they would remove the spuds and lay them down on deck for travel up the coast. When they had a job in Lewiston they had to remove the A-frame / gantry and the height became 52'.

The ~~heir~~ highest point on both barges is the top of the A-frame / gantry. The boom lays flat and rests in a cradle. He has full size drawings that he can make copies of and send me. DB 24 has been to Lewiston twice. (1991+?)

Chris is currently in a Dr. Appointment and will call me back.

action required: Follow-up call to obtain drawings. Call Steve Lee in the equipment department.

distribution:

by: R. Petereit

The Derrick 24 (same name as Mansons Derrick 24 but they are different) has the following dimensions.

Width = 54 ft + tires
Length = 150 ft
Draft (light) = 5 ft
Draft (heary) = 9 ft
Distance between deck and A-frame = 60 ft 10 in
Hull height = 13 ft

The A-frame is the highest point on the derrick barge while being towed.

The Pavla Lee has the following dimensions

Width = 68 feet + tires
Length = 250 ft
Boom length = 140 ft
Draft (light) = 5 ft
Draft (heary) = 10 ft
Hull height = 15 ft
Distance between deck and top of A-frame = 70 ft

As with the DB 24, the A-frame is the highest point on the derrick barge while it is being towed.

Marine Contractors

Company: General Construction Company

Vessels:

- DB General
- DB Alameda
- DB Oakland
- DB Olympia
- DB Pacific
- DB Seattle

Company confirmed the information provided during the CRC NIR is still accurate (email confirmation included below). Vessel details that follow were included in the CRC NIR.

From:	Brian Carrico
To:	Nicole McDermott
Subject:	Fw: Interstate Bridge Program
Date:	Thursday, September 23, 2021 11:36:04 AM
Attachments:	image002.png image003.png image004.png image005.png

---

From: Kent.Boden <Kent.Boden@kiewit.com>
Sent: Thursday, September 23, 2021 11:23 AM
To: Brian Carrico <Brian.Carrico@interstatebridge.org>
Cc: Todd.Wille <Todd.Wille@kiewit.com>
Subject: Interstate Bridge Program

Hello Brian, there are three vessels no longer in service; the Beaver, Tacoma, and Anchorage. The remainder of the information is accurate. Please feel free to call me if you have any questions.

Kiewit Infrastructure Group

Kent Boden
Pursuits Manager, Kiewit Bridge & Marine

Kiewit Infrastructure West Co.
2200 Columbia House Blvd, Vancouver, WA 98661
360.693.1478 (P) 360.721.9208 (C)
Kiewit.com An Equal Opportunity Employer

From: Brian Carrico <Brian.Carrico@interstatebridge.org>
Sent: Thursday, September 23, 2021 9:17 AM
To: Kent.Boden <Kent.Boden@kiewit.com>
Subject: [EXTERNAL] Interstate Bridge Program

Kent - Thanks for taking my call today. Attached is the information submitted for the CRC program back in 2012. We would appreciate a review of this information to confirm that it remains accurate. We would especially want to know if any of the specifications have changed, if any of the fleet are no longer in service, if other vessels should be considered and whether you have any planned or potential projects that would result in the need to transit through the I-5 bridge area.

Feel free to contact me with any questions.

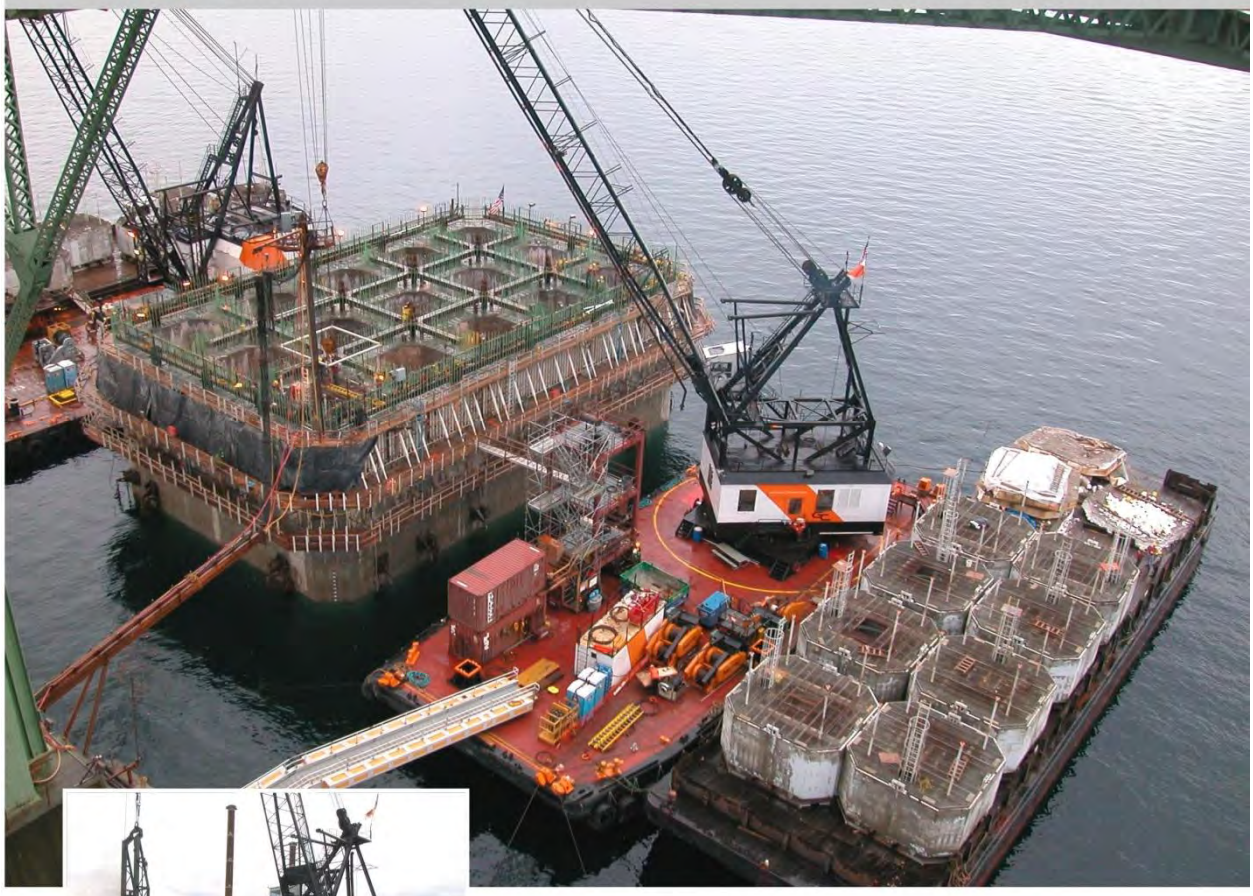
Brian

Brian Carrico
Interstate Bridge Replacement Program
Environmental Program
O: 360-823-6122 | **C:** 360-433-7775
E: brian.carrico@interstatebridge.org
interstatebridge.org

Marine Contractors
Owner: General Construction
Vessel: D.B. Alameda

GENERAL CONSTRUCTION COMPANY

D.B. ALAMEDA
100 TON FLOATING CRANE



CAPABILITIES

- Piledriving
- Duty Cycle
- Clamshell Dredging
- Heavy Lifting
- Crane Service

SPECIFICATIONS

- Main Crane: Dravo-Wellman 413D
- Capacities: 100 tons @ 55′ radius over stern
  80 tons @ 50′ radius fully revolving
  30 tons @ 120′ radius 2-line whip
  15 tons @ 160′ single whip
- Boom: 160′ to main fall
- Barge Size: 142′ x 58′ x 12′
- Classification: USCG
- Draft (std.): 5′-10″
- Spuds: Two 28″ square x 90′ long
- Bunkers: 6,500 gallons diesel fuel

© 2007 General Construction Company, 19472 Powder Hill Place N.E., Poulsbo, WA 98370 ♦ Phone (360) 779-3200 ♦ Fax (360) 779-3132
Please contact Pat Boyd-Equipment Manager at (206) 938-6758 or pat.boyd@kiewit.com for load charts, deck configuration, and availability.
www.generalconstructionco.com

NOTE BREADTH DOES NOT INCLUDE FENDERS. DEPTH = DRAFT + FREEBOARD

Floating Cranes		Official Number	Length	Breadth	Depth	Gross Tonnage
53-0705	DB Tacoma, 37 ton	505025	150	44	9.5	557
53-0706	DB Olympia, 80 ton	1027118	150	60	10	756
53-0707	DB Beaver, 98 ton	602235	115.9	52	8.8	577
53-0732	DB Columbia, 125 ton	1048155	141	58	13	893
53-0733	DB Seattle, 165 ton	547079	152	70	11.6	1158
53-0734	DB Oakland Dredge	1089113	140	70	12	987
53-0738	DB Vancouver, 130 ton	587032	210	60	13.1	1487
53-0739	DB Pacific, 165 ton	653245	250	72	13.7	2114
53-0737	DB Los Angeles, 300 ton	1047575	210	68	15	1799
53-0736	DB General, 700 ton	1042279	288	100	18	4040
53-0755	DB Anchorage 75 ton	CG599745	120	50	9.1	
53-0754	DB Alameda 65 ton	1075264	142	58	12	830
Spud Barges						
53-0679	GC-26 Spud Barge	CG007597	119.5	43	9	
53-0544	Kiewit Pacific Barge	1041180	153.6	60	12	928
53-0830	Jeanne Barge	503792	164.9	50	12.1	731
53-0680	Burrard Barge	CG051637	116	51.6	10	
Dump Barges						
53-0704	Pt. Basalt Dump Barge, 1375 CY	597335	180	50	13.5	1086
53-0750	Pt. Defiance Dump Barge, 1375 CY	661902	180	50	14	1083
53-0756	Pt. No Point Dump Barge, 2000 CY	505209	217	43.1	15.4	1288
53-0749	Pt. Vashon Dump Barge, 1375 CY	605636	180	50	12	957
Small Flat Deck Barges						
53-0700	Longview Barge	UNDOC.	65	25	5	
53-0763	GC 20 Flat Barge	1172636	85	26	4.5	83
53-0681	GC 25 Flat Barge	UNDOC.	110	30	8	
53-0682	GC 28 Flat Barge	1140218	110	35	8	258
53-0685	GC 31 Flat Barge	1140219	110	32	8	236
53-0742	GC 34 Flat Barge	1140217	110	35	8	258
53-0743	GC 35 Flat Barge	1140215	110	35	8	258
53-0744	GC 36 Flat Barge	1140213	110	32	8	236
53-0745	GC 37 Flat Barge	1140212	110	35	6	194
53-0764	GC 39 Flat Barge	1172640	110	30	8	221
53-0854	GC 40 Flat Barge	1172646	110	32	8	236
53-0855	GC 41 Flat Barge	1172650	110	32	8	236
Large Flat Deck Barges						
53-0686	GC-101 Flat Barge	522512	164.1	50.1	10.2	745
53-0687	GC-102 Flat Barge	522513	164.1	50.1	10.2	745
53-0688	GC-103 Flat Barge	523820	164.1	50.1	10.2	745
53-0689	GC-104 Flat Barge	523821	164.1	50.1	10.2	745
53-0690	GC-120 Flat Barge	558616	159.6	50	12.4	902
53-0691	GC-121 Flat Barge	557752	159.6	50.5	12.4	902
53-0693	GC-151 Flat Barge	508395	150	42	11.3	586
53-0694	GC-152 Flat Barge	507931	150	42	9.3	523
53-0759	GC-155 Flat Barge	294820	150.3	42.1	10.5	607
53-0858	GC-156 Flat Barge	508468	144	48	10	479
53-0859	GC-160 Flat Barge	297320	160.1	43.6	10.2	607
53-0698	GC-173 Flat Barge	298614	178	50	11.6	946
53-0857	GC-175 Flat Barge	278799	170.2	44	11.6	806
53-0752	GC-180 Flat Barge	503956	180	45.1	11.5	768
53-0765	CG-181 Flat Barge	273546	175	60	9	793
53-0801	GC-183 Flat Barge	502560	180	44.1	16.2	1095
53-0821	GC-184 Flat Barge	508544	178	50	11.6	946
53-0829	GC-185 Flat Barge	561206	180	50	11.3	945
53-0699	GC-191 Flat Barge	288082	189.5	44	13.5	1027
53-0748	GC-192 Flat Barge	542082	178.1	50	12	1097
53-0692	GC-205 Flat Barge	503698	210	54	14.3	1341
53-0263	KP-202 Barge	504019	200	45	14	1056
53-0266	KP-203 Barge	504480	200	45	14	1050

Columbia River CROSSING

River User Data Sheet

By: RALPH PETEREIT Date: 2/27/2012

1. Company Name and/or Owner of Vessel and contact information

Name of company: GENERAL CONSTRUCTION CO.

Name of contact: PAT BOYD - EQUIPMENT MANAGER

Phone number (Office): 206-938-6750 (Cell): 206-498-8815

Email: pat.boyd@kiewit.com

Address: 3838 W. MARGINAL WAY SW

City: SEATTLE State: WA Zip code: 98106

3a. Vessel Name: D.B. ALAMEDA **3b. Vessel Type:** FLOATING CRANE/ DERRICK BARGE

3c. US Coast Guard Document Number:

4a. Length Overall (LOA), **feet:** 142 **4b. Beam** (width), **feet:** 61.5

5. Draft (depth of hull below waterline, fully laden), **feet:** 6

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), **feet:** 71

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 5-10

8. Frequency of one-way passage underneath I-5 main channel (typical per month):

Jan ____ **Feb** ____ **Mar**____ **Apr**____ **May**____ **Jun**____ **Jul**____ **Aug**____ **Sep**____ **Oct**____ **Nov**____ **Dec**____

9. Frequency of one-way passage underneath I-5 main channel (other historic events):

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

Jan ____ **Feb** ____ **Mar**____ **Apr**____ **May**____ **Jun**____ **Jul**____ **Aug**____ **Sep**____ **Oct**____ **Nov**____ **Dec**____

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? NOT AVAILABLE

What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)?

May we have a copy?

13. Other miscellaneous

Vessel Height Verification Sheet

By: Ralph Petereit Date: July 10, 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: General Construction Co.
   b. Name of contact: Pat Boyd – Equipment Manager
   c. Phone number (Office): (206) 938-6758 (Cell): (206) 498-8815
   d. Email: PAT.BOYD@KIEWIT.COM
   e. Address: 3838 W. Marginal Way City: Seattle
      State: WA Zip code: 98106
2. Vessel
   a. ID: b. Name: DB Alameda
   c. Type: Crane Barge d. USCG Document Number: 1075264
3. Vessel Configuration
   a. Identify vessel configuration: Crane barge
   - Is a vessel specification sheet available? Yes
   - Configuration shown on the sheet: Yes
   - What is the lowest height configuration for transport? 71 ft 2 in.

   b. What is the gantry configuration? Pinned Estimated gantry height: 71 ft 2 in
   c. Does the barge have spuds? Yes
   - Height above waterline for travel? Gantry height
   - Can the spuds be removed for travel? Yes
   - Work and cost involved in removing spuds? ½ - full day
4. Vessel Location
   a. Where is the vessel currently located? Portland
   b. Is it working on a job? Yes – Tri Met Bridge Is it tied up to shore? No
   c. What is the best time to make a trip to the vessel? NA

5. Measurements from Spec Sheet

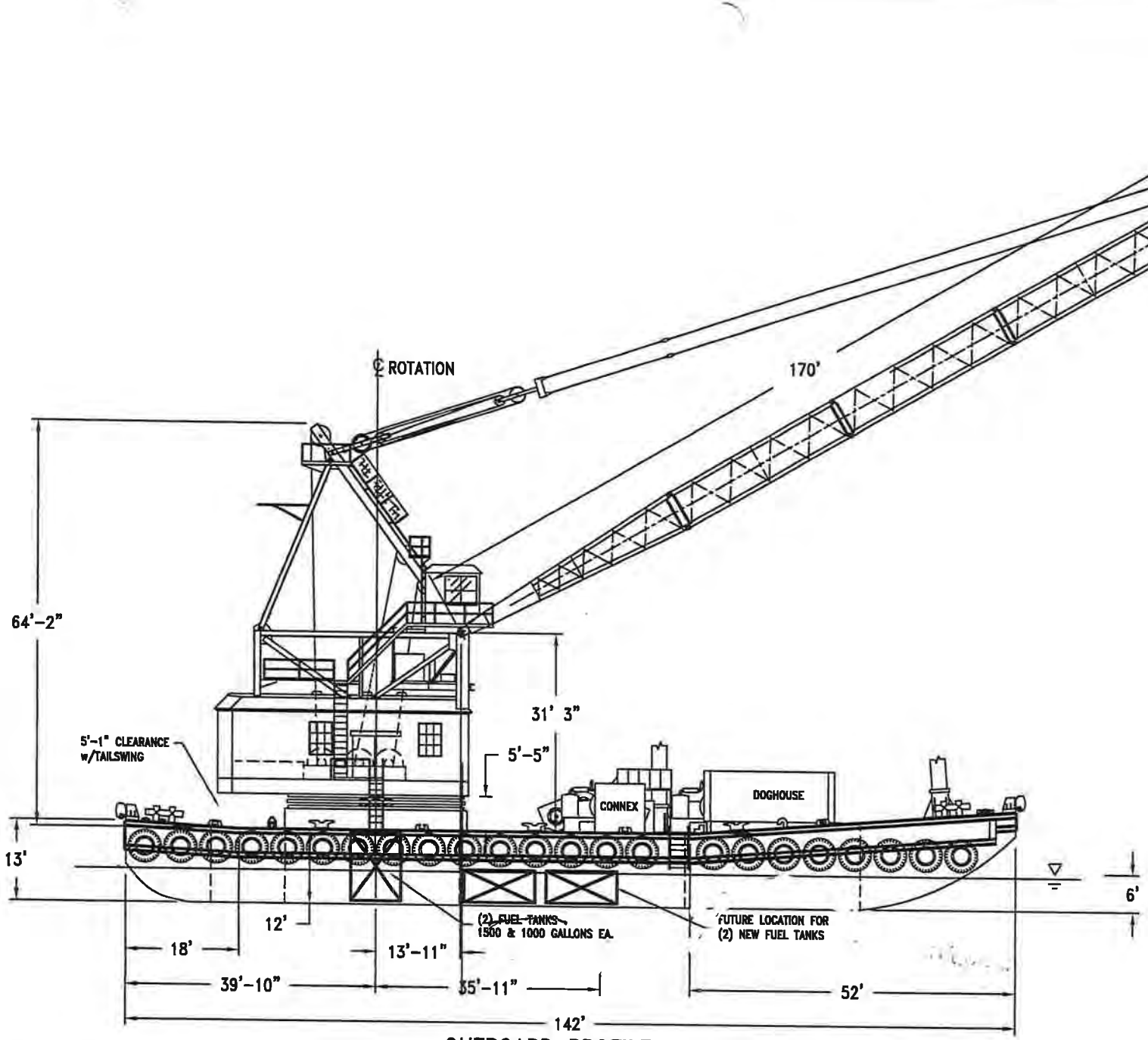
Gantry Height:	71 ft 2 in
Water Level:	
Top of Boom:	
Height of Boom Hinge Pin:	
Boom Cradle:	
Top of Spud:	

6. Vessel Height

Self-Reported		From Spec Sheet	
Air Draft:	71 ft	Air Draft:	71 ft 2 in
Air Gap:	5 – 10 ft	Air Gap:	10 ft
Water Level:	16	Water Level:	16
Total Height:	97 ft	Total Height:	97 ft 2 in

7. History Notes

Date	Item
6/29/2012	Contacted Pat Boyd- Equipment Manager
7/10/2012	Visited Yard to confirm vessel locations and heights

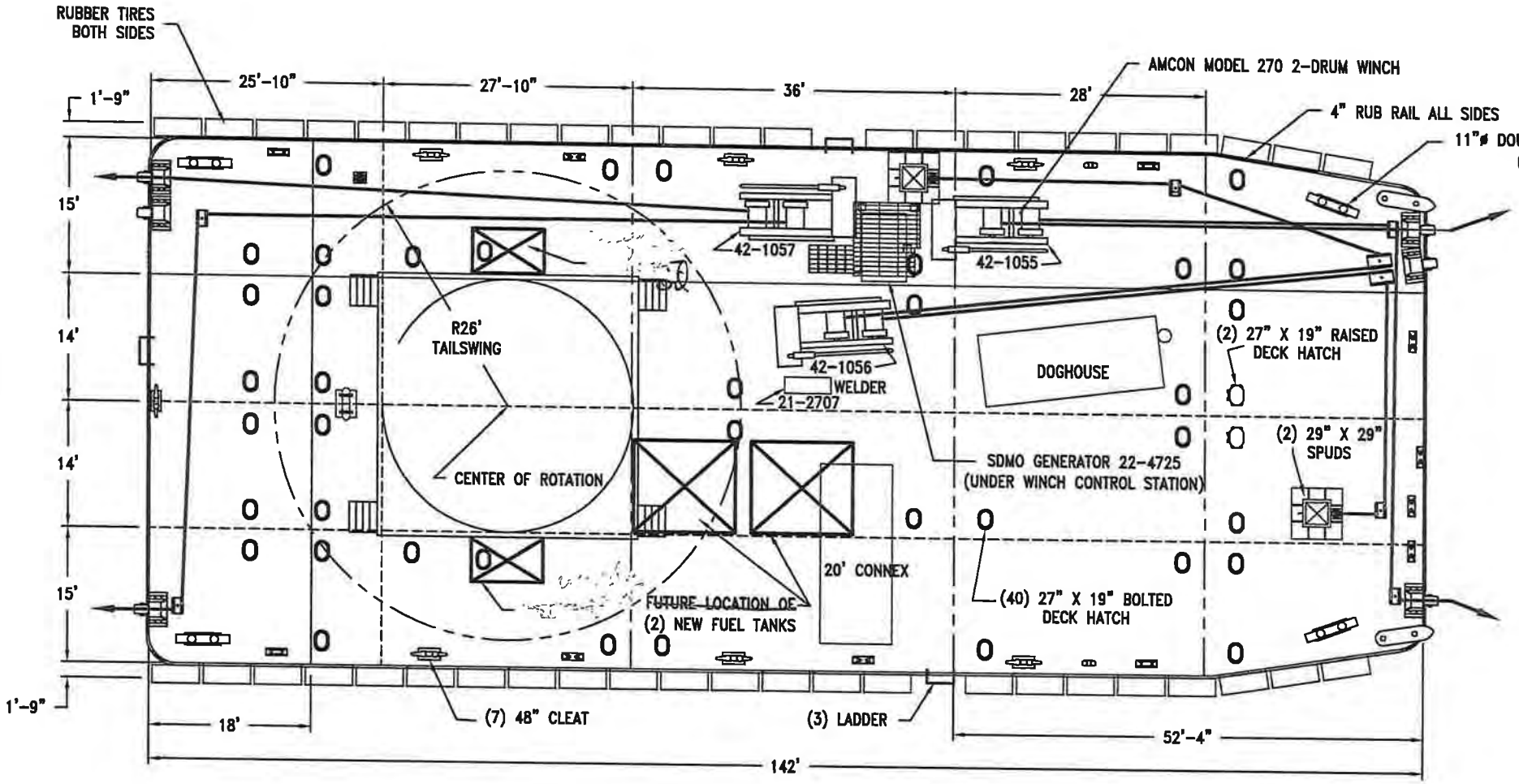


OUTBOARD PROFILE

GENERAL CONSTRUCTION COMPANY
19472 POWDER HILL PL * POULSBO, WA * 98370-7466
(360) 779-3200 * FAX (360) 779-3132

D.B. ALAMEDA (100 TON) – #53-0754

ISSUED: – JAN 2010
FC-53-0754-2



GENERAL CONSTRUCTION COMPANY
19472 POWDER HILL PL * POULSBO, WA * 98370-7466
(360) 779-3200 * FAX (360) 779-3132

D.B. ALAMEDA (100 TON) - #53-0754

ISSUED: - JAN 2010

FC-53-0754-3

Marine Contractors
Owner: General Construction
Vessel: D.B. General

GENERAL CONSTRUCTION COMPANY

D.B. GENERAL
700 TON FLOATING CRANE

SPECIFICATIONS

- Main Crane: Clyde 52
- Capacities: 700 tons @ 70′ radius over the stern
  500 tons @ 70′ radius fully revolving
  40 tons @ 243′ radius (auxiliary)
  25 tons @ 257′ radius (whip)
- Boom: 200′ to main fall (260′ available)
  230′ to auxiliary line (290′ available)
  245′ to whip line (305′ available)
- Barge Size: 300′ x 100′ x 18′
- Classification: ABS+A1, USCG
- Draft (std.): 8′-0″
- Spuds: Two 48″Ø x 90′ long
- Anchors: 6-point moorage
- Deck Loading: 2,000 psf uniform
- Bunkers: 50,000 gallons diesel fuel
  310,000 gallons fresh water

CAPABILITIES

- Heavy Lifting
- Piledriving
- Offshore Construction & Service
- Duty Cycle – Dredging
- Pipe Lay

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Please contact Pat Boyd-Equipment Manager at (206) 938-6758 or pat.boyd@kiewit.com for load charts, deck configuration, and availability.
www.generalconstructionco.com

Columbia River CROSSING

River User Data Sheet

By: RALPH PETEREIT Date: 2/27/2012

1. Company Name and/or Owner of Vessel and contact information

Name of company: GENERAL CONSTRUCTION CO.

Name of contact: PAT BOYD - EQUIPMENT MANAGER

Phone number (Office): 206-938-6750 (Cell): 206-498-8815

Email: pat.boyd@kiewit.com

Address: 3838 W. MARGINAL WAY SW

City: SEATTLE State: WA Zip code: 98106

3a. Vessel Name: D.B. GENERAL **3b. Vessel Type:** FLOATING CRANE/ DERRICK BARGE

3c. US Coast Guard Document Number:

4a. Length Overall (LOA), **feet:** 300 **4b. Beam** (width), **feet:** 105.8

5. Draft (depth of hull below waterline, fully laden), **feet:** 8

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), **feet:** 93

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 5-10

8. Frequency of one-way passage underneath I-5 main channel (typical per month):

Jan ____ Feb ____ Mar____ Apr____ May____ Jun____ Jul____ Aug____ Sep____ Oct____ Nov____ Dec____

9. Frequency of one-way passage underneath I-5 main channel (other historic events):

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month): NONE

Jan ____ Feb ____ Mar____ Apr____ May____ Jun____ Jul____ Aug____ Sep____ Oct____ Nov____ Dec____

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? NOT AVAILABLE

What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? NOTHING IN THE WORKS FOR ANYTHING LARGER THAN THIS BARGE.

May we have a copy?

13. Other miscellaneous THIS IS GENERAL'S/KIEWIT'S LARGEST CRANE BARGE. IT HAS GONE UNDER THE BRIDGE TO TAKE THE CRANE OFF THE DAVY CROCKET MANY YEARS AGO, AS WELL AS SOME PICKS UP AT THOMSEN METAL FAB. - BUT CAN'T REMEMBER WHEN

Provided by Kiewit

River User Data Sheet By:_____Date:_____

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: GENERAL CONSTRUCTION COMPANY
   b. Name of contact: _____
   c. Phone number (Office):_____ d. (Cell):_____
   e. Email:_____
   f. Address: 33455 6TH AVE S.
   g. City: FEDERAL WAY
   h. State: WA i. Zip code: 98003

3a. Vessel Name: D.B. GENERAL 3b. Vessel Type: CRANE BARGE

3c. US Coast Guard Document Number: 1042279

4a. Length Overall (LOA), feet: 288.0 4b. Beam (width), feet: 100.0

5. Draft (depth of hull below waterline, fully laden), feet: 8'
6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 93'
7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 10'
8. Frequency of one-way passage underneath I-5 main channel (typical per month):_____

   Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___
9. Frequency of one-way passage underneath I-5 main channel (other historic events):____
10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

    Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___
11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):_____

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy?
13. Other miscellaneous

Vessel Height Verification Sheet

By: Ralph Petereit Date: July 10, 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: General Construction Co.
   b. Name of contact: Pat Boyd – Equipment Manager
   c. Phone number (Office): (206) 938-6758 (Cell): (206) 498-8815
   d. Email: PAT.BOYD@KIEWIT.COM
   e. Address: 3838 W. Marginal Way City: Seattle
      State: WA Zip code: 98106
2. Vessel
   a. ID: b. Name: DB General
   c. Type: Crane Barge d. USCG Document Number: 1042279
3. Vessel Configuration
   a. Identify vessel configuration: Crane barge
   - Is a vessel specification sheet available? Yes
   - Configuration shown on the sheet: Yes
   - What is the lowest height configuration for transport? 93 ft

   b. What is the gantry configuration? Pinned Estimated gantry height: 93 ft

   c. Does the barge have spuds? Yes
   - Height above waterline for travel? Gantry height
   - Can the spuds be removed for travel? Yes
   - Work and cost involved in removing spuds? ½ - full day
4. Vessel Location
   a. Where is the vessel currently located? Terminal 105 – Doing day jobs in the Puget Sound Region
   b. Is it working on a job? Yes Is it tied up to shore? Depends on the day
   c. What is the best time to make a trip to the vessel? Need to call for daily schedule

5. Measurements from Spec Sheet

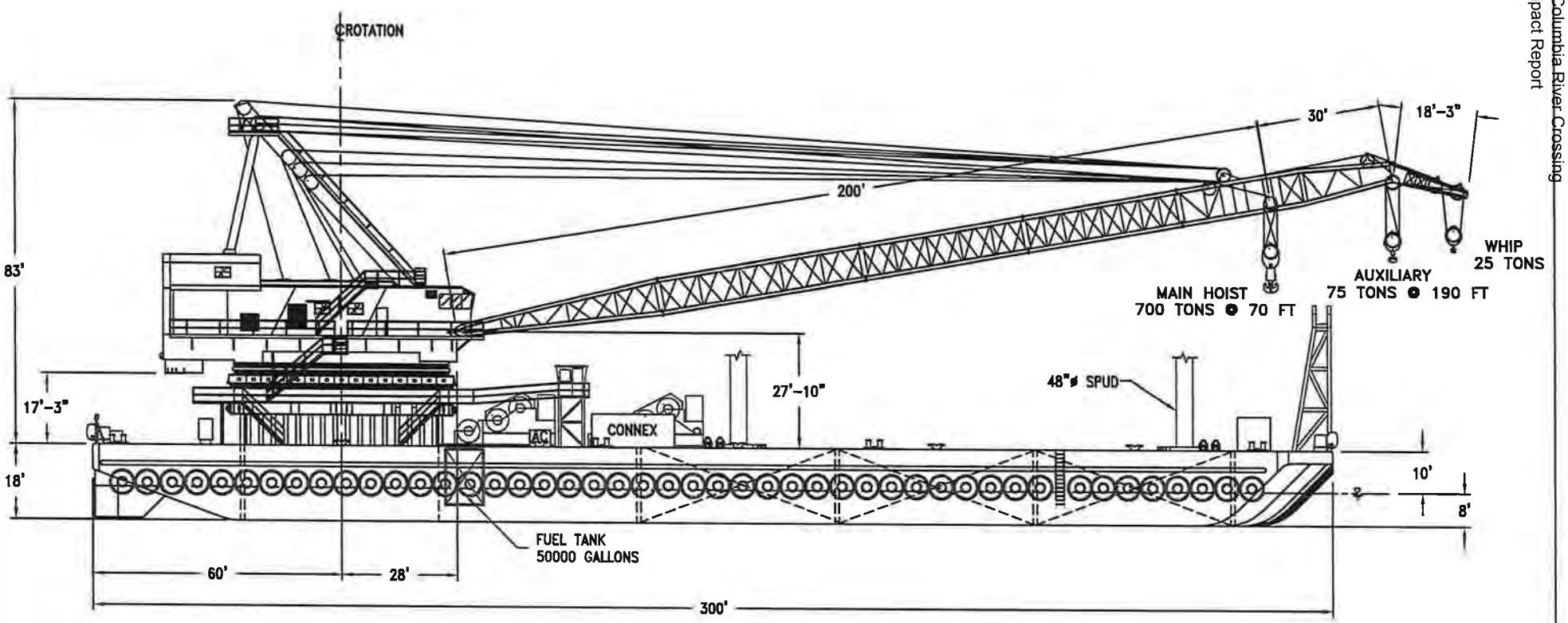
Gantry Height:	93 ft
Water Level:	
Top of Boom:	
Height of Boom Hinge Pin:	
Boom Cradle:	
Top of Spud:	

6. Vessel Height

Self-Reported		From Spec Sheet	
Air Draft:	93 ft	Air Draft:	93 ft
Air Gap:	5 – 10 ft	Air Gap:	10 ft
Water Level:	16	Water Level:	16
Total Height:	119 ft	Total Height:	119 ft

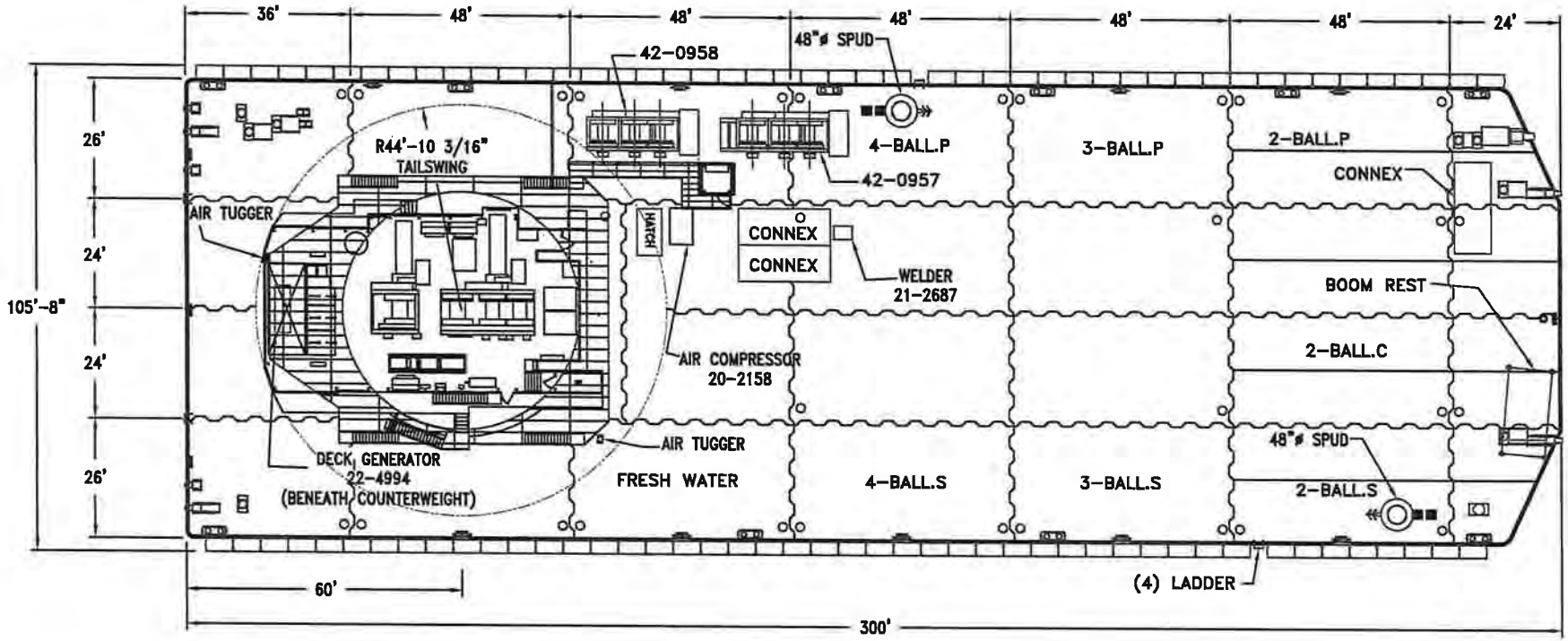
7. History Notes

Date	Item
6/29/2012	Contacted Pat Boyd- Equipment Manager
7/10/2012	Visited Yard to confirm vessel locations and heights



OUTBOARD PROFILE

GENERAL CONSTRUCTION COMPANY 19472 POWDER HILL PL * POULSBO, WA * 98370-7466 (360) 779-3200 * FAX (360) 779-3132	D.B. GENERAL (700 TON) - #53-0736	ISSUED: JAN 2010 FC-53-0736-2



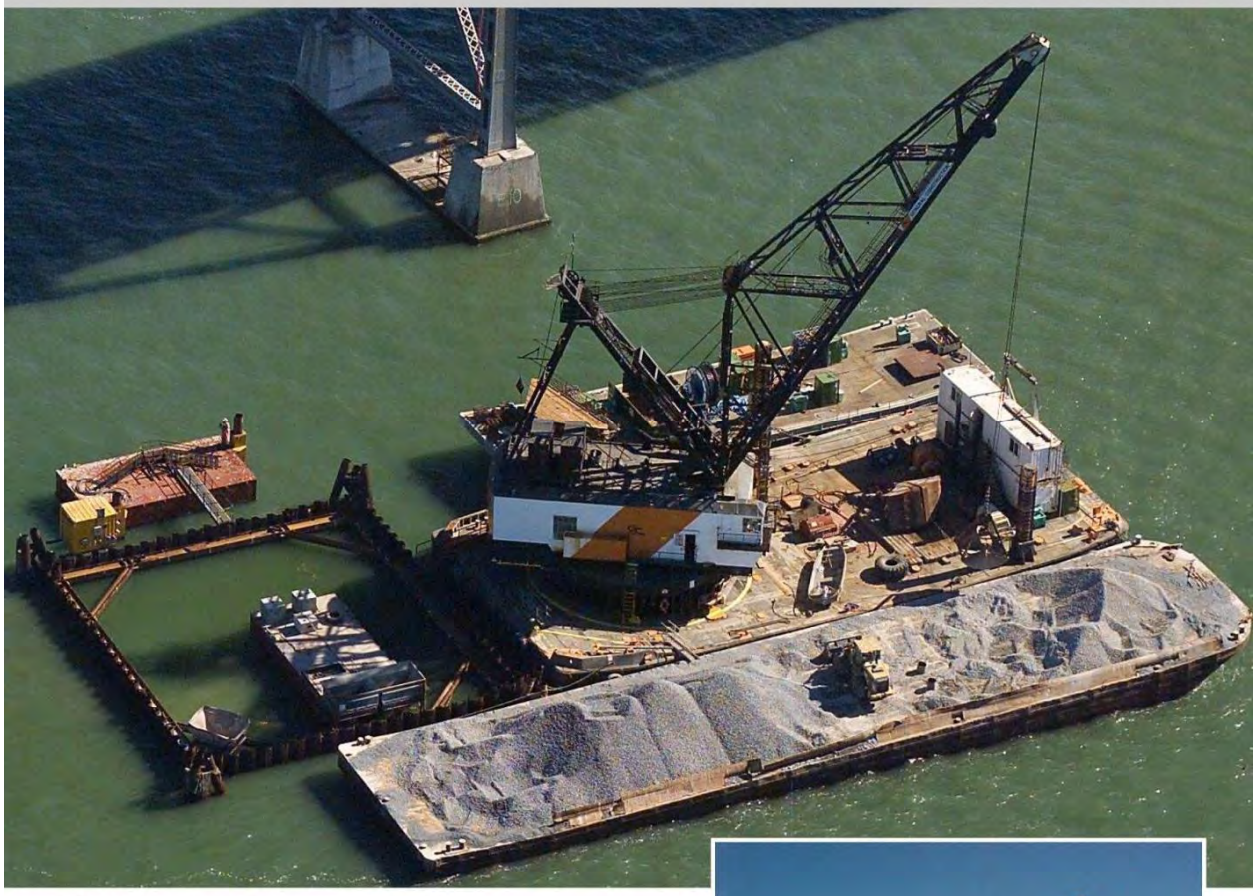
DECK PLAN

GENERAL CONSTRUCTION COMPANY 19472 POWDER HILL PL * POULSBO, WA * 98370-7466 (360) 779-3200 * FAX (360) 779-3132	D.B. GENERAL (700 TON) - #53-0736	ISSUED: JAN 2010 FC-53-0736-3

Marine Contractors
Owner: General Construction
Vessel: D.B. Oakland

GENERAL CONSTRUCTION COMPANY

D.B. OAKLAND
60 TON FLOATING CRANE



SPECIFICATIONS

- Main Crane: Dravo
- Power: Diesel or electric shore power
- Capacities: 60 tons @ 105′ radius duty-cycle
  25 tons @ 125′ radius duty-cycle
- Clamshell: 27 CY Atlas environmental bucket
  14 CY Hawco heavy digging bucket
- Boom: 120′ fixed bridge boom
- Barge Size: 140′ x 70′ x 12.5′
- Classification: USCG
- Draft (std.): 4′-0″
- Spuds: Two 36″ square x 90′ long
- Deck Loading: 1,000 psf uniformly distributed
- Bunkers: 10,000 gallons diesel fuel

CAPABILITIES

- Clamshell Dredging
- Jetties & Breakwaters
- Crane Service

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Please contact Pat Boyd-Equipment Manager at (206) 938-6758 or pat.boyd@kiewit.com for load charts, deck configuration, and availability.
www.generalconstructionco.com

Columbia River CROSSING

River User Data Sheet

By: RALPH PETEREIT Date: 2/27/2012

1. Company Name and/or Owner of Vessel and contact information

Name of company: GENERAL CONSTRUCTION CO.

Name of contact: PAT BOYD - EQUIPMENT MANAGER

Phone number (Office): 206-938-6750 (Cell): 206-498-8815

Email: pat.boyd@kiewit.com

Address: 3838 W. MARGINAL WAY SW

City: SEATTLE State: WA Zip code: 98106

3a. Vessel Name: D.B. OAKLAND **3b. Vessel Type:** FLOATING CRANE/ DERRICK BARGE

3c. US Coast Guard Document Number:

4a. Length Overall (LOA), **feet:** 140 **4b. Beam** (width), **feet:** 70

5. Draft (depth of hull below waterline, fully laden), **feet:** 6

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), **feet:** 84.9

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 5-16

8. Frequency of one-way passage underneath I-5 main channel (typical per month):

Jan ____ **Feb** ____ **Mar**____ **Apr**____ **May**____ **Jun**____ **Jul**____ **Aug**____ **Sep**____ **Oct**____ **Nov**____ **Dec**____

9. Frequency of one-way passage underneath I-5 main channel (other historic events):

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

Jan ____ **Feb** ____ **Mar**____ **Apr**____ **May**____ **Jun**____ **Jul**____ **Aug**____ **Sep**____ **Oct**____ **Nov**____ **Dec**____

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? NOT AVAILABLE

What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)?

May we have a copy?

13. Other miscellaneous

Vessel Height Verification Sheet

By: Ralph Petereit Date: July 10, 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: General Construction Co.
   b. Name of contact: Pat Boyd – Equipment Manager
   c. Phone number (Office): (206) 938-6758 (Cell): (206) 498-8815
   d. Email: PAT.BOYD@KIEWIT.COM
   e. Address: 3838 W. Marginal Way City: Seattle
      State: WA Zip code: 98106
2. Vessel
   a. ID: b. Name: DB Oakland
   c. Type: Crane Barge d. USCG Document Number: 1089113
3. Vessel Configuration
   a. Identify vessel configuration: Crane barge
   - Is a vessel specification sheet available? Yes
   - Configuration shown on the sheet: Yes
   - What is the lowest height configuration for transport? 78 ft 10 in

   b. What is the gantry configuration? Pinned Estimated gantry height: 78 ft 10 in

   c. Does the barge have spuds? Yes
   - Height above waterline for travel? Gantry height
   - Can the spuds be removed for travel? Yes
   - Work and cost involved in removing spuds? ½ - full day
4. Vessel Location
   a. Where is the vessel currently located? In the yard, going to Bangor July 23rd.
   b. Is it working on a job? No Is it tied up to shore? Yes
   c. What is the best time to make a trip to the vessel? Any time

5. Measurements from Spec Sheet

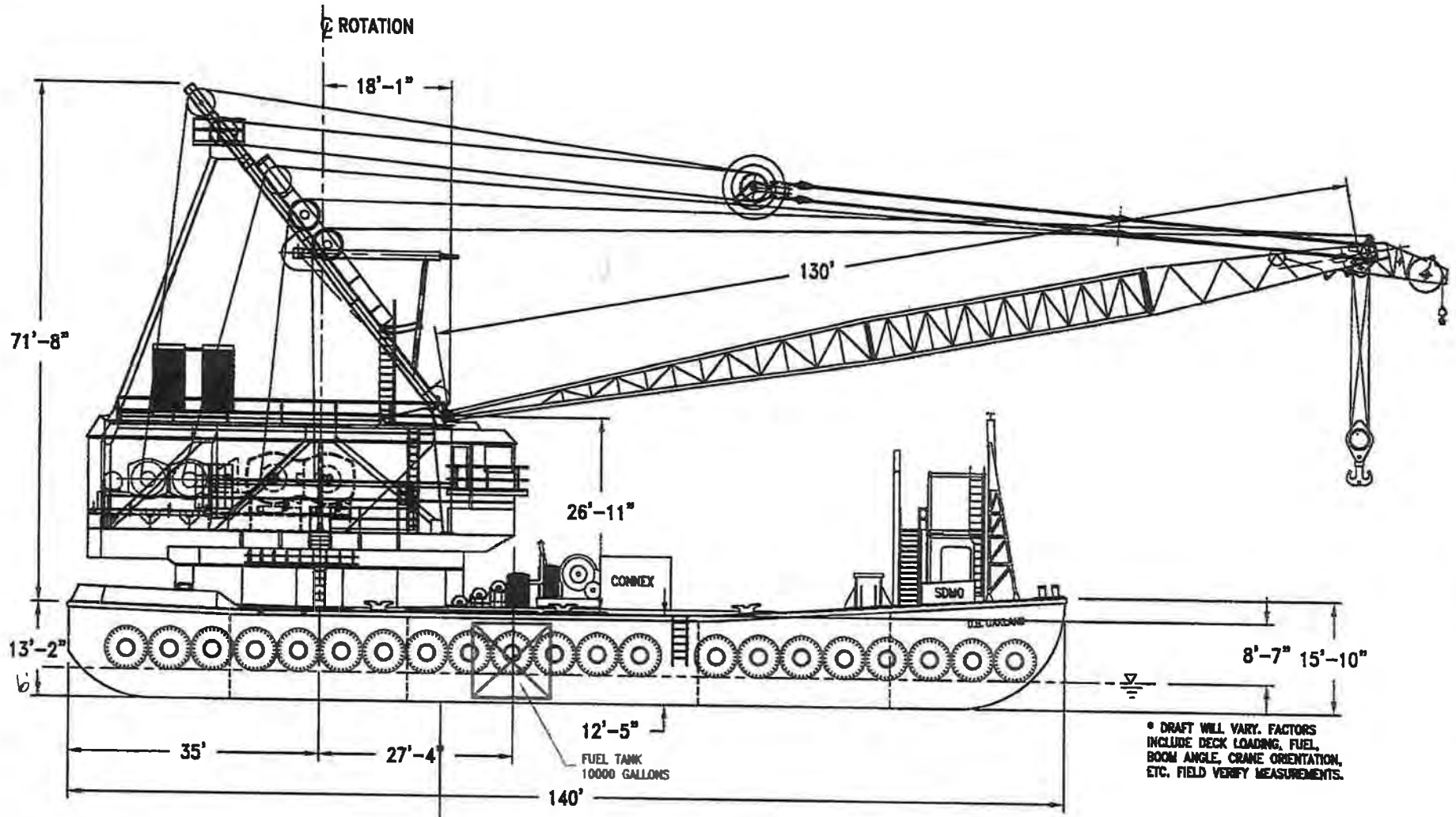
Gantry Height:	78 ft 10 in
Water Level:	
Top of Boom:	
Height of Boom Hinge Pin:	
Boom Cradle:	
Top of Spud:	

6. Vessel Height

Self-Reported		From Spec Sheet	
Air Draft:	84.9 ft	Air Draft:	78 ft 10 in
Air Gap:	5 – 10 ft	Air Gap:	10 ft
Water Level:	16	Water Level:	16
Total Height:	110.9 ft	Total Height:	104 ft 10 in

7. History Notes

Date	Item
6/29/2012	Contacted Pat Boyd- Equipment Manager
7/10/2012	Visited Yard to confirm vessel locations and heights

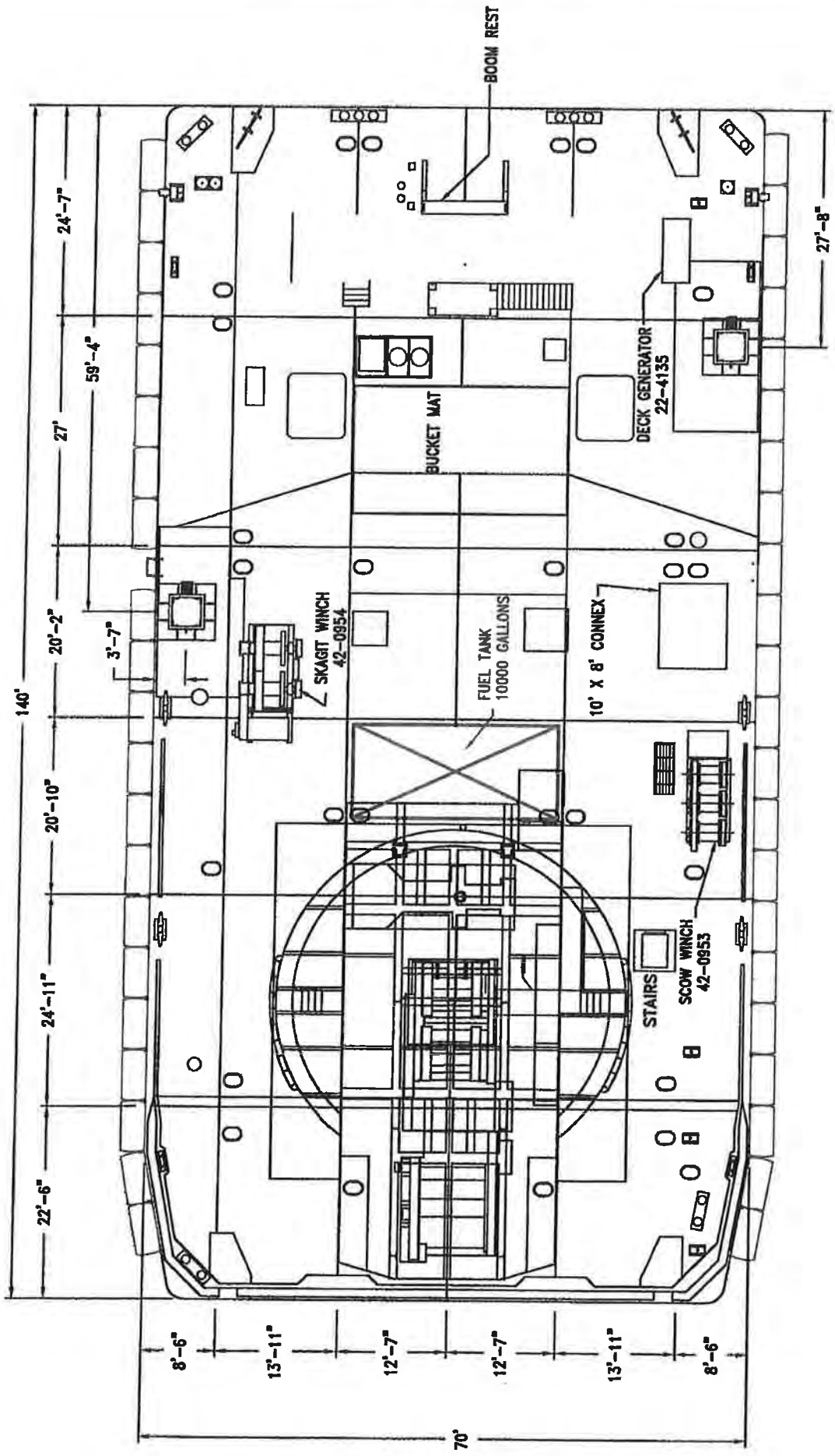


OUTBOARD PROFILE

GENERAL CONSTRUCTION COMPANY
3838 WEST MARGINAL WAY S * SEATTLE, WA * 98106
(206) 938-6750 * FAX (206) 938-6766

D.B. OAKLAND (210 TON) - 53-0734

ISSUED: - OCT 2010
FC-53-0734-2/6



DECK PLAN

GENERAL CONSTRUCTION COMPANY
3838 WEST MARGINAL WAY S • SEATTLE, WA • 98106
(206) 938-6750 • FAX (206) 938-6766

D.B. OAKLAND (210 TON) - 53-0734

ISSUED: - OCT 2010

FC-53-0734-3/6

Marine Contractors
Owner: General Construction
Vessel: D.B. Olympia

GENERAL CONSTRUCTION COMPANY

D.B. OLYMPIA
100 TON FLOATING CRANE

SPECIFICATIONS

- Main Crane: Dravo-Wellman 413
- Capacities: 100 tons @ 55′ radius over stern
  80 tons @ 50′ radius fully revolving
  15 tons @ 75′ duty-cycle
  15 tons @ 160′ radius
- Boom: 160′ to main fall (200′ available)
  165′ to main whip line (205′ available)
  Additional 50′ luffing jib available
- Barge Size: 150 x 60′ x 10′
- Classification: USCG
- Draft (std.): 4′-0″
- Spuds: Two 28″ square x 90′ long
- Bunkers: 6,000 gallons diesel fuel

CAPABILITIES

- Piledriving
- Duty Cycle
- Clamshell Dredging
- Heavy Lifting
- Crane Service

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Please contact Pat Boyd-Equipment Manager at (206) 938-6758 or pat.boyd@kiewit.com for load charts, deck configuration, and availability.
www.generalconstructionco.com

Columbia River CROSSING

River User Data Sheet

By: RALPH PETEREIT Date: 2/27/2012

1. Company Name and/or Owner of Vessel and contact information

Name of company: GENERAL CONSTRUCTION CO.

Name of contact: PAT BOYD - EQUIPMENT MANAGER

Phone number (Office): 206-938-6750 (Cell): 206-498-8815

Email: pat.boyd@kiewit.com

Address: 3838 W. MARGINAL WAY SW

City: SEATTLE State: WA Zip code: 98106

3a. Vessel Name: D.B. OLYMPIA **3b. Vessel Type:** FLOATING CRANE / DERRICK BARGE

3c. US Coast Guard Document Number:

4a. Length Overall (LOA), **feet:** 150 **4b. Beam** (width), **feet:** 63

5. Draft (depth of hull below waterline, fully laden), **feet:** 4

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), **feet:** 70.1

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 5-10

8. Frequency of one-way passage underneath I-5 main channel (typical per month):

Jan ____ **Feb** ____ **Mar**____ **Apr**____ **May**____ **Jun**____ **Jul**____ **Aug**____ **Sep**____ **Oct**____ **Nov**____ **Dec**____

9. Frequency of one-way passage underneath I-5 main channel (other historic events):

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

Jan ____ **Feb** ____ **Mar**____ **Apr**____ **May**____ **Jun**____ **Jul**____ **Aug**____ **Sep**____ **Oct**____ **Nov**____ **Dec**____

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? NOT AVAILABLE

What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)?

May we have a copy?

13. Other miscellaneous

Vessel Height Verification Sheet

By: Ralph Petereit Date: July 10, 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: General Construction Co.
   b. Name of contact: Pat Boyd – Equipment Manager
   c. Phone number (Office): (206) 938-6758 (Cell): (206) 498-8815
   d. Email: PAT.BOYD@KIEWIT.COM
   e. Address: 3838 W. Marginal Way City: Seattle
      State: WA Zip code: 98106
2. Vessel
   a. ID: b. Name: DB Olympia
   c. Type: Crane Barge d. USCG Document Number: 1027118
3. Vessel Configuration
   a. Identify vessel configuration: Crane barge
   - Is a vessel specification sheet available? Yes
   - Configuration shown on the sheet: Yes
   - What is the lowest height configuration for transport? 70 ft 1.5 in

   b. What is the gantry configuration? Pinned Estimated gantry height: 70 ft 1.5 in

   c. Does the barge have spuds? Yes
   - Height above waterline for travel? Gantry height
   - Can the spuds be removed for travel? Yes
   - Work and cost involved in removing spuds? ½ - full day
4. Vessel Location
   a. Where is the vessel currently located? Lake Washington, WA.
   b. Is it working on a job? Yes – 520 Bridge Replacement Is it tied up to shore? No

c. What is the best time to make a trip to the vessel? None currently

5. Measurements from Spec Sheet

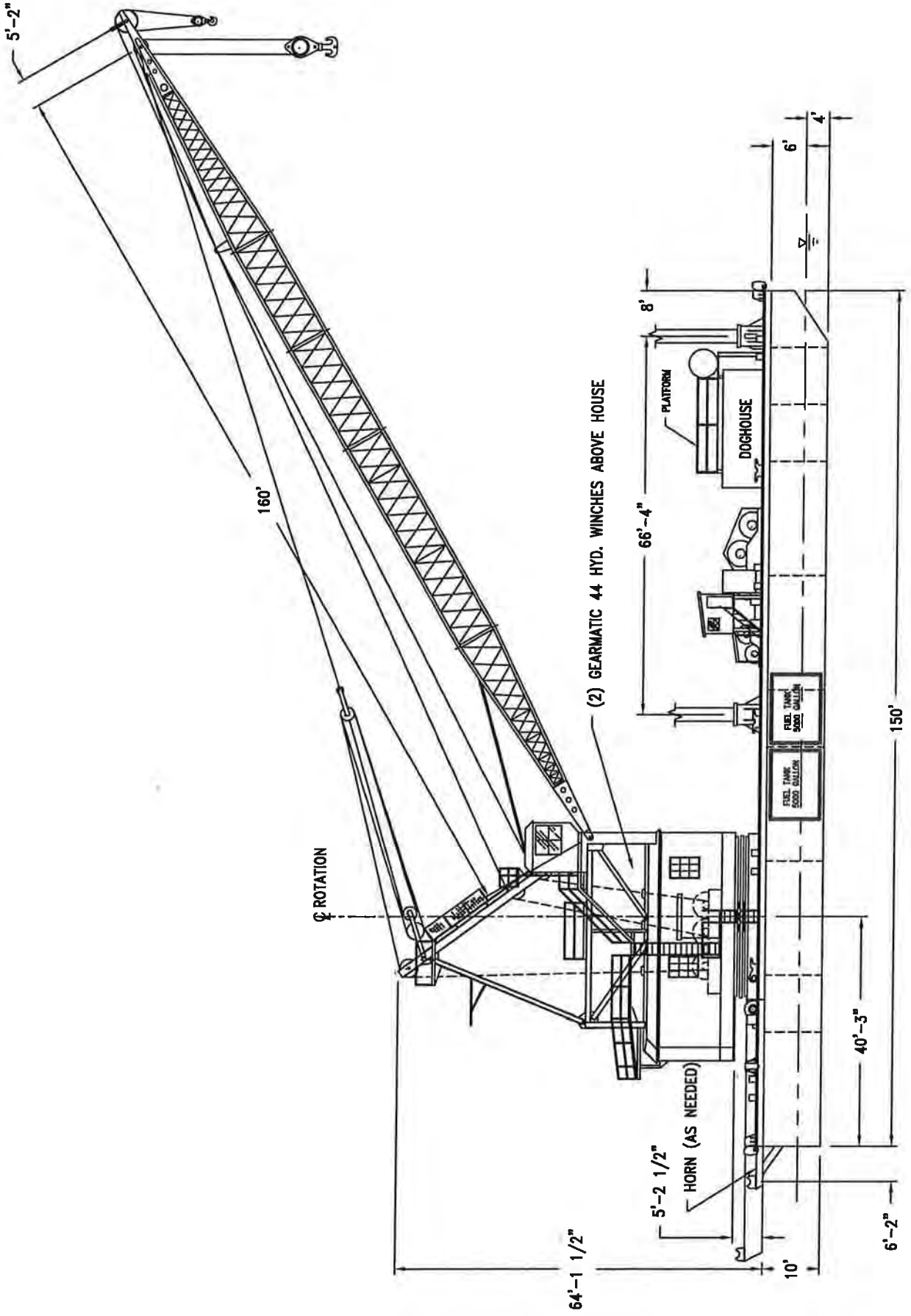
Gantry Height:	78 ft 10 in
Water Level:	
Top of Boom:	
Height of Boom Hinge Pin:	
Boom Cradle:	
Top of Spud:	

6. Vessel Height

Self-Reported		From Spec Sheet	
Air Draft:	70.1 ft	Air Draft:	70 ft 1.5 in
Air Gap:	5 – 10 ft	Air Gap:	10 ft
Water Level:	16	Water Level:	16
Total Height:	96.1 ft	Total Height:	96 ft 1.5 in

7. History Notes

Date	Item
6/29/2012	Contacted Pat Boyd- Equipment Manager
7/10/2012	Visited Yard to confirm vessel locations and heights

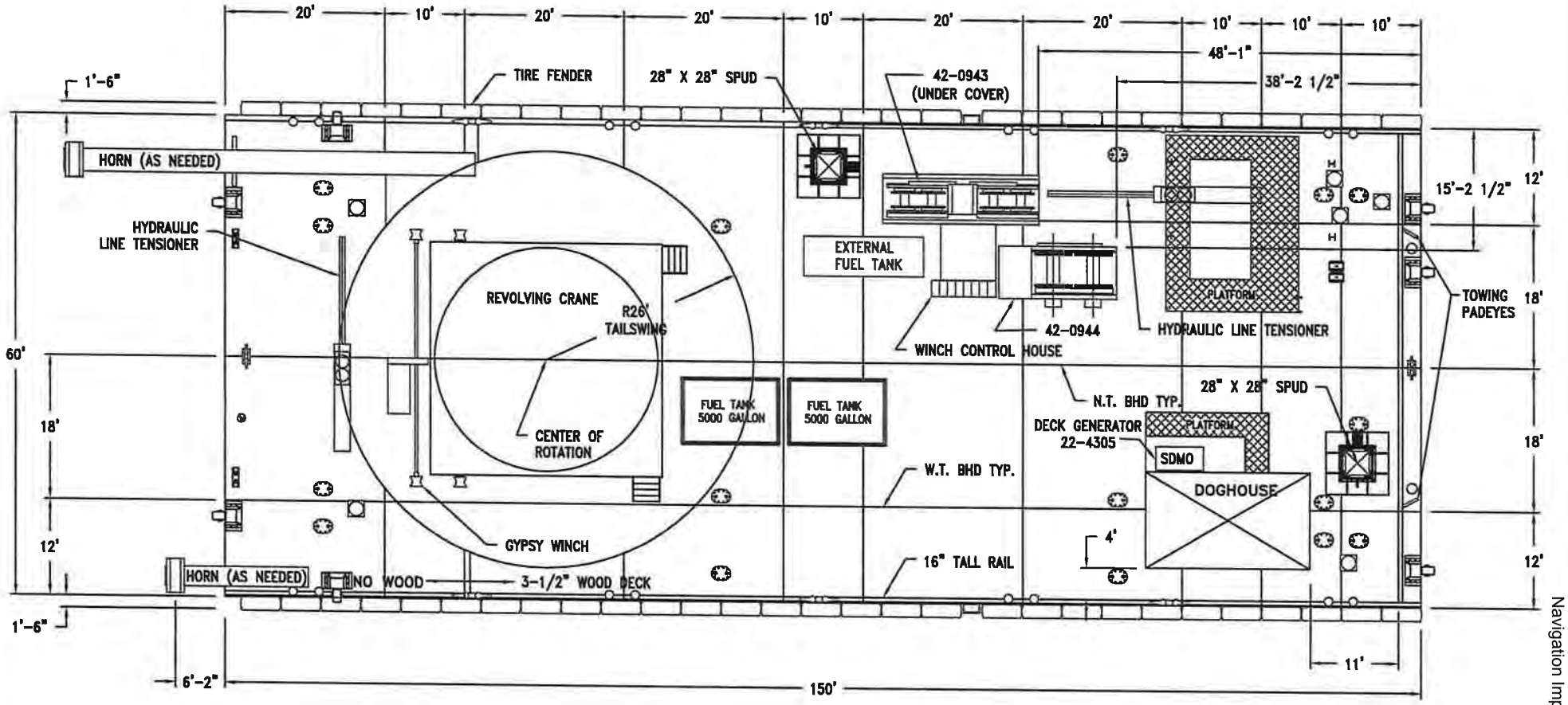


OUTBOARD PROFILE

GENERAL CONSTRUCTION COMPANY
19472 POWDER HILL PL * POULSBO, WA * 98370-7466
(360) 779-3200 * FAX (360) 779-3132

D.B. OLYMPIA (100 TON) - #53-0706

ISSUED: - JAN 2010
FC-53-0706-3



DECK PLAN

GENERAL CONSTRUCTION COMPANY
19472 POWDER HILL PL * POULSBO, WA * 98370-7466
(360) 779-3200 * FAX (360) 779-3132

D.B. OLYMPIA (100 TON) - #53-0706

ISSUED: - JAN 2010

FC-53-0706-3

Marine Contractors

Owner: General Construction

Vessel: D.B. Pacific

GENERAL CONSTRUCTION COMPANY

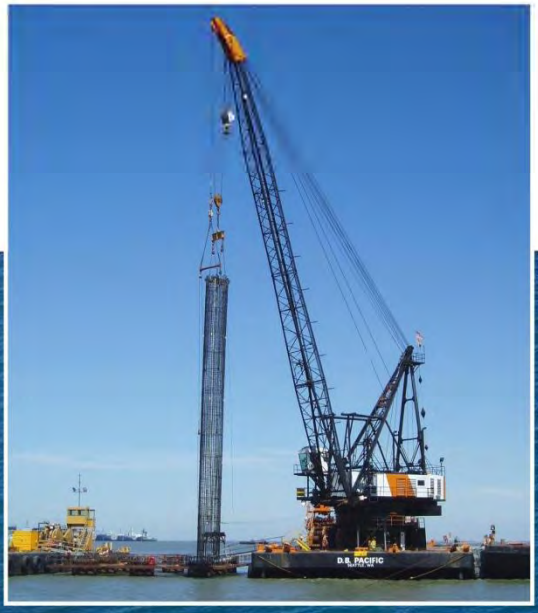
D.B. PACIFIC
180 TON FLOATING CRANE

CAPABILITIES

- Piledriving
- Heavy Lifting
- Duty Cycle – Dredging
- Offshore Construction & Service
- Pipe Lay

SPECIFICATIONS

- Main Crane: American M-25A
- Capacities: 180 tons @ 44′ radius fully revolving
  42 tons @ 130′ radius fully revolving
- Boom: 120′ to main fall (200′ available)
  126′ to whip line (206′ available)
- Barge Size: 250′ x 72′ x 15′
- Classification: ABS+A1, USCG
- Draft (std.): 7′-0″
- Spuds: Not available
- Anchors: 6-point moorage
- Deck Loading: 1,800 psf uniformly distributed
- Bunkers: 35,000 gallons diesel fuel
  3,000 gallons fresh water



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Please contact Pat Boyd-Equipment Manager at (206) 938-6758 or pat.boyd@kiewit.com for load charts, deck configuration, and availability.
www.generalconstructionco.com

Columbia River CROSSING

River User Data Sheet

By: RALPH PETEREIT Date: 2/27/2012

1. Company Name and/or Owner of Vessel and contact information

Name of company: GENERAL CONSTRUCTION CO.

Name of contact: PAT BOYD - EQUIPMENT MANAGER

Phone number (Office): 206-938-6750 (Cell): 206-498-8815

Email: pat.boyd@kiewit.com

Address: 3838 W. MARGINAL WAY SW

City: SEATTLE State: WA Zip code: 98106

3a. Vessel Name: D.B. PACIFIC **3b. Vessel Type:** FLOATING CRANE / DERRICK BARGE

3c. US Coast Guard Document Number:

4a. Length Overall (LOA), **feet:** 250 **4b. Beam** (width), **feet:** 72

5. Draft (depth of hull below waterline, fully laden), **feet:** 7

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), **feet:** 86.5

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 5-10

8. Frequency of one-way passage underneath I-5 main channel (typical per month):

Jan ____ **Feb** ____ **Mar**____ **Apr**____ **May**____ **Jun**____ **Jul**____ **Aug**____ **Sep**____ **Oct**____ **Nov**____ **Dec**____

9. Frequency of one-way passage underneath I-5 main channel (other historic events):

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

Jan ____ **Feb** ____ **Mar**____ **Apr**____ **May**____ **Jun**____ **Jul**____ **Aug**____ **Sep**____ **Oct**____ **Nov**____ **Dec**____

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? NOT AVAILABLE

What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)?

May we have a copy?

13. Other miscellaneous

Vessel Height Verification Sheet

By: Ralph Petereit Date: July 10, 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: General Construction Co.
   b. Name of contact: Pat Boyd – Equipment Manager
   c. Phone number (Office): (206) 938-6758 (Cell): (206) 498-8815
   d. Email: PAT.BOYD@KIEWIT.COM
   e. Address: 3838 W. Marginal Way City: Seattle
      State: WA Zip code: 98106
2. Vessel
   a. ID: b. Name: DB Pacific
   c. Type: Crane Barge d. USCG Document Number: 65245
3. Vessel Configuration
   a. Identify vessel configuration: Crane barge
   - Is a vessel specification sheet available? Yes
   - Configuration shown on the sheet: Yes
   - What is the lowest height configuration for transport? 86 ft 5 in

   b. What is the gantry configuration? Pinned Estimated gantry height: 83 ft

   c. Does the barge have spuds? Yes
   - Height above waterline for travel? 86 ft 5 in
   - Can the spuds be removed for travel? Yes
   - Work and cost involved in removing spuds? ½ - full day
4. Vessel Location
   a. Where is the vessel currently located? Lake Washington, WA.
   b. Is it working on a job? Yes – 520 Bridge Replacement Is it tied up to shore? No
   c. What is the best time to make a trip to the vessel? None currently

5. Measurements from Spec Sheet

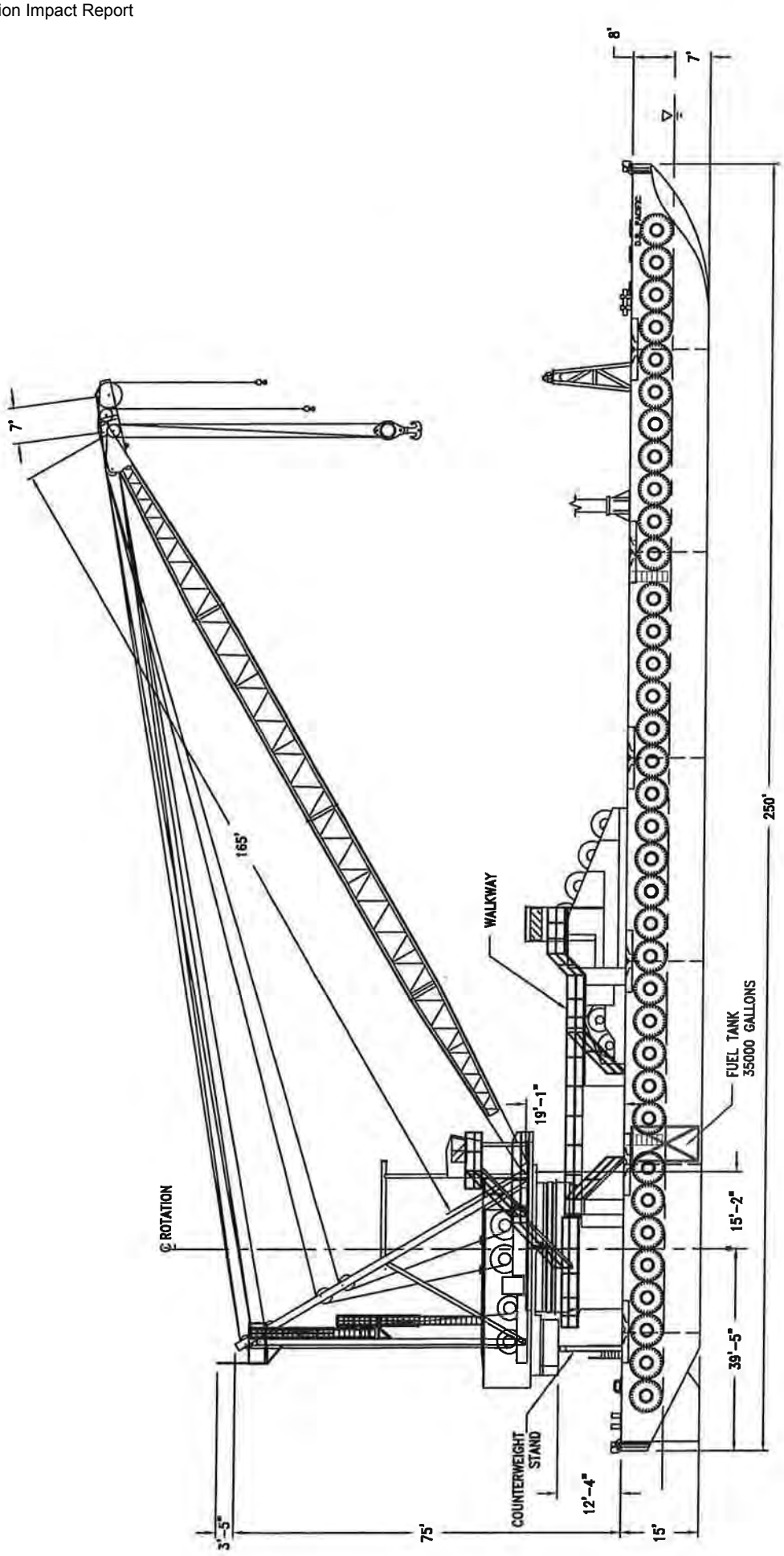
Gantry Height:	83 ft
Water Level:	
Top of Boom:	
Height of Boom Hinge Pin:	
Boom Cradle:	
Top of Spud:	

6. Vessel Height

Self-Reported		From Spec Sheet	
Air Draft:	86.5 ft	Air Draft:	86 ft 5 in
Air Gap:	5 – 10 ft	Air Gap:	10 ft
Water Level:	16	Water Level:	16
Total Height:	112.5 ft	Total Height:	112 ft 5 in

7. History Notes

Date	Item
6/29/2012	Contacted Pat Boyd- Equipment Manager
7/10/2012	Visited Yard to confirm vessel locations and heights

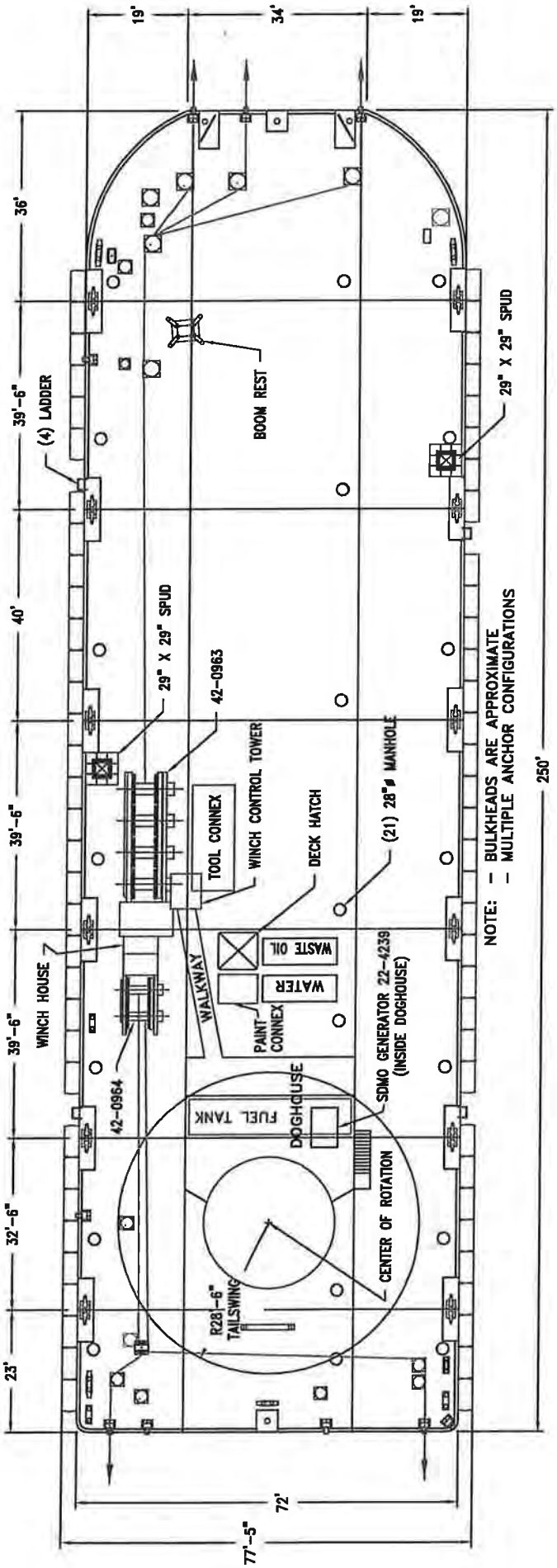


OUTBOARD PROFILE

GENERAL CONSTRUCTION COMPANY
19472 POWDER HILL PL * POULSBO, WA * 98370-7466
(360) 779-3200 * FAX (360) 779-3132

D.B. PACIFIC (180 TON) - #53-0739

ISSUED: - JAN 2010
FC-53-0739-4



DECK PLAN

GENERAL CONSTRUCTION COMPANY
19472 POWDER HILL PL * POULSBO, WA * 98370-7466
(360) 779-3200 * FAX (360) 779-3132

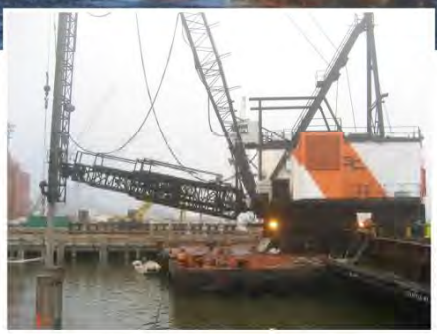
D.B. PACIFIC (180 TON) - #53-0739

ISSUED: - JAN 2010
FC-53-0739-4

Marine Contractors
Owner: General Construction
Vessel: D.B. Seattle

GENERAL CONSTRUCTION COMPANY

D.B. SEATTLE
165 TON FLOATING CRANE



CAPABILITIES

- Clamshell Dredging
- Piledriving
- Rock Jetties and Breakwaters
- Heavy Lifting

SPECIFICATIONS

- Main Crane: American M-25A
- Capacities: 165 tons @ 50′ radius over stern
  150 tons @ 50′ radius fully revolving
  50 tons @ 90′ duty-cycle (150′ boom)
- Clamshell: 27 CY Atlas environmental bucket
  14 CY Hawco heavy digging bucket
- Boom: 165′ to main fall (210′ available)
  177′ to whip line (222′ available)
- Barge Size: 150′ x 70′ x 12.5′
- Classification: USCG
- Draft (std.): 7′-0″
- Spuds: Two 28″ square x 90′ long
- Bunkers: 45,000 gallons diesel fuel
  2,350 gallons fresh water

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Please contact Pat Boyd-Equipment Manager at (206) 938-6758 or pat.boyd@kiewit.com for load charts, deck configuration, and availability.
www.generalconstructionco.com

Columbia River CROSSING

River User Data Sheet

By: RALPH PETEREIT Date: 2/27/2012

1. Company Name and/or Owner of Vessel and contact information

Name of company: GENERAL CONSTRUCTION CO.

Name of contact: PAT BOYD - EQUIPMENT MANAGER

Phone number (Office): 206-938-6750 (Cell): 206-498-8815

Email: pat.boyd@kiewit.com

Address: 3838 W. MARGINAL WAY SW

City: SEATTLE State: WA Zip code: 98106

3a. Vessel Name: D.B. SEATTLE **3b. Vessel Type:** FLOATING CRANE / DERRICK BARGE

3c. US Coast Guard Document Number:

4a. Length Overall (LOA), **feet:** 152 **4b. Beam** (width), **feet:** 76

5. Draft (depth of hull below waterline, fully laden), **feet:** 7.5

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), **feet:** 90

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 5 - 10

8. Frequency of one-way passage underneath I-5 main channel (typical per month):

Jan ____ **Feb** ____ **Mar**____ **Apr**____ **May**____ **Jun**____ **Jul**____ **Aug**____ **Sep**____ **Oct**____ **Nov**____ **Dec**____

9. Frequency of one-way passage underneath I-5 main channel (other historic events):

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

Jan ____ **Feb** ____ **Mar**____ **Apr**____ **May**____ **Jun**____ **Jul**____ **Aug**____ **Sep**____ **Oct**____ **Nov**____ **Dec**____

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? NOT AVAILABLE

What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)?

May we have a copy?

13. Other miscellaneous

Vessel Height Verification Sheet

By: Ralph Petereit Date: July 10, 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: General Construction Co.
   b. Name of contact: Pat Boyd – Equipment Manager
   c. Phone number (Office): (206) 938-6758 (Cell): (206) 498-8815
   d. Email: PAT.BOYD@KIEWIT.COM
   e. Address: 3838 W. Marginal Way City: Seattle
      State: WA Zip code: 98106
2. Vessel
   a. ID: b. Name: DB Seattle
   c. Type: Crane Barge d. USCG Document Number: 547079
3. Vessel Configuration
   a. Identify vessel configuration: Crane barge
   - Is a vessel specification sheet available? Yes
   - Configuration shown on the sheet: Yes
   - What is the lowest height configuration for transport? 85 ft 11 in

   b. What is the gantry configuration? Pinned Estimated gantry height: 75 ft 6 in

   c. Does the barge have spuds? Yes
   - Height above waterline for travel? 85 ft 11 in
   - Can the spuds be removed for travel? Yes
   - Work and cost involved in removing spuds? ½ - full day
4. Vessel Location
   a. Where is the vessel currently located? Lake Washington, WA.
   b. Is it working on a job? Yes – 520 Bridge Replacement Is it tied up to shore? No
   c. What is the best time to make a trip to the vessel? None currently

5. Measurements from Spec Sheet

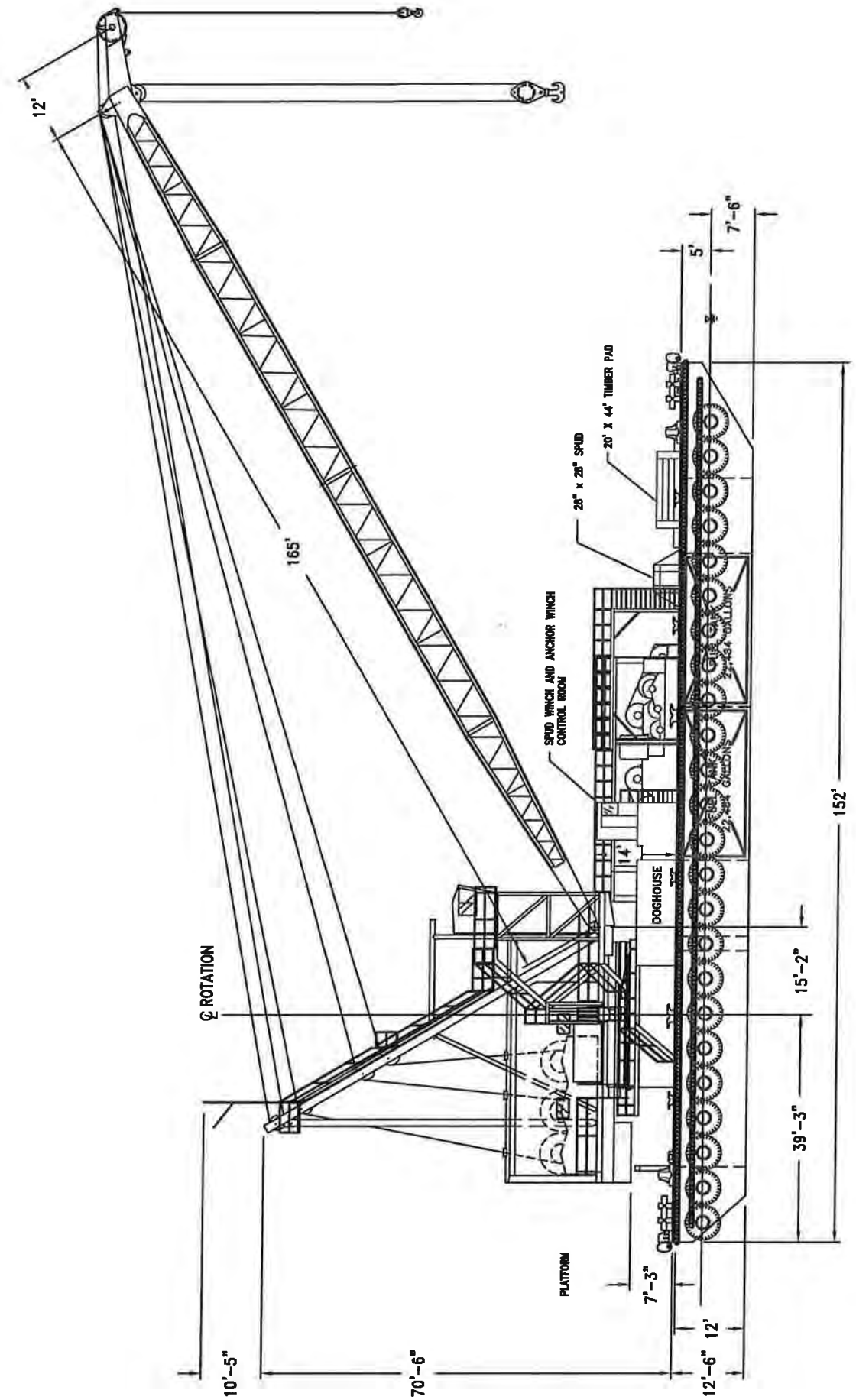
Gantry Height:	75 ft 6 in
Water Level:	
Top of Boom:	
Height of Boom Hinge Pin:	
Boom Cradle:	
Top of Spud:	

6. Vessel Height

Self-Reported		From Spec Sheet	
Air Draft:	90 ft	Air Draft:	85 ft 11 in
Air Gap:	5 – 10 ft	Air Gap:	10 ft
Water Level:	16	Water Level:	16
Total Height:	116 ft	Total Height:	111 ft 11 in

7. History Notes

Date	Item
6/29/2012	Contacted Pat Boyd- Equipment Manager
7/10/2012	Visited Yard to confirm vessel locations and heights

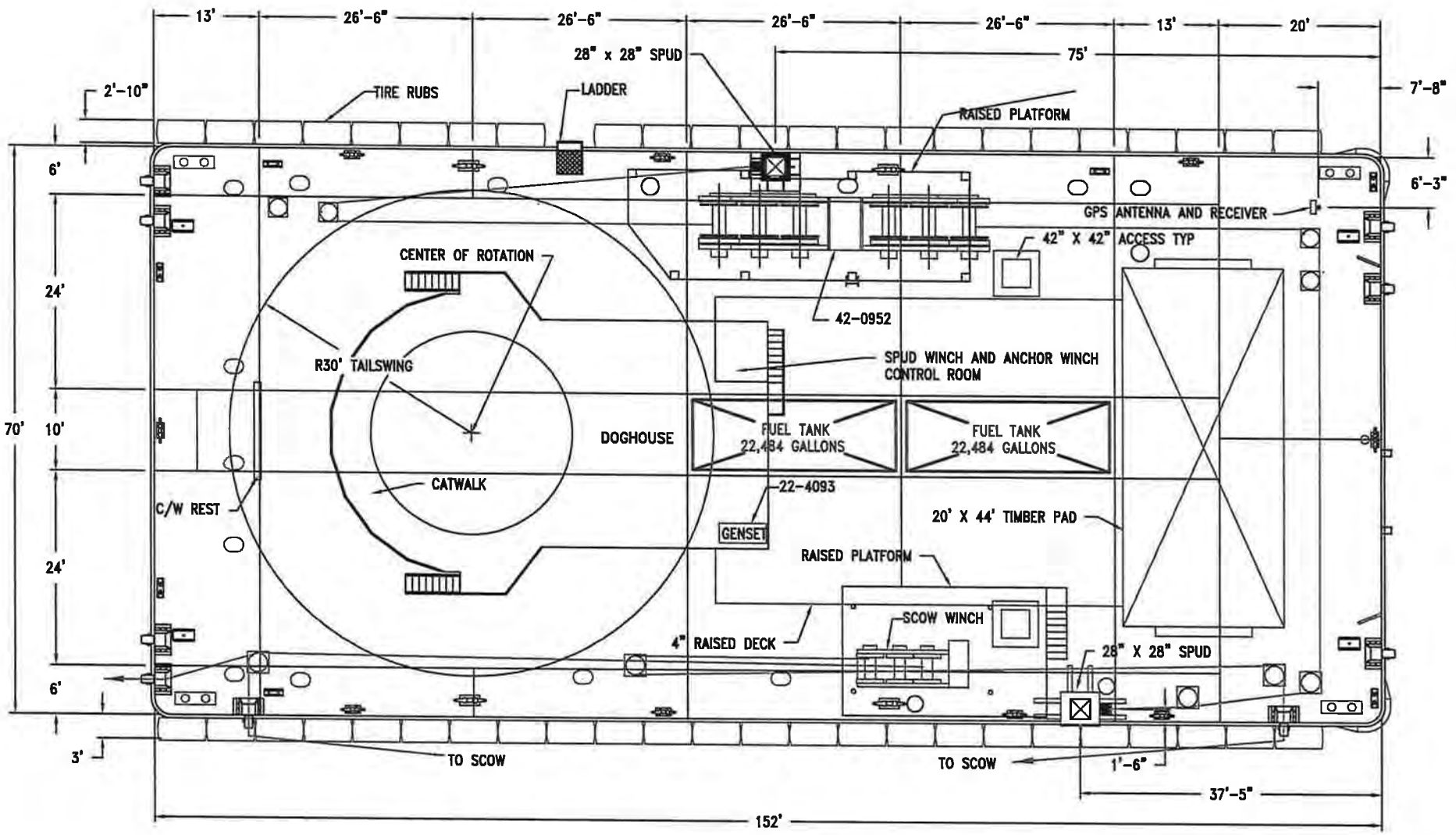


OUTBOARD PROFILE

D.B. SEATTLE (165 TON) - #53-0733

ISSUED: - JAN 2010
FC-53-0733-2

GENERAL CONSTRUCTION COMPANY
19472 POWDER HILL PL * POULSBO, WA * 98370-7466
(360) 779-3200 * FAX (360) 779-3132



NOTE: MULTIPLE ANCHOR CONFIGURATIONS

DECK PLAN

GENERAL CONSTRUCTION COMPANY
19472 POWDER HILL PL * POULSBO, WA * 98370-7466
(360) 779-3200 * FAX (360) 779-3132

D.B. SEATTLE (165 TON) - #53-0733

ISSUED: JAN 2010

FC-53-0733-3

Marine Contractors

Company: Hickey Marine

Vessels:

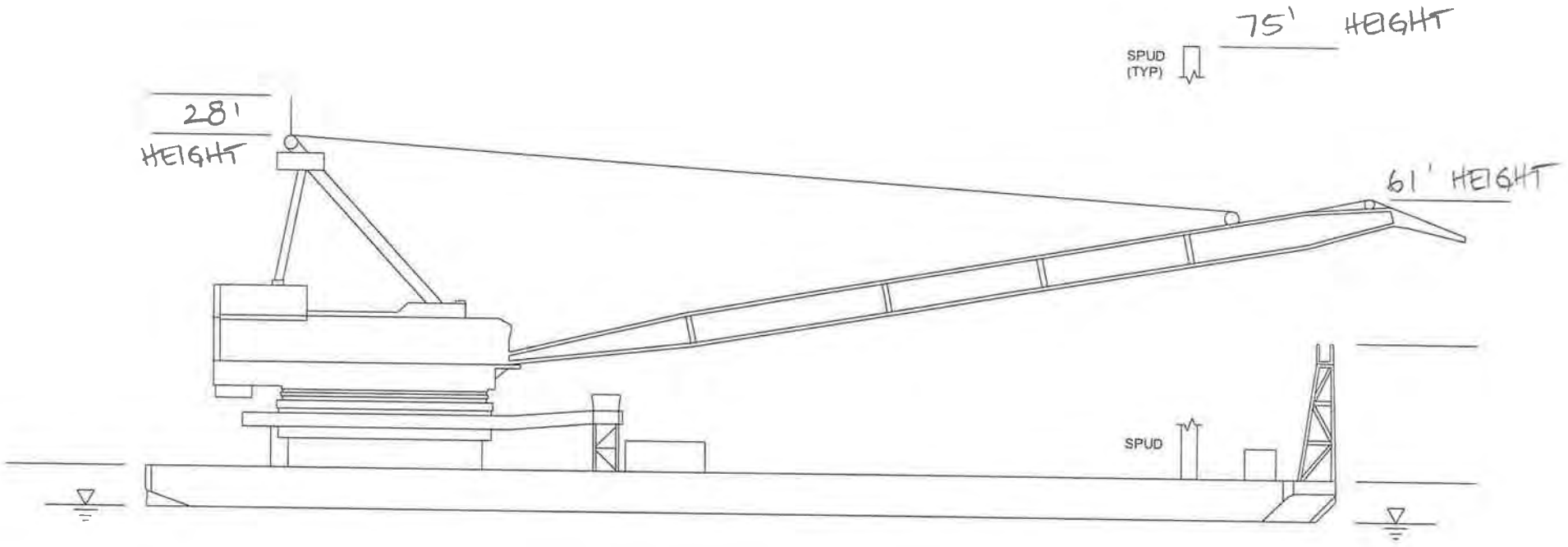
- Sea Hawk
- Sea Horse
- Sea Lion
- Sea Vulture

Company did not respond to IBR request. Information below was included in the CRC NIR.

Marine Contractors

Owner: Hickey Marine Enterprises

Vessel: Sea Hawk



SEA HAWK
NAME

HICKEY MARINE
LOCATION

07-05-12
DATE

CRC Vessel Verification

Prepared by: David Evans and Associates, Inc.

Vessel Name	Owner	Antenna Elev (ft)	Mast Elev (ft)	Spud Elev (ft)	Boom Crane Elev (ft)	Gantry Elev (ft)	Pivot Pt Elev (ft)	Cradle Elev (ft)	Water Elev (ft)	Height Above Water
Sea Hawk	Hickey Marine Enterprises					44.0			15.6	28
				90.4					15.6	75
					77.0				15.6	61
Sea Horse	Hickey Marine Enterprises				65.1				15.6	49
				104.0					15.6	88
						88.7			15.6	73
								52.2	15.6	37
Sea Vulture	Hickey Marine Enterprises					58.4			15.6	43
							31.8		15.6	16
				90.7					15.6	75
					185.8				15.6	170
								37.9	15.6	22
Sea Lion	Hickey Marine Enterprises					49.4			15.6	34
							31.9		15.6	16
					136.6				15.6	121
				77.0					15.6	61

Vessel Height Verification Sheet

By: Pete Geiger Date: 5 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Hickey Marine Enterprises/HME Construction
   b. Name of contact: Greg Speyer/Darrell Jamieson
   c. Phone number (Office): 360.695.4553 (Cell):
   d. Email: gregs@hickeymarine.com; darrellj@hickeymarine.com;
   e. Address: 6801 NW Old Lower River Road City: Vancouver
      State: WA Zip code: 98660
2. Vessel
   a. ID: b. Name: SeaHawk
   c. Type: Derrick Barge with Crane d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Crane Boom lowered in travel postion; Spud Up on Pin
      - Is a vessel specification sheet available? On ProjectSolve
      - Configuration shown on the sheet: not shown, photo only
      - What is the lowest height configuration for transport? ~75 Feet (Spud on Pin)

   b. What is the gantry configuration? Assembled with Pins Estimated gantry height: Not given

   c. Does the barge have spuds? Yes, Two
      - Height above waterline for travel? Center (2) = 75 feet
      - Can the spuds be removed for travel? Only on very rare occasions
      - Work and cost involved in removing spuds? 4 hours to reset spuds. Need to find a site to harbor or tie up to. Spuds often need separate barge to transport them.
4. Vessel Location
   a. Where is the vessel currently located? Columbia River
   b. Is it working on a job? Yes but at HMI Is it tied up to shore? Yes

c. What is the best time to make a trip to the vessel? Anytime, Just need a few days advance notice.

5. Surveyed Measurements (all measurements NAVD 88)

Gantry Height:	44.0 feet
Water Level:	15.6 feet
Top of Boom:	77.0 feet (Travel angle ~17.5 degrees off horizontal)
Height of Boom Hinge Pin:	Not Measured
Boom Cradle:	Not Measured – No Boom Cradle
Top of Spud:	90.4 feet
Top of Deck:	Not Measured

6. Vessel Height

Self-Reported		Surveyed	
Air Draft:	75 feet	Air Draft:	75 feet
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet (CRD)	Water Level:	16 feet (CRD)
Total Height:	101 feet	Total Height:	101 feet

7. History Notes

Date	Item
2/23/2012	Contacted by Jennifer Rabby
2/23/2012	Data sheet submitted
6/28/2012	Contacted by Pete Geiger for field measurement
7/5/2012	Field measured

Hickey Marine Enterprises, Inc.

D.B. SEA HAWK

CERTIFICATION: ABS LOADLINE

HULL DIMENSIONS: 110' X 44' X 10'

PERFORMANCE: 50 Ton LIFT CAPACITY

BOOM LENGHTS: 100' – 150'

spud H. 75' to water

OPERATION: D.B. SEA HAWK is equipped to perform dredging and pile driving operations.

DECK EQUIPMENT: Two 75' spuds, 3 drum Skagit deck winch, 100kw generator, APE 100 vibratory hammer, Vulcan 06 impact hammer. Clamshell buckets ranging from 3cy to 5cy.

FUEL CAPACITY: 6,000 GALLONS

6801 NW Old Lower River Road, Vancouver, WA 98660
Office (360) 695-4553 Fax (360) 695-3295
Email – djamiesonhme@comcast.net

Marine Contractors

Owner: Hickey Marine Enterprises

Vessel: Sea Horse

River User Data Sheet By: Jennifer Rabby Date: 2/23/2012 10:00am

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: AME Hickey Marine Enterprises
   b. Name of contact: Greg Speyer & Darrell Jamieson
   c. Phone number (Office): 360.695.4553 d. (Cell): 360.772.4068
   e. Email: gregs@hickeymarine.com
   f. Address: 6801 NW Old Lower River Rd.
   g. City: Vancouver
   h. State: WA i. Zip code: 98660

3a. Vessel Name: Seahorse (Largest of 4) 3b. Vessel Type: Derrick Barge & Crane

3c. US Coast Guard Document Number: _____

4a. Length Overall (LOA), feet: 142 4b. Beam (width), feet: 60

5. Draft (depth of hull below waterline, fully laden), feet: 6.5'

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 90' with spuds 75' gantry

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 10' They request 100' clearance when they go through bridges

8. Frequency of one-way passage underneath I-5 main channel (typical per month): Approx. 6x/yr. for all 4 vessels

   Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___ Oct - March

9. Frequency of one-way passage underneath I-5 main channel (other historic events):____

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month): None

    Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):_____ Rarely have a need to go through because they can get to either side without going through

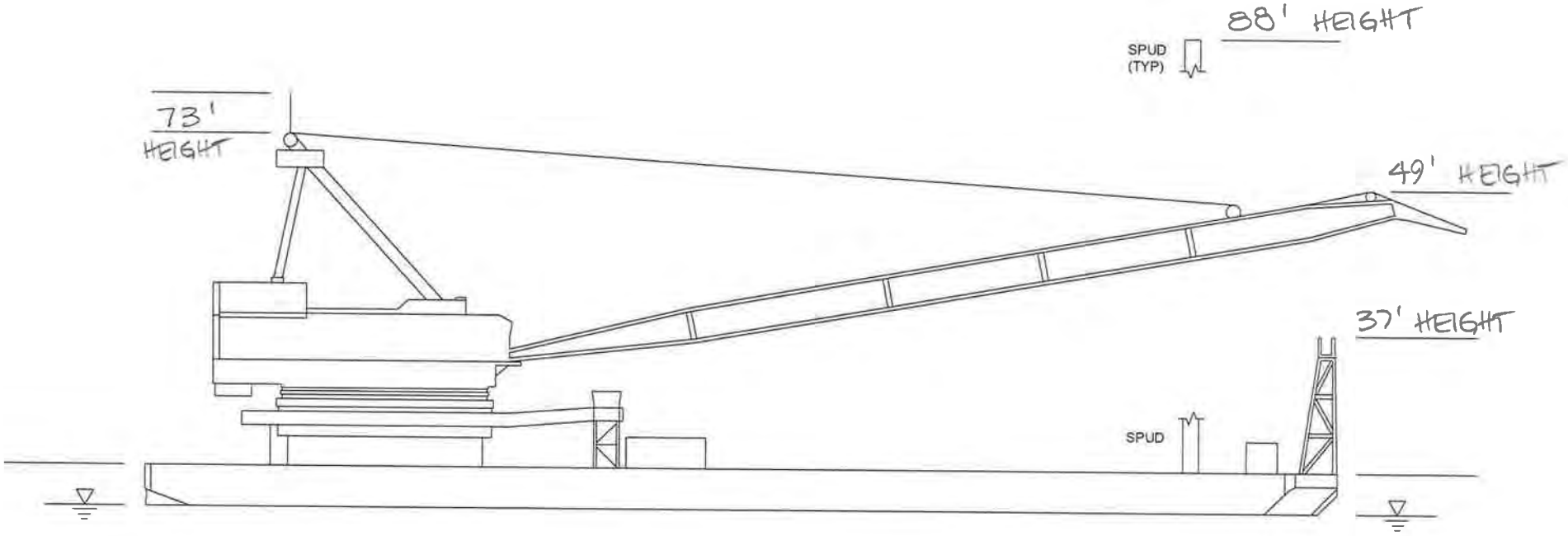
Diversified Marine is in N. Portland Harbor but doesn't go above the I-5 bridge.

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy?

13. Other miscellaneous

They don't see a need for larger equipment. They have lengthened their spuds in the past. When they do that, they pull them out and barge them upstream.

- The gantry height (75') is the limiting factor. It is not adjustable. Other companies could have higher gantries.
- Bridge height of 125' at O'CRD would accomodate most users.
- Most of their work is in the Willamette Harbor. Also go up to Bonneville Dam (taking Seahorse + Sea Vulture there in March). Currently working in Longview & Pasco Dams and other facilities (grain elevators, petroleum docks) upstream for maint. Work on Columbia, Willamette, and Snake Rivers
- They can often "sneak" through the bridge high span rather than the lift span, depends on draft.
- They don't usually lower spuds, but can if the draft is good. Risk of losing spuds / bending them.
- March each year there is a shut down of the locks, so several barges (HME + others) going there



SEA HORSE
NAME

HICKEY MARINE
LOCATION

07-05-12
DATE

Vessel Height Verification Sheet

By: Pete Geiger Date: 5 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Hickey Marine Enterprises/HME Construction
   b. Name of contact: Greg Speyer/Darrell Jamieson
   c. Phone number (Office): 360.695.4553 (Cell):
   d. Email: gregs@hickeymarine.com; darrellj@hickeymarine.com;
   e. Address: 6801 NW Old Lower River Road City: Vancouver
      State: WA Zip code: 98660
2. Vessel
   a. ID: b. Name: SeaHorse
   c. Type: Derrick Barge with Crane d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Crane Boom Down Near Cradle; Aft Spud Up on Pin
      - Is a vessel specification sheet available? On ProjectSolve
      - Configuration shown on the sheet: Crane Boom Up; Spuds Down
      - What is the lowest height configuration for transport? ~90 Feet (Aft Spud on Pin)

   b. What is the gantry configuration? Assembled with Pins Estimated gantry height: 75 Feet

   c. Does the barge have spuds? Yes, Three
      - Height above waterline for travel? Aft = 90 feet Center (2) = 79 feet
      - Can the spuds be removed for travel? Only on very rare occasions
      - Work and cost involved in removing spuds? 4 hours to reset spuds. Need to find a site to harbor or tie up to. Spuds often need separate barge to transport them.
4. Vessel Location
   a. Where is the vessel currently located? Columbia River
   b. Is it working on a job? No Is it tied up to shore? Yes

c. What is the best time to make a trip to the vessel? Anytime, Just need a few days advance notice.

5. Surveyed Measurements (all measurements NAVD 88)

Gantry Height:	88.7 feet
Water Level:	15.6 feet
Top of Boom:	65.1 feet
Height of Boom Hinge Pin:	Not Measured
Boom Cradle:	52.2 feet
Top of Spud:	104.0 feet
Top of Deck:	Not Measured

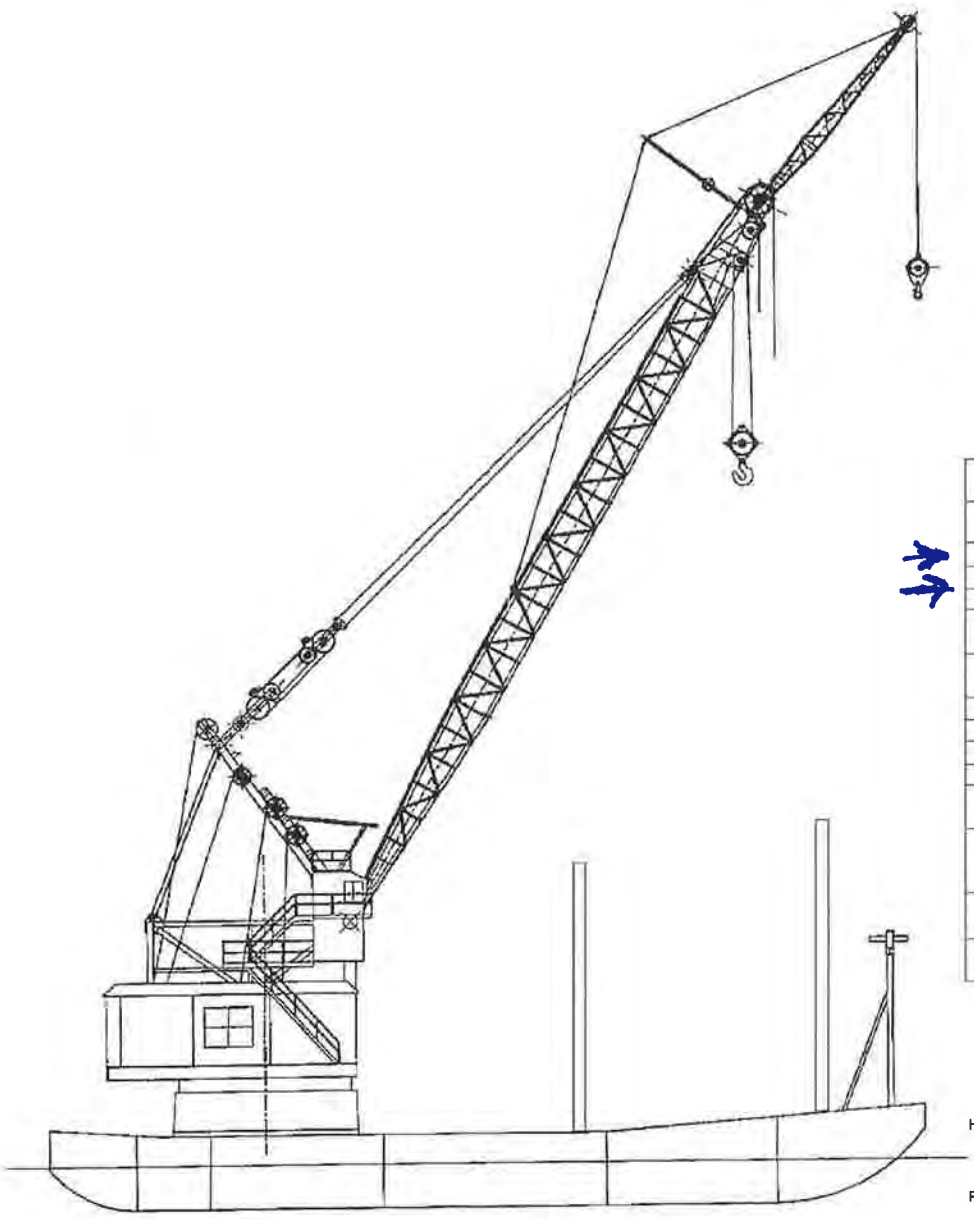
6. Vessel Height

Self-Reported (Spud)		Surveyed (Spud)	
Air Draft:	90 feet	Air Draft:	88 feet
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet (CRD)	Water Level:	16 feet (CRD)
Total Height:	116 feet	Total Height:	114 feet

7. History Notes

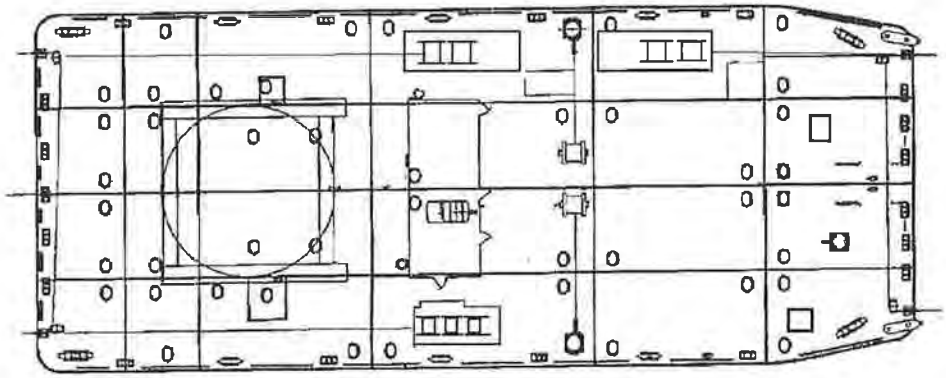
Date	Item
2/23/2012	Contacted by Jennifer Rabby
2/23/2012	Data sheet submitted
6/28/2012	Contacted by Pete Geiger for field measurement
7/5/2012	Field measured

HICKEY MARINE ENTERPRISES
DERRICK BARGE "SEA HORSE"



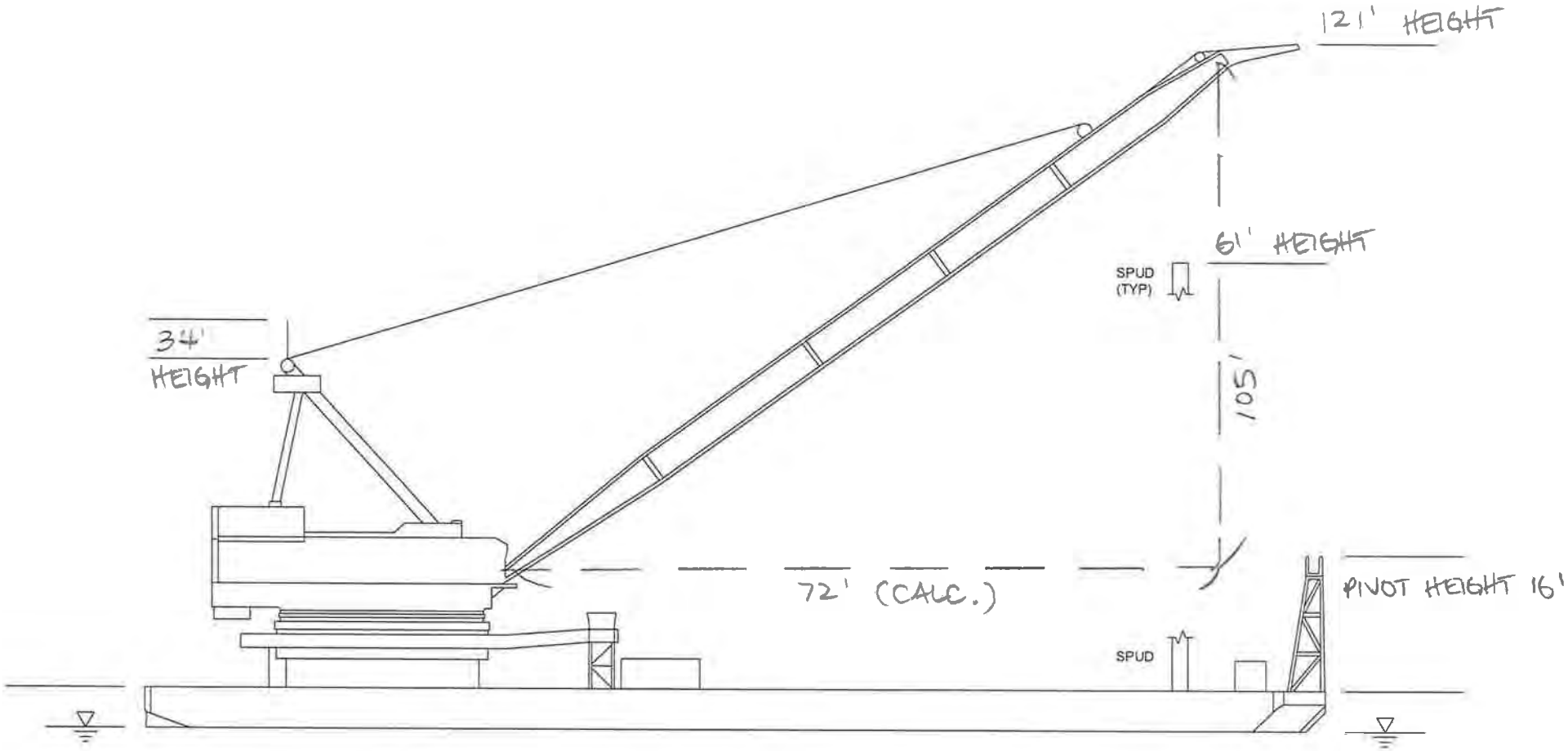
ELEVATIONS TAKEN WITH FUEL TANKS FULL

	FROM DECK	FROM WATER @ 5' FREEBOARD
CENTER SPUDS (ON PIN)	74'	79'
AFT SPUD (ON PIN)	79'	89' 3"
BOOM GANTRY	70'	75'
HEEL PIN	35' 2"	40' 2"
TOP OF CAB WITH HANDRAIL	47' 6"	52' 6"
TOP OF CAB W/O HANDRAIL	44' 3"	49' 3"
OPERATOR EYE LEVEL	41'	46'
CENTER PIN TO BOW	107'	
CENTER PIN TO STERN	35'	
CENTER PIN TO SIDE	29'	
HEEL PIN TO CENTER PIN (HORIZONTAL)	15'	
(DISTANCE) MULTI – PART SHEAVES TO POINT SHEAVES	10'	
STANDARD BOOM LENGTH	125' UTILIZING MULTI-PART	135' MAIN BOOM POINT SHEAVES
OPTIONAL BOOM ATTACHMENTS	20' MIDSECTION	40' JIB



Hull:	142' x 58' x 12' 7' Draft	
	Beam 58'-6" with rub rails. 62' edge of tires	
Fuel Capacity:	20,000 gallons	
Mainlines :	2" x 425' with 135' boom. 440' for rear drum.	
	2" x 385' with 115' boom. 400' for rear drum.	
Tag Line:	¾" x 500'	
Boom and Heavy Lift:	1 1/8"x 1900'	
Spuds :		
Center	1 ¼ " x 550'	
Aft	1" x 550'	
Atlas 10yd Clamshell :	2" x 125'	45,000lbs
Atlas 14yd Clamshell :	2" x 135'	32,000lbs
Atlas 10yd Re- handle:	1 ¼" x 70'	20,000lbs
21yd CA:	2" x 80'	30,000lbs
14yd CA:	1 ½" x 70'	17,000lbs
3-Drum fleeting Lines:	1" x 900'	

Marine Contractors
Owner: Hickey Marine Enterprises
Vessel: Sea Lion



SEA LION
NAME

HICKEY MARINE
LOCATION

07-05-12
DATE

Vessel Height Verification Sheet

By: Pete Geiger Date: 5 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Hickey Marine Enterprises/HME Construction
   b. Name of contact: Greg Speyer/Darrell Jamieson
   c. Phone number (Office): 360.695.4553 (Cell):
   d. Email: gregs@hickeymarine.com; darrellj@hickeymarine.com;
   e. Address: 6801 NW Old Lower River Road City: Vancouver
      State: WA Zip code: 98660
2. Vessel
   a. ID: b. Name: Sea Lion
   c. Type: Derrick Barge with Crane d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Crane Boom Elevated above Spuds; Both Spuds dropped
   - Is a vessel specification sheet available? On ProjectSolve
   - Configuration shown on the sheet: not shown, photo only
   - What is the lowest height configuration for transport? ~75 Feet (Spud on Pin)

   b. What is the gantry configuration? Assembled with Pins Estimated gantry height: Not given

   c. Does the barge have spuds? Yes, Two
   - Height above waterline for travel? Center (2) = 75 feet
   - Can the spuds be removed for travel? Only on very rare occasions
   - Work and cost involved in removing spuds? 4 hours to reset spuds. Need to find a site to harbor or tie up to. Spuds often need separate barge to transport them.
4. Vessel Location
   a. Where is the vessel currently located? Columbia River
   b. Is it working on a job? No Is it tied up to shore? Yes

c. What is the best time to make a trip to the vessel? Anytime, Just need a few days advance notice.

5. Surveyed Measurements (all measurements NAVD 88)

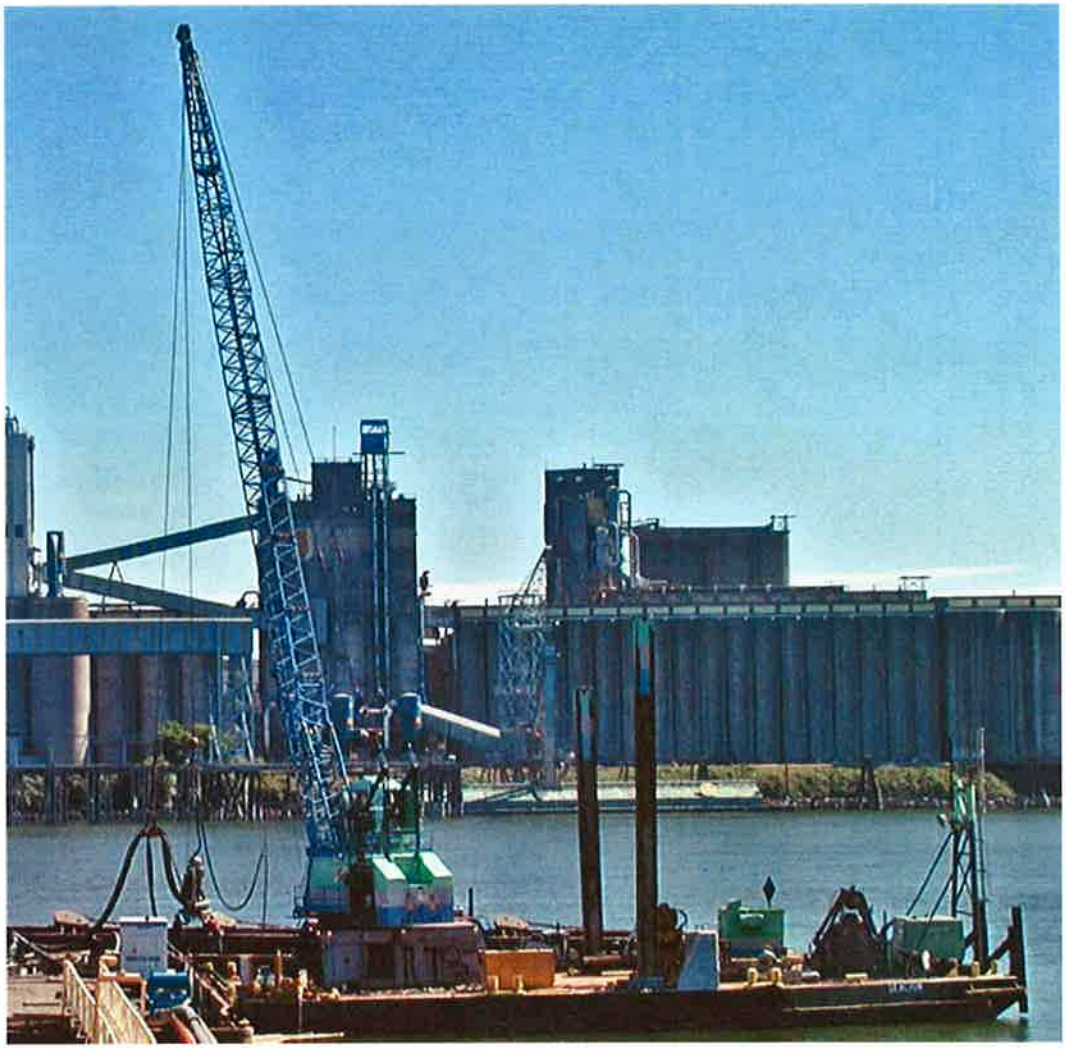
Gantry Height:	49.4 feet
Water Level:	15.6 feet
Top of Boom:	Measured while stored =136.6 feet (56 degrees off horizontal) Estimated at travel angle(17.5 degrees off horizontal) = 69.6 feet
Height of Boom Hinge Pin:	31.9 feet
Boom Cradle:	Not Measured (obscured)
Top of Spud:	77.0 (Spud imbedded in river bottom)
Top of Deck:	Not Measured

6. Vessel Height

Self-Reported (Spuds)		Surveyed (Spuds)	
Air Draft:	75 feet	Air Draft:	75 feet (From Self Reporting)
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet (CRD)	Water Level:	16 feet (CRD)
Total Height:	101 feet	Total Height:	101 feet

7. History Notes

Date	Item
2/23/2012	Contacted by Jennifer Rabby
2/23/2012	Data sheet submitted
6/28/2012	Contacted by Pete Geiger for field measurement
7/5/2012	Field measured



SEA LION

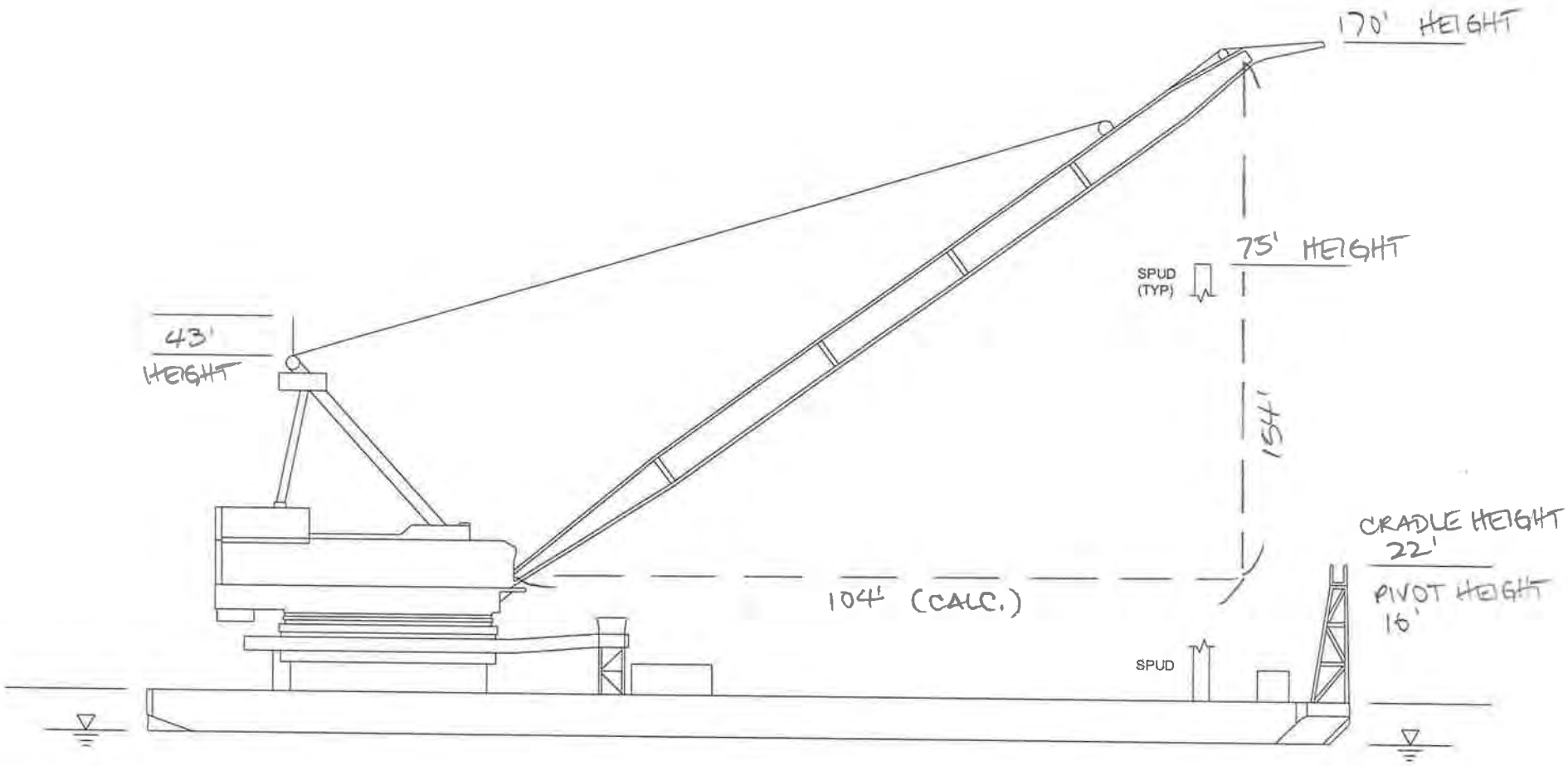
The Derrick Barge Sea Lion is a Manitowoc 60 Ton mounted crane on a 103' x 50'x 8' barge. Main draw-works power is provided by a Cummins diesel 300 HP She is set up with two winch controlled spuds. She was rebuilt in 1970. She has a minimum Height of 34.5' along with Minimum draft of 3' and Maximum draft of 5'. She has a 4,000 gallon fuel capacity which is separate from the hull. Clamshell Buckets available: 3 cy Yaun digging, 3.5 cy Esco digging, 3 cy Erie heavy duty digging, and 5 cy Yaun re-handle.

Spud Height 75' to water

Marine Contractors

Owner: Hickey Marine Enterprises

Vessel: Sea Vulture



SEA VULTURE
NAME

HICKEY MARINE
LOCATION

07-05-12
DATE

Vessel Height Verification Sheet

By: Pete Geiger Date: 5 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Hickey Marine Enterprises/HME Construction
   b. Name of contact: Greg Speyer/Darrell Jamieson
   c. Phone number (Office): 360.695.4553 (Cell):
   d. Email: gregs@hickeymarine.com; darrellj@hickeymarine.com;
   e. Address: 6801 NW Old Lower River Road City: Vancouver
      State: WA Zip code: 98660
2. Vessel
   a. ID: b. Name: Sea Vulture
   c. Type: Derrick Barge with Crane d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Crane Boom Elevated above Spuds; Bow Spud Up on Pin
   - Is a vessel specification sheet available? On ProjectSolve
   - Configuration shown on the sheet: not shown, plan view only
   - What is the lowest height configuration for transport? ~77 Feet (Bow Spud on Pin)

   b. What is the gantry configuration? Assembled with Pins Estimated gantry height: Not given

   c. Does the barge have spuds? Yes, Three
   - Height above waterline for travel? Bow = 77 feet Center (2) = 48 feet
   - Can the spuds be removed for travel? Only on very rare occasions
   - Work and cost involved in removing spuds? 4 hours to reset spuds. Need to find a site to harbor or tie up to. Spuds often need separate barge to transport them. Sea Vulture cannot reach its own spuds, necessitating a second crane.
4. Vessel Location
   a. Where is the vessel currently located? Columbia River

b. Is it working on a job? No Is it tied up to shore? Yes

c. What is the best time to make a trip to the vessel? Anytime, Just need a few days advance notice.

5. Surveyed Measurements (all measurements NAVD 88)

Gantry Height:	58.4 feet
Water Level:	15.6 feet
Top of Boom:	Measured while stored =185.8 feet (56 degrees off horizontal) Estimated at travel angle(17.5 degrees off horizontal) = 87.6 feet
Height of Boom Hinge Pin:	31.8 feet
Boom Cradle:	37.9 feet
Top of Spud:	90.7
Top of Deck:	Not Measured

6. Vessel Height

Self-Reported		Surveyed	
Air Draft:	77 feet	Air Draft:	75 Feet (Spud)
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet (CRD)	Water Level:	16 feet (CRD)
Total Height:	103 feet	Total Height:	101 feet

7. History Notes

Date	Item
2/23/2012	Contacted by Jennifer Rabby
2/23/2012	Data sheet submitted
6/28/2012	Contacted by Pete Geiger for field measurement
7/5/2012	Field measured

D.B. SEA VULTURE 60' X 112' X 10'

38' 5" TOP OF GANTRY TO DECK

11' 10" CENTER OF HEEL PIN TO DECK

26' 6" CENTER PIN TO BOW

30' CENTER PIN TO EDGE OF BARGE

23' CENTER PIN TO OUTSIDE EDGE OF COUNTERWEIGHT

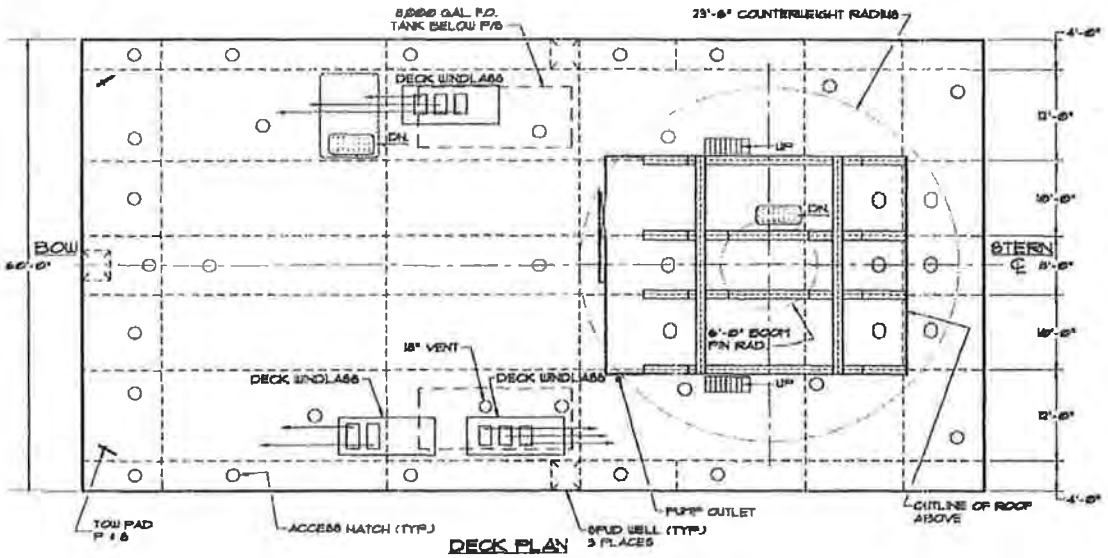
85' 6" CENTER PIN TO STERN

12' 6" COUNTERWEIGHT CLEARANCE TO SPUD

20' 6" HEEL PIN TO BOW

SPUDS: 77' ON PIN – WATER TO TOP 83' OVERALL PLUS 3' POINT

SHORT SPUDS: 48' ON PIN – WATER TO TOP 55' OVERALL PLUS 2' 6" POINT



DECK PLAN

Marine Contractors

Company: JE McAmis

Vessel:

- Heidi Renee

Company did not respond to IBR request. Information below was included in the CRC NIR.

Marine Contractors
Owner: J.E. McAmis
Vessel: Heidi Renee

River User Data Sheet By: Patty Gillett Date: 2-27-12

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: J.E. McAMIS, INC.
   b. Name of contact: Patty Gillett
   c. Phone number (Office): 530-891-5061 d. (Cell): _____
   e. Email: jemcamis@jemcamis.com
   f. Address: 2485 Notre Dame Blvd.
   g. City: Chico
   h. State: CA i. Zip code: 95928

3a. Vessel Name: Heid, Renee 3b. Vessel Type: Barge

3c. US Coast Guard Document Number: 1232925

4a. Length Overall (LOA), feet: 211.2 4b. Beam (width), feet: 60

5. Draft (depth of hull below waterline, fully laden), feet: 12

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: ____

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): _____

8. Frequency of one-way passage underneath I-5 main channel (typical per month): 1

   Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___

9. Frequency of one-way passage underneath I-5 main channel (other historic events): 1

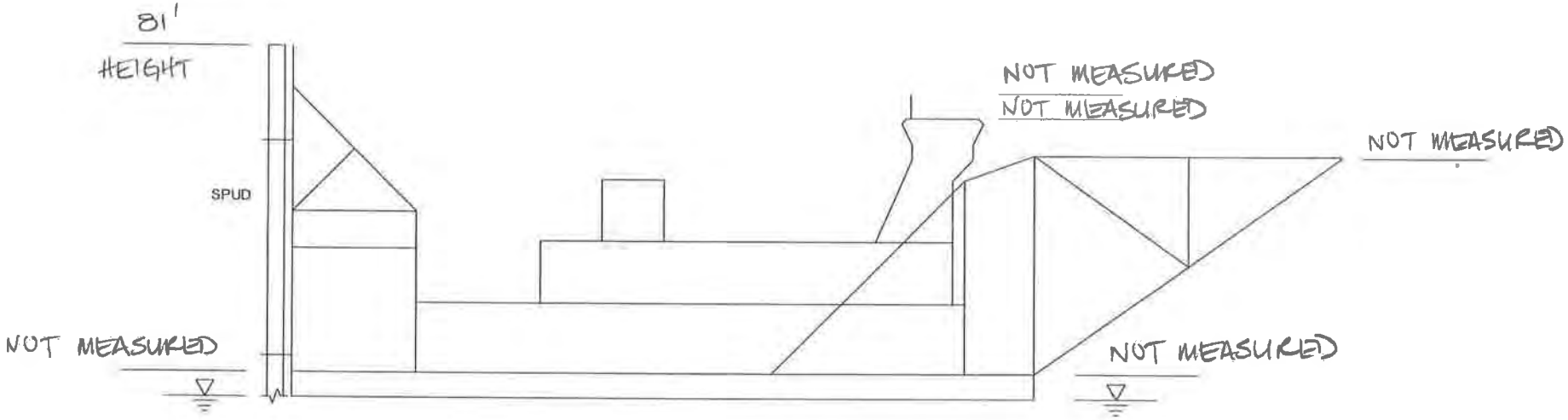
10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month): N/A

    Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): _____ N/A

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy? no

13. Other miscellaneous



HEIDI RENEE

NAME

J.E. McAMIS
MEASURED AT
TONGUE POINT, ASTORIA, OR

LOCATION

07-10-12

DATE

Vessel Name	Owner	Antenna Elev (ft)	Mast Elev (ft)	Spud Elev (ft)	Boom Crane Elev (ft)	Gantry Elev (ft)	Pivot Pt Elev (ft)	Cradle Elev (ft)	Water Elev (ft)	Height Above Water
Ironwood	Tongue Point Job Corps Maritime Training Program	60.2	N/M	N/A	N/A	N/A	N/A	N/A	3.4	57
		77.4	N/M	N/A	N/A	N/A	N/A	N/A	3.4	74
		80.5	N/M	N/A	N/A	N/A	N/A	N/A	3.4	77
Heidi Renee	J.E. McAmis	N/A	N/A	82.8	N/A	N/A	N/A	N/A	2.2	81
Carr	Bergerson Construction Inc.	N/A	N/A	79.1	N/M	N/M	N/M	N/A	1.8	77
		N/A	N/A	80.2	N/M	N/M	N/M	N/A	1.8	78
		N/A	N/A	N/M	53.5	N/M	N/M	N/A	1.8	52
		N/A	N/A	N/M	94.8	N/M	N/M	N/A	1.8	93
Betsy Ross	Bergerson Construction Inc.	N/A	N/A	71.0	NM	N/M	N/M	N/M	3.0	68
		N/A	N/A	N/M	69.3	N/M	N/M	N/M	3.0	66
		N/A	N/A	N/M	158.4	N/M	N/M	N/M	3.0	155
		N/A	N/A	71.4	NM	N/M	N/M	N/M	3.0	68

N/A - does not exist
N/M - exists but not measured

Vessel Height Verification Sheet

By: Karl Krcma Date: 10 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: J.E. McAmis
   b. Name of contact: John McAmis, Jr (Chico, CA)/Aaron Anderson (Astoria, OR)
   c. Phone number (Office): 530.891.5061 (J.McAmis) (Cell):503.791.2161 (A.Anderson)
   d. Email: jemcamis@jemcamis.com
   e. Address: 2485 Notre Dame Bldv City: Chico
      State: CA Zip code: 95928
2. Vessel
   a. ID: b. Name: Heidi Renee
   c. Type: Spud Barge d. USCG Document Number: 1232925
3. Vessel Configuration
   a. Identify vessel configuration: Spuds Up on Pin
      - Is a vessel specification sheet available? No
      - Configuration shown on the sheet: not shown, photo only
      - What is the lowest height configuration for transport? ~81 Feet (Spud on Pin)

   b. What is the gantry configuration? N/A Estimated gantry height: N/A

   c. Does the barge have spuds? Yes, Two
      - Height above waterline for travel? Center (2) = 81 feet
      - Can the spuds be removed for travel? Only on very rare occasions
      - Work and cost involved in removing spuds? ½ day to full day to reset spuds. Need to find a site to harbor or tie up to. Need a crane to lift spuds.
4. Vessel Location
   a. Where is the vessel currently located? Tongue Point, Astoria, Columbia River
   b. Is it working on a job? No Is it tied up to shore? Yes

c. What is the best time to make a trip to the vessel? Prior August.

5. Surveyed Measurements (all measurements NAVD 88)

Gantry Height:	N/A
Water Level:	15.6 feet
Top of Boom:	N/A
Height of Boom Hinge Pin:	N/A
Boom Cradle:	N/A
Top of Spud:	81 feet
Top of Deck:	Not Measured

6. Vessel Height

Self-Reported		Surveyed	
Air Draft:	70 feet	Air Draft:	81 feet
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet (CRD)	Water Level:	16 feet (CRD)
Total Height:	96 feet	Total Height:	107 feet

7. History Notes

Date	Item
2/17/2012	Contacted by Megan Nelson
2/27/2012	Data sheet submitted
6/28/2012	Contacted by Karl Krcma for field measurement
7/10/2012	Field measured
7/17/2012	New data sheet submitted

Marine Contractors

Company: JT Marine

Vessels:

- Christy T
- Irene T
- DB Astoria
- DB Taylor
- LeAnne T

Company provided data sheets to the IBR Program. Data sheets are included below, followed by the information included in the CRC NIR.

Company/Owner Name: JT Marine, Inc.

Vessel Name:
Cristy T

Vessel Type:
Tug

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Commercial

USCG Document Number:
231849

Primary Mooring Location *(waterway milepoint, if known)***:**
JT Marine Vancouver, WA

Type and quantity of cargo, if applicable:

Length (overall; ft):
99.3

Beam (width; ft):
24

Draft (ft) - *depth of hull below waterline, fully laden*:

10

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

55

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

10

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

100' (always pushing a tow)

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

all year long

Tug Assistance Required: Choose an item.

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan____10___ **Feb**____10___ **Mar**____10____ **Apr**____10___ **May**__10_____ **June**____10___

Jul___10____ **Aug**____10___ **Sep**_____10__ **Oct**___10_____ **Nov**___10____ **Dec**____10_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan___1_____ **Feb**____1_____ **Mar**____1_____ **Apr**____1_____ **May**_____1____ **June**_____1____

Jul_____1____ **Aug**____1_____ **Sep**_____1____ **Oct**_____1____ **Nov**_____1___ **Dec**_____1_____

Company/Owner Name: JT Marine, Inc.

Vessel Name:
DB Astoria

Vessel Type:
Crane barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Commercial

USCG Document Number:

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):
118

Beam (width; ft):
33

Draft (ft) - *depth of hull below waterline, fully laden*:

4

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

80 with spuds; 30 spuds out

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

10

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: Choose an item.

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan____10___ **Feb**____10___ **Mar**____10____ **Apr**____10___ **May**__10_____ **June**____10___

Jul___10____ **Aug**____10___ **Sep**_____10__ **Oct**___10_____ **Nov**___10____ **Dec**____10_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan___1_____ **Feb**____1_____ **Mar**____1_____ **Apr**____1_____ **May**_____1____ **June**_____1____

Jul_____1____ **Aug**____1_____ **Sep**_____1____ **Oct**_____1____ **Nov**_____1___ **Dec**_____1_____

Company/Owner Name: JT Marine, Inc.

Vessel Name:
DB Taylor

Vessel Type:
Crane barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Commercial

USCG Document Number:
514786

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):
148

Beam (width; ft):
50

Draft (ft) - *depth of hull below waterline, fully laden*:

5

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

90' w/ spuds 75' w/ spuds out

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

10

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

60'

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: Choose an item.

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan____10___ **Feb**____10___ **Mar**____10____ **Apr**____10___ **May**__10_____ **June**____10___

Jul___10____ **Aug**____10___ **Sep**_____10__ **Oct**___10_____ **Nov**___10____ **Dec**____10_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan___1_____ **Feb**____1_____ **Mar**____1_____ **Apr**____1_____ **May**_____1____ **June**_____1____

Jul_____1____ **Aug**____1_____ **Sep**_____1____ **Oct**_____1____ **Nov**_____1___ **Dec**_____1_____

Company/Owner Name: JT Marine, Inc.

Vessel Name:
Irene T

Vessel Type:
Tug

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial

USCG Document Number:
241235

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):
62

Beam (width; ft):
18

Draft (ft) - *depth of hull below waterline, fully laden*:

8

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

50

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

10

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: Choose an item.

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan____10___ **Feb**____10___ **Mar**____10____ **Apr**____10___ **May**__10_____ **June**____10___

Jul___10____ **Aug**____10___ **Sep**_____10__ **Oct**___10_____ **Nov**___10____ **Dec**____10_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan___1_____ **Feb**____1_____ **Mar**____1_____ **Apr**____1_____ **May**_____1____ **June**_____1____

Jul_____1____ **Aug**____1_____ **Sep**_____1____ **Oct**_____1____ **Nov**_____1___ **Dec**_____1_____

Company/Owner Name:

Vessel Name:
LeAnn T

Vessel Type:
Tow boat

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Choose an item.
Comemrcial

USCG Document Number:
250205

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):
72.3'

Beam (width; ft):
22.3'

Draft (ft) - *depth of hull below waterline, fully laden*:
7.9'

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: Choose an item.

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan__10__ **Feb**__10__ **Mar**__10__ **Apr**__10__ **May**__10__ **June**__10__

Jul__10__ **Aug**__10__ **Sep**__10__ **Oct**__10__ **Nov**__10__ **Dec**__10__

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ **Feb**_____ **Mar**_____ **Apr**_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**_____ **Oct**_____ **Nov**_____ **Dec**_____

Marine Contractors

Owner: JT Marine

Vessel: DB Astoria

Columbia River CROSSING

River User Data Sheet

By: Irene T Date: 3-22-2012

1. Company name and/or owner of vessel and contact information

Name of company: JT Marine Inc.

Name of contact: Irene Toristaja

Phone number (Office): 360-750-1300 (Cell): _____

Email: irene@jtmarineinc.com

Address: 2301 SE Hidden Way, Suite 100

City: Vancouver State: WA Zip code: 98661

3a. Vessel name: DB Astoria **3b. Vessel type:** crane barge

3c. U.S. Coast Guard Document Number: N/A

4a. Length Overall (LOA), **feet:** 118' **4b. Beam** (width), **feet:** 33'

5. Draft (depth of hull below waterline, fully laden), **feet:** 4'

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), **feet:** 100'

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 10'

8. Frequency of one-way passage underneath I-5 main channel (typical per month):

Jan 10 Feb 10 Mar 10 Apr 10 May 10 Jun 10 Jul 10 Aug 10 Sep 10 Oct 10 Nov 10 Dec 10

9. Frequency of one-way passage underneath I-5 main channel (other historic events): _____

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

Jan 1 Feb 1 Mar 1 Apr 1 May 1 Jun 1 Jul 1 Aug 1 Sep 1 Oct 1 Nov 1 Dec 1

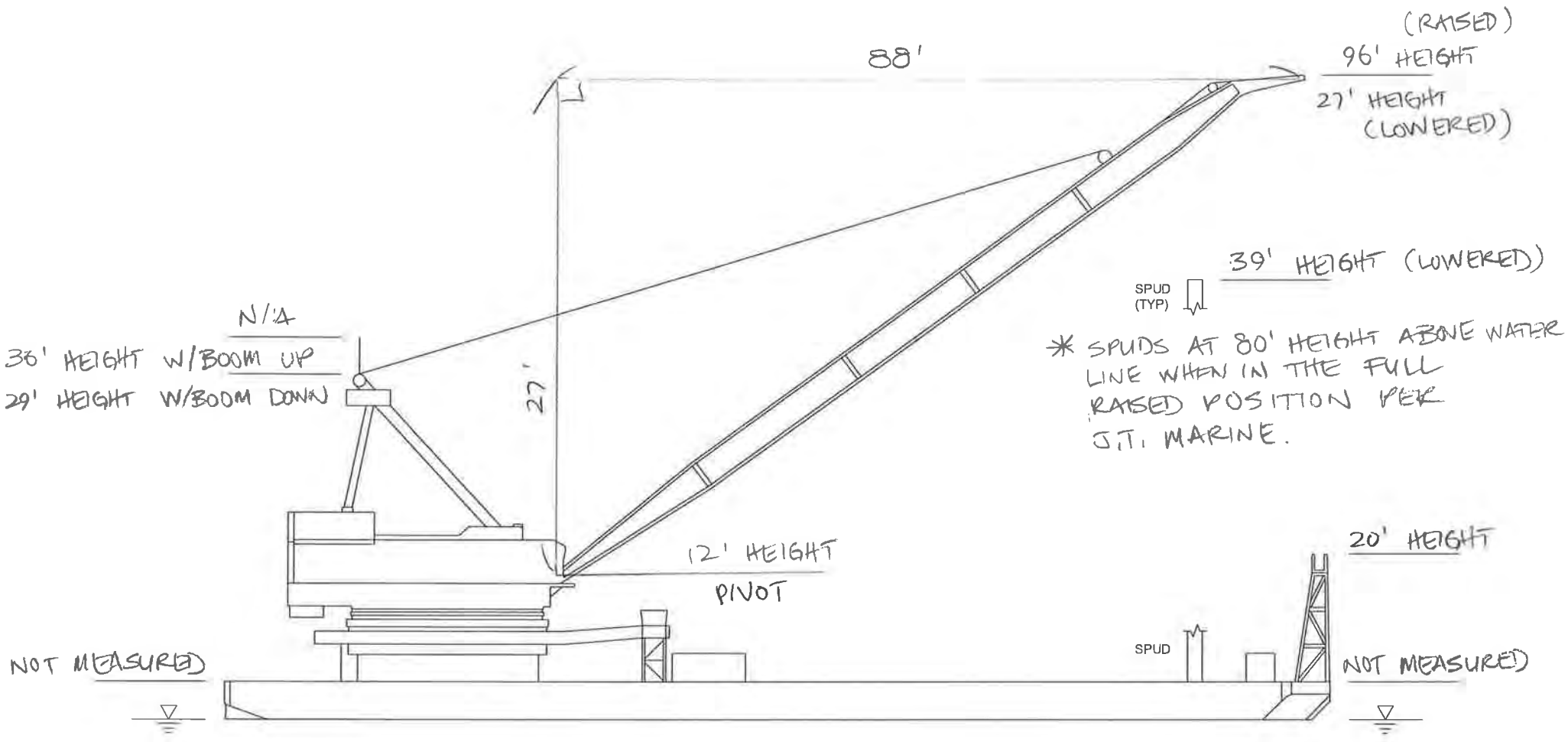
11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): _____

12. Do you have a business plan (e.g. 10 or 20 year plan)? (No)

What does it say related to vessels traveling under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? _____

May we have a copy? _____

13. Other (additional sheets may be attached.) N/A



DB ASTORIA

NAME

J.T. MARINE
MEASURED AT
VANCOUVER, WA

LOCATION

07-12-12

DATE

CRC Vessel Verification
Prepared by: David Evans and Associates, Inc.

Vessel Name	Owner	Antenna Elev (ft)	Mast Elev (ft)	Spud Elev (ft)	Boom Crane Elev (ft)	Gantry Elev (ft)	Pivot Pt Elev (ft)	Cradle Elev (ft)	Water Elev (ft)	Height Above Water
DB Taylor	J.T. Marine	N/A	N/A				35.0		13.8	21
		N/A	N/A		192.7				13.8	179
		N/A	N/A			65.3			13.8	51
		N/A	N/A	62.4					13.8	49
		N/A	N/A					38.9	13.8	25
		N/A	N/A		182.4				13.8	169
DB Astoria	J.T. Marine	N/A	N/A			51.3			14.8	36
		N/A	N/A		111.0				14.8	96
		N/A	N/A				26.9		14.8	12
		N/A	N/A	53.9					14.8	39
		N/A	N/A					34.9	14.8	20
		N/A	N/A		41.5				14.8	27
		N/A	N/A			43.9			14.8	29

N/A - does not exist

Vessel Height Verification Sheet

By: Pete Geiger Date: 12 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: JT Marine
   b. Name of contact: Waino Toristoja
   c. Phone number (Office): 360.750.1300 (Cell): 360.567.8382
   d. Email: waino@jtmarineinc.com
   e. Address: 2301 SW Hidden Way, #100 City: Vancouver
      State: WA Zip code: 98661
2. Vessel
   a. ID: b. Name: DB Astoria
   c. Type: Crane Barge d. USCG Document Number: N/A
3. Vessel Configuration
   a. Identify vessel configuration: Crane Barge
   - Is a vessel specification sheet available? No
   - Configuration shown on the sheet: N/A
   - What is the lowest height configuration for transport? Crane down in cradle, spuds up and pinned

   b. What is the gantry configuration? Pinned Estimated gantry height: Not given

   c. Does the barge have spuds? Yes two foreward port and aft starboard. Both Spuds down
   - Height above waterline for travel? 80 Feet
   - Can the spuds be removed for travel? Only in very special circumstances when they travel far upriver on the Columbia
   - Work and cost involved in removing spuds? 4 hours each spud to re-install; need to tie up to a dock near the work area. Cannot lift both spuds with own crane.

4. Vessel Location
   a. Where is the vessel currently located? Columbia River
   b. Is it working on a job? No Is it tied up to shore? Yes
   c. What is the best time to make a trip to the vessel? Anytime just give him 1 day notice

5. Surveyed Measurements (all measurements NAVD 88)

Gantry Height:	51.3 feet
Water Level:	14.8 feet
Top of Boom:	Measured while working = 111 feet (71 degrees off horizontal) Estimated height while traveling: 27 feet
Height of Boom Hinge Pin:	26.9 feet
Boom Cradle:	34.9 feet
Top of Spud:	53.9 – spuds in down position

6. Vessel Height

Self-Reported		Surveyed	
Air Draft:	80 feet (top of spuds)	Air Draft:	36.5 feet
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet CRD	Water Level:	16 feet CRD
Total Height:	106 feet	Total Height:	62.5 feet[1]

[1] Note: The spuds were in the down position when surveyed.

7. History Notes

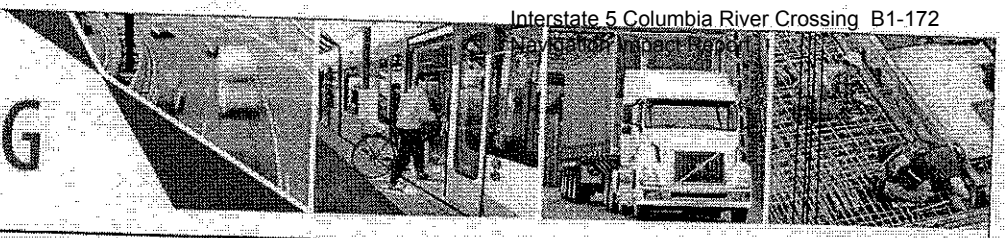
Date	Item
3/27/2012	Contacted by Ron Del Rosario
3/28/2012	Data sheet submitted
6/28/2012	Contacted by Pete Geiger for field measurement
7/12/2012	Field measured

Marine Contractors

Owner: JT Marine

Vessel: DB Taylor

Columbia River CROSSING



River User Data Sheet

By: Irene T Date: 3-22-2012

1. Company name and/or owner of vessel and contact information

Name of company: JT Marine Inc

Name of contact: Irene Toristoja

Phone number (Office): 360 750-1300 (Cell):

Email: irene@jtmarineinc

Address: 2301 SE Hidden town, Suite 100

City: Vancouver State: WA Zip code: 98661

3a. Vessel name: DB Taylor **3b. Vessel type:** Crane barge

3c. U.S. Coast Guard Document Number: 514786

4a. Length Overall (LOA), **feet:** 148' **4b. Beam** (width), **feet:** 50'

5. Draft (depth of hull below waterline, fully laden), **feet:** 5'

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), **feet:** ~~150~~ 143' as per Irene Toristoja 3/27/12

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 10'

8. Frequency of one-way passage underneath I-5 main channel (typical per month):

Jan 10 Feb 10 Mar 10 Apr 10 May 10 Jun 10 Jul 10 Aug 10 Sep 10 Oct 10 Nov 10 Dec 10

9. Frequency of one-way passage underneath I-5 main channel (other historic events):

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

Jan 1 Feb 1 Mar 1 Apr 1 May 1 Jun 1 Jul 1 Aug 1 Sep 1 Oct 1 Nov 1 Dec 1

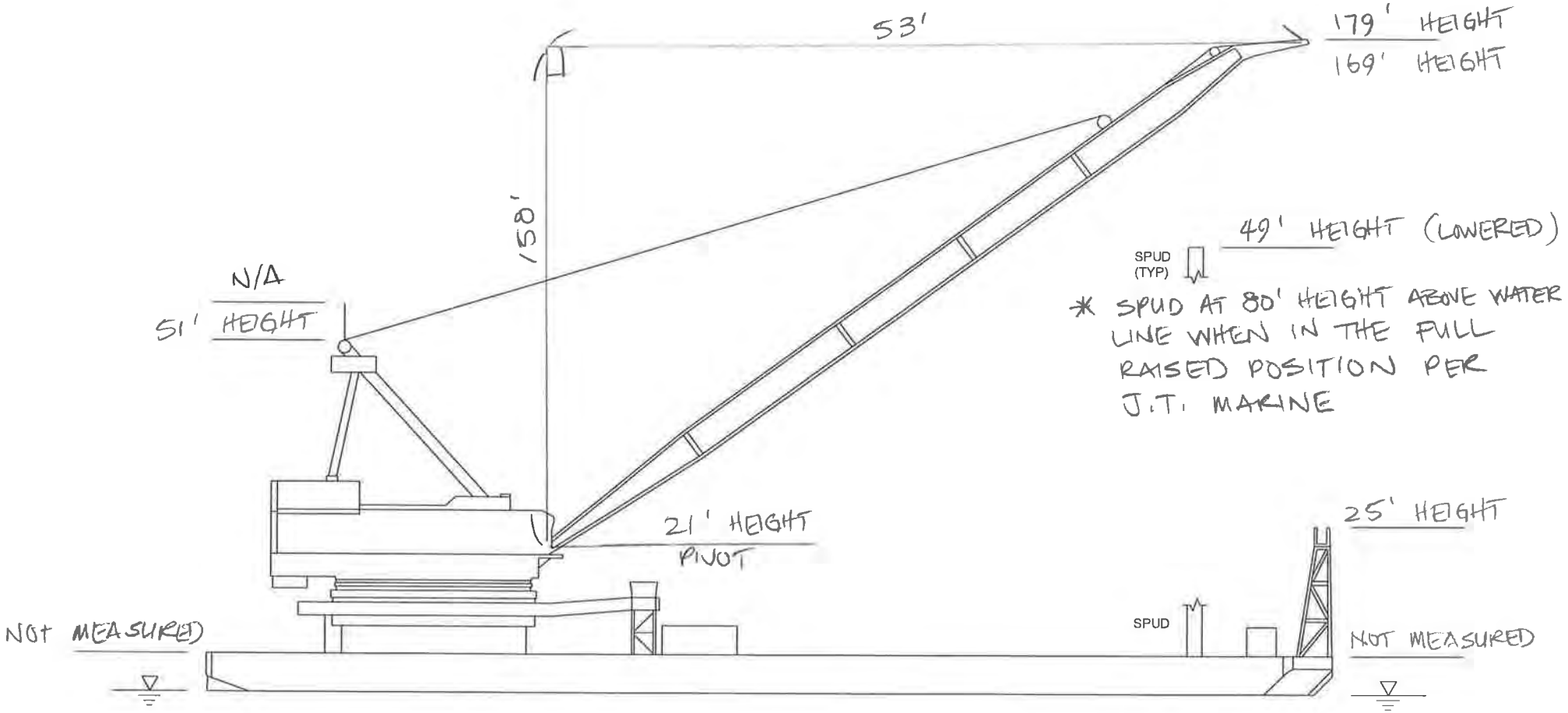
11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):

12. Do you have a business plan (e.g. 10 or 20 year plan)? NO

What does it say related to vessels traveling under the I-5 Bridge or into North Portland Harbor (Oregon Slough)?

May we have a copy?

13. Other (additional sheets may be attached.) NA



DB TAYLOR
NAME

J.T. MARINE
MEASURED AT
SELLWOOD BRIDGE, PORTLAND, OR
LOCATION

07-12-12
DATE

Vessel Height Verification Sheet

By: Pete Geiger Date: 12 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: JT Marine
   b. Name of contact: Waino Toristoja
   c. Phone number (Office): 360.750.1300 (Cell): 360.567.8382
   d. Email: waino@jtmarineinc.com
   e. Address: 2301 SW Hidden Way, #100 City: Vancouver
      State: WA Zip code: 98661
2. Vessel
   a. ID: b. Name: DB Taylor
   c. Type: Crane Barge d. USCG Document Number: 514786
3. Vessel Configuration
   a. Identify vessel configuration: Crane Barge
      - Is a vessel specification sheet available? No
      - Configuration shown on the sheet: N/A
      - What is the lowest height configuration for transport? Crane down in cradle, spuds up and pinned

   b. What is the gantry configuration? Pinned Estimated gantry height: Not given

   c. Does the barge have spuds? Yes two midpoint. Spuds currently down
      - Height above waterline for travel? 80 Feet
      - Can the spuds be removed for travel? Only in very special circumstances when they travel far upriver on the Columbia
      - Work and cost involved in removing spuds? 4 hours each spud to re-install; need to tie up to a dock near the work area. Can lift both spuds with own crane.

4. Vessel Location

   a. Where is the vessel currently located? Willamette River Sellwood Bridge

   b. Is it working on a job? Yes Is it tied up to shore? No

   c. What is the best time to make a trip to the vessel? Anytime just give him 1 day notice

5. Surveyed Measurements (all measurements NAVD 88)

Gantry Height:	65.3 feet
Water Level:	13.8 feet
Top of Boom[1]:	Measured while working = 192.7 feet (71 degrees off horizontal) Estimated height at travel angle: • 220 foot long boom: 131 feet • 166.6 foot long boom: 51 feet (limit is the gantry height)
Height of Boom Hinge Pin:	35.0 feet
Boom Cradle:	38.9 feet
Top of Spud:	62.4 feet – spuds in down position[2]

[1] Note: JT Marine reported that they use two different booms on the DB Taylor; one with a length of 220 feet and one with a length of 166.6 feet.

[2] JT Marine self reported that the height to the top of their spuds are 80 feet.

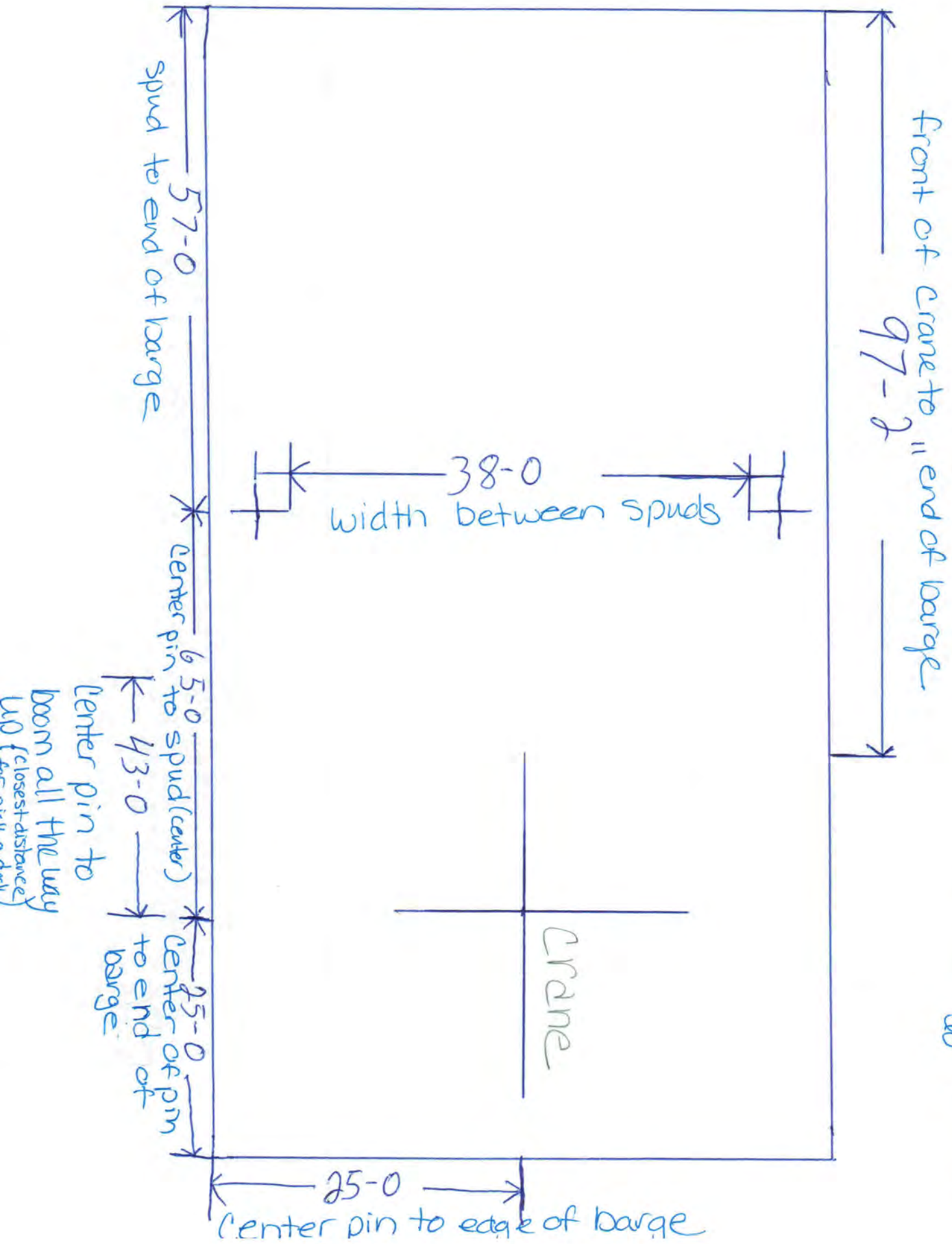
6. Vessel Height

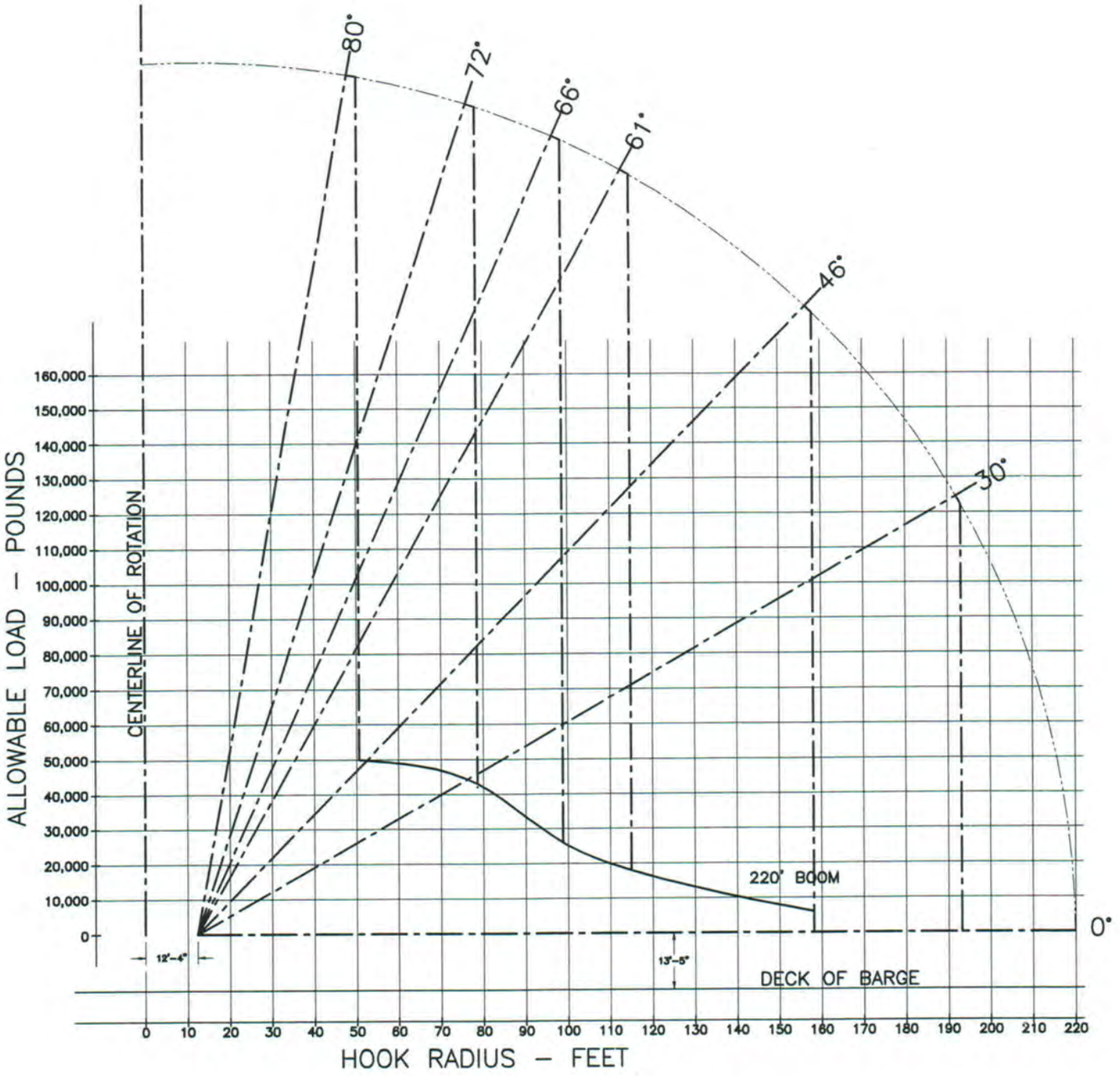
Self-Reported		Surveyed[1]	
166.6 foot boom		220 foot boom	
Air Draft:	80 feet (top of spuds)	Air Draft:	131 feet
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet CRD	Water Level:	16 feet CRD
Total Height:	106 feet	Total Height:	157 feet

[1] Note: The surveyed air draft measurement shown is the estimated travel height based on the surveyed boom length.

7. History Notes

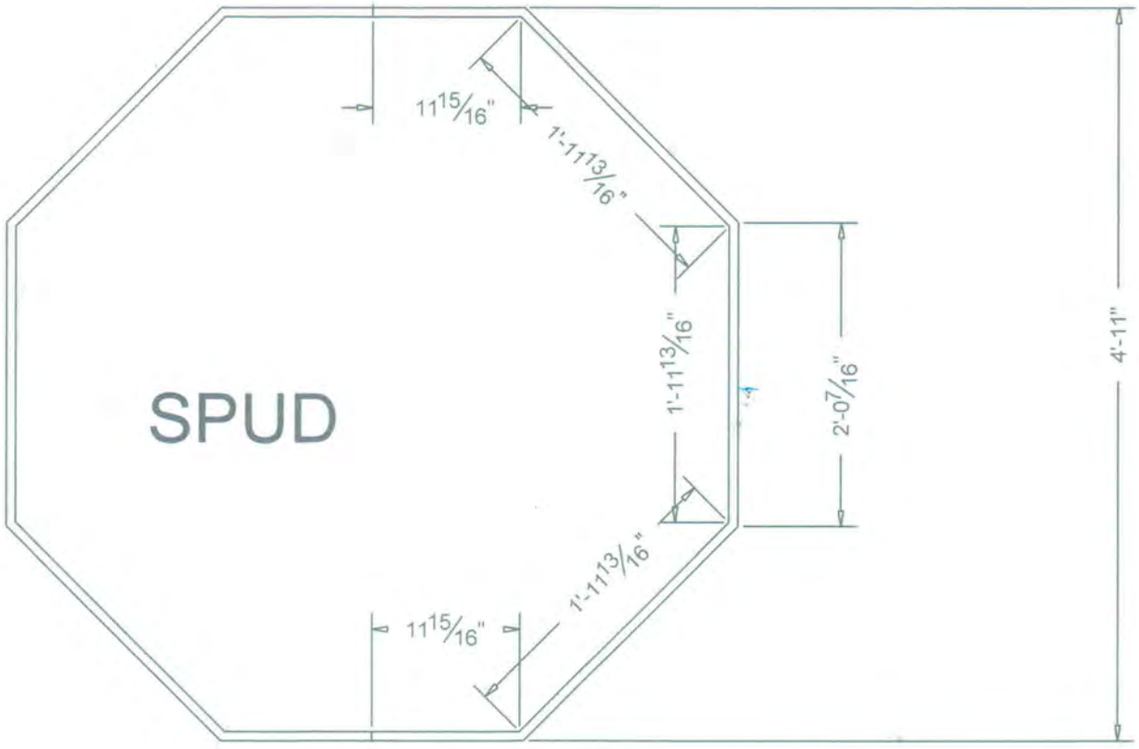
Date	Item
3/27/2012	Contacted by Ron Del Rosario
3/28/2012	Data sheet submitted
6/28/2012	Contacted by Pete Geiger for field measurement
7/12/2012	Field measured


front of crane to end of barge
97-2"
spud to end of barge
57-0
38-0
width between spuds
center pin to spud (center)
65-0
43-0
center pin to boom all the way up (closest distance)
25-0
center of pin to end of barge
crane
25-0
center pin to edge of barge
* Top of Gantry to H2O: 60'

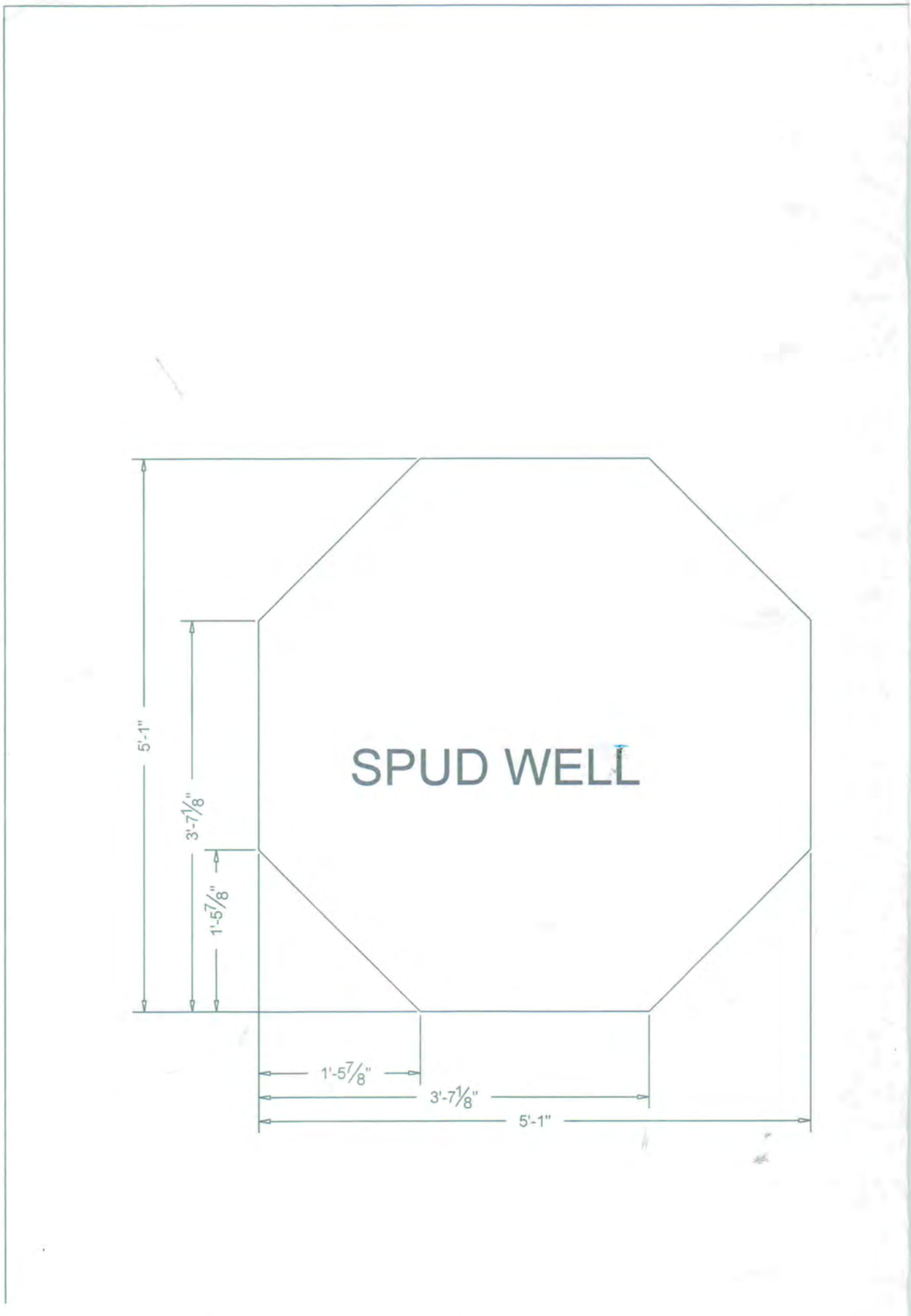


DERRICK BARGE TAYLOR
MAIN HOOK – ALLOWABLE LOAD
WITH 220 FOOT BOOM

McKERNAN FILE: P10–07
BY: JCMcK 2–12–11



Hi-Tech Metal Fabrication Inc. 2301 SE Hidden Way, Suite 100 Vancouver, WA 98661	CUSTOMER	SCALE	NA
	ADDRESS	DRAWN BY	WG
	ADDRESS	DATE	2/27/2011
		DRAWING #	
		REV	0
?		JOB #	


SPUD WELL
5'-1"
3'-7 1/8"
1'-5 7/8"
1'-5 7/8"
3'-7 1/8"
5'-1"

Marine Contractors

Company: Knife River

Vessels:

- KR-1
- ITB-282

Company did not respond to IBR request. Information below for KR-1 was included in the CRC NIR. Information for ITB-282 was included in the Hood River-White Salmon Bridge Replacement NIR.

Marine Contractors

Owner: Knife River

Vessel: KR-1

River User Data Sheet By: _____ Date: 3-6-12

1. Company Name and/or Owner of Vessel and contact information

a. Name of company: **Knife River Northwest**

b. Name of contact: Dave Jensen

c. Phone number (Office): 503-944-3500 d. (Cell): 503-706-5117

e. Email: dave.jensen@kniferiver.com

f. Address: 12222 NW Marina Way

g. City: Portland

h. State: OR i. Zip code: 97231-2300

3a. Vessel Name: KR-1 3b. Vessel Type: Deck Barge

3c. US Coast Guard Document Number: 590980

4a. Length Overall (LOA), feet: 282' 4b. Beam (width), feet: 78'

5. Draft (depth of hull below waterline, fully laden), feet: 13.5'

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 48.5'

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 5'

8. Frequency of one-way passage underneath I-5 main channel (typical per month):
Jan _4_ Feb _4_ Mar_6_ Apr_6_ May_8_ Jun_12_ Jul_16_Aug_18_Sep_18_Oct_12_Nov_4_Dec_4_

9. Frequency of one-way passage underneath I-5 main channel (other historic events):

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month): N/A
Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): N/A

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy? Nothing formalized at this time. As the economy recovers, the frequency of trips under the bridge will increase – possibly twice as much.

13. Other miscellaneous

VESSEL DATA SHEET

Please fill out the data sheet below. Please complete a data sheet for each vessel in your fleet that transits under the Hood River – White Salmon Bridge. In addition, please note any future vessel or cargo plans that might require different vessels to transit under the bridge.

Company Name:

Vessel Name:

Current name: ITB-282

Vessel Type:

Deck Barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Choose an item.

Commercial

USCG Document Number:

596502

Primary Mooring Location *(waterway milepoint, if known)***:**

Sundial

Type and quantity of cargo, if applicable:

Aggregate

Length (overall; ft):

282

Beam (width; ft):

78

Draft (ft) - *depth of hull below waterline, fully laden*:

13.5

VESSEL DATA SHEET, CONT.

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
48.5

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
5

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Frequency of passage under HR-WS Bridge:
Most likely never

Transit speed under HR-WS Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: Choose an item.

Ability to Modify *(If yes, provide details including cost of modification and who pays cost):*Choose an item.

Please identify any future vessel or cargo plans that might require different vessels to transit under the bridge. Attach additional pages as needed.

Marine Contractors

Company: Manson Construction Company

Vessel:

- Derrick No. 24
- Haakon

Company did not respond to IBR request. Information below was included in the CRC NIR.

Marine Contractors
Owner: Manson Construction
Vessel: Derrick No. 24

MANSON CONSTRUCTION CO.

Serving the Nation's Waterways Since 1905

Fleet

Derrick Barges/Clamshell Dredges "Derrick #24"

"Derrick #24" Specifications

Dimensions

Length:
200 ft / 60.9 m

Beam:
84 ft / 25.6 m

Depth:
13 ft / 3.96 m

Draft:
6 ft / 1.8 m

Operating Parameters

Maximum Linepull w/ boom extended 65 ft (19.8 m):
800,000 lb / 3,558 kN

Fuel:
40,000 gal / 151,400

©2008 Manson Construction Co. Seattle Office (Headquarters): 5209 East Marginal Way S., Seattle, WA 98134
Phone: (206) 762-0850 • Fax: (206) 764-8590 • email@mansonconstruction.com • www.mansoncontruction.com

Columbia River CROSSING

River User Data Sheet

By: RALPH PETEREIT Date: 2/27/2012

1. Company Name and/or Owner of Vessel and contact information

Name of company: MANSON CONSTRUCTION CO.

Name of contact: RANDY THORSEN

Phone number (Office): 206-762-0850 (Cell): 206-793-2630

Email: rthorsen@mansonconstruction.com

Address: 5209 E. MARGINAL WAY S.

City: SEATTLE State: WA Zip code: 98134

3a. Vessel Name: DERRICK NO. 24 **3b. Vessel Type:** FLOATING CRANE / DERRICK BARGE

3c. US Coast Guard Document Number:

4a. Length Overall (LOA), **feet:** 200 **4b. Beam** (width), **feet:** 90

5. Draft (depth of hull below waterline, fully laden), **feet:** 6

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), **feet:** 99

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 5-10

8. Frequency of one-way passage underneath I-5 main channel (typical per month):

Jan ____ **Feb** ____ **Mar**____ **Apr**____ **May**____ **Jun**____ **Jul**____ **Aug**____ **Sep**____ **Oct**____ **Nov**____ **Dec**____

9. Frequency of one-way passage underneath I-5 main channel (other historic events):

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

Jan ____ **Feb** ____ **Mar**____ **Apr**____ **May**____ **Jun**____ **Jul**____ **Aug**____ **Sep**____ **Oct**____ **Nov**____ **Dec**____

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? NOT AVAILABLE

What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)?

May we have a copy?

13. Other miscellaneous LOCATED IN SEATTLE AND IS THE LARGEST BARGE IN THE PACIFIC NW. THIS BARGE HAS NOT BEEN UP THE COLUMBIA RIVER IN OVER 10 YEARS. NO CURRENT PLANS TO RELOCATE THIS BARGE TO THE COLUMBIA RIVER.

Vessel Height Verification Sheet

By: Ralph Petereit Date: July 21, 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Manson Construction Co.
   b. Name of contact: Randy Thorsen – Northwest Operations Manager
   c. Phone number (Office): (206) 762-0850 (Cell): (206) 793-2630
   d. Email: RTHORSEN@MANSONCONSTRUCTION.COM
   e. Address: 5209 E. Marginal Way City: Seattle
   State: WA Zip code: 98124
2. Vessel
   a. ID: b. Name: Derrick 24
   c. Type: Crane Barge d. USCG Document Number: 657491
3. Vessel Configuration
   a. Identify vessel configuration: Crane Barge
   - Is a vessel specification sheet available? Yes
   - Configuration shown on the sheet: Yes
   - What is the lowest height configuration for transport? Gantry Height

   b. What is the gantry configuration? Estimated gantry height: 98 ft 7 in
   c. Does the barge have spuds? Yes
   - Height above waterline for travel? 98 ft 7 in
   - Can the spuds be removed for travel? Yes
   - Work and cost involved in removing spuds?
4. Vessel Location
   a. Where is the vessel currently located? Lake Washington, WA.
   b. Is it working on a job? Yes – 520 Bridge Replacement Is it tied up to shore? No
   c. What is the best time to make a trip to the vessel? None currently

5. Measurements from Spec Sheet

Gantry Height:	98 ft 7 in
Water Level:	
Top of Boom:	
Height of Boom Hinge Pin:	
Boom Cradle:	
Top of Spud:	

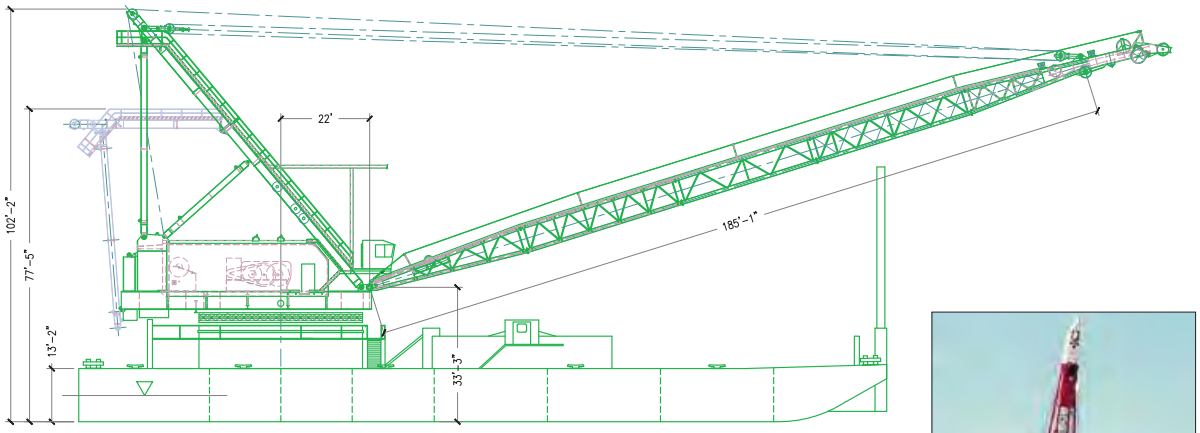
6. Vessel Height

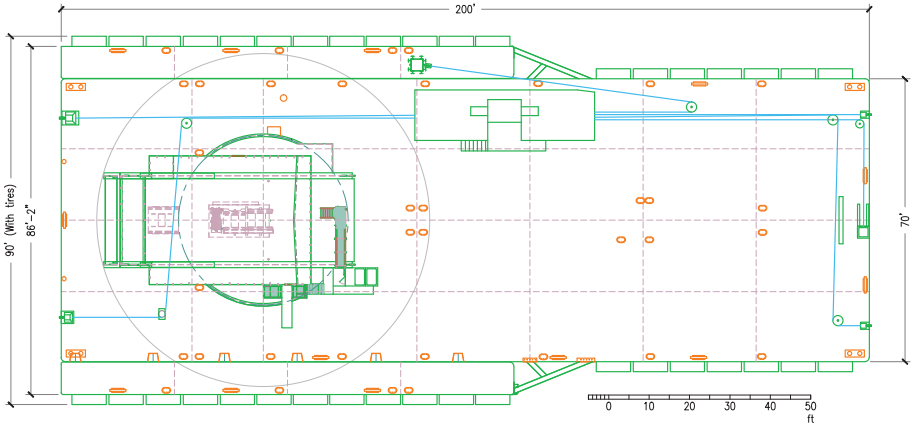
Self-Reported		From Spec Sheet	
Air Draft:	99 ft	Air Draft:	98 ft 7 in
Air Gap:	5 – 10 ft	Air Gap:	10
Water Level:	16	Water Level:	16
Total Height:	125 ft	Total Height:	124 ft 7 in

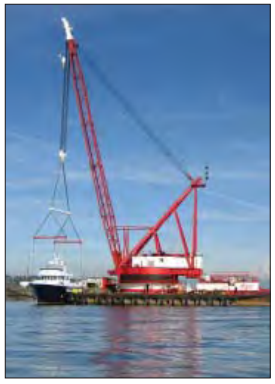
7. History Notes

Date	Item
6/27/2012	Called and left message for Randy Thorsen – NW Ops Manager
7/9/2012	Called Randy, was told to send e-mail
7/9/2012	Sent-mail with information request
7/21/2012	Still no reply

Manson Derrick *24*





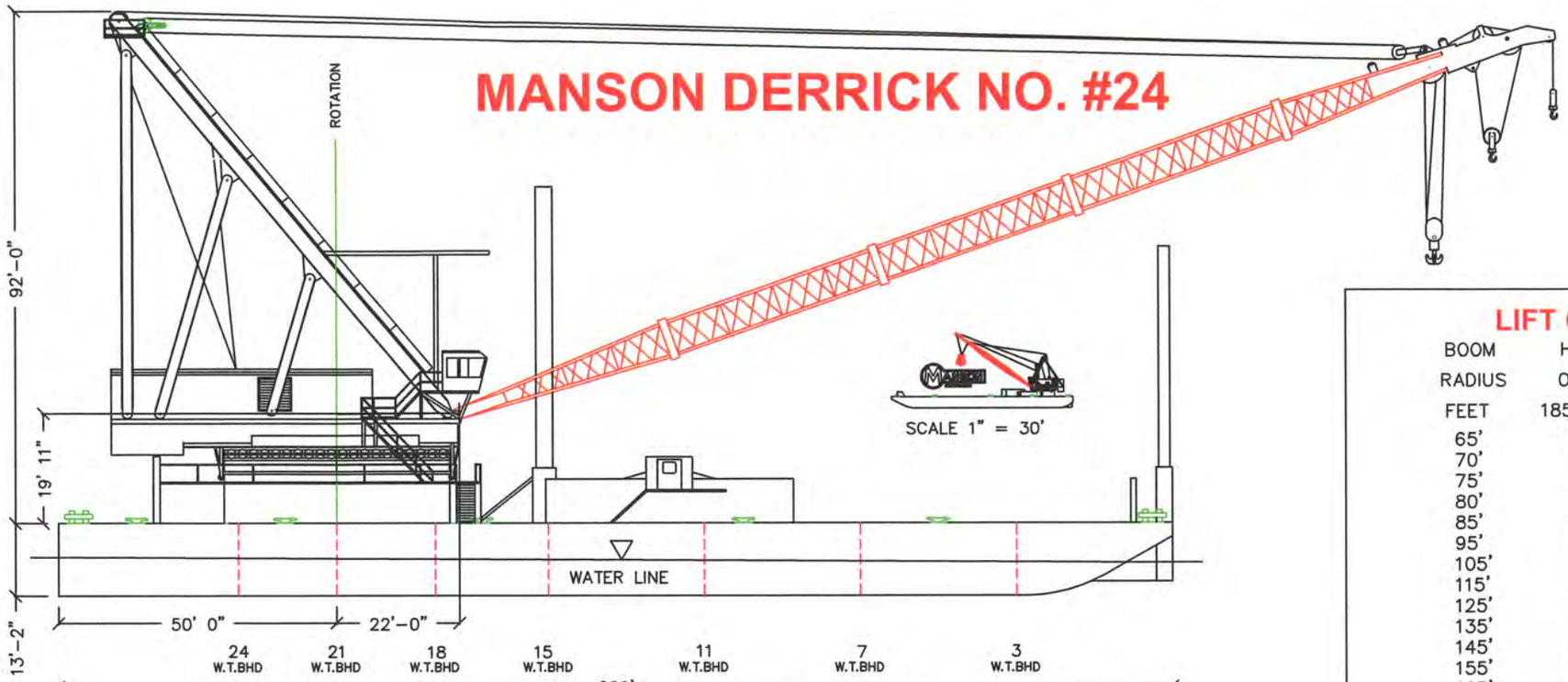


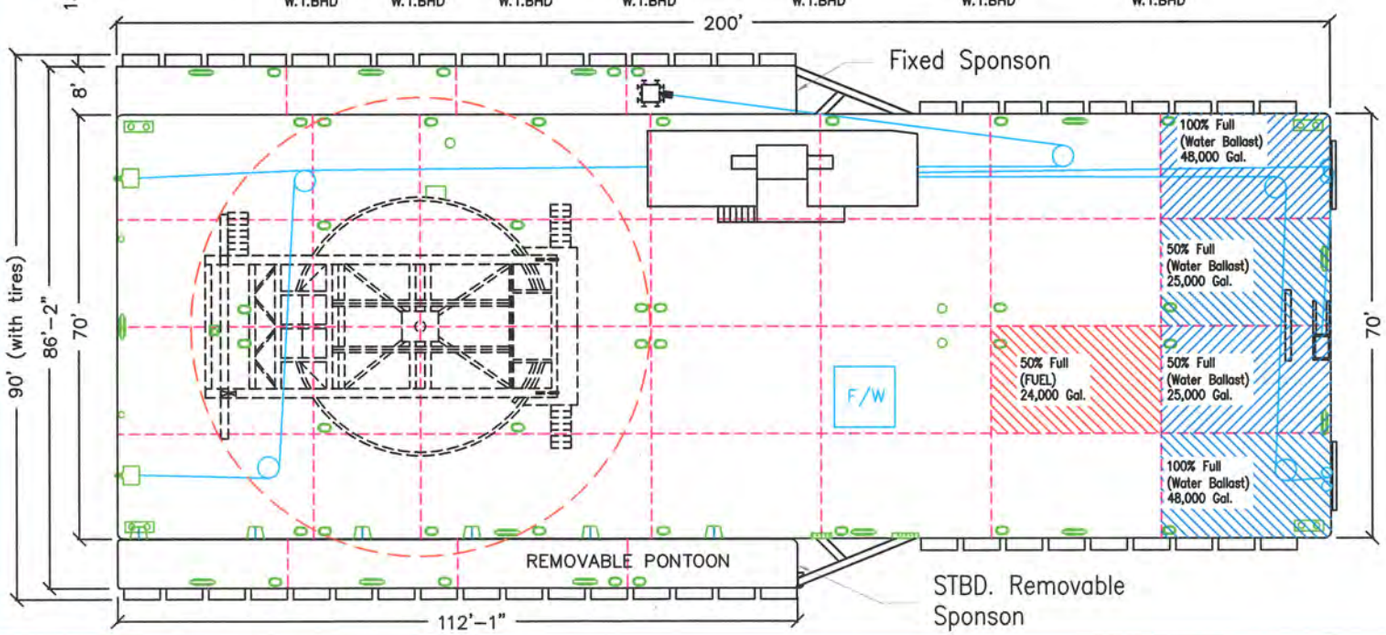
Principal Characteristics	
Length Overall	200'-0"
Beam Overall (With Pontoons & Tires)	90'-0"
Beam Overall (With Pontoons)	86'-2"
Beam Overall (W/O Pontoon)	78'-0"
Barge Depth	13'-0"
Minimum Draft	7'-0"
Distance Deck to Boom Heel	22'-3"
Boom Length to Main Block	185'-0"
Boom Length to 2-Part Whip	156'-0"
Boom Length to Whip	207'-2"
Boom Length Main to Whip	22'-0"
Spuds - 92' Each, Good to 70' Depth	2 - Each

Miscellaneous Characteristics	
Crane Manufacture	Clyde Iron Works
Model Number	42-DE-145
Serial Number	CW 3931
Circle Diameter	42' Diameter
Rigging Wire	
Main Hoist	5,150' 1 1/4" 6x26
2-Part Whip	1,150' 1 1/4" 6x26
Whip Line	550' 1" 6x26
Boom (Topping Gear)	5,250' 1 1/4" 6x26

Miscellaneous Characteristics	
Spud Wire	
Side Spud	360' 1 1/4"
Stern Spud	360' 1 1/4
Anchor Wire	
Stern Anchors (2)	1,700' 1 1/4" 6x26
Bow Anchors (2)	1,700' 1 1/4" 6x26
Normal Fues Capacity	40,000 Gallons (1"=307 Gallons)
Boom (Topping Gear)	3,000 Gallons

MANSON DERRICK NO. #24





PRINCIPAL CHARACTERISTICS

LENGTH OVERALL	200'-0"
BEAM OVERALL (WITH PONTOONS & TIRES)	90'-0"
BEAM OVERALL (WITH PONTOONS)	86'-2"
BEAM OVERALL (W/O PONTOON)	78'-0"
BARGE DEPTH	13'-0"
DRAFT FWD 6'-0" AFT	7'-0"
DISTANCE DECK TO BOOM HEEL	22'-3"
BOOM LENGTH TO MAIN BLOCK	185'-0"
BOOM LENGTH TO 2-PART WHIP	156'-0"
BOOM LENGTH TO WHIP	207'-0"
BOOM LENGTH MAIN TO WHIP	22'-0"
SPUDS - 92' EA., GOOD TO 70' DEPTH	2 EA.

LIFT CAPACITY CHART IN POUNDS

BOOM RADIUS FEET	HEAVY LIFT OVER STERN 185 FOOT BOOM	HEAVY LIFT FULL REVOLVING 185 FOOT BOOM	2 PART WHIP LINE FULL REVOLVING 185 FOOT BOOM
65'	800,000		60,000
70'	800,000		60,000
75'	800,000	600,000	60,000
80'	739,000	567,900	60,000
85'	671,700	538,000	60,000
95'	563,300	483,000	60,000
105'	479,500	434,200	60,000
115'	412,100	388,900	60,000
125'	356,500	346,500	60,000
135'	309,200	306,400	60,000
145'	268,100	268,100	60,000
155'	231,600	231,600	60,000
165'	198,400	198,400	60,000
175'	167,300	167,300	60,000
185'	137,100	137,100	60,000
195'	105,500	105,500	60,000

MISCELLANEOUS CHARACTERISTICS

CRANE MANUFACTURE	CLYDE IRON	
MODEL NUMBER	42-DE-145	
SERIAL NUMBER	CW 3931	
CIRCLE DIAMETER	42' DIAMETER	
RIGGING WIRE		
MAIN HOIST	5,350' 1 1/4"	6 X 26
2-PART WHIP	700' 1 1/4"	6 X 26
WHIP LINE	600' 1 1/8"	18 X 19 DY18
BOOM (TOPPING GEAR)	5,240' 1 1/4"	6 X 26
SPUD WIRE		
SIDE SPUD	360' 1 1/4"	
STERN SPUD	360' 1 1/4'	
ANCHOR WIRE		
STERN ANCHOR'S (2)	1,700' 1 1/4"	6 X 26
BOW ANCHOR'S (2)	1,700' 1 1/4"	6 X 26
NORMAL FUEL CAPACITY	40,000 GALS.	(1" = 307 GALS.)
NORMAL WATER CAPACITY	3,000 GALS.	

Marine Contractors
Owner: Manson Construction
Vessel: Haakon

Columbia River CROSSING

River User Data Sheet

By: RALPH PETEREIT Date: 2/27/2012

1. Company Name and/or Owner of Vessel and contact information

Name of company: MANSON CONSTRUCTION CO.

Name of contact: RANDY THORSEN

Phone number (Office): 206-762-0850 (Cell): 206-793-2630

Email: rthorsen@mansonconstruction.com

Address: 5209 E. MARGINAL WAY S.

City: SEATTLE State: WA Zip code: 98134

3a. Vessel Name: HAAKON **3b. Vessel Type:** FLOATING CRANE/ DERRICK BARGE

3c. US Coast Guard Document Number:

4a. Length Overall (LOA), **feet:** 280 **4b. Beam** (width), **feet:** 68

5. Draft (depth of hull below waterline, fully laden), **feet:** 9

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), **feet:** 84

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 5-10

8. Frequency of one-way passage underneath I-5 main channel (typical per month):

Jan ____ **Feb** ____ **Mar**____ **Apr**____ **May**____ **Jun**____ **Jul**____ **Aug**____ **Sep**____ **Oct**____ **Nov**____ **Dec**____

9. Frequency of one-way passage underneath I-5 main channel (other historic events):

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

Jan ____ **Feb** ____ **Mar**____ **Apr**____ **May**____ **Jun**____ **Jul**____ **Aug**____ **Sep**____ **Oct**____ **Nov**____ **Dec**____

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? NOT AVAILABLE

What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)?

May we have a copy?

13. Other miscellaneous

Vessel Height Verification Sheet

By: Ralph Petereit Date: July 21, 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Manson Construction Co.
   b. Name of contact: Randy Thorsen – Northwest Operations Manager
   c. Phone number (Office): (206) 762-0850 (Cell): (206) 793-2630
   d. Email: RTHORSEN@MANSONCONSTRUCTION.COM
   e. Address: 5209 E. Marginal Way City: Seattle
   State: WA Zip code: 98124
2. Vessel
   a. ID: b. Name: Haakon
   c. Type: Crane Barge d. USCG Document Number: 246141
3. Vessel Configuration
   a. Identify vessel configuration: Crane Barge
   - Is a vessel specification sheet available? Yes
   - Configuration shown on the sheet: Yes
   - What is the lowest height configuration for transport? Gantry Height

   b. What is the gantry configuration? Estimated gantry height: 84 ft
   c. Does the barge have spuds? Yes
   - Height above waterline for travel? 84 ft
   - Can the spuds be removed for travel? Yes
   - Work and cost involved in removing spuds?
4. Vessel Location
   a. Where is the vessel currently located? Gulf of Mexico
   b. Is it working on a job? Yes Is it tied up to shore? No
   c. What is the best time to make a trip to the vessel? None currently

5. Measurements from Spec Sheet

Gantry Height:	84 ft
Water Level:	
Top of Boom:	
Height of Boom Hinge Pin:	
Boom Cradle:	
Top of Spud:	

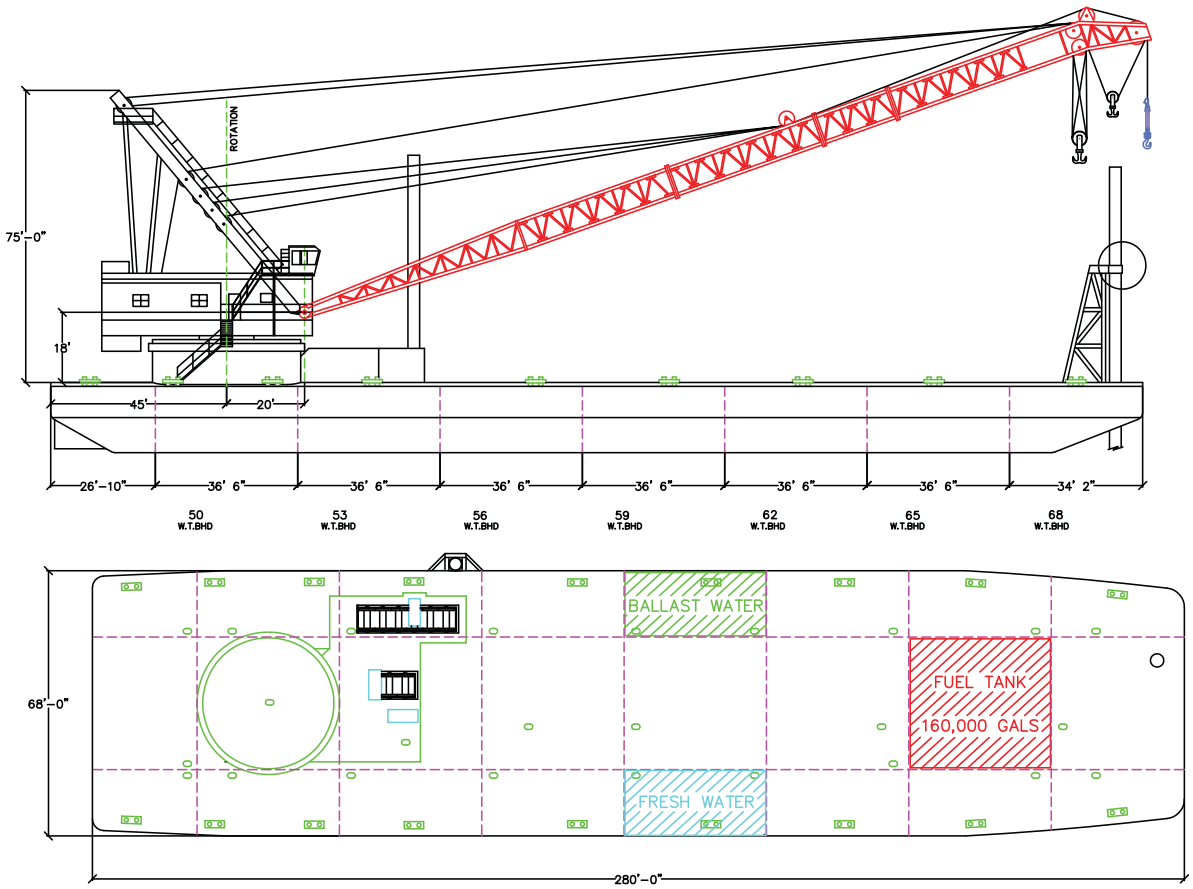
6. Vessel Height

Self-Reported		From Spec Sheet	
Air Draft:	84 ft	Air Draft:	84 ft
Air Gap:	5 – 10 ft	Air Gap:	10
Water Level:	16	Water Level:	16
Total Height:	106 ft	Total Height:	106 ft

7. History Notes

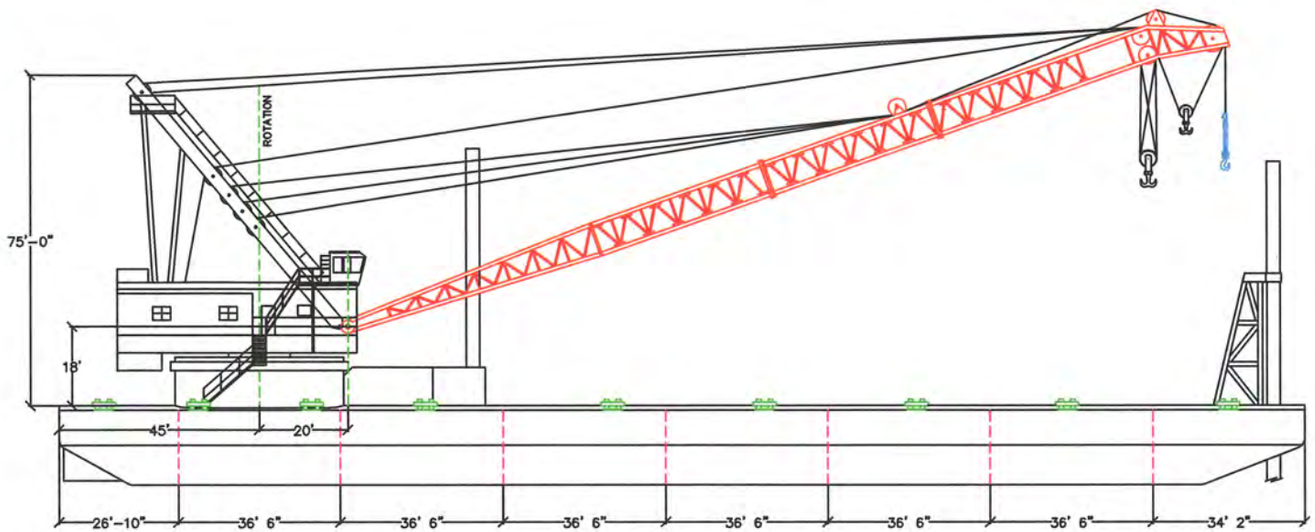
Date	Item
6/27/2012	Called and left message for Randy Thorsen – NW Ops Manager
7/9/2012	Called Randy, was told to send e-mail
7/9/2012	Sent-mail with information request
7/21/2012	Still no reply

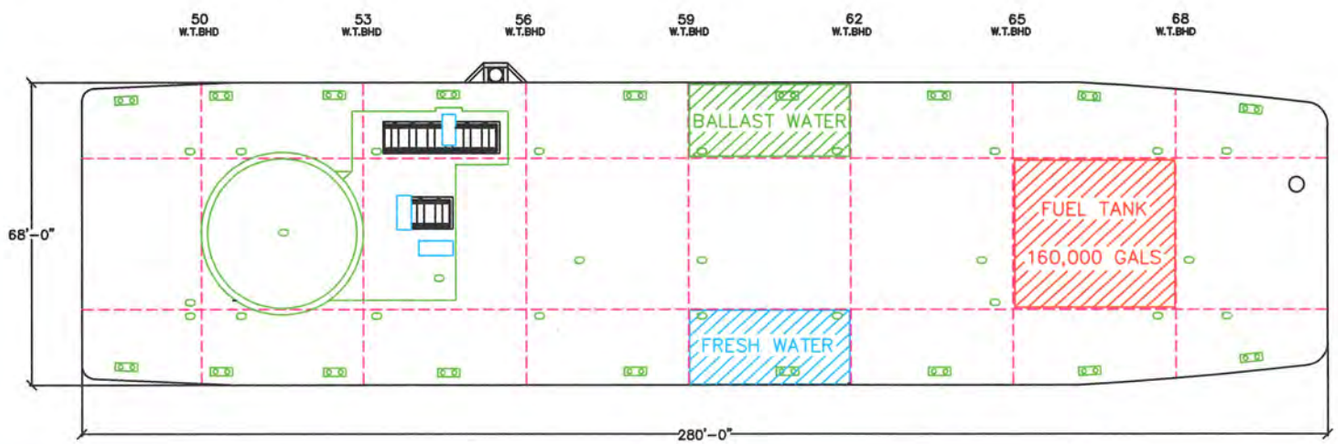
Manson Derrick *Haakon*



Principal Characteristics	
Length Overall	280′-0″
Beam Overall (Without Spuds & Fenders)	68′-0″
Barge Depth at Main Deck	18′-0″
Mean Draft	9′-0″
Distance Deck to Boom Heel	18′-0″
Boom Length to Main	210′-0″
Boom Length Main to Whip	16′-0″
Spuds	Two
Clamshell Bucket Capacity (Cu Yards)	15 Cubic Yards

MANSON DERRICK "HAAKON"





PRINCIPAL CHARACTERISTICS

LENGTH OVERALL	280'-0"
BEAM OVERALL (WITHOUT FENDERS)	68'-0"
BARGE DEPTH	18'-0"
MEAN DRAFT	9'-0"
DISTANCE DECK TO BOOM HEEL	18'-0"
BOOM LENGTH TO MAIN	190'-0"
BOOM LENGTH MAIN TO WHIP	16'-0"
SPUDS	TWO
CLAMSHELL BUCKET CAPACITY	15 CU.YDS.

SCALE : 1" = 40'

LIFT CAPACITY CHART IN POUNDS

BOOM RADIUS FEET	FULL REVOLVING 190 FOOT BOOM	OVER STERN 190 FOOT BOOM
55'		750,000
60'	500,000	750,000
70'	440,000	657,000
80'	390,000	537,000
90'	332,000	453,000
100'	265,000	389,000
110'	238,000	337,000
120'	210,000	293,000
130'	192,000	256,000
140'	175,000	223,000
150'	158,000	193,000
160'	140,000	167,000
170'	124,000	142,000
180'	102,000	118,000
190'	80,000	95,000
200'	56,000	75,000

FULL REVOLVING LOADS FOR 3 DEGREES COMBINED LIST & ROLL

Marine Contractors

Company: Mark Marine Service

Vessels:

- DB Camas
- DB Columbia
- DB Sequoia
- Paterson Barge
- Mark 12
- Mark 1
- Mark 3
- Mark 5
- Mark 6
- M/V South Creek
- Barge #7
- Patricia
- Umatilla

Company did not respond to IBR request. Information below for DB Columbia, Patricia, Umatilla, Barge #7, and DB Camas were included in the CRC NIR. Information for DB Sequoia, Mark 12, Paterson Barge, Mark 1, Mark 3, Mark 5, Mark 6, and M/V South Creek were included in the Hood River-White Salmon Bridge Replacement NIR.

Marine Contractors

Owner: Mark Marine Service

Vessels: DB Columbia

Patricia

Umatilla

Vessel: DB Columbia

River User Data Sheet By: Craig Mark Date: 3/1/12

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: Mark Marine Service, Inc
   b. Name of contact: Craig Mark
   c. Phone number (Office): 3608373677 d. (Cell): 3607720916
   e. Email: markmarine@earthlink.net
   f. Address: P.O. Box 574
   g. City: Washougal
   h. State: WA i. Zip code: 98671

3a. Vessel Name: DB Columbia 3b. Vessel Type: Derrick Barge

3c. US Coast Guard Document Number: Undocumented

4a. Length Overall (LOA), feet: 140 4b. Beam (width), feet: 34

5. Draft (depth of hull below waterline, fully laden), feet: 12

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 75'

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): bridge At Owater 110'

8. Frequency of one-way passage underneath I-5 main channel (typical per month):_____

   Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___

9. Frequency of one-way passage underneath I-5 main channel (other historic events):____

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

    Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):_____

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy?
13. Other miscellaneous

River User Data Sheet By: Craig Mark Date: 3/4/12

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: Mark Marine Service, Inc
   b. Name of contact: Craig Mark
   c. Phone number (Office): 360 837 2677 d. (Cell): 360 772 0916
   e. Email: markmarine@earthlink.net
   f. Address: P.O. Box 574
   g. City: Washougal
   h. State: WA i. Zip code: 98671

3a. Vessel Name: Patricia 3b. Vessel Type: Twin diesel oil screw Towboat with Tower

3c. US Coast Guard Document Number: 236788

4a. Length Overall (LOA), feet: 84 4b. Beam (width), feet: 22

5. Draft (depth of hull below waterline, fully laden), feet: 7
6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: ~~85~~ 48'
7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 110' For we Push CRANE BARGES
8. Frequency of one-way passage underneath I-5 main channel (typical per month): _____

   Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___
9. Frequency of one-way passage underneath I-5 main channel (other historic events): ____
10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

    Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___
11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): 1 Per Year

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy?
13. Other miscellaneous

River User Data Sheet By: Craig Mark Date: 3/1/12

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: Mark Marine Service, Inc.
   b. Name of contact: Craig Mark
   c. Phone number (Office): 360 837 2677 d. (Cell): 360 772 0916
   e. Email: markmarine@earthlink.net
   f. Address: P.O. Box 574
   g. City: Washougal
   h. State: WA i. Zip code: 98671

3a. Vessel Name: Umatilla (AKA: Washougal) 3b. Vessel Type: Twin diesel oil Screw Towboat with Tower

3c. US Coast Guard Document Number: 227132

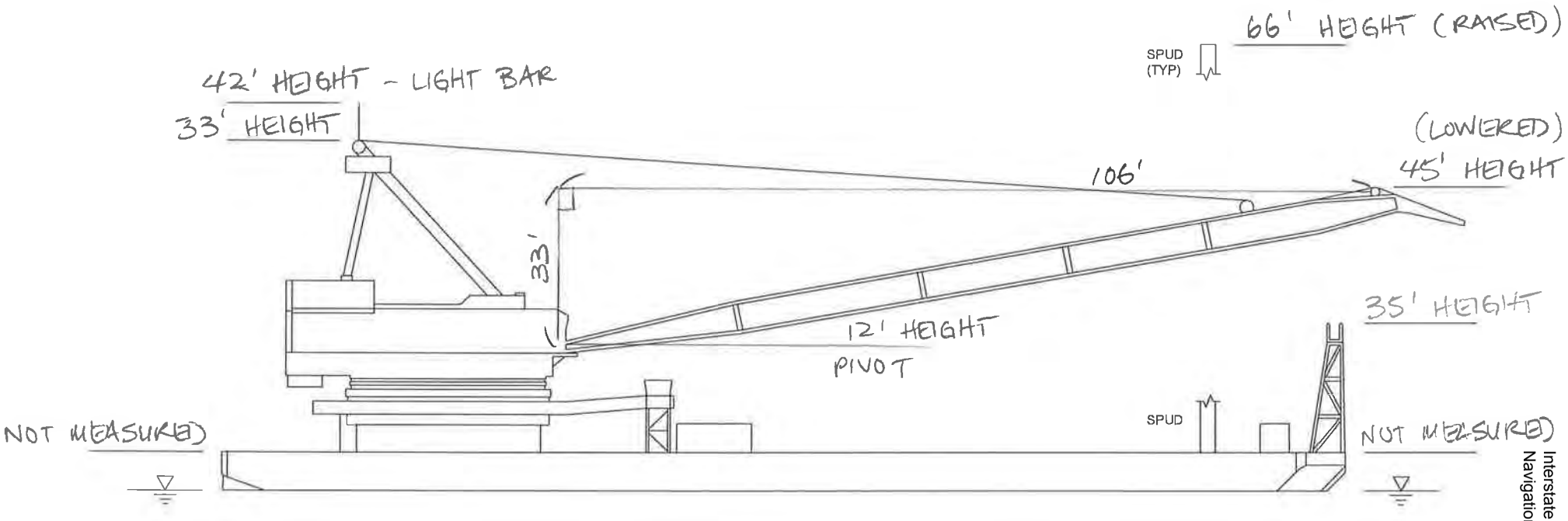
4a. Length Overall (LOA), feet: 82.5 4b. Beam (width), feet: 20.0

5. Draft (depth of hull below waterline, fully laden), feet: 7.5
6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 50
7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 110' For We Pick CRANE Barges
8. Frequency of one-way passage underneath I-5 main channel (typical per month): _____

   Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___
9. Frequency of one-way passage underneath I-5 main channel (other historic events): ____
10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

    Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___
11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): 1 Per Year

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy?
13. Other miscellaneous



DB COLUMBIA

NAME

MARK MARINE SERVICE
MEASURED AT
WASHOUGAL, WA

LOCATION

07-13-12

DATE

CRC Vessel Verification

Prepared by: David Evans and Associates, Inc.

Vessel Name	Owner	Light Bar Elev (ft)	Mast Elev (ft)	Spud Elev (ft)	Boom Crane Elev (ft)	Gantry Elev (ft)	Pivot Pt Elev (ft)	Cradle Elev (ft)	Water Elev (ft)	Height Above Water
DB Columbia	Mark Marine Service		N/A	84.1					18.4	66
			N/A			51.8			18.4	33
		60.6	N/A						18.4	42
			N/A		63.9				18.4	45
			N/A					53.5	18.4	35
			N/A				30.7		18.4	12

N/A - does not exist

Vessel Height Verification Sheet

By: Pete Geiger Date: 13 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Mark Marine
   b. Name of contact: Craig Mark
   c. Phone number (Office): 360.837.2677 (Cell): 360.772.0916
   d. Email: markmarine@ eathlink.net
   e. Address: 1498 SE 12th Street/PO Box 574 City: Washougal
      State: WA Zip code: 98671
2. Vessel
   a. ID: b. Name: DB Columbia
   c. Type: Derrick Barge with Crane d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration: Crane Boom Elevated below Spuds; Port Spud Up on Pin
   - Is a vessel specification sheet available? No
   - Configuration shown on the sheet: N/A
   - What is the lowest height configuration for transport? ~75 Feet (Port Spud on Pin)

   b. What is the gantry configuration? Assembled with Pins Estimated gantry height: Not given

   c. Does the barge have spuds? Yes, Two
   - Height above waterline for travel? Port=75 feet Starboard = 75 feet
   - Can the spuds be removed for travel? Only on very rare occasions
   - Work and cost involved in removing spuds? 4 hours to reset spuds. Need to find a site to harbor or tie up to. Spuds often need separate barge to transport them.
4. Vessel Location
   a. Where is the vessel currently located? Columbia River
   b. Is it working on a job? No Is it tied up to shore? Yes

c. What is the best time to make a trip to the vessel? Anytime, Just need a few days advance notice.

5. Surveyed Measurements (all measurements NAVD 88)

Gantry Height:	51.8 feet
Water Level:	18.4 feet
Top of Boom:	63.9 feet
Height of Boom Hinge Pin:	30.7 feet
Boom Cradle:	53.5 feet
Top of Spud:	84.1 feet
Top of Deck:	Not Measured

6. Vessel Height

Self-Reported		Surveyed	
Air Draft:	75 feet	Air Draft:	66 feet (top of spud)
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet (CRD)	Water Level:	16 feet (CRD)
Total Height:	101 feet	Total Height:	92 feet

7. History Notes

Date	Item
3/1/2012	Contacted by Jennifer Rabby
3/1/2012	Data sheet submitted
7/6/2012	Contacted by Karl Krcma for field measurement
7/13/2012	Field measured

Marine Contractors
Owner: Mark Marine Service
Vessel: Barge #7

River User Data Sheet By:_____ Date:_____

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: Mark Marine Service, Inc
   b. Name of contact: Craig Mark
   c. Phone number (Office): 360 834-2678 d. (Cell): (360) 772-0916
   e. Email: Markmarine@earthlink.net
   f. Address: P.O. Box 574
   g. City: Washougal
   h. State: WA i. Zip code: 98671

3a. Vessel Name: Barge #7 3b. Vessel Type: Crane Barge

3c. US Coast Guard Document Number: Undocumented

4a. Length Overall (LOA), feet: 100 4b. Beam (width), feet: 40

5. Draft (depth of hull below waterline, fully laden), feet: 4
6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 80'
7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 110'
8. Frequency of one-way passage underneath I-5 main channel (typical per month):_____

   Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___
9. Frequency of one-way passage underneath I-5 main channel (other historic events):____
10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

    Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___
11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):_____

Marine Contractors
Owner: Mark Marine Service
Vessel: DB Camas

No image available

River User Data Sheet By: Craig Mark Date: 3/1/12

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: Mark Marine Service, Inc
   b. Name of contact: Craig Mark
   c. Phone number (Office): 360 837 2677 d. (Cell): 360 772 0916
   e. Email: markmarine@earthlink.net
   f. Address: P.O. Box 574
   g. City: Washougal
   h. State: WA i. Zip code: 98671

3a. Vessel Name: DB Camas 3b. Vessel Type: Derrick Barge

3c. US Coast Guard Document Number: undocumented

4a. Length Overall (LOA), feet: 90 4b. Beam (width), feet: 34

5. Draft (depth of hull below waterline, fully laden), feet: 12
6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 75'
7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): Bridge Shall Be A 110' At Zero water
8. Frequency of one-way passage underneath I-5 main channel (typical per month): _____

   Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___
9. Frequency of one-way passage underneath I-5 main channel (other historic events): ____
10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

    Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___
11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): 1 Per year

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy?
13. Other miscellaneous

EXISTING VESSEL DATA SHEET, CONT.

Company Name: Mark Marine Service, Inc

Vessel Name:
DB Sequoia

Vessel Type:
Derrick Barge (crane)

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Choose an item.

USCG Document Number:

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):
100'

Beam (width; ft):
40'

Draft (ft) - *depth of hull below waterline, fully laden*:
10'

EXISTING VESSEL DATA SHEET, CONT.

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
75’

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
25’

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Frequency of passage under HR-WS Bridge:
0-2 times a year

Transit speed under HR-WS Bridge and Load Configuration:

Time of Year of Passage:
Anytime of year

Tug Assistance Required: Choose an item.

Ability to Modify *(If yes, provide details including cost of modification and who pays cost):*Choose an item.

EXISTING VESSEL DATA SHEET, CONT.

Company Name: Mark Marine Service, Inc.

Vessel Name:
Mark 12

Vessel Type:
Material Barge w/ spuds

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Choose an item.

USCG Document Number:
1140207

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):
110’

Beam (width; ft):
35’

Draft (ft) - *depth of hull below waterline, fully laden*:
11’

EXISTING VESSEL DATA SHEET, CONT.

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
75’ Spuds

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
25’

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Frequency of passage under HR-WS Bridge:
0-2 times a year

Transit speed under HR-WS Bridge and Load Configuration:

Time of Year of Passage:
Anytime

Tug Assistance Required: Choose an item.

Ability to Modify *(If yes, provide details including cost of modification and who pays cost):*Choose an item.

EXISTING VESSEL DATA SHEET, CONT.

Company Name: Mark Marine Service, Inc

Vessel Name:
Paterson Barge

Vessel Type:
Ramp Barge w/spuds

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Choose an item.

USCG Document Number:

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):
75'

Beam (width; ft):
24'

Draft (ft) - *depth of hull below waterline, fully laden*:
4

EXISTING VESSEL DATA SHEET, CONT.

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
70’ Spuds

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
25’

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Frequency of passage under HR-WS Bridge:
0-2 times

Transit speed under HR-WS Bridge and Load Configuration:

Time of Year of Passage:
Anytime

Tug Assistance Required: Choose an item.

Ability to Modify *(If yes, provide details including cost of modification and who pays cost):*Choose an item.

EXISTING VESSEL DATA SHEET, CONT.

Company Name: Mark Marine Service, Inc

Vessel Name:
Mark 1

Vessel Type:
Material Barge w/spuds

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Choose an item.

USCG Document Number:

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):
50'

Beam (width; ft):
16'

Draft (ft) - *depth of hull below waterline, fully laden*:
5'

EXISTING VESSEL DATA SHEET, CONT.

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
40’ Spuds

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
25’

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Frequency of passage under HR-WS Bridge:
0-2 times a year

Transit speed under HR-WS Bridge and Load Configuration:

Time of Year of Passage:
Anytime

Tug Assistance Required: Choose an item.

Ability to Modify *(If yes, provide details including cost of modification and who pays cost):*Choose an item.

EXISTING VESSEL DATA SHEET, CONT.

Company Name: Mark Marine Service, Inc

Vessel Name:
Mark 3

Vessel Type:
Material Barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*: Choose an item.

Vessel Category: Choose an item.

USCG Document Number:

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):
155'

Beam (width; ft):
40'

Draft (ft) - *depth of hull below waterline, fully laden*:
11'

EXISTING VESSEL DATA SHEET, CONT.

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
42’ boat

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
25’

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Frequency of passage under HR-WS Bridge:
0-2 times per year

Transit speed under HR-WS Bridge and Load Configuration:

Time of Year of Passage:
Anytime

Tug Assistance Required: Choose an item.

Ability to Modify *(If yes, provide details including cost of modification and who pays cost):* Choose an item.

EXISTING VESSEL DATA SHEET, CONT.

Company Name: Mark Marine Service, Inc

Vessel Name:
Mark 5

Vessel Type:
Material Barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*: Choose an item.

Vessel Category: Choose an item.

USCG Document Number:

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):
115'

Beam (width; ft):
30'

Draft (ft) - *depth of hull below waterline, fully laden*:
8'

EXISTING VESSEL DATA SHEET, CONT.

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
42’ boat

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
25’

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Frequency of passage under HR-WS Bridge:
0-2 times per year

Transit speed under HR-WS Bridge and Load Configuration:

Time of Year of Passage:
Anytime

Tug Assistance Required: Choose an item.

Ability to Modify *(If yes, provide details including cost of modification and who pays cost):* Choose an item.

EXISTING VESSEL DATA SHEET, CONT.

Company Name: Mark Marine Service, Inc

Vessel Name:
Mark 6

Vessel Type:
Material Barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*: Choose an item.

Vessel Category: Choose an item.

USCG Document Number:

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):
115'

Beam (width; ft):
30'

Draft (ft) - *depth of hull below waterline, fully laden*:
8'

EXISTING VESSEL DATA SHEET, CONT.

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
42’ boat

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
25’

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Frequency of passage under HR-WS Bridge:
0-2 times per year

Transit speed under HR-WS Bridge and Load Configuration:

Time of Year of Passage:
Anytime

Tug Assistance Required: Choose an item.

Ability to Modify *(If yes, provide details including cost of modification and who pays cost):* Choose an item.

EXISTING VESSEL DATA SHEET, CONT.

Company Name: Mark Marine Service, Inc

Vessel Name:
M/V South Creek (aka: Grant)

Vessel Type:
Tug

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*: Choose an item.

Vessel Category: Choose an item.

USCG Document Number:
1231465

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):
25'

Beam (width; ft):
14'

Draft (ft) - *depth of hull below waterline, fully laden*:
5'

EXISTING VESSEL DATA SHEET, CONT.

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

42’

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

25’

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Frequency of passage under HR-WS Bridge:

0-2 times per year

Transit speed under HR-WS Bridge and Load Configuration:

Time of Year of Passage:

Anytime

Tug Assistance Required: Choose an item.

Ability to Modify *(If yes, provide details including cost of modification and who pays cost):* Choose an item.

EXISTING VESSEL DATA SHEET, CONT.

Company/Owner Name: Mark Marine Service

Vessel Name:
DB Camas –

Vessel Type:
Crane Barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Choose an item.
commercial

USCG Document Number:

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):
90

Beam (width; ft):
34

Draft (ft) - *depth of hull below waterline, fully laden*:
12

EXISTING VESSEL DATA SHEET, CONT.

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
75

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
25

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Frequency of passage under HR-WS Bridge:

Transit speed under HR-WS Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: Choose an item.

Ability to Modify *(If yes, provide details including cost of modification and who pays cost):*Choose an item.

Please identify any future vessel or cargo plans that might require different vessels to transit under the bridge. Attach additional pages as needed.

EXISTING VESSEL DATA SHEET, CONT.

Company/Owner Name: Mark Marine Service

Vessel Name:
DB Columbia

Vessel Type:
Crane Barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Choose an item.
commercial

USCG Document Number:

Primary Mooring Location *(waterway milepoint, if known)***:**

Type and quantity of cargo, if applicable:

Length (overall; ft):
140

Beam (width; ft):
34

Draft (ft) - *depth of hull below waterline, fully laden*:
12

EXISTING VESSEL DATA SHEET, CONT.

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
75

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
25

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Frequency of passage under HR-WS Bridge:

Transit speed under HR-WS Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: Choose an item.

Ability to Modify *(If yes, provide details including cost of modification and who pays cost):*Choose an item.

Marine Contractors

Company: NorthBank Civil and Marine

Vessel:

- Northbank

Company provided data sheets to IBR Program. No information was included in CRC NIR.

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Northbank Civil and Marine, inc.

Vessel Name:
Northbank

Vessel Type:
Crane Barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Yes

Pushed by 850 HP St. Helens tug boat

Vessel Category: Commercial

USCG Document Number:
1282254

Primary Mooring Location *(waterway milepoint, if known)*:
Port of Morrow

Type and quantity of cargo, if applicable:
N/A

Length (overall; ft):
110

Beam (width; ft):
50

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:
4 to 6

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
With crane boomed down in travel position, 51 feet

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
10

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:
100 feet for either side of barge (250 ft opening)

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: Yes

Frequency of passage under Interstate Bridge main channel (typical per month): Varies – 0-3 times/year

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough): Zero

Jan_____ Feb_____ Mar_____ Apr_____ May_____ June_____

Jul_____ Aug_____ Sep_____ Oct_____ Nov_____ Dec_____

Marine Contractors

Company: Ross Island

Vessels:

- Dredge #7
- Rossisle

Company provided information and a photo via email. Email is included below, followed by information included in the CRC NIR.

From: Randy Steed
To: Brian Carrico
Cc: Nicole McDermott
Subject: RE: Interstate Bridge Replacement Program
Date: Wednesday, May 5, 2021 10:38:15 AM
Attachments: image001.png
image002.png
image003.png
image004.png

Good Morning Brian:

Ross Island Sand & Gravel Co. is indeed still a user of the Columbia with our dredging and marine construction operations. We pass through the Interstate Bridge two to four (2-4) times per year with our sand mining Dredge #7 pushed by the Tug Rossisle. Dredge #7 with it's positioning spuds raised requires a vertical clearance of 75' from the water surface.

See attached example photo.

Thank You for allowing our input. Ross Island is of course interested in what portions of the replacement project we can assist in with our marine construction cranes and barges.

ROSS ISLAND SAND & GRAVEL CO.

Randall H. "Randy" Steed
President & Chief Operating Officer

Office (503) 239-5504
randysteed@ridredge.com

From: Brian Carrico <Brian.Carrico@interstatebridge.org>
Sent: Tuesday, May 4, 2021 4:23 PM
To: Randy Steed <randysteed@ridredge.com>
Cc: Nicole McDermott <Nicole.McDermott@interstatebridge.org>
Subject: Interstate Bridge Replacement Program

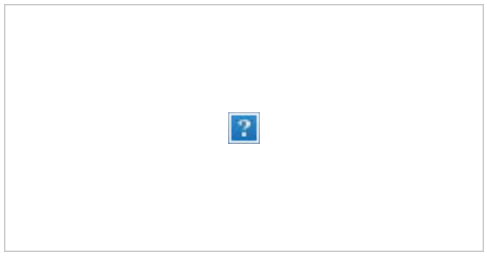
Mr. Steed,

I am part of the team working on the Interstate Bridge (IBR) Program for ODOT and WSDOT (https://www.interstatebridge.org/). I am reaching to you because Ross Island vessels were included in the Navigation Impact Report completed for the prior Columbia River Crossing project and we are validating and updating this data for the IBR program. We reached out to the contact listed in 2012 (Paul Godsil) but the email address was rejected. Can you provide a name and contact information for someone who can provide information your vessels and their use of the Columbia River at the I-5 bridge? Thanks in advance for your time and feel ree

to reach out if you have any questions specific to this request or the program in general.

Regards,

Brian



I-5 Bridge Replacement Program

Interstate 5 provides a critical connection between Oregon and Washington that supports local jobs and families, and is a vital trade route for regional, national and international economies. Beyond the concrete and steel of the existing bridge

www.interstatebridge.org

Brian Carrico

Interstate Bridge Replacement Program
Environmental Program

O: 360-823-6122 | **C:** 360-433-7775

E: brian.carrico@interstatebridge.org

interstatebridge.org

Marine Contractors

Owner: Ross Island Sand and Gravel

Vessel: RI Dredge No. 7

River User Data Sheet By: Ron Del Rosario Date: 3/6/2012

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: Ross Island Sand and Gravel
   b. Name of contact: Paul Godsil
   c. Phone number (Office): 503-239-5504 d. (Cell): _____
   e. Email: ptgodsil@ridredge.com
   f. Address: 4315 Se McLoughlin Blvd
   g. City: Portland
   h. State: Or i. Zip code: 97282

3a. Vessel Name: RI Dredge no.7 3b. Vessel Type: Cutter Section Dredge

3c. US Coast Guard Document Number: _____

4a. Length Overall (LOA), feet: 185 4b. Beam (width), feet: 35

5. Draft (depth of hull below waterline, fully laden), feet: 5.5
6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 80
7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): _____
8. Frequency of one-way passage underneath I-5 main channel (typical per month): _____

   Jan 1 Feb 1 Mar 1 Apr 1 May 1 Jun 1 Jul ___ Aug ___ Sep ___ Oct ___ Nov ___ Dec ___
9. Frequency of one-way passage underneath I-5 main channel (other historic events): ____
10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

    Jan ___ Feb ___ Mar ___ Apr ___ May ___ Jun ___ Jul ___ Aug ___ Sep ___ Oct ___ Nov ___ Dec ___
11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): _____

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy?
13. Other miscellaneous

Marine Industries and Fabricators

Company: Greenberry

Company provided the following information to the IBR Program.

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Greenberry Industrial LLC

Vessel Name:
Third-party

Vessel Type:
Barge and Tug

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:**Yes**

Tugboat towing barge

Vessel Category: Commercial

USCG Document Number:
Third-party

Primary Mooring Location *(waterway milepoint, if known)*:
N/A

Type and quantity of cargo, if applicable:
Modules, Process modules, piperacks, MCC buildings, Alaska Sealift Modules, Drill Rigs, Pressure Vessels, Shiploaders, Piling Templates, Vessels, Bridge Girders, Bridge Components, Railroad Bridges, DOT Bridge Sections, Autoclaves, Slugcatcher Vessels, Port Assemblies, Material Handling Systems, Conveyor Systems, Dock Sections, Bridge Maintenance Travelers, and various other over-dimensional fabricated items.

Length (overall; ft):
650 Feet

Beam (width; ft):

VESSEL DATA SHEET, CONT.

120 Feet

Draft (ft) - *depth of hull below waterline, fully laden*:
18ft

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
136 Feet

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
1 Foot

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:
10 Feet?

Transit speed under Interstate Bridge and Load Configuration:
10-12kts MAX

Time of Year of Passage:
Year round

Tug Assistance Required:Yes

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____1____ **Feb**_____1____ **Mar**____1_____ **Apr**____1_____ **May**___1_____ **June**__1_____

Jul____1_____ **Aug**_____1____ **Sep**_____1___ **Oct**_____1_____ **Nov**___1_____ **Dec**___1_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan____0_____ **Feb**_____0____ **Mar**_____0___ **Apr**_____0__ **May**_____0____ **June**____0_____

Jul____0_____ **Aug**_____0____ **Sep**_____0____ **Oct**_____0____ **Nov**_____0____ **Dec**_____0_____

Marine Industries and Fabricators

Company: Thompson Metal Fab

Company provided the following information to the IBR Program.

Interstate Bridge Replacement Project

Thompson Metal Fab – Impact Statement

May 26, 2021

Presented by John Rudi
Owner, President – Thompson Metal Fab

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INTRODUCTION

The history of Thompson Metal Fab includes two major influences, the opening of the Interstate Bridge in 1917, and the opening of the Columbia Business Center *(originally Henry Kaiser's Vancouver Shipyard)* in 1942. Over the years, Thompson Metal Fab (TMF), the Columbia Business Center (CBC) and the Interstate Bridge will see their history evolve due to the changing needs of the region, rapid population grown, and dynamic industrial development. For these same reasons, their history also begins to connect, and their futures are tied together.

The original Thompson Metal Fab facility, shown in 2018. Thompson moved from this location and to Vancouver in the early 1970's. The old facility has since been demolished, making way for the brand new Meyer Memorial Trust building.

Original span of the Interstate Bridge opened 1917 – shown here in 1931.

The original Interstate Bridge (current day northbound span) was completed and opened in February of 1917. Upon completion of this span, travelers could go from Canada to Mexico on one complete roadway. This was not only a big accomplishment for the country, but it was also an opportunity for growth, specifically in southwestern Washington. At the time the bridge was opened, there were approximately 250,000 people in Portland, compared to the 12,000 in Vancouver. The new bridge would provide opportunity for dynamic population movement, economic growth, and forever connect not only two states, but two communities. To satisfy the needs of this expanding community, a second 'twin' span was eventually completed and opened in 1958.

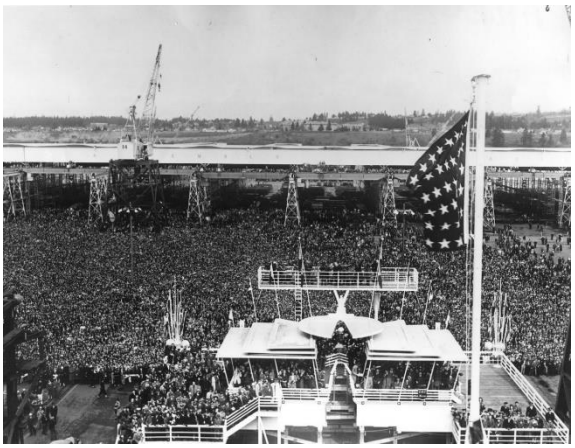
With a clearance of 72 feet, most river barges can pass under the bridge without impact when the drawbridge is closed. This is not the case with large industrial projects, like those manufactured currently by Thompson Metal Fab, or for large vessels, like the Liberty and Victory ships from the early 1940's. At full height, the current lift span can accommodate 178' from the water to the underside of the bridge. This "air gap" allows very large loads to pass upriver and downriver and has driven the development of upstream industrial areas such as the Columbia Business Center, originally known as Henry Kaiser's Vancouver Shipyard.

COLUMBIA BUSINESS CENTER *(former Kaiser Vancouver Shipyard)*

Building 40 and 41 of current day Thompson Metal Fab is shown prominently in the middle of this picture. At the time this picture was taken (circa early 1940's) the building and entire industrial area would have been known as Kaiser's Vancouver Shipyards.

At nearly 200-acres, Kaiser's Vancouver Shipyard began production in early 1942 with an initial payroll of 38,000 workers. This facility, along with two in Portland, produced 752 ships during WWII and peaked at 97,000 workers in total. Many of these workers migrated from other parts of the country and is part of the reason why the Portland/Vancouver area saw such a big jump in population at this time. The development of these shipyards certainly contributed to the need for a new span (eventually built and completed in 1958) and the need to modify the original span, completed in 1960. For perspective on what these facilities were able to produce, the construction on the first Liberty ship took 131 days in 1941. By 1943, Kaiser workers were averaging a completed Liberty ship in 42-days and three ships were being completed each day. Record production for a completed ship was 10-days, although that production was bested by one of the Kaiser facilities in Richmond, CA *(4-days, 15-hours, 29-minutes)*.

[1943] Escort carriers at the Vancouver Shipyards (current day Thompson Metal Fab)



75,000 people (largest crowd in Clark County's history) assembled on April 5, 1943 to witness first lady Eleanor Roosevelt christen the 'Alazon Bay' escort aircraft. Current day Thompson Metal Fab is seen prominently in the background.

drive opportunity to the Columbia Business Center as oil companies looked for fabricators to build "jacket liners" for new offshore wells. The facility could support the work on the massive infrastructure and the bridge was high enough to allow the jacket liners to be shipped downstream.

The 1960's and 1970's saw the construction of new dams on the Columbia River and Snake River in addition to the development of major oil fields in Alaska (i.e. Prudhoe Bay). Ongoing work on the US Interstate Highway System also provided opportunity for new bridges, including four highly visible bridges in Portland: Morrison Bridge (1958), Marquam Bridge (1966), Freemont Bridge (1973), and the Glenn L. Jackson Memorial Bridge (1982). These would be opened to accommodate a shifting population and to relieve pressure on traffic crossing the Interstate Bridge.

After the war ended and the need for shipbuilding diminished, learning how to leverage these 'abandoned' facilities for future industrial growth was important. The size of the facility at the Vancouver Shipyard was simply greater than most fabrication shops of the day. Even now, it remains one of the largest fabrication facilities on the West Coast. The sheer size of the building, access to a large yard, and location to a major waterway made the facility at the future Columbia Business Center an extremely attractive option for the large infrastructure needs that were coming.

The Portland/Vancouver Metro area became highly industrialized by the 1960's, driven by the ability of the Columbia Business Center and companies such as Thompson Metal Fab. This strong local economy centered around logging, pulp & paper products, and maritime transport on the Columbia River; and stimulated additional growth in the region. The California oil boom would also

Infrastructure for the California offshore oil fields being manufactured at the Columbia Business Center in 1967. Thompson Metal Fab would begin operations here a few years later in 1973.

THOMPSON METAL FAB

In 1937, "Pudge" Thompson opens 'Thompson Metal Fab' at 2405 Vancouver Avenue in Portland, OR. The opening of his facility comes 20-years after the opening of the Interstate Bridge while also pre-dating the second span by 20-years.

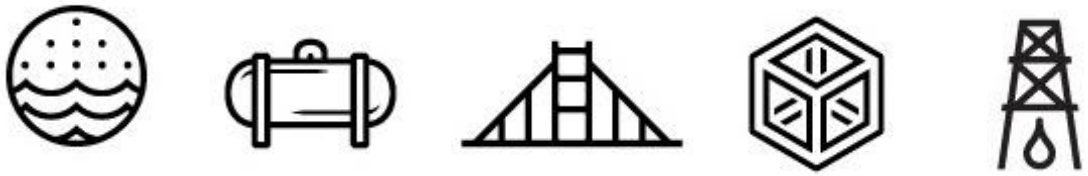
Original marketing display of the Thompson Ice Tongs

The origin story of Thompson Metal Fab is a humble one, especially compared to the work they do today. Pudge and his craftsmen manufactured lightweight metal products for the dairy and timber industries. One product, the Thompson Ice Tongs, held US patient #D206,091 and a quick Google search shows that the Thompson Ice Tongs are still selling online to this day. Thanks in part to the WWII war effort, expansion of TMF continued during the 1940's and 1950's; mirroring the growth of the community it served and the new industrial opportunities.

In 1973, after 36 years, Pudge Thompson sold his company to Harder Mechanical, whose story is like TMF's. Harder began as a small local plumbing contractor who was founded in 1934. A few years later they reinvented themselves so they could build housing for the workers at the Portland area shipyards during WWII. As the region continued to see growth, so did Harder who saw the acquisition of Thompson Metal Fab as a way to expand their capabilities and stake a claim on some of these emerging industries (i.e. hydroelectric dams). Shortly after the acquisition, the original Thompson Metal Fab facility (Portland, OR) was closed for good, and all operations were moved to the old Kaiser Shipyard in Vancouver, WA – a facility well suited to support the large projects Harder Mechanical would earn as they grew and expanded.

Thompson Metal Fab would transfer ownership again in the early 2000's with even more emphasis on how to maximize the capacity. The size of the facility requires TMF to be a diversified business and one with experience in multiple disciplines, including:

Marine/Hydro **Tanks/Vessels** **Bridges** **Modular/Structural** **Oil & Gas**



Since the early 1970's, TMF has completed countless projects while working over 10-Million man-hours *(estimated)*. The following list showcases some of the completed projects over the last 40+ years. In each case, transportation by barge was required (either by design or necessity), and in many cases the load passed under the Interstate Bridge.

Projects noted with (*) were not completed by Thompson Metal Fab but are on this list to showcase examples of other mega projects where a facility like Thompson's was required (Big shop, assembly yard, barge loading capabilities)

MARINE/HYDRO

<u>The Dalles Dam, Downstream Navigation Lock Miter Gates, Columbia River, WA/OR, USA [2011]</u>

Two Miter Gates were manufactured, where each gate measured 52' W x 106' L and weighed 1-Million pounds each. Due to navigational lock closures on the Columbia River, an aggressive fabrication and delivery schedule was required which required a fabricator with ample space and ability to load a barge. Picture to the right shows one gate getting ready to be loaded on the barge. Seen in the background is Parker Drilling Rig 272 & 273. Those rigs would ship just a few months after this load.

<u>Lower Monumental Dam, Downstream Navigation Lock Lift Gate, Snake River, WA, USA [2010]</u>

The finished weight of this structure was 1.5-Million pounds and would ship to the jobsite by barge in three segments. The final gate is 88' W x 84' H

<u>Ice Harbor Dam, Removable Spillway Weir, Snake River, WA, USA [2005]</u>

This removable spillway weir is designed to move juvenile fish more efficiently through the dam spillways. The unit measured 70' in width x 68' in height x 105' in length. It weighed 950-tons and is taller than Thompson's facility! The weir was completely fabricated at TMF and then transported by barge to Cascade General for repositioning before shipping to the jobsite on the Snake River.

Lower Granite Dam, Removable Spillway Weir, Snake River, WA, USA [2001]

The removable spillway weir is designed to move juvenile fish more efficiently downstream through the dam spillways. The weir was 83' wide x 61' deep x 115' long and weighed approximately 1,000-tons. The weir was completely fabricated at TMF and then transported by barge to Cascade General for repositioning before shipping to the jobsite on the Snake River.

Esperanza 124 MW Power Barge [1999]

Recently retrofitted in 2017 in Panama, it was originally fabricated in 1999 by Thompson Metal Fab, and transported to Cascade General in Portland, OR for final assembly and functional testing. The barge measured 105' wide x 30' deep x 284' long with a weight of 1,800-tons. The completed barge was loaded on a 400' L x 100' W barge for delivery to Cascade General.

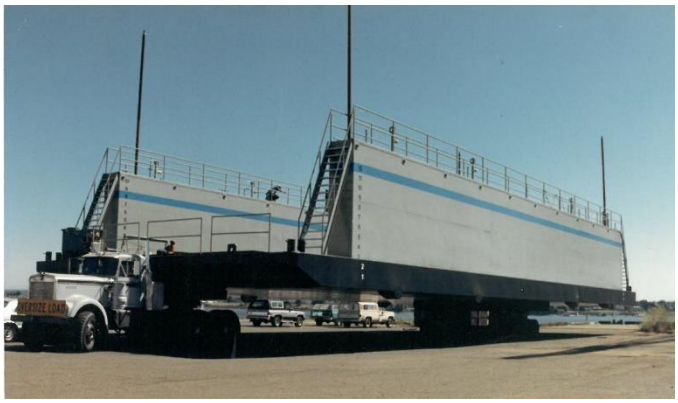
Golmar Explorer Ship Conversion [1997]

In 1997, Thompson fabricated multiple items for the infamous Golmar Explorer ship which was developed for the CIA and at the direction of Howard Hughes. By the mid-1990's the ship had changed hands a few times over and was in the process of being converted into an oil drilling vessel. TMF fabricated two double-bottom sections, four thruster tubs, vessel exhaust stacks, and manifold systems for this project. Completed components were transported by barge from TMF to Cascade General Shipyard.

John Day Dam, Upstream Navigation Lock Gate, Columbia River, WA/OR, USA [1991]
This gate was fabricated at the Columbia Business Center. The gate measured 28' deep x 80' high x 120' wide and weighed 105-tons. It was transported standing (80' high) for installation purposes.

Pacific Marine Hull Fabrication, Honolulu, HI, USA [1989]
TMF fabricated a 365-ton "SWATH" (Small Waterplane Area Twin Hull) excursion vessel. The fabrication consisted of twin cigar-shaped hulls that were 9' in diameter and 132' in length with vessel beams measuring 53'. Thompson's location adjacent to the Columbia River proved valuable for launching the vessel. After sea trials, the "Navatek" vessel headed to Hawaii. The vessel is still operating today.

Christensen Shipbuilders, Dry Dock, Vancouver, WA, USA [1987]
210' long dry dock was fabricated by TMF, including all walls, deck, ballast tanks and piping



Columbia River Barge Conversions [1979-1971]
Thompson converted barges to carry wood chips in support of the pulp and paper mills. The converted barges were fabricated to ABS and USCG standards. Projects were installed at our adjacent dock and barge facilities.

Alaska Ferry Conversion [1973]
Thompson Metal Fab supplied an exhaust funnel, solarium structure and modular subcomponents for the passenger ferry that travels the Inland Passage to Alaska. The existing ferry was cut in half and lengthened, with TMF fabricating all components for this major renovation. All items delivered by barge to the shipyard.

Other Examples Include:

- WSDOT Coleman Dock Improvements [2023] *
- Ballard Lock & Dam, Navigation Lock Center Miter Gates, Lake Washington, WA, USA [2022] *

- John Day Dam, 150-Ton Gantry Crane, Columbia River, OR/WA, USA [2022] *
- McNary Dam, Intake Bulkhead Gates, Columbia River, OR/WA, USA [2022] *
- Port of Alaska Petroleum & Cement Terminal Expansion, Anchorage, Alaska, USA [2021]
- Ward Cove Ferry Dock Expansion, Ward Cove, Alaska, USA [2020]
- WSDOT Mukilteo Dock Improvements, Mukilteo, WA, USA [2020] *
- The Dalles Dam, Upstream Navigation Lock Radial Gate, Columbia River, OR/WA, USA [2016] *
- Lower Granite Dam Expansion, Snake River, Washington, USA [1987]
- Revelstoke Dam, Columbia River, British Columbia, Canada [1984] *
- Bonneville Dam Expansion, Columbia River, Oregon, USA [1981] *
- Brownlee Dam Expansion, Snake River, ID/OR, USA [1980] *
- American Falls Dam Replacement, Snake River, ID, USA [1978] *
- Ice Harbor Dam Expansion, Snake River, Washington, USA [1976] *
- Grand Coulee Dam Expansion, Columbia River, Washington, USA [1974] *
- Mica Dam, Columbia River, British Columbia, Canada [1973] *
- John Day Dam, Columbia River, WA/OR, USA [1971] *
- Little Goose Dam, Snake River, Washington, USA [1970] *
- Lower Monumental Dam, Snake River, Washington, USA [1969] *

TANKS/VESSELS

<u>Phillips 66 Prefractioner Tower, Rodeo, CA, USA [2015]</u>

The 200-ton tower stretched 126' Long and transitions from 10'-6" diameter at the smallest to 17'-0" at the largest. The vessel was manufactured in three separate sections before being married together at Thompson's shop. The vessel shell and heads are made from clad plate which provides the necessary strength while also providing the required corrosion protection on the interior. For final acceptance, nearly 120,000 gallons of water was pumped into the vessel for a leak test. The vessel was pressurized over a period to ensure that all welds were water-tight.

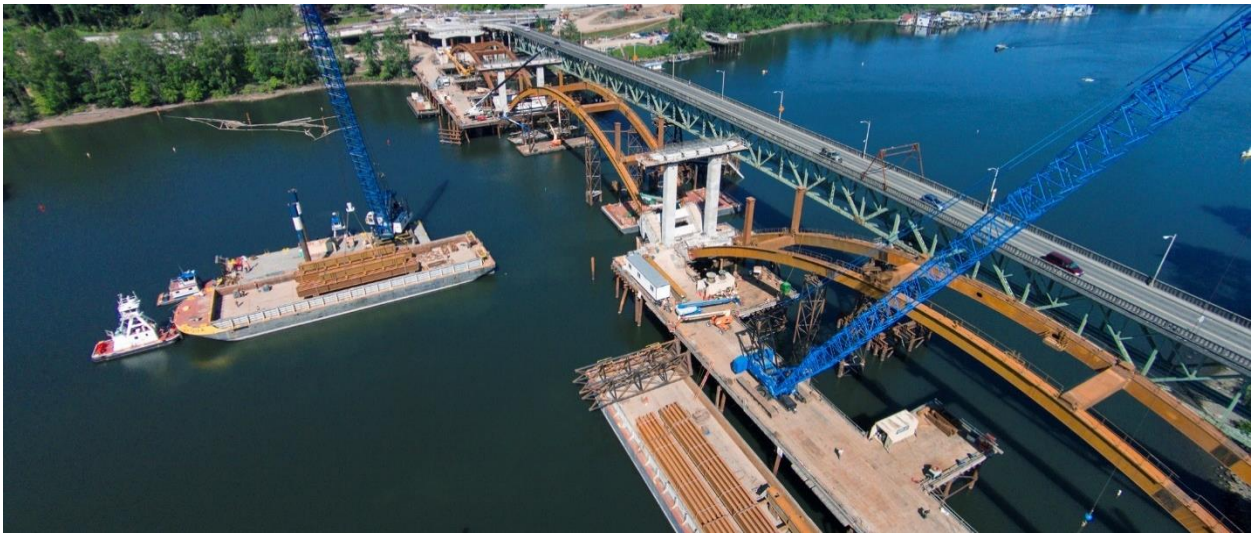
REC Solar Grade Silicon Project, Moses Lake, WA, USA [2007]

Thompson Metal Fab manufactured a total of 10 process vessels for the solar grade silicon industry. The project included four vessels which required barge transportation due to their size. Those vessels were 150" ID x nearly 120'-0" L and weighed over 200,000 LBS/ea. Vessels were barged to Pasco, WA and then shipped over the road to Moses Lake.

BRIDGE

Sellwood Bridge, Portland, OR, USA [2016]

Thompson's scope of supply included fabrication of all major bridge components: Arches, Arch Cross-frames, Vertical Spandrels, and the Bridge Deck Steel. Over 5,000-tons in total. The distinctive feature of the bridge are the three arches which cover 1,275' of the total 1,976' crossing. Each arch was fabricated in segments, with each segment 100' long. Because of the project's location on the Willamette River, steel was delivered to the jobsite with seven barge loads. Multiple barges can be seen here with incoming steel deliveries.



Bay Bridge Connector, Bay Area, CA, USA [2006]
TMF painted two orthotropic tub girders that were fabricated at the Columbia Business Center. Each weighed more than 1,600-tons and measured over 200' L x 80' W. Girders were transported by barge to the Bay Area for erection.

Richmond San Rafael Bridge, Bay Area, CA, USA [2004]
10,000 tons of structural bridge steel for the substructure was supplied for a seismic retrofit. Total fabrication took three years to complete. Larger components were transported by barge and direct to the jobsite.

Tri-Met Terry Moore Pedestrian Bridge, Portland, OR, USA [1996]
Fabricated at the Columbia Business Center, TMF painted the pedestrian bridge spanning HWY 26 near the HWY 217 junction. Completed sections were shipped by barge to a nearby location before being trucked to the jobsite.

1st Ave & Duwamish Bascule Bridge, Seattle, WA, USA [1996]
Completed truss sections for this project were fabricated at the Columbia Business Center, painted by Thompson, and assembled at the facility. Transportation to the jobsite in Seattle was done over the water, by barge.

Nimitz Freeway, Bay Area, CA, USA [1995]
This project consisted of (13) curved tub girders for the reconstruction of the Nimitz Freeway in the Bay Area. Girders were fabricated at the Columbia Business Center and painted by TMF. The total project weighed 6,000-tons with the largest girders weighing 450-tons; 50' W x 250' L. This project required four barges for delivery to jobsite..

I-90 East Channel Bridge, Seattle, WA, USA [1986]
Trapezoidal tub girders that varied from 98' to 198' in length and weighed between 60 and 200-tons each were fabricated at the Columbia Business Center and painted by Thompson Metal Fab. Girders were pre-assembled and completed sections loaded on a barge for transport to Lake Washington.

Other Examples Include:

- BNSF Bridge 66.4 Replacement, Cook, WA, USA [2020] *
- BNSF Bridge 58.8 Replacement, Home Valley, WA, USA [2019] *
- Wittpenn Bridge, Jersey City, NJ, USA [2017] *
- Sauvie Island Bridge, Portland, OR, USA [2004] *
- Glenn L. Jackson Bridge, WA/OR, USA [1982] *
- Freemont Bridge, Portland, OR, USA [1973] *

MODULAR/STRUCTURAL

Intel Expansion, Hillsboro, OR, USA [2010's - Present]

Expansion at the Intel facility in Hillsboro has been going on for some time and Thompson has supplied numerous modular structures in support of their effort. In 2020, TMF shipped the largest modules to date, buildings that were 44' W x 97' L x 16' H. Due to their size, the buildings could break apart in half, but still required a barge to get from TMF's facility to the jobsite as shipping over the road was not an option.

Caltrans, East Tie-In Project, Bay Area, CA, USA [2008-2009]

Thompson was selected by Caltrans (owner) to work with TY-Lin (designer), CC Myers (contractor) and DCCI (erector) to fabricate 3,100-tons of temporary steel to provide detour for the Oakland Bay Bridge at Yerba Vista Island. Thanks to the size of their facility TMF could meet the 'expedited' schedule requirement for this project. Major components required four barge loads from TMF's facility to the job-site in California. Project was completed in 2009.

OHSU Tram, Portland, OR, USA [2006]

TMF fabricated the center support tower, the lower station, and the upper station for the tram project. The major components were transported by barge from TMF to the jobsite in Portland, OR where they were offloaded and erected.

The team at Thompson Metal Fab standing in front of base of the iconic Portland Aerial Tram mid-tower. The tram is located at the OHSU hospital in Portland and spans across I-405. The tower base is over 40' high as shown in this picture.

Alaska Gold Mining Project, Nome, Alaska, USA [2005]

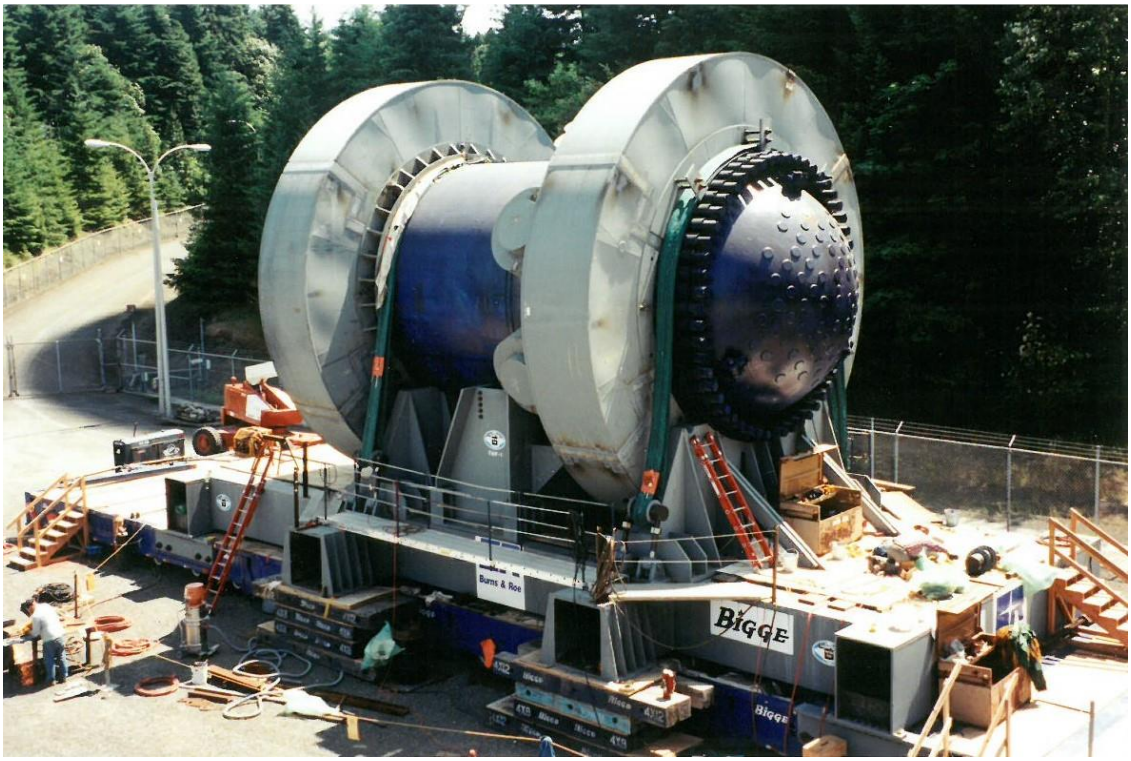
Thompson fabricated hoppers, grizzly grates, ball mill chutes, structural supports, modification of the ball mill, and other mining equipment for this project. TMF's facility was used for the marshaling yard and the load out point for all equipment and structures. Delivery was made via barge to Nome, AK.

Boeing Delta IV Launch Table, Vandenberg AFB, CA, USA [2003]

The 98' long x 33' high x 46' wide launch table weighed 580-tons. The project also included large flame deflector components which weighed up to 120-tons. The launch table and flame deflectors were fully assembled at the TMF facility and transported by barge to Vandenberg Air Force Base in California. It was then off-loaded an installed at the launch site.

PGE Decommissioning Trojan Nuclear Reactor Project, Rainier, OR, USA [1998]

TMF fabricated a 120-ton transport structure and 5" THK shielding enclosures. The completed structures were shipped by barge to the jobsite where the decommissioned reactor was loaded. The entire load was then shipped by barge to the final storage location at Hanford – Richland, WA.



Powell River Paper Company, British Columba, CANADA [1991]

Thompson supplied the fabricated steel for a Chlorine Dioxide Module that measured 35' wide x 76' high x 35' long. This module weighed 350-tons and was transported by barge in the vertical position from TMF's facility in Vancouver, WA to the Power River Paper Company in British Columbia, Canada.

Georgia Pacific Wood Chip Material Handling System, Toledo, OR, USA [1973]

TMF fabricated six 280' tube conveyor sections and all support towers for this project. The completed structures were transported by barge to Toledo, OR and installed.

Other Examples Include:

- Data Centers, The Dalles, OR, USA [2010's – Present] *
- Data Centers, Hermiston, OR, USA [2010's – Present] *
- Pre-Heater Tower, Richmond, British Columbia, CANADA [1997]
- Portland Expo Center, Portland, OR, USA [1995]
- Bulk Material Handling System, Sacramento, CA, USA [1993]
- Newport Bay Floating Restaurant, Portland, OR, USA [1986]

OIL & GAS

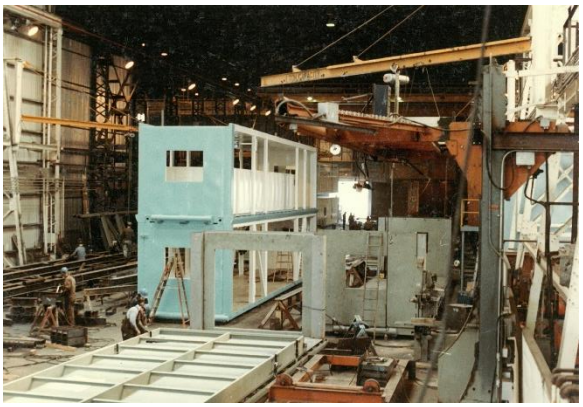
The turnkey modular service TMF offers today reflects what kicked off in the 1980's. By that point work at Prudhoe Bay was ongoing, but the infrastructure needed to support the development was still in process. In 1984, Thompson supported ARCO by manufacturing two 96-room housing modules. Each module was 40' wide x 46' high x 80' long. In addition, two Utilidor Modules were manufactured *(each 10' W x 22' H x 24 L)*. In 1985, more infrastructure was sent to ARCO; these 'bases' were 33' wide x 100' long x 10' high. Thompson also supported Conoco's Milne Point unit in 1985 with the supply of (10) module bases and (11) skids. These structures weighed anywhere from 20 to 270 tons each, with a max dimension of 64' W x 123' L x 12' H. Manufacturing structures of this size and delivering complete to the jobsite seems strange in the lower-48, but given the expanse of the North Slope, it's well suited to receive large infrastructure without other physical limitations to navigate. Additionally, with as fast as the development was happening, there was a value placed on 'set it and leave it' projects; things that could be installed and immediately put-to-use.

Massive platforms for the Alaska oilfields being fabricated at Thompson Metal Fab in the mid-1980's. The platforms nearly took up the entire width of a bay (80')

The platforms (seen left) were delivered by barge to Alaska where high capacity trucks and dollies (shown above) off loaded the structures for delivery to the jobsite.

Thompson's experience in supplying the oil fields eventually led to connections with the drilling contractors. The drilling contractors work on behalf of the owners to drill production wells and test holes as part of the exploration process. Drillers operate large equipment (known as rigs) to drill the holes. Thompson's first experience with rigs started in the late 1980's with Pool Arctic *(now Nabors Drilling)* who was a drilling contractor working on Alaska's North Slope. At one point, Pool Arctic operated the largest fleet of drill rigs on the North Slope. When TMF began working for Pool, they were looking to expand their fleet to meet market demand. This required retrofitting current rigs due to advances in equipment technology and drilling conditions that surpassed the capability of their rigs. Retrofitting works the same way as a new-build, only backwards. In a retrofit, the rig is placed on the barge and then shipped to a location large enough to receive it over the water and with enough yard space to accommodate the work. There are very few facilities on the West Coast who can accommodate this. Retrofits are just as attractive to TMF as new-builds. During a retrofit it is not unusual for some level of "rigging down" to happen and for structures to be placed in the shop. In that circumstance, it is very attractive to contractors to work with a facility large enough to handle these structures and keep them under the roof and out of the elements.

AADCO merged with Pool Arctic in 1983 and provided the rig shown above as part of the merger. This rig would be retrofitted by TMF.



Modular fabrication at Thompson Metal Fab for a Pool Arctic retrofit. The modules shown here represent the scale of a 'truckable' module, typically 12' H x 10' W x 40' L

Traditionally, drill rigs are built by manufacturing a series of truckable modules. These modules are fully assembled at the manufacturer's yard for verification, testing, and commissioning. Upon approval, the rig is completely disassembled for transportation to the jobsite. "Rigging up" is the process by which all these truckable modules are then reconnected together and recommissioned. Depending on the size of the rig, it is not unusual for 200 truckloads to be needed to move from the manufacturing location to jobsite. The process of putting a rig back together in remote locations can take months and cuts into production time. The ability to offer a turnkey service and integrate work in Thompson's shop and in their yard ultimately saves money in the long run – and contractors and owners have come to expect the capacity TMF can offer. During the early development of Prudhoe Bay in the Arctic, machinery and field services were limited and getting the required equipment to the jobsite required creative solutions. Field work is expensive and risky; and often there is limitations to what can be performed. Thompson can build larger modules for delivery, which provides a distinct advantage by minimizing costs in the field and minimizing risk.

Parker Drilling was one of the first contractors who recognized that one solution to the problems on the North Slope was to simply to deliver a *bigger* rig. A bigger rig would be capable of holding more robust equipment which would allow for drilling longer, bigger holes for greater production. The benefit of drilling longer holes is that you do not need to move the rig from pad to pad as frequently; you can cover a lot more ground from just one spot. They understood the importance of downtime and the full capacity of what TMF could offer with regards to turnkey modular fabrication. The design for Parker Drilling's Rig 245 swapped out the multiple, smaller, truckable

A large module for Parker Drilling Rig 245 moving from TMF's shop to their yard for assembly. Seen in the background is the mast and substructure of this massive drilling rig.

Rig 245 shown here at the assembly yard. When fully raised, the mast hangs high in the Vancouver, WA skyline.

modules and consolidated them into fewer 'mega modules.' Less modules simply take less time to put back together in the field. What could be 4-6 months in field work could now be up and running in weeks. Also, by eliminating trucks, the risk of loads being damaged during transport is reduced dramatically. Parkers' vision of 'mega modules' required a facility that offered a few things: a big shop, big yard, skilled workforce, access to water for shipping, and a logistically friendly location.

Parker Drilling Rig 245 being 'rigged up' at Thompson Metal Fab's yard. This yard space is immediately adjacent to the manufacturing facility and to the roll-on/roll-off barge slip. The ability to offer turnkey projects and delivery via water has given Thompson Metal Fab an advantage in the marketplace.

Drilling equipment has long been manufactured in Houston, Louisiana, and other Gulf state locations. These facilities manufacture the truckable modules and often the large offshore platforms. They certainly have the shop, yard, workforce, and access to water – but they do not have a strategic location to Alaska when it comes to logistics. To get a barge from the Gulf to the North Slope requires passage through the Panama Canal just to get from one side of the continent to the other. The added time for shipping and the added cost of voyage does not justify the mega module concept. What is needed is a manufacturer in the Pacific Northwest. TMF's location at the old Kaiser shipyard in Vancouver, WA provides the space and direct access to a deep-water barge slip with roll-on/roll-off access. The combination of a heavy-industrial construction facility and a support yard with marine transportation capability is an important asset to the region's industrial job base and has potential to attract large job producing projects. This capability has enabled TMF to stay competitive in a business that has largely moved overseas.

Becoming a proven West Coast manufacturer of drilling equipment gave drilling contractors an option that was not there previously. By entering the market, engineers could now extend the limits of their design and present solutions that were attractive to both contractors and owners who were seeking to replicate what Parker did with Rig 245, the first mega-rig on the North Slope. Among the design variables that has always been taken into consideration are the shipping clearances between our facility and the North Slope of Alaska. In that distance, there are three bridges which loads must pass under: The Interstate Bridge, the Lewis & Clark Bridge, and the Astoria-Megler Bridge. Of those three, the Interstate has the lowest total clearance, but is currently sufficient to meet the requirements of transporting mega modules.

Doyon Drilling Rig 25 shown on the barge in the foreground. Due to the size of the rig and its six mega-modules, two barges were required for delivery to Alaska's North Slope. The background shows the remaining modules for Rig 25, in addition to Parker Drilling's AADU Rigs (Rig 272 and Rig 273)

Thompson's greatest competitive advantage in earning business with the drilling contractors is their ability to ship completed, commissioned, turn-key 'mega modules' to the jobsite. If that advantage is eliminated, they will be priced out of the market. In addition to competing against the Gulf states, they actively compete with Canadian shops in Alberta. Because of the exchange rate, those facilities have a 30% pricing advantage, all other things being equal. That is the magnitude of the shipping advantage they have at Thompson. Contractors are willing to pay a

Picture of the Interstate Bridge in 2011 showing both the original Northbound span (background) and the second span (foreground) which opened in 1958 to traffic in both directions. In 1960, the second span was dedicated to Southbound traffic only. (Photo shows TMF manufactured drill rigs, AADU Rig 272 & 273 for Parker Drilling)

premium to avoid truckable modules manufactured in interior Canada or in the Gulf. It is the Contractor's advantage in the long term to have mega modules as their risk is lower, their down time is lower, field erection and trucking costs diminish, etc. Please note, these mega modules can only have their loads diminished so much (because of shipping clearance issues, etc.) before the concept no longer makes sense and the design is forced back to a more traditional build plan.

PROJECT EXAMPLES:

Hilcorp Innovation Rig, North Slope, Alaska, USA [2016]

The Innovation Rig is the next generation of drilling equipment. At nearly 1.5-Million LBS of steel, this rig consists of multiple modules and was built up to 50' H in TMF's shop before moving to their yard for final fit-up. At 9-months, this was the fastest rig build in Thompson's history, a true testament to their size and capability.

Parker Drilling AADU Rig 272 & 273, North Slope, Alaska, USA [2011]

Each drilling rig was comprised of three main modules. The Mud Modules weigh 600-tons, the Drill Modules weigh 700-tons, and the Utility Modules weigh 460-tons. The Mud and Utility Modules are 48' wide x 55' high x 99' long. The Drill Module is 76' high with the mast in the lay-down position.

Doyon Drilling Rig 25, North Slope, Alaska, USA [2010]

4-million LBS of steel and aluminum fabricated for Rig 25, a project where TMF also acted as the General Contractor. TMF managed all rig-up activities including mechanical, electrical, and functional checkout. This rig consisted of six primary modules: Power Complex (550-tons, 56' L x 40' W x 42' H); Drill Complex (560-tons, 96' L x 37' W x 40' H); Pipe Complex (560-tons, 68' L x 47' W x 25' H); Mud Complex (550-tons, 68' L x 40' W x 49' H); Pump Complex (560-tons, 64' L x 40' W x 52' H); Casing Complex (500-tons, 60' L x 56' W x 40' H). The 26' x 25' Mast extends to 148' L.

Parker Drilling/British Petroleum Liberty Rig, North Slope, Alaska, USA [2009]

This drilling rig shipped from our facility to the North Slope of Alaska in July 2009. TMF furnished approximately 5.5-milion pounds of fabricated steel. The rig was the world's largest land-based rig at the time of manufacturing and consisted of three large modules. The Drill Module was 58' W x 98' H x 68' L, weighing 900-tons. The Pipe Barn module was 158' W x 45' H x 170' L, weighing 2,560-tons. The Drill Service Module was 50' W x 48' H x 177' L, weighing 2,600-tons.

Pool Arctic Rig 6, North Slope, Alaska, USA [1998]

The Rig 6 project was a retrofit of the existing rig and included all new structural framing in addition to new mechanical components for the moving system. At the time of manufacturing, it was reported by the tire manufacturer to be the largest rubber tire vehicle in the world. Nicknamed 'Radio Flyer', this backbone of this rig is twin 6' x 10' box girders which support the drill floor and mast, and transfers load to the substructure.

Nordic Calista Rig 3, North Slope, Alaska, USA [1998]

In 1998, TMF completed and delivered Modular Mobile Oil Drilling Rig 3 to Nordic Calista. The rig includes 850-tons of fabricated steel, it measures 45' wide x 78' high x 110' long. The rig was transported by barge to the North Slope of Alaska.

Parker Drilling Rig 245, North Slope, Alaska, USA [1990]

In 1990, TMF fabricated a self-propelled mobile oil drilling rig. The drilling module was 43' wide x 78' high x 150' long and weighed 3,000-tons. The utility module was 40' wide x 58' high and 130' long, weighing 1,500-tons. The cutting module is 30' wide x 30' high x 40' L, weighing 350-tons. The completed drilling rig was transported by ocean-going barge from TMF's facility to the North Slope.

ConocoPhillips Milne Point, North Slope, Alaska, USA [1987]

3,400-tons of fabricated modular steel structures were supplied to ConocoPhillips. This took three ocean-going barge loads to deliver to Alaska.

ARCO Operation Center Housing Expansion, North Slope, Alaska, USA [1985]

Modular superstructures (40' W x 65' H x 80' L) were fabricated along with bases and decking housing modules. Completed modules were loaded onto a barge and transported direct to the North Slope.

Other Examples Include:

- Crowley, Monopod Pile, Cook Inlet, Alaska, USA [2014]
- Saxon Rig 147 Retrofit, Cook Inlet, Alaska, USA [2013]
- Saxon Rig 169 Retrofit, Cook Inlet, Alaska, USA [2013]
- Kuukpik Rig 5 Retrofit, North Slope, Alaska, USA [2005]
- Pool Arctic Rig 9, North Slope, Alaska, USA [1999]
- Nordic-Calista Rig 1 Retrofit, North Slope, Alaska, USA [1997]
- Pool Arctic Rig 4, North Slope, Alaska, USA [1994]
- Petro Star Refinery (Valdez), Alaska, USA [1993] *
- Pool Arctic Rig 3, North Slope, Alaska, USA [1990]
- Petro Star Refinery (North Star), Alaska, USA [1985] *
- Trans Alaska Pipeline System (TAPS), Alaska, USA [1977]
- Prudhoe Bay, Alaska, USA
    - *Discovered (1968), Start of Production (1977), Peak Production (1988)*
- Cherry Point Refinery, Washington, USA [1971] *
- Cook Inlet Monopod, Cook Inlet, Alaska, USA [1970's] *
- Kenai Refinery, Alaska, USA [1969] *
- Maintenance on California refining facilities
- Maintenance on Washington refining facilities

With a structural height of 126', this pile template for a monopod in the Cook Inlet (Alaska) is one of the largest structures to ship from the Columbia Business Center in the last 40-years. Thompson Metal Fab manufactured piling for this project, delivered in 2014.

Taken in the early 1970's, the photo above shows Thompson Metal Fab shortly after closing the original facility in Portland and moving to Vancouver. Thompson added fiberglass roofing and walls to bays 5 through 9 to create an enclosed space. The land has been developed quite a bit in the last 40-years (including improvements to the roll-on/roll-off barge slip), but the building remains virtually the same.

LOCAL BENEFIT & LOOKING AHEAD

Because of Thompson's 40-year reputation, logistical advantage and modern quality programs required, they have a distinct benefit. Loss of that logistical advantage due to a diminished shipping clearance (or other) is not something they could replace. Earning this business is a tremendous benefit to Thompson, their employees, and their local community. For example, any one rig project is equivalent to one year of revenues, in addition to hundreds of direct high wage jobs, as well as work for hundreds of local small businesses.

Due to the magnitude of work, contractors often mobilize to Vancouver to manage the construction. This includes management, engineers, and other personnel to ensure that projects are delivered on time. This staff of people stay long-term in local hotels, rent from local citizens, spend entertainment dollars with local small businesses, and are an economic benefit. They not only employ the staff at TMF, but they also employ local electricians, machinists, painters, millwrights, pipe fitters, hydraulic operators, boilermakers, sheet metal workers, and other trades. This work also supports various apprentice programs which train the next generation of trade workers. Loss of this total benefit cannot be replaced.

Local businesses see boosts in revenues when major job producing projects are brought to the Columbia Business Center. Due to the nature of these large projects, stakeholders often move management teams to Vancouver to oversee manufacturing.

History has shown us that building a new link between Vancouver and Portland will bond our communities together and provide opportunity for economic growth and expansion. We also see that there is a correlation between the bridge, the growth of our community, and Thompson Metal Fab. The need for large-scale fabrication remains and markets that require TMF's services show no sign of slowing. There is potential for an industrial rebirth, one that mimics the industrial expansion of the 1950's through 1970's. While it is yet to be seen at the time of this writing, the federal government will at some point pass an infrastructure spending bill, which intends to replace our aging and deteriorating bridges, dams, and other critical works. Just as building these original structures kept generations of people working, so will the effort to replace these structures.

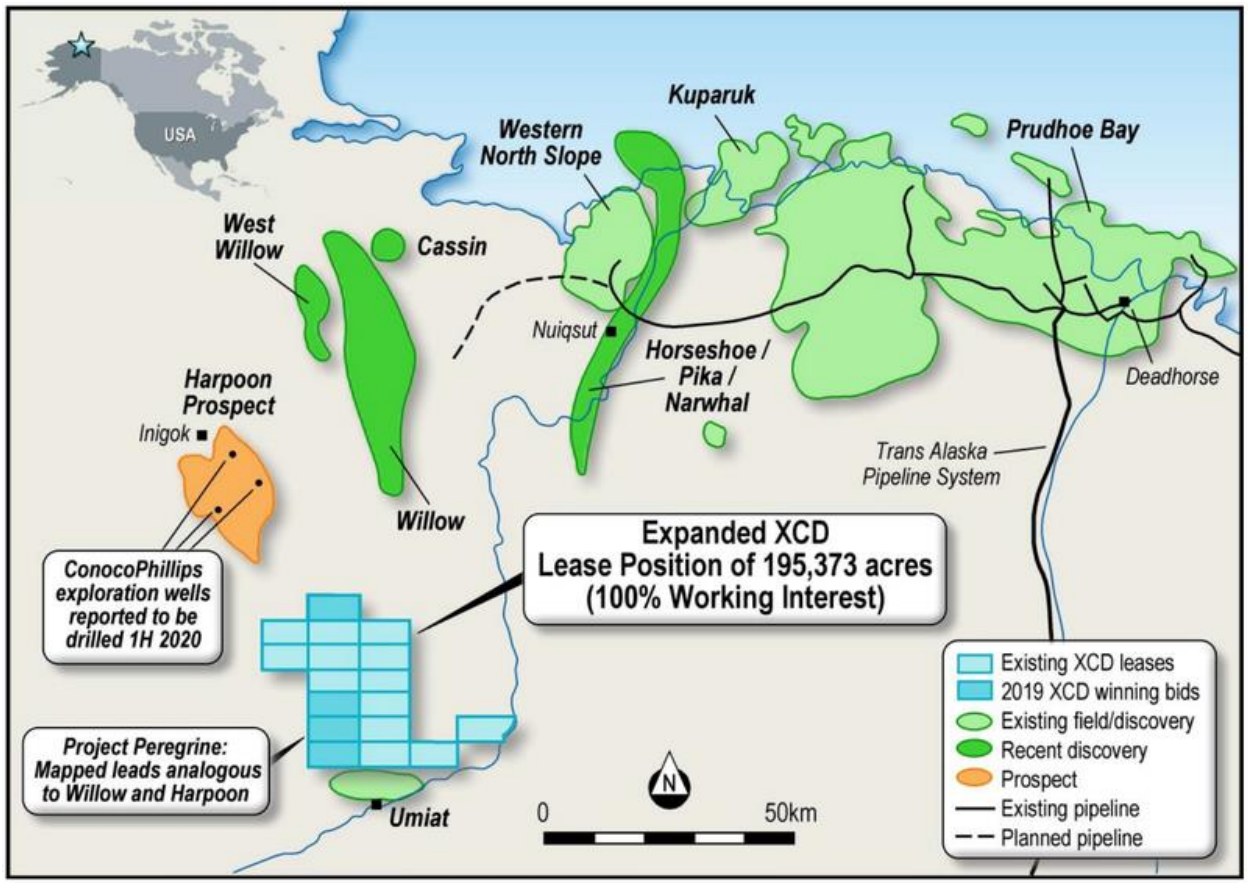
Thompson is encouraged by the commitment made to develop renewable energy sources. TMF has directly supported this effort for decades by manufacturing equipment that grows polysilicon crystals used in the development of solar panels. They have even been successful exporting domestically manufactured polysilicon equipment to countries such as China. Being a part of clean and renewable projects is something TMF does every day, thanks to the nature of their business. Steel is the most recycled material on Earth and steel products are 100% recyclable at the end of their useful life. Once produced, steel can be continually recycled into a new steel product without deterioration in product quality. Even the byproducts of steel work can be reused. Weld slag is used in cement, road construction, fertilizers, and hydraulic engineering. Process gasses are used to produce heat and electricity. Metal oxides can be recovered from steel making dust. Steel's inherent durability and recyclability make it an ideal fit for a circular economy. Allowing Thompson Metal Fab to continue producing steel products in the manner they do currently is a critical component in the continued development of clean energy and in effort to reduce America's carbon footprint.

As Thompson looks ahead to the future, they are currently tracking several projects and emerging markets which will certainly require a shop of their size and skill set. These projects will likely require delivery by barge and be of scale greater than or equal to what has been demonstrated. As noted, TMF has a competitive advantage with projects that require delivery by water and there is no other comparable, active facility with a roll-on/roll-off barge slip on the West Coast. Future opportunities include:

- ConocoPhillips – Willow expansion *(drill rigs, modules)*
- Oil Search – Pikka expansion *(drill rigs, modules)*

- Horseshoe Unit – Future North Slope Expansion *(drill rigs, modules)*
- Aerospace
- Offshore Wind and Wave power generators
- Burnside Bridge
- Golden Gate Bridge Seismic Retrofit
- West Coast Movable Bridges
- Hydroelectric Maintenance Projects
- Desalination in California
- Port of Nome - Expansion

Willow Expansion/Pikka Expansion/Horseshoe Unit



In many regards, the original Prudhoe Bay development has reached the end of its useful life. In 2020 original Owner, BP, sold their Prudhoe rights to ConocoPhillips and Hilcorp. Hilcorp is renowned for their ability to acquire 'legacy wells' and get a high level of production thanks to their ability to match modern technology with lean processes. What bigger companies might steer away from or flat out abandon due to high overheads, Hilcorp (a smaller independent company) can come in and still make profits for many years. The sale of Prudhoe and acquisition by Hilcorp signals the end of an era at Prudhoe, but it also marks the beginning of Alaska's next chapter in oil production.

In 2016, discovery wells were drilled in the Willow unit, owned by ConocoPhillips. The Willow unit is immediately west of Prudhoe and other large operating units but is on land that is largely under-developed. During the expansion of Prudhoe Bay facilities were tied into one another (Alpine, Kuparuk, Oooguruk, Milne Point, North Star, Endicott), man camps often shared, and roads and bridges integrated into one logistical network. Willow is far enough outside of this integrated network that relying on the existing infrastructure to support further expansion is not feasible. New piping systems would be needed, new roads would be required, new processing modules installed, and essentially a 'mini Prudhoe' would need to be built from scratch. After a successful exploration and appraisal season in 2018 it is estimated that Willow could contain up to 750-million barrels of oil and the infrastructure that would support Willow could produce approximately 100,000 barrels per day. Assuming full production each day of the year, Willow would be 'on-line' for 20-years.

This massive process module is being loaded out for delivery to the North Slope of Alaska in July 1990. This industrial equipment rivals the size of most downtown buildings and is representative of the equipment currently being requested for North Slope expansion projects. Due to scale and complex nature of work, this sort of equipment cannot be manufactured at the remote jobsite or accomplished at all in Alaska.

This massive process module is being loaded out for delivery to the North Slope of Alaska in July 1990. This industrial equipment rivals the size of most downtown buildings and is representative of the equipment currently being requested for North Slope expansion projects.

Flanked by existing units, Alpine and Kuparuk, sits Pikka. The Pikka unit is part of the Nanushuk Field which is estimated to hold as much as 1.5-billion barrels of oil. This is considered to be the biggest conventional onshore oil discovery in the US in the last 30-years. Upon full development, it is anticipated that Pikka will produce 120,000 barrels per day, and on some accounts up to 160,000 barrels per day. Conservatively, there is enough oil here to keep Pikka online for nearly 35-years.

Like Willow, there's just no infrastructure in Pikka despite being sandwiched by two existing fields. Early planning on Pikka included budgetary Requests for Proposal which were submitted by Pikka's Owner, Oil Search. One RFP requested multiple modules nearly 80' H x 200' L x 80' W, a fairly typical example of the infrastructure which is required.

Finally, early testing has been going on in the Horseshoe unit of the North Slope (south of the Willow and Pikka unit) and early indication is that Horseshoe will also be a high volume area, with volume of over 1-billion barrels. Combined with Willow and Pikka, the makings of a modern day Prudhoe Bay is in the works and could be a generational project.

Aerospace

Vandenberg Air Force Base is home to the US Air Force, United Launch Alliance, Space X, and now home of the Space Force, a branch of the US Air Force. Blue Origin is looking at Vandenberg as well and this will produce new opportunities for launch facilities. The western range is advantageous and continues to serve the needs of the industry. All these groups are getting a boost from "REACH" (Regional Economic Action Coalition). Currently, Vandenberg has the only Space Launch Complex (SLC) to launch for polar orbit. The Cape is working on a program for this, but currently the capability does not exist.

(Report from 'REACH' available for online viewing at https://reachcentralcoast.org/wp-content/uploads/Phase-0-Report.pdf)

Excerpt from the referenced report:

"Driven in large part by commercial enterprises, space is now a $425-billion industry that's expected to grow to $3-trillion over the next three decades…It's a huge opportunity and why REACH adopted building a thriving space enterprise as a core initiative in our 2030 plan."

This bold plan by the State in collaboration with all the stake holders will result in the construction of new facilities to support launch efforts at Vandenberg. Launch towers and/or mobile assemble buildings will be major projects that will require work on very large structures within this decade. The work on these facilities in the past been done by NW Oregon/SW Washington fabricators – including Thompson Metal Fab. This work requires facilities with large yard areas and heavy fabrication capabilities as well as a barge loading facility that is capable of supporting ocean going barges. There are very few of these types of facilities on the West Coast. The Columbia Business Center is one of those few spaces and represents a location that has both barge loading capabilities and the manufacturing capacity through groups like Thompson Metal Fab.

Pictures from Space Launch Complex-6 on April 26, 2021 show before and during launch of United Launch Alliance Delta IV Heavy rocket carrying a classified spy satellite. The launch table was manufactured by Thompson Metal Fab and delivered to the jobsite in 2003.

Past work in California dating back to the 1960's has been done at the Columbia Business Center. Jacket Liners for the Santa Barbara oil field were built at this location. Work for both Space Launch Complex 3 (SLC 3) and SLC 6 were done at Columbia Business Center. Much of this work required a full bridge raise to facilitate passage of the cargo on board a barge.

In addition to this planning at Vandenberg, Space X is now under contract for two more launches from there.

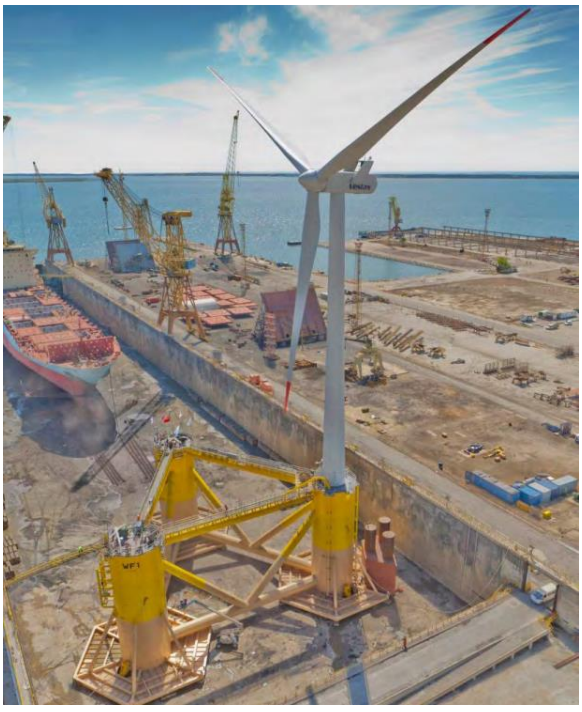
(https://www.noozhawk.com/article/defense_department_awards_contract_to_spacex_for_2_vandenberg_afb_launches)

Excerpt from NOOZHAWK Santa Barbara:

"The Department of Defense awarded Space Exploration Technologies a pair of missions that will involve two rocket launches from Vandenberg Air Force Base for the military's next-generation of space-based tools for warfighters….The announcement in the final hours of 2020 put the firm-fixed-price contract cost for SpaceX at $150,450,000…The first launch will occur in September 2022, and the second mission will take place no later than March 31, 2023, to complete putting the constellation in space, according to the award by the Space Development Agency in Washington, D.C."

SpaceX and United Launch Alliance have been awarded a 40%/60% split for launching DOD payloads. This award was made in August of 2020. For work at Vandenberg, SpaceX will have to add the capability of vertical integration of DOD payloads. This will require Space X to build a Mobile Service Tower (MST) or a similar structure to facilitate vertical integration of their vehicles. Currently SpaceX does all integration horizontally, installing satellites and rockets onto Falcon 9 and Falcon Heavy inside hangars near the company's launch pads. But some of the of the US Government's most sensitive and expensive intelligence-gathering satellites are designed to be mounted on their launch vehicles vertically. SpaceX officials have indicated that vertical integration capability is required of participants in the National Security Space Launch Phase 2 Launch Service Procurement.

Offshore Wind and Wave



Currently there are no independent organizations/companies willing to make the upfront investment into this emerging market. The land based wind industry grew because of federal tax credits that made it profitable, and without federal assistance it is unlikely that offshore systems will get the boost needed.

Recently, the administration under President Biden cited their plan to expand the use of off-shore wind farms in effort to develop renewable energy sources. The goal of the Biden Administration is to increase capacity of the current off-shore systems to power 10-Million homes by the year 2030. To meet that target, the administration intends to accelerate the permitting of projects along the coastlines and to open waters for development. $3-Billion in federal loan guarantees are available for offshore wind projects and for investing in the nation's port properties to support wind construction.

Mirroring this goal to develop offshore wind energy, the states of California and Oregon have introduced bills to develop wind energy along their coastlines. California bill AB525 sets a goal of 10GW of offshore wind by 2040,

3GW of which to be established by 2030. Oregon's HB3375 also sets a goal of 3GW by 2030. Oregon's effort is sponsored by a Republican (Rep. David Brock Smith) who has positioned the states bill as an opportunity to stimulate economic development and resiliency.

Currently there is not a facility on the West Coast that is set up to assemble these massive offshore wind systems. Thompson Metal Fab certainly has the capacity to manufacture the floating bases, and the facility/space to receive the wind towers and turbines. We also have the space to perform all assembly required. All opportunity to participate with this emerging market is gone however if the new bridge is not at a suitable height. Our current plan to participate with this emerging market is to manufacture the bases at TMF and float them downstream to a satellite yard where the towers and turbines can be assembled and installed on our bases. With that plan in place, we can utilize our current facility for all the heavy manufacturing, and provided that we are not impacted by the height of the I-5 bridge, we can ship these structures to wherever the assembly yard is located. The Biden administration keys in on one important factor, most coastal port properties are not currently set up to handle this massive manufacturing and investment in the properties must be made.

Most of the current facilities manufacturing offshore structures are on the American East Coast, or in the Gulf. Even though these facilities have the capacity, they are not well positioned to support the manufacturing of offshore systems for the West Coast. To reach the West Cost, all cargo must travel through the Panama Canal and the distance associated with voyage makes the transportation very expensive and further defines the reason why developing a manufacturer on the West Coast is so important.

Figure A-20 Vancouver

Image above comes from BOEM report in 2016 which evaluates various sites on the West Coast that would be suitable for the development of offshore wind power manufacturing. The far right shows the Columbia Business Center, and predominantly in middle is Thompson Metal Fab.

Thompson Metal Fab is one of possibly two manufacturers on the West Coast who has the size of facility, yard space and direct access to water to make our company a very attractive option for full-scale manufacturing of offshore systems. When you look at the total capacity of the Columbia Business Park, there is more than enough space and infrastructure to use our location in a dynamic way. If the new bridge does not at least accommodate this emerging market, it will be very difficult to develop the required infrastructure at all on the West Coast. Let us not lose what we currently have.

On March 3rd, 2016, the Bureau of Ocean Energy Management published a 256-page report that names the Columbia Business Park as a viable option for manufacturing offshore wind systems, but also notes that if the new height of the I-5 bridge is lowered below its current air gap it will severely restrict this type of manufacturing for any facility that is upstream of the bridge (i.e. Thompson Metal Fab).

To download a PDF file of the Environmental Studies Program report, go to the US Department of the Interior, Bureau of Ocean Energy Management, Environmental Studies Program Information System website and search for OCS Study BOEM 2016-011.

Images above comes from the 2016 BOEM report which shows the manufacturing and shipping capabilities of the Columbia Business Center for the wave power industry.

Burnside Bridge

The Burnside Bridge is scheduled for start of construction in 2024. There are two alternatives to the movable portion of the bridge: Replace the existing double-leaf bascule bridge with a vertical lift bridge – or – replace the bridge with a modern double-leaf bascule. The replacement of the approaches is difficult and would be best with a long span alternative. The option of a Tied-Arch, Cable-Stayed or Truss Span is attractive.

Image above shows the Sauvie Island Bridge being shipped to the jobsite via barge on the Willamette River and passing under the Burlington Northern RR Bridge in Portland, OR. Delivery of steel for the new Burnside Bridge would take a similar approach, due to the limited area for construction at the jobsite in downtown Portland, OR. Bridge steel coming from the Columbia Business Center would pass under the Interstate Bridge to reach the jobsite.

Due to congestion at the job site, moving the major spans into place will be done by water. Similar work has been done in the past on the Freemont Bridge, Sauvie Island Bridge and Sellwood Bridge.

Golden Gate Bridge Seismic Retrofit

The Golden Gate Bridge has an upcoming project that is one of the largest projects on a single bridge that is not new construction. The iconic towers on the Golden Gate Bridge will be retrofitted in addition to the deck steel between the two towers. This project was due to be completed by 2024 but has been delayed by other projects *(currently scheduled to be complete in 2023)*.

West Coast Movable Bridges

California has 36 movable (non-railroad) bridges. Of that group, four are in poor condition and 25 are in fair. Replacement will be recommended for some of these bridges and most will be shipped to the job-site by barge.

Oregon has the previously mentioned Burnside Bridge coming up. Additionally, the Rose Quarter Improvement project which will include the manufacturing of major steel spans.

Washington has 51 movable bridges (non-railroad). 10 are in poor condition and 34 are in fair condition. These bridges will be slow to replace due to budget issues but most of the poor condition bridges will be replace.

Hydroelectric Maintenance Projects

The current 2021 (fiscal year) budget work plan for the US Army Corps of Engineers is $2.7-Billion. Much of this work will be on the Columbia River system. Applicable work for TMF is as follows:

<u>Portland District</u>

- Bonneville Dam
    - Powerhouse 2, 65-Ton Tailrace Gantry Crane Replacement
    - Headgate Repair Pit Rehab
    - Powerhouse 1 Trash Racks
    - Fish Guidance Efficiency
- John Day Dam
    - Navigation Lock Downstream Gate Bearing Shoe Replacement
    - Trash Racks Replacement
- Cougar Dam:
    - Spillway Gate Rehab
    - Butterfly Valves

- Foster Dam:
    - Oil Spill Prevention
    - Oil Water Separator
    - Fish Weir Follow-on
- Detroit Dam:
    - Spillway Gate Rehab
- Dexter Dam:
    - Trash racks
    - Intake Gates
    - 25-Ton Intake Gantry Crane Replacement
- Green Peter Dam:
    - 180-Ton Bridge Crane Rehab
- Big Cliff Dam:
    - 40-Ton Intake Gantry Crane
    - Trash Racks and Gates Rehab

Seattle District

- Libby Dam
    - 75-Ton Intake Gantry Crane Rehab
- Albeni Falls Dam
    - Turbine Maintenance Platform
- Chief Joseph Dam
    - Intake Gates Rehab or Replacement
    - Turbine Maintenance Platform
    - 50-Ton Intake Gantry Crane Rehab
    - 18-Ton Tailrace Gantry Crane Rehab

Walla Walla District

- Ice Harbor Dam
    - Intake Gate Hydraulic System Upgrades
- Lower Monumental Dam
    - Turbine Maintenance Platform
- Lower Granite Dam
    - Turbine Maintenance Platforms

Desalination in California

California is always in a water crisis. They have new reservoirs planned that will require outlet works, gates, etc. Most of this work will ship by truck/train, but shipping over the water (by barge) will be the modular structures for new equipment in the planned Desalination facilities that California needs to sustain the population growth.

30-miles north of San Diego is the Claude "Bud" Lewis Carlsbad Desalination Plant, the largest effort in North America to turn salt water into fresh water. Each day 100-million gallons of seawater are pushed through semi permeable membranes to create 50-million gallons of fresh water that is piped to municipal users. Carlsbad, which became fully operational in 2015, creates about 10% of the fresh water the 3.1-million people in the region use, at about twice the cost of the other main source of water. This is a real issue for California and will require the state to build more of these desalination plants.

Wartime Efforts

Henry Kaiser's Vancouver Shipyard, shown in development in 1942. Eventually becoming the Columbia Business Center, this facility would become a strategic West Coast manufacturing facility.

It is important to plan for the unforeseen as well. Contingency comes in many forms; but let us not lose sight of the reason why the facility exists to begin with. Kaiser built the facility as part of the war effort in WWII. Because of the shipping clearances allowed when the drawbridge was at full height, the Vancouver Shipyards could produce Liberty and Victory war ships despite being upstream from the bridge. If that height is impacted by a fixed structure at a *lower* clearance, the ability for Thompson to support major wartime efforts is certainly diminished especially when compared to the capacity we could offer today. As noted previously, we are one of only a handful of facilities on the West Coast who has facility large enough to manufacture the structures we do and ship over the water. Reducing shipping clearances will certainly limit Thompson's ability to be a strategic West Coast manufacturer if a major wartime event occurs.

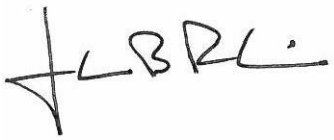
IN CLOSING

Thompson Metal Fab supports the new Interstate Bridge Replacement project. The region has outgrown the capacity of the current span and a new bridge is needed to reflect current and future needs. Innovations in transportation have changed the way people travel and move goods since 1917; and modern engineering, materials, manufacturing, and construction should allow for a beautiful, robust structure that will serve the needs for future generations. Currently the lift span on the Interstate Bridge is 178' at maximum clearance, any reduction

on a new span will have significant impact on TMF's industrial competitiveness. Less clearance will inhibit Thompson's ability to attract job-producing industrial projects to the region. Lower bridge clearance will also cause constraints for current and future energy infrastructure needs where TMF is counted on to be a major supplier to energy producers. Impacts to clearance could also affect the development of renewable energy sources, such as offshore wind. A facility, like that at Thompson Metal Fab in the current configuration, will be critical in the success of offshore wind programs on the West Coast. Additionally, users such as the US Army Corps of Engineers, will be impacted as they depend on TMF to deliver structures by barge to support our region's dams and ports East of I-5.

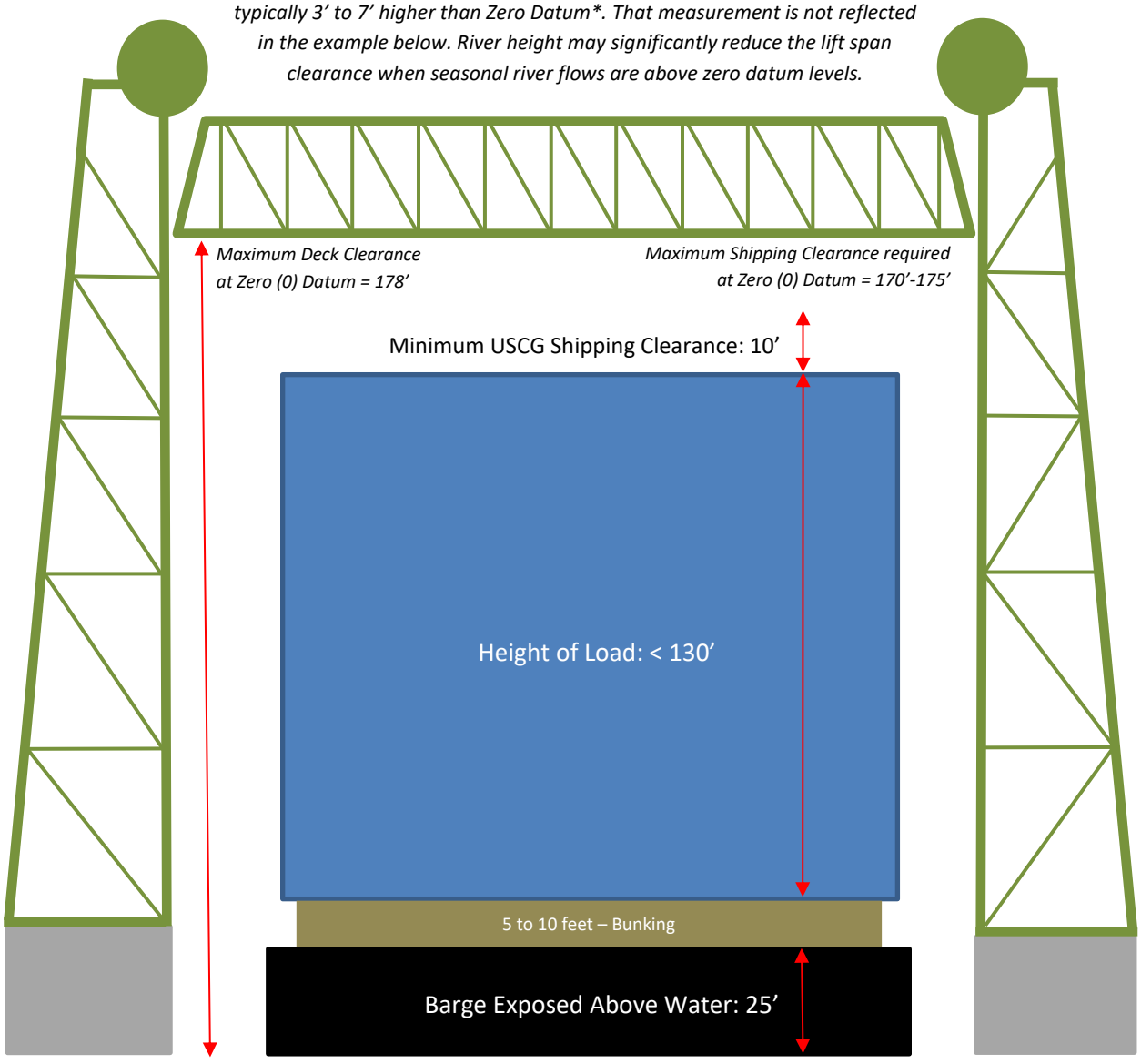
We recognize a new Interstate Bridge replacement needs to meet the requirements of all modern and future modes of transportation, and that requirement will most likely impact our historical, current, and future usage of river transit. However, Thompson also recognizes the importance of a new, safe, and modern bridge to the region, and is willing to work with the Interstate Bridge Replacement project team to preserve Thompson Metal Fab and hundreds of family wage jobs, while at the same time advancing a much needed new bridge to the future.

Sincerely,



John B. Rudi
Owner/President
Thompson Metal Fab

Clearance information assumes Zero (0) Datum. The Columbia River is typically 3' to 7' higher than Zero Datum. That measurement is not reflected in the example below. River height may significantly reduce the lift span clearance when seasonal river flows are above zero datum levels.*

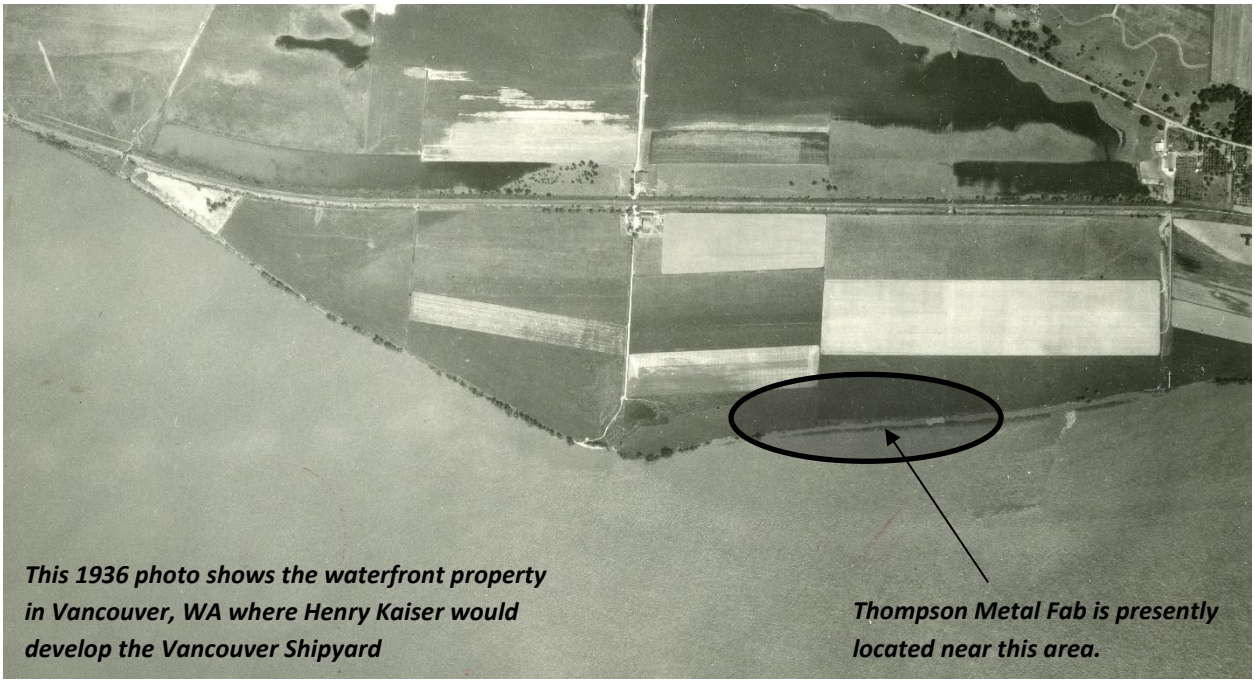


* https://water.weather.gov/ahps2/hydrograph.php?wfo=pqr&gage=vapw1

EXAMPLES OF THOMPSON METAL FAB PROJECTS WHICH REQUIRED BRIDGE LIFT

Owner	Project Name	Shipping Date	Shipping Destination	Number of Barges	Barge List, FT *(height exposed above waterline)*	Dunnage/Blocking Height (ft)	Height of tallest structure (ft)	USGC Minimum Gap (ft)	Total Required Clearance, FT *(Assumes Zero Datum)*
AKDOT	Ward Cove Ferry Dock Expansion	2020	Ketchikan, AK	1	25	5	14	10	**54**
Intel	LARK E-Houses	2020	Hillsboro, OR	1	25	5	16	10	**56**
ASE	Wind Tunnel Retrofit	2019	Tongue Point, OR	1	25	5	18	10	**58**
Hilcorp	Innovation Rig	July 2016	North Slope, AK	1	25	10	50	10	**95**
Multnomah County	Sellwood Bridge	2015-2016	Portland, OR	7	25	5	20	10	**60**
Furie	Monopod Pile	July 2014	Cook Inlet, AK	1	25	0	126	10	**161**
Saxon Drilling	Rig 147	July 2013	Kenai, AK	1	25	10	40	10	**85**
Saxon Drilling	Rig 169	July 2013	Kenai, AK	1	25	10	40	10	**85**
Parker Drilling	Rig 272	July 2011	North Slople, Alaska	1	25	10	113	10	**158**
Parker Drilling	Rig 273	July 2011	North Slople, Alaska	1	25	10	113	10	**158**
Doyon Drilling	Rig 25	July 2010	North Slople, Alaska	2	25	10	70	10	**115**
British Petroleum (BP)	Liberty Rig	July 2009	North Slople, Alaska	2	25	10	100	10	**145**
CalTrans	East Tie-In	2008-09	Bay Area, CA	2	25	5	40	10	**80**
OHSU	Portland Aerial Tram	2006	Portland, OR	1	25	10	33	10	**78**
CalTrans	Bay Bridge Retrofit	2006	Portland, OR	3	25	5	60	10	**100**
US Army Corps of Engineers	Ice Harbor RSW	March 2005	Portland, OR (Swan Island) and then to Ice Harbor Dam	1	25	5	68	10	**108**
Samuel Engineering	Alaska Gold Mining	2005	Nome, AK	1	25	5	50	10	**90**
CalTrans	Richmond San Rafael Retrofit	2004	Bay Area, CA	1	25	5	40	10	**80**
Boeing	Delta IV Launch Table	2003	Vandenberg AFB, CA	1	25	10	33	10	**78**
US Army Corps of Engineers	Lower Granite RSW	March 2001	Portland, OR (Swan Island) and then to Lower Granite Dam	1	25	5	61	10	**101**
Pool Arctic	Rig 9	1999	North Slope Alaska	1	25	10	60	10	**105**
Cascade General	Esperanza Power Barge	1999	Portland, OR	1	25	10	30	10	**75**
Pool Arctic	Rig 6	1998	North Slope, AK	1	25	10	60	10	**105**
PGE	Trojan Decommissioning	1998	Hanford, WA	1	25	5	40	10	**80**
Nordic-Calista	Rig 3	July 1997	North Slople, Alaska	1	25	10	78	10	**123**
LaFarge Cement	Pre-Heater Tower	1997	Richmond, BC, Canada	1	25	5	60	10	**100**
Cascade General	Golmar Explorer Ship Conversion	1997	Portland, OR	1	25	5	30	10	**70**
TriMet	Terry Moore Pedestrain Bridge	1996	Portland, OR	1	25	5	30	10	**70**
WSDOT	Duwamish Bascule Bridge	1996	Seattle, WA	1	25	5	30	10	**70**
CalTrans	Nimitz Freeway	1995	Bay Area, CA	4	25	5	70	10	**110**
Port of Sacramento	Bulk Material Handling System	1993	Sacramento, CA	1	25	5	50	10	**90**
Powell River Paper Company	Chlorine Dioxide Module	November 1991	British Columbia, Canada	1	25	5	76	10	**116**
Parker Drilling	Rig 245	July 1990	North Slople, Alaska	1	25	10	78	10	**123**
Pacific Marine	SWATH Hull	1989	Honolulu, HI	1	25	10	60	10	**105**
Christenesn Marine	Dry Dock	1987	Vancouver, WA	1	25	10	40	10	**85**
ConocoPhillips	Milne Point Modules	1987	North Slope, AK	3	25	10	30	10	**75**
	Newport Bay Floating Foundation	1986	Portland, OR	1	25	5	20	10	**60**
WSDOT	I-90 East Channel Bridge	1986	Seattle, WA	1	25	5	30	10	**70**
ARCO	Housing Expansion	July 1985	North Slople, Alaska	1	25	5	65	10	**105**
Georgia Pacific	Wood Chip Material Handling System	1973	Toledo, OR	1	25	5	60	10	**100**

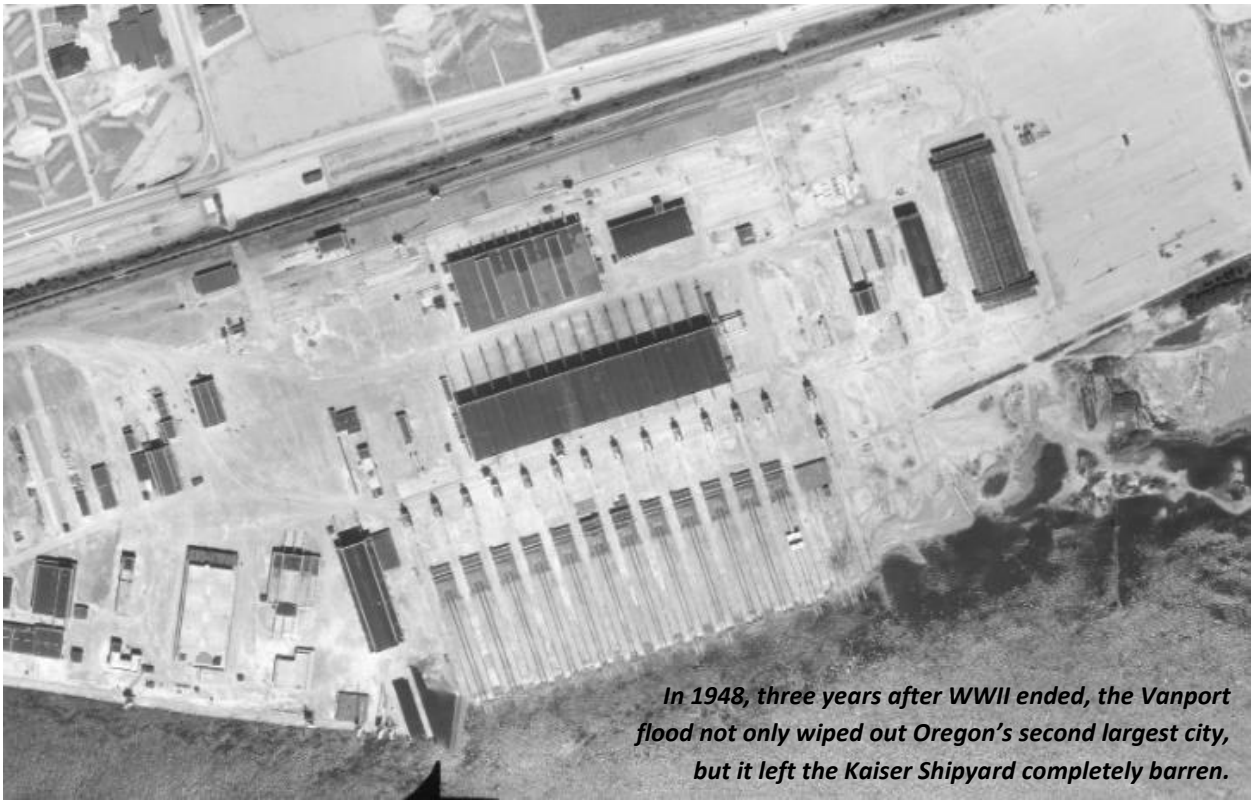
Bridge to be opened at Captain's discretion for loads under 72' high.



This 1936 photo shows the waterfront property in Vancouver, WA where Henry Kaiser would develop the Vancouver Shipyard

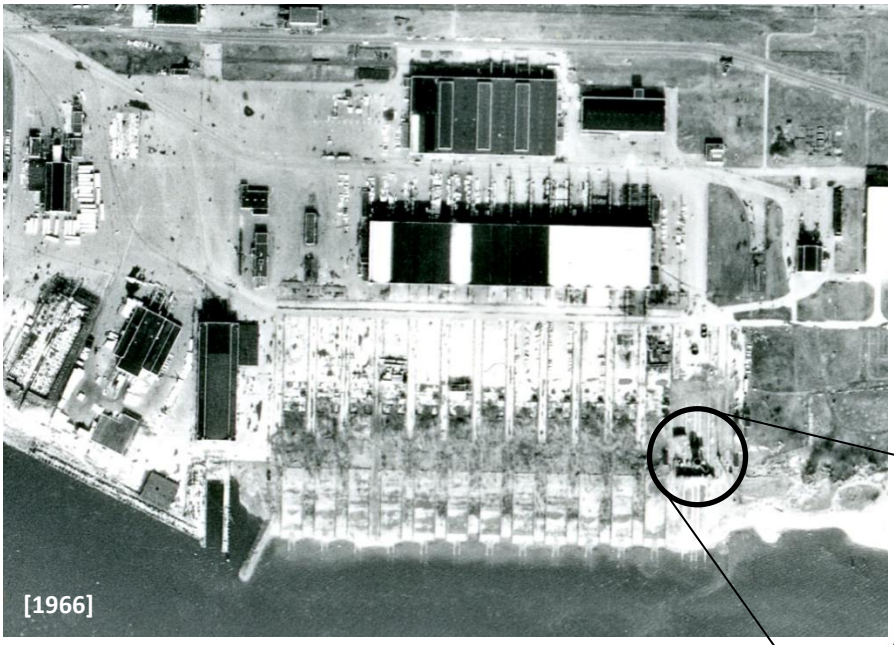
Thompson Metal Fab is presently located near this area.

In just a few years nearly 200-acres was redeveloped, providing Vancouver a major industrial waterfront facility. An active Kaiser Shipyard is shown here in 1943



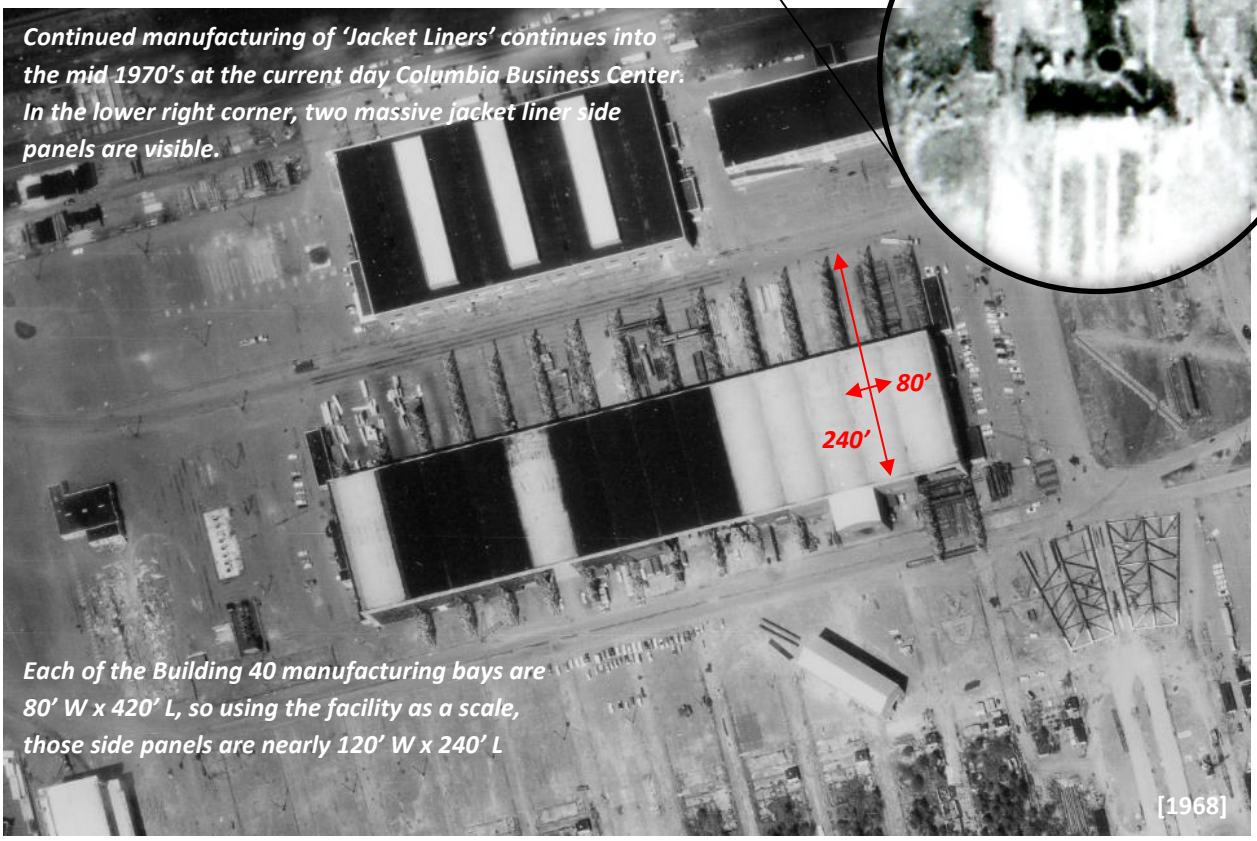
In 1948, three years after WWII ended, the Vanport flood not only wiped out Oregon's second largest city, but it left the Kaiser Shipyard completely barren.

By 1956, the facilities at the current Columbia Business Center are in full operation once more, leveraging the capacity to support the industrial needs of the time.



[1966]

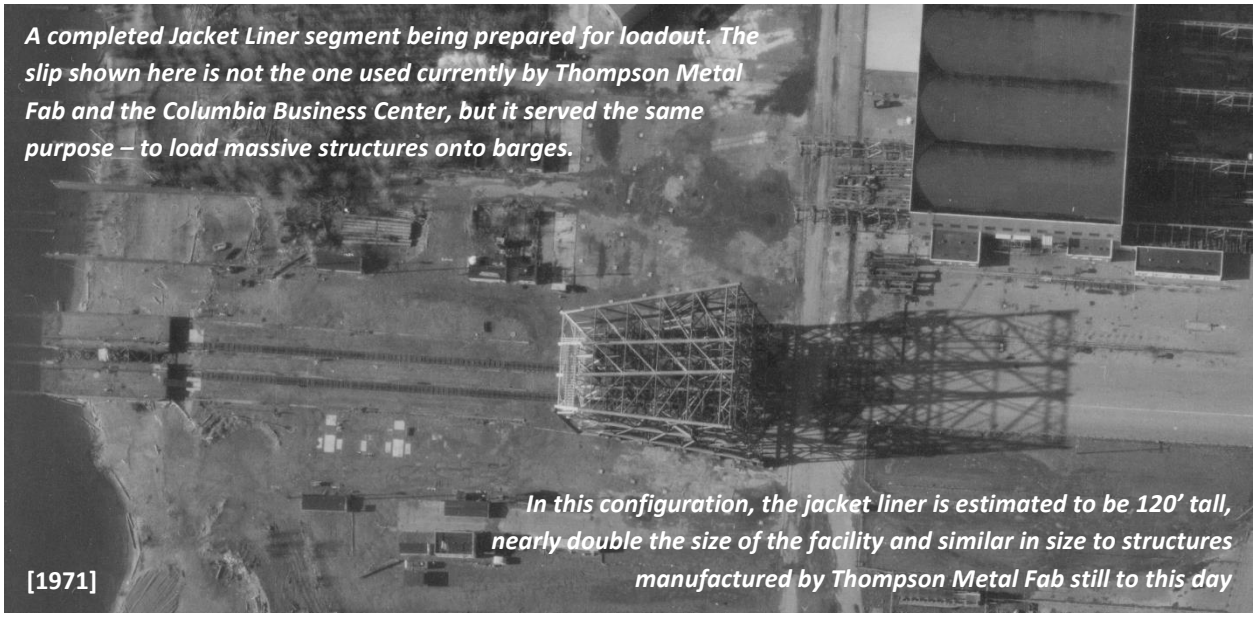
The development of offshore oil in California required the fabrication of massive infrastructure. Typically, offshore oil fabrication is done in the Gulf states, but with major oil production now on the West Coast those Gulf state areas could not lend support and a West Coast facility was required.



Continued manufacturing of 'Jacket Liners' continues into the mid 1970's at the current day Columbia Business Center. In the lower right corner, two massive jacket liner side panels are visible.

Each of the Building 40 manufacturing bays are 80' W x 420' L, so using the facility as a scale, those side panels are nearly 120' W x 240' L

[1968]



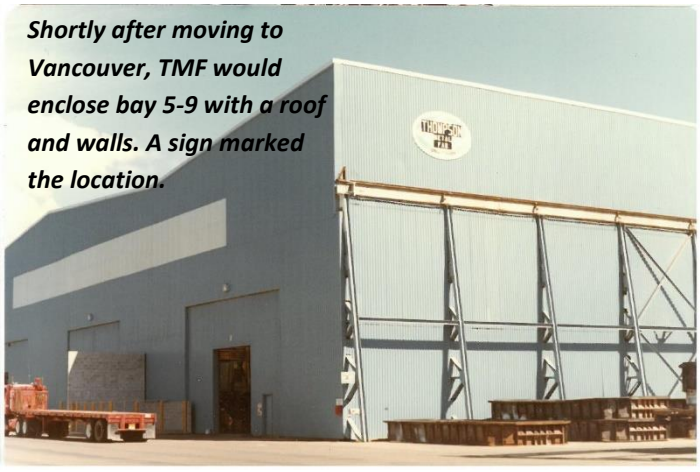
A completed Jacket Liner segment being prepared for loadout. The slip shown here is not the one used currently by Thompson Metal Fab and the Columbia Business Center, but it served the same purpose – to load massive structures onto barges.

In this configuration, the jacket liner is estimated to be 120' tall, nearly double the size of the facility and similar in size to structures manufactured by Thompson Metal Fab still to this day

[1971]

Roofing being extended to Building 40, Bay 10-12 (current Thompson Metal Fab).

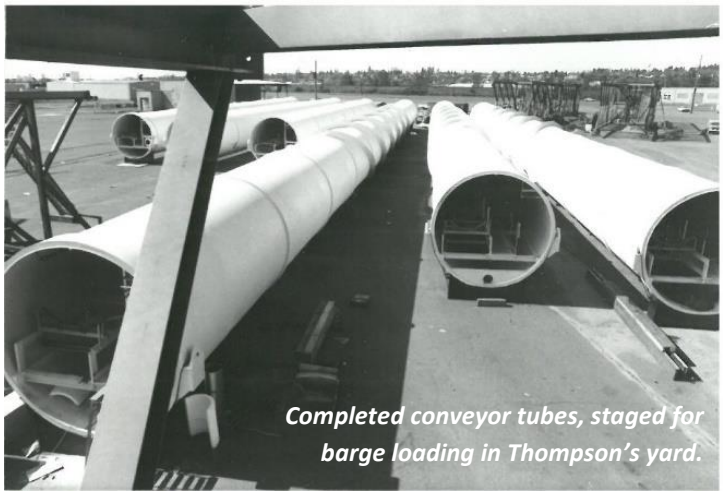
TMF Project Managers, early 1970's



Shortly after moving to Vancouver, TMF would enclose bay 5-9 with a roof and walls. A sign marked the location.

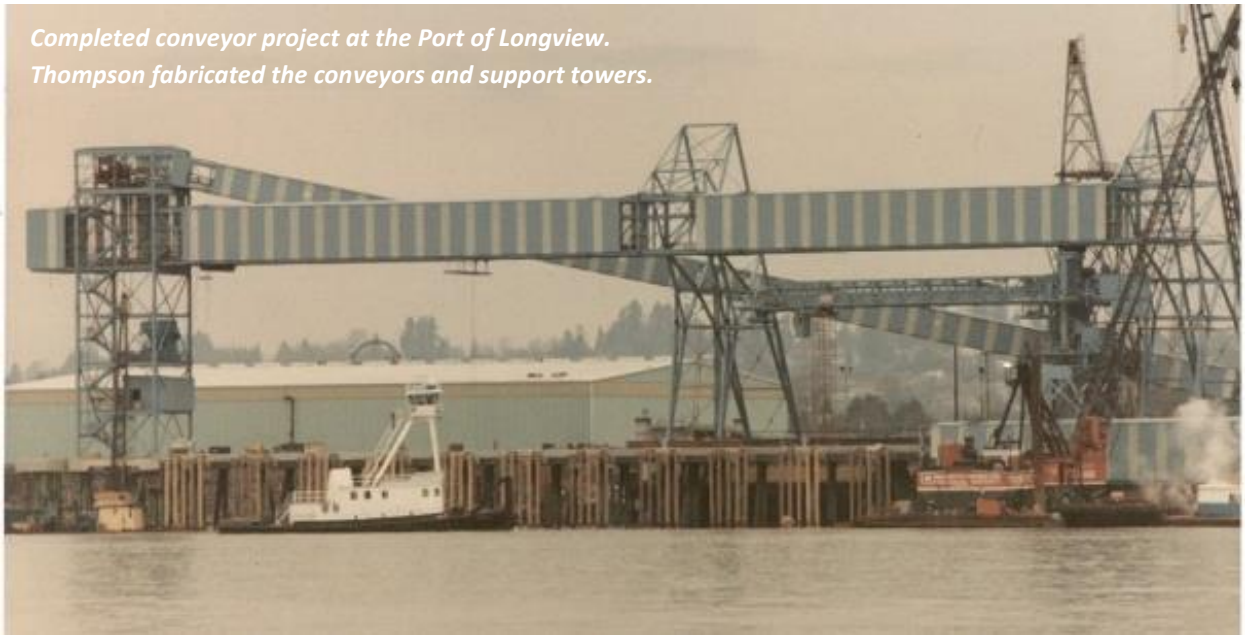
At 300' long, this conveyor nearly takes up the entire length of a bay at TMF

A barge is being loaded with conveyors for delivery to Bay Area, CA

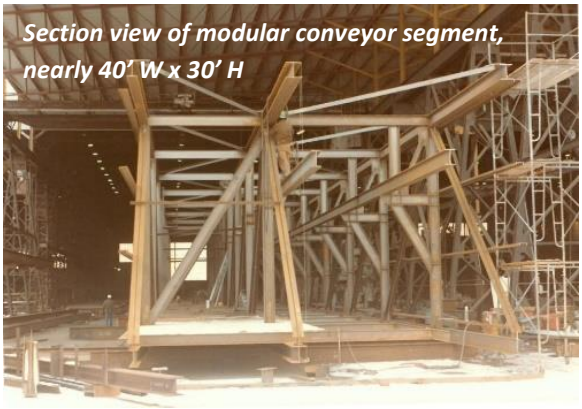


Completed conveyor tubes, staged for barge loading in Thompson's yard.

Conveyor systems and support towers were a major part of Thompson's first few decades at the Columbia Business Center. TMF's barge slip allowed for massive, modular deliveries to Ports, pulp & paper factories, and other industrial areas.



Completed conveyor project at the Port of Longview. Thompson fabricated the conveyors and support towers.



Section view of modular conveyor segment, nearly 40' W x 30' H

Conveyor being loaded on barge at Thompson Metal Fab.

There are numerous Ports on the Columbia River with large, developed properties and robust industrial activity. These Ports are critical to our region and are the hub for most incoming goods.

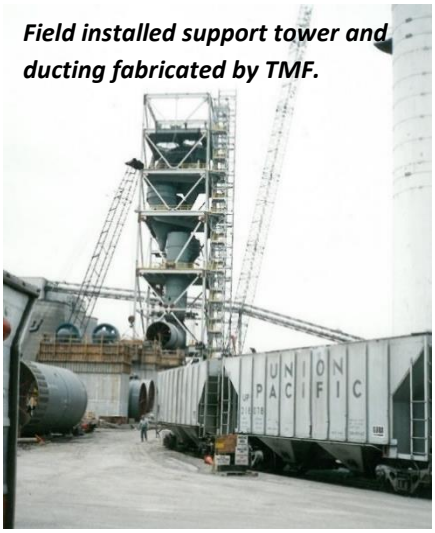
Conveyor systems are often used at Ports to quickly handle and transfer bulk materials. Thompson Metal Fab manufactured and delivered the massive conveyor system and support towers shown here and delivered to the Port of Longview.

Modular structures were loaded on a barge and erected in the field. Delivering modular units allows for quicker assembly in the field and easier integration of all mechanical components.

Conveyors come in many shapes and sizes, depending on the intended use. Shipping the structures pre-assembled saves on time and money in the long-run and is a value-add for Owners and other stakeholders. Shown here are additional examples of projects that were manufactured by Thompson and delivered all over the West Coast, from Toledo, OR to Sacramento, CA.

Heavy ducting for baghouses requires a facility like Thompson's. They can accommodate the size of the infrastructure in their shop and ship over the water by barge. The large duct section shown here is nearly 30' high and over 100' long.

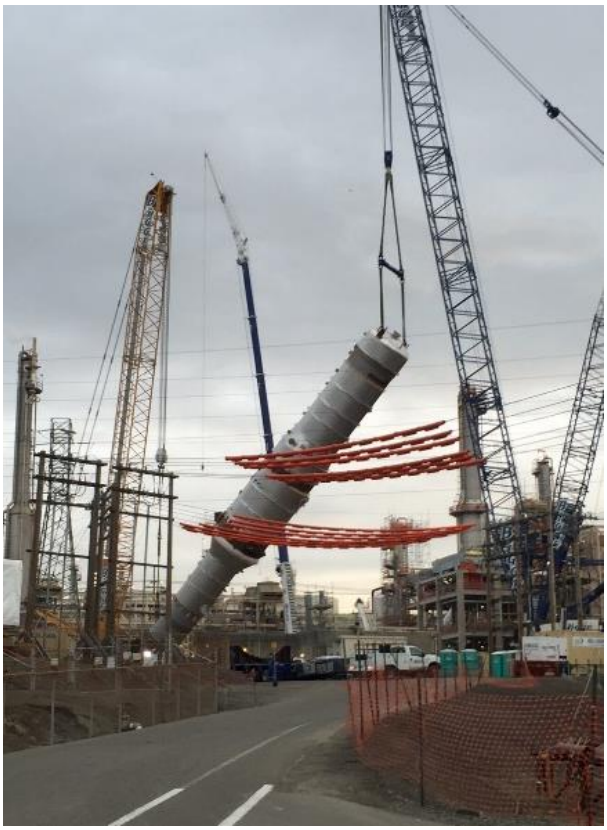
Structural tower inside Thompson's shop being outfitted with piping and ducting systems. This tower is well over 30' high.



Field installed support tower and ducting fabricated by TMF.

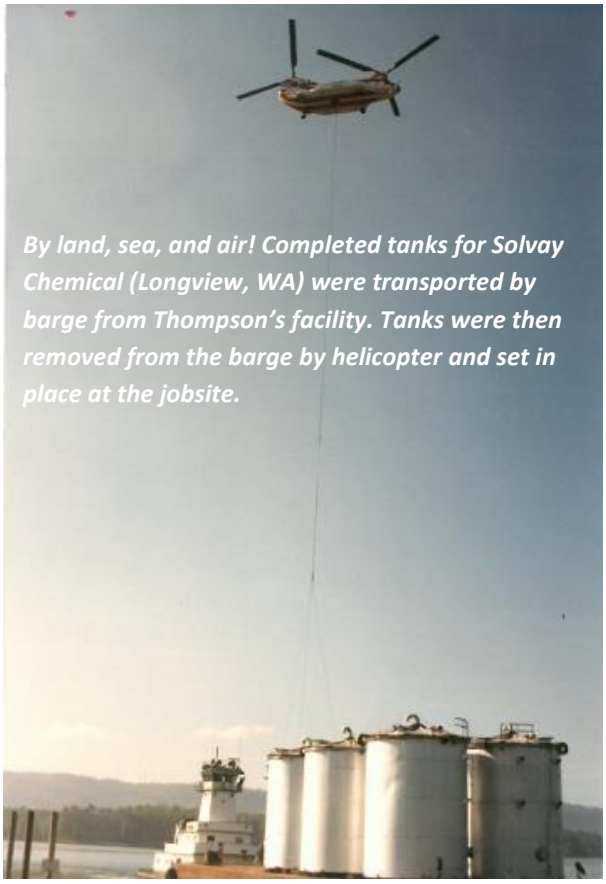
Baghouse components being loaded on a barge from Thompson Metal Fab's facility

Nearly touching the rafters, this giant structural building will soon be outfitted with mechanical items prior to load out on the barge. The size of Thompson's facility provides value to project owners who seek out modular, turn-key solutions for their infrastructure needs.



Refineries on the West Coast are typically located on coastal properties or are otherwise accessible by deep water ports. In addition to capacity expansion and improvements, these facilities have processing vessels and other equipment that wear out over time and need to be replaced.

Shown here at the Phillips 66 facility in Rodeo, CA, Thompson Metal Fab fabricated a "prefractioner" tower which was 17' diameter x 126' L. Too large and heavy to ship over the road, this vessel was delivered by barge and direct to the jobsite.

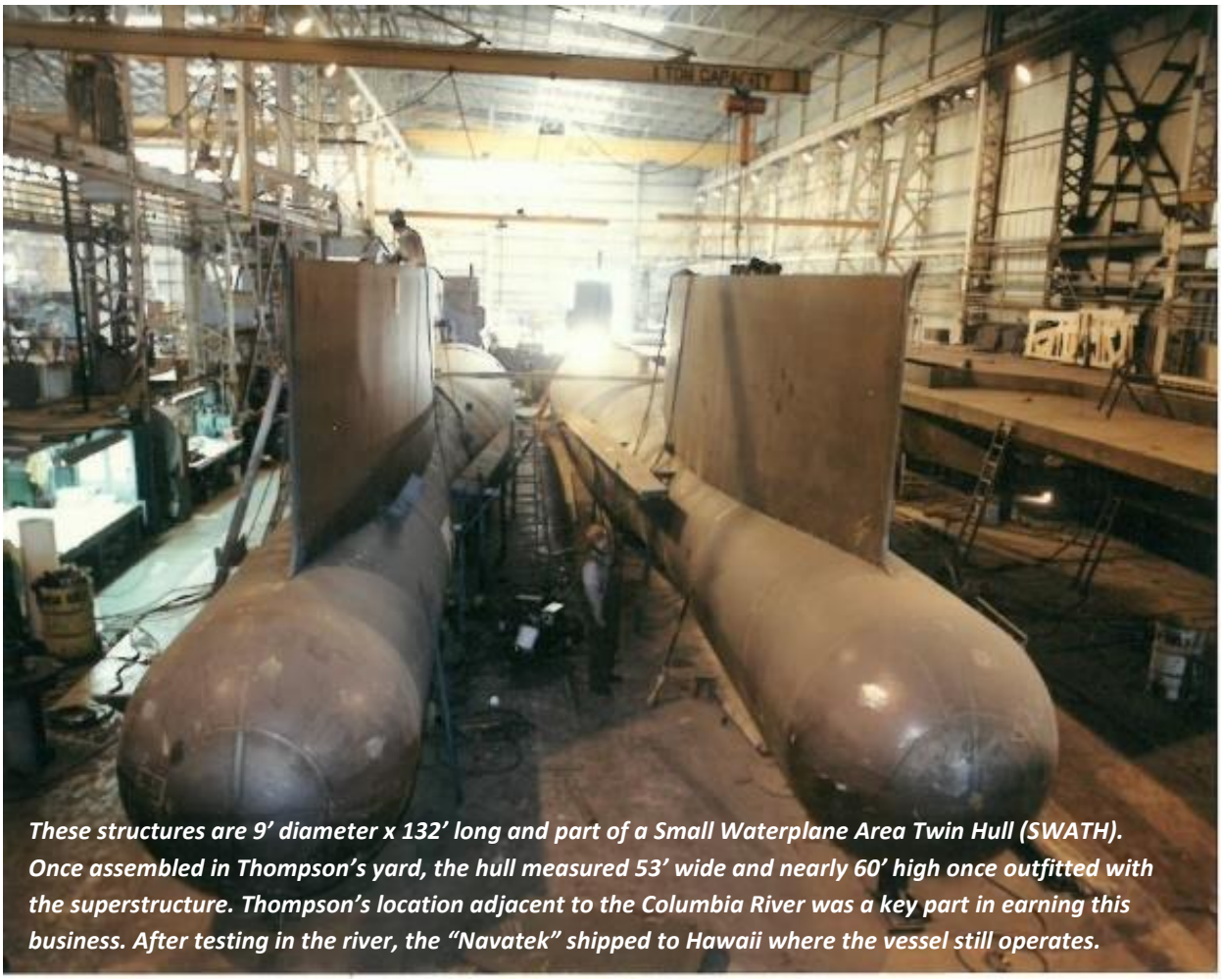


By land, sea, and air! Completed tanks for Solvay Chemical (Longview, WA) were transported by barge from Thompson's facility. Tanks were then removed from the barge by helicopter and set in place at the jobsite.

Process vessels and skids are being loaded on a barge from Thompson Metal Fab's facility. This load will be delivered to Alaska and used on the North Slope. These units are well over 20' and 40' long.

Large tanks for Amalgamated Sugar in Portland, OR. The tanks are used as part of their manufacturing process. Due to the size of the tanks, they were shipped by barge and then transloaded to a truck for final delivery.

Trunnions for the Interstate Bridge shown above in Thompson's shop. Their proximity to the bridge made TMF an ideal location when repairs were needed. Shown below are two Seattle area bridge projects that were completed at the Columbia Business Center, painted by TMF, and delivered to the jobsite by barge.



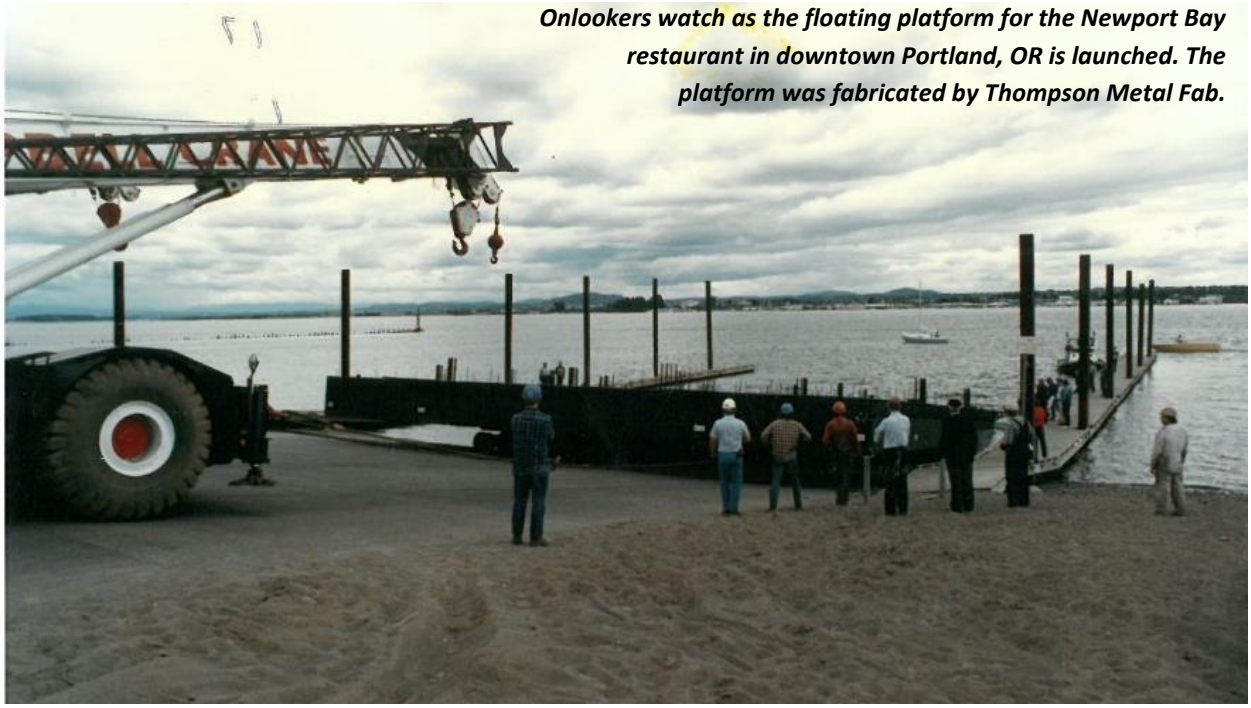
These structures are 9’ diameter x 132’ long and part of a Small Waterplane Area Twin Hull (SWATH). Once assembled in Thompson’s yard, the hull measured 53’ wide and nearly 60’ high once outfitted with the superstructure. Thompson’s location adjacent to the Columbia River was a key part in earning this business. After testing in the river, the “Navatek” shipped to Hawaii where the vessel still operates.

Barge load approaching the Interstate Bridge after leaving Thompson Metal Fab. TMF's massive facility is seen in the background.

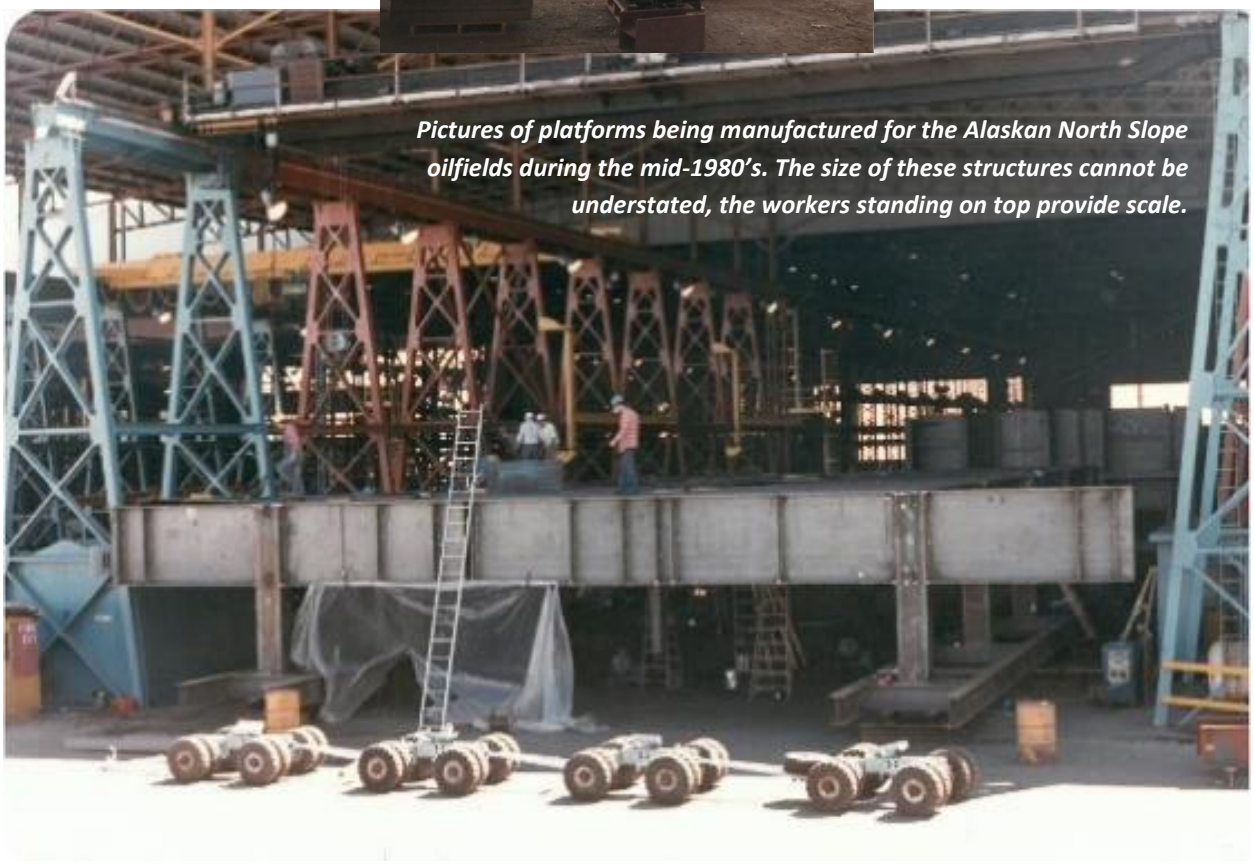
Shown above and below is a modular segment of the Power Barge fabricated by TMF. Segments were pre-fabricated in the shop before being assembled in Thompson's yard. The final assembly was 105' W x 30' H x 284' L

At left, large platform is being flipped inside Thompson Metal Fab's shop.

Thompson Metal Fab has a legacy of fabricating unique, complex, and often massive structures which require delivery by water.



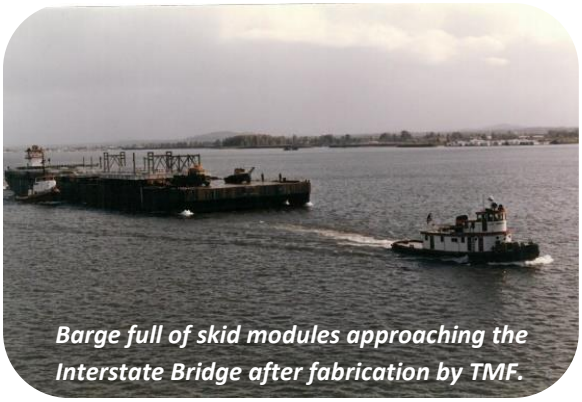
Onlookers watch as the floating platform for the Newport Bay restaurant in downtown Portland, OR is launched. The platform was fabricated by Thompson Metal Fab.



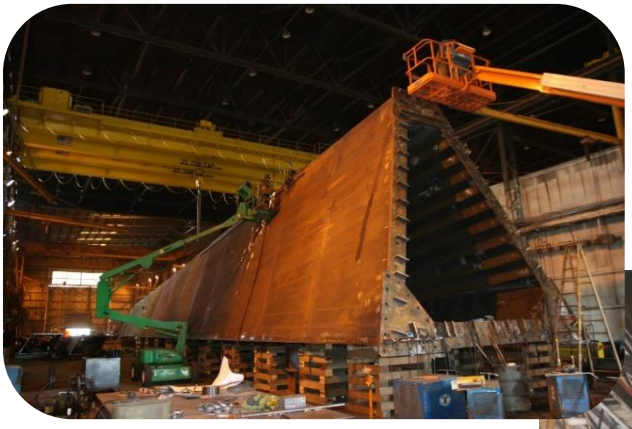
Pictures of platforms being manufactured for the Alaskan North Slope oilfields during the mid-1980's. The size of these structures cannot be understated, the workers standing on top provide scale.

Shown below, load out of the cradle base that would carry PGE's Trojan nuclear reactor. TMF fabricated the base and the shielding enclosures.

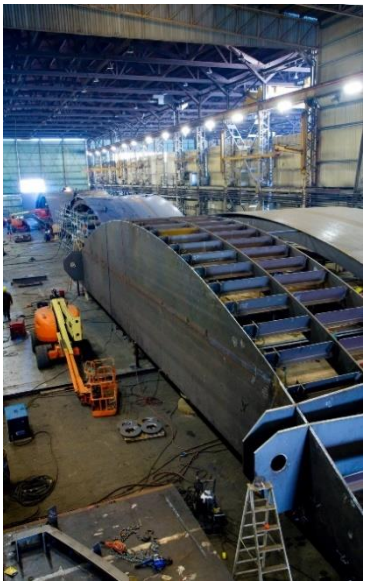
Support towers nearing the Interstate Bridge. This load is headed for the Port of Sacramento upon completion at Thompson Metal Fab



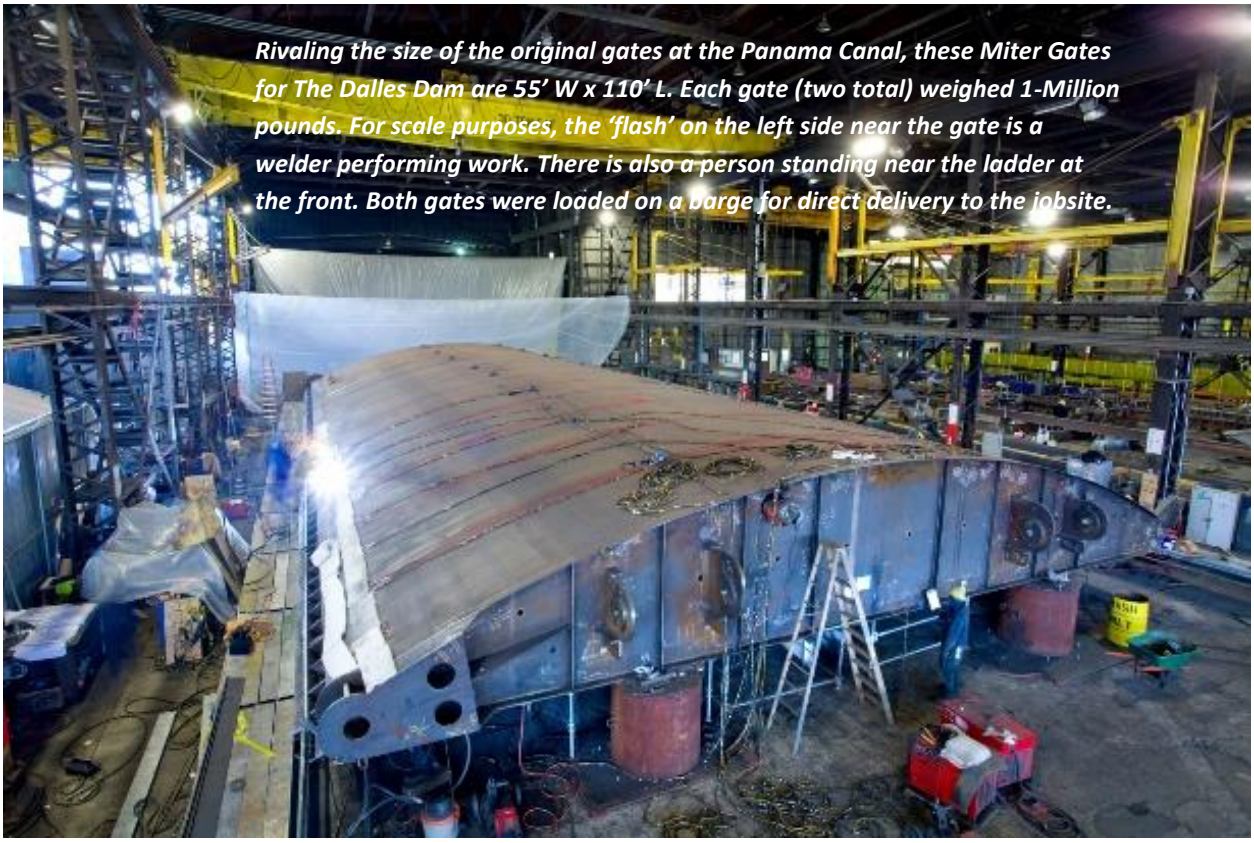
Barge full of skid modules approaching the Interstate Bridge after fabrication by TMF.



The lower segment of the iconic Portland Aerial Tram's tower is shown inside Thompson Metal Fab's shop. Including the bunking underneath, the tower is nearly 40' high and 30' wide. The completed tower can be seen at OHSU, spanning over I-405.



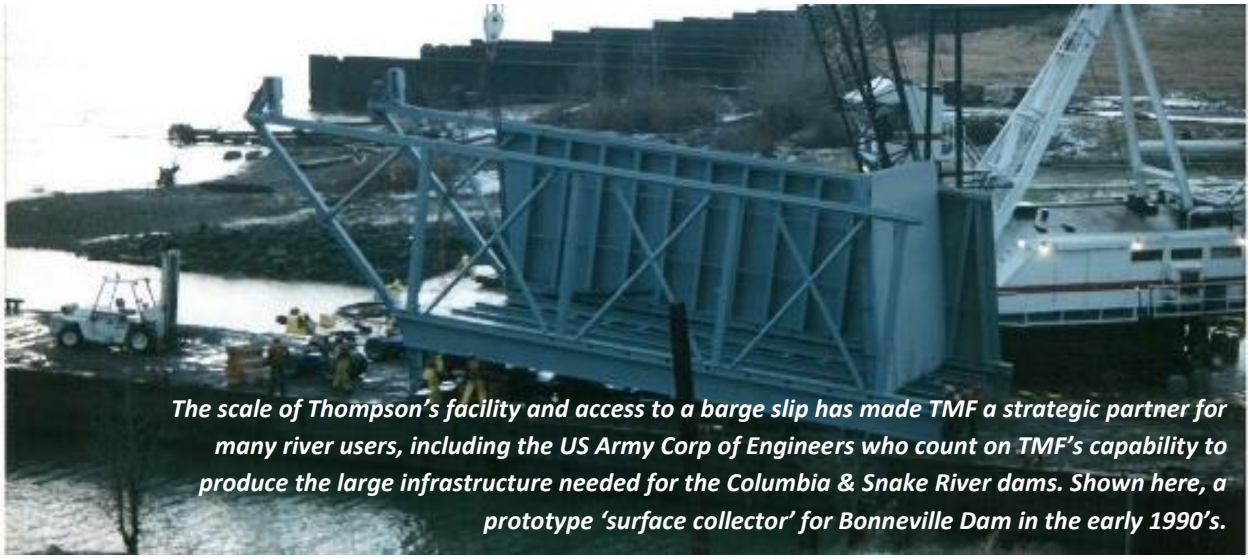
Fabrication of the Lower Monumental Dam Lift Gate is shown at left inside Thompson's shop. Due to its size (nearly 1.5-Million pounds) the gate was fabricated in three segments, loaded on a barge, and finished in the field by the General Contractor. The picture here shows the three segments be aligned for fit verification at TMF's yard. Final dimensions are 88' W x 84' H



Rivaling the size of the original gates at the Panama Canal, these Miter Gates for The Dalles Dam are 55' W x 110' L. Each gate (two total) weighed 1-Million pounds. For scale purposes, the 'flash' on the left side near the gate is a welder performing work. There is also a person standing near the ladder at the front. Both gates were loaded on a barge for direct delivery to the jobsite.

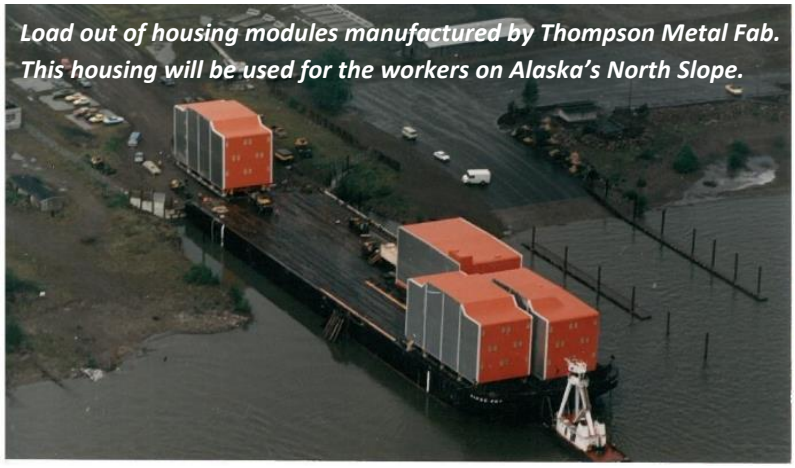
Many of the structures fabricated by TMF require the use of specialty moving systems for handling around the shop and for loading barges. Shown here, an SPMT (Self Propelled Modular Transporter) is used to move one of the Ward Cove Rection Dolphins from TMF's Bay 8 and out to the barge slip for loading. Each reaction dolphin is 30' x 30' x 12' H

Barge load out for the Ward Cove Ferry Terminal Expansion project. All structures were fabricated at the Columbia Business Center, including the Transfer Span and Reaction Dolphins which were completed by Thompson. The Transfer Span, shown near the back of the barge is 14' H x 140' L. These structures were delivered direct to the jobsite in Ketchikan, AK.



The scale of Thompson's facility and access to a barge slip has made TMF a strategic partner for many river users, including the US Army Corp of Engineers who count on TMF's capability to produce the large infrastructure needed for the Columbia & Snake River dams. Shown here, a prototype 'surface collector' for Bonneville Dam in the early 1990's.

Shown above and below are multiple barge loadings for a massive project at Lower Granite Dam in the mid-1990's. All structures were fabricated by Thompson Metal Fab and loaded out at the Columbia Business Center.



Load out of housing modules manufactured by Thompson Metal Fab. This housing will be used for the workers on Alaska's North Slope.

Enclosed modules to be used for a drilling rig, shown inside TMF's shop

Modular fabrication has long been a part of Thompson's history and success. The size of their facility at the Columbia Business Center allows TMF to offer large, turn-key, fully-operational modular systems which get used for housing, data centers, oil production/drilling, crude oil processing, technology, electrification, water treatment, chemical processing, fuel storage, pipe handling, and conveyor systems – among other uses. Remote jobsite locations and size of many of these structure require use of the barge slip, adjacent to Thompson's facility.

Example of processing modules being manufactured inside Thompson Metal Fab

Walls, roof, and equipment being installed on 44' x 97' skid shown below

Thompson's extensive experience with turn-key modular systems made it a valuable partner as a new market emerged for these products. Increase demand for technology pushed groups, like Intel, to expand their facilities. 'Cloud based' data storage requires facilities on the ground that can house servers. Increased online shopping (i.e. Amazon) requires warehouses and data centers. As the world becomes dependent on technology the demand for these custom, modular buildings has significantly increased.

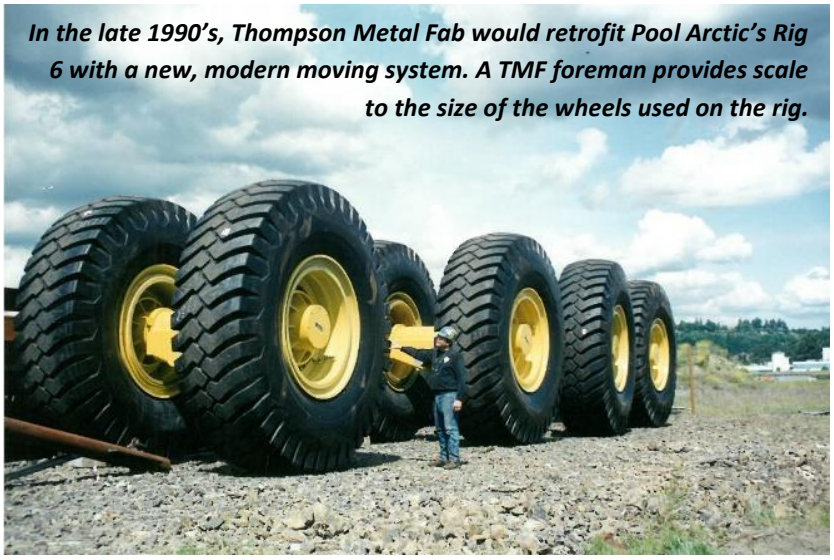
Shown below in late 2019, this skid represents the largest non-oil related module manufactured by TMF. At 44' W x 97' L, this module is too large to ship over the road, and too big to be handled in the field.

To accommodate field conditions, a shipping 'split' was engineered in the middle of the floor (shown) and in the roof trusses. The 44-ft mega module would ship via barge, and completely outfitted in two segments.

Two 44' x 97' modules were manufactured by TMF, each with a shipping split described above. Shown in the middle of this picture are two of the four total segments prior to barge loading.

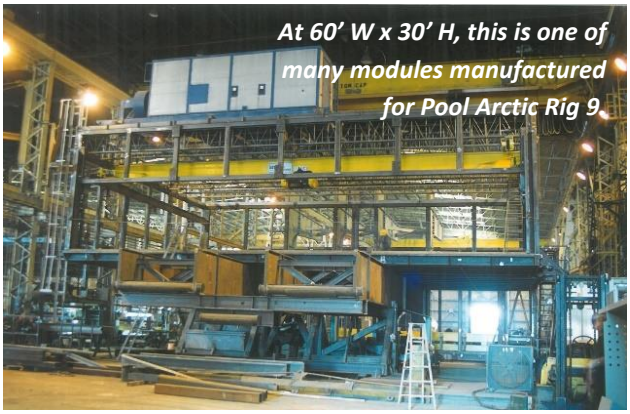
Also shown is the BNSF Wind River Bridge. This was manufactured at the Columbia Business Center and would ship via barge completely assembled and installed in one-piece.

Pool Arctic Rig 3 Retrofit, performed by TMF



In the late 1990's, Thompson Metal Fab would retrofit Pool Arctic's Rig 6 with a new, modern moving system. A TMF foreman provides scale to the size of the wheels used on the rig.

Manufacturing Pool Arctic's Rig 9 inside TMF.

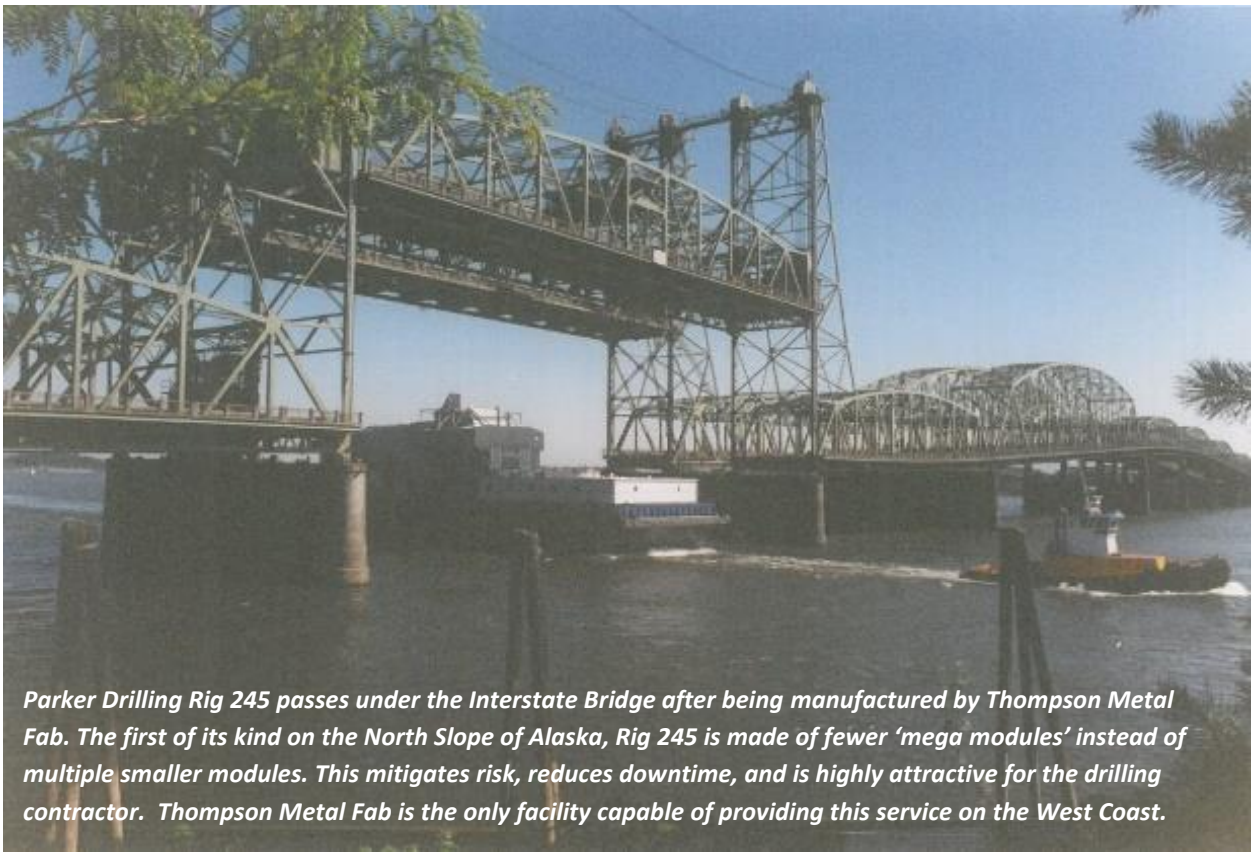


At 60' W x 30' H, this is one of many modules manufactured for Pool Arctic Rig 9.

Following some of its recent predecessors (i.e. Rig 245), Rig 9 would use the 'mega module' concept to reduce downtime on the North Slope

Over the last 30-years, 15 rig projects have been awarded to Thompson Metal Fab. Nearly 1/3rd of the rigs in Alaska have some connection to TMF.

Shown at right, Nordic-Calista's Rig 3 being 'rigged up' in Thompson's yard in 1997. This workover rig is used to restore production on exiting wells.



Parker Drilling Rig 245 passes under the Interstate Bridge after being manufactured by Thompson Metal Fab. The first of its kind on the North Slope of Alaska, Rig 245 is made of fewer 'mega modules' instead of multiple smaller modules. This mitigates risk, reduces downtime, and is highly attractive for the drilling contractor. Thompson Metal Fab is the only facility capable of providing this service on the West Coast.

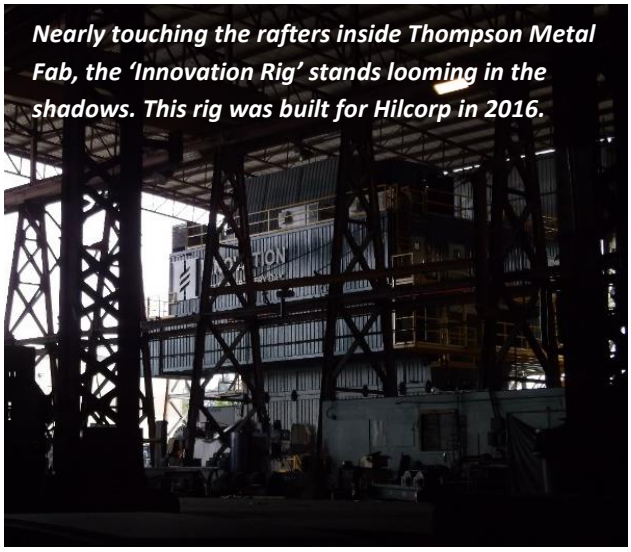
No, the picture to the right is not the inside of a 'big box' store, but it is the size of one! This is the inside of the Liberty Rig's Pipe Module (see above) and is where all production drill pipe is stored.

At the time it was manufactured, the Liberty Rig was the world's largest land-based drilling rig. Everything about this rig was supersized, including the mast shown here inside Thompson Metal Fab. Drill structures, like the one shown here, require special certification for manufacturing, and TMF is the only facility on the West Coast who holds that certification while also boasting a facility/yard of its size, in addition to roll-on/roll-off barge capabilities.

For new rig builds, drilling contractors traditionally manage the design and hire their own sub-contractors (structural, electrical, mechanical, etc.) For Doyon Drilling's Rig 25, TMF was hired as the General Contractor and managed all rig-build efforts on behalf of Doyon. As a result, Rig 25 becomes the rig built by Thompson as General Contractor.

Rig 25 is a sought after work-horse on Alaska's North Slope and is a dependable rig in Doyon's fleet. This picture shows a very proud Thompson team at the end of the project.

Shown above is the part of the substructure base for Rig 272. Its twin (Rig 273) was manufactured at the same time at TMF. Picture below shows the yard assembly of Rig 272, Rig 273, and Rig 25.



Nearly touching the rafters inside Thompson Metal Fab, the 'Innovation Rig' stands looming in the shadows. This rig was built for Hilcorp in 2016.

The Interstate Bridge looks on in the distance as Thompson Metal Fab manufactures three rig projects from their Columbia Business Center facility. Shipping clearance on Rig 272 & 273 (blue) would be nearly 160'.

Marine Industries and Fabricators

Company: Vigor

Company provided the following information to the IBR Program.

Vigor Works, LLC. is a Heavy Industrial Fabrication Company that serves the Marine, Hydro-Electric, Nuclear, Oil & Gas and Steel Bridge Industries. The wide variety of products produced by Vigor Works support private industry as well as Government Agencies (local, state, federal). Past and present projects completed from the Columbia Industrial Park include fully assembled final products: Bridges, Oil Field Modules/Platforms, Marine Vessels and other extremely large infrastructure type goods which have limited areas for fabrication due to water loadout/shipping and air draft restrictions.

Vigor Works (in and adjacent to the Columbia Industrial Park) are uniquely qualified and situated to support strategic and industrial needs, particularly our national infrastructure of dams, locks and bridges and marine vessels. The living wage trade jobs created by this work are critical to the health of the Vancouver/Portland area. Vigor currently supports ~1500 trade related jobs in the Portland Metro area which includes three separate locations in and around the Columbia Industrial Park.

Heavy investment in capital and people has occurred in all three Vancouver locations upriver of the I-5 bridge. By maintaining flexibility to pursue and provide ultra large product for customers, we can continue to pursue this type of work to support the jobs and economy of Vancouver. Our sites are unique due to their access to a large metro area with truck, rail and marine access.

The current bridge height has been important for commerce and shipments along the Columbia River for nearly a century and even more critically important since the war effort in the 1940s. In the late sixties and early seventies, offshore drilling rigs were constructed at this location and had to transit under the bridge. These offshore platforms required the bridge to be raised to its full height of 174 feet to allow them to pass under the raised span. More recently we have watched drilling equipment destined for Alaska being assembled in the Columbia Industrial Park that required 150 feet of clearance to be shipped down the river. Vigor consistently evaluates opportunities for product up to 110 feet in height. The additional height of blocking, transport barge freeboard and clearance margin, easily results in an air draft requirement of 130’ for these projects. Ideally, we recommend a height of 150 feet air draft.

Our other Portland facility located on Swan Island (Portland Shipyard) also engages in large fabrications and we have in the past, barged components to/from the Vancouver facilities. Our Marine Fabrication work has also resulted in portions of vessels being shipped via barge to Ketchikan and we are currently evaluating shipping product components to our Seattle Shipyard- the exact size of those products have not yet been determined. In the future, we would expect to ship product both upriver and down river.

The lower height of the bridge will limit Vigor Works’ ability to compete on some projects. The ability and direct access to shipping on the Pacific Ocean and subsequent trade routes to Alaska or the gulf coast and Mississippi River system (via the Panama Canal) is critical for our full and sustained operation. One recent project was delivered to New Jersey.

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In summary:

The Bridge Height is now is 174 feet; this height has been needed as follows:

- 1960 to 1975 Drilling Platforms for the California Offshore Field.
- 1980 to 1995 Various loads from the Industrial Park to locations in Alaska and elsewhere.

- 2000 to 2012 Drilling Equipment for Parker Drilling assembled in the Park and shipped to Alaska.

Current:

- We are evaluating Vancouver for long term production related to partial or all construction for upcoming work. The final bridge height could impact the amount of work completed in Vancouver.
- We anticipate there will be some opportunity for future module or drill platform work associated with Alaska as equipment requires replacement.
- We expect, although do not know what the development of offshore wind will need for industrial shore side support.

Conclusion:

This Marine Highway is used by a multitude of users with traffic going both upstream and down. We ship goods from the industrial park upstream of the bridge to Swan Island Ship Yard and from the Swan Island Ship Yard to the industrial park. The I-205 Bridge upstream of the bridge has a clearance of 144 feet and downstream of the bridge we have clearance limited only at Astoria and that is 196 feet with the Lewis and Clark (Longview) bridge over 200 feet. We believe it is critical to our business and the viability of the river system used for commerce to keep the height of this bridge at least 150 feet.

Marine Industries and Fabricators

Company: Schnitzer Steel

Company provided the following information to the IBR Program.

From: Tony Belot
To: Brian Carrico
Cc: Nicole McDermott
Subject: RE: Interstate Bridge Program - Vessels
Date: Thursday, August 5, 2021 10:59:03 AM
Attachments: image001.png
image002.png
image003.png
image004.pn

Brian,

Thank you for your patience, Brian. Here is our updated information you requested:

Schnitzer Steel owns two vessels—MAX 111 (flat deck barge with bin walls) and CHIPPY 002 (flat deck barge with bin walls)—and uses a third—B5 (flat deck barge with bin walls)—which is owned by Bernert Barge Lines. Schnitzer Steel uses Bernert Barge Lines as its tug company. The information provided by Bernert Barge Lines for air draft and air gap would apply to Schnitzer Steel since none of the Schnitzer Steel vessels is taller than the tugs. The vessels average two trips in March and four to six trips per month during all other months of the year.

From: Brian Carrico <Brian.Carrico@interstatebridge.org>
Sent: Wednesday, July 14, 2021 5:02 PM
To: Tony Belot <abelot@schn.com>
Cc: Nicole McDermott <Nicole.McDermott@interstatebridge.org>
Subject: [EXTERNAL] Interstate Bridge Program - Vessels

Tony - Thanks for looking into this. Attached is the data previously provided by Schnitzer in 2012. We are looking to confirm or update this information. This is how it was described in our report.

Schnitzer Steel owns two vessels—MAX 111 (flat deck barge with bin walls) and CHIPPY 002 (flat deck barge with bin walls)—and uses a third—Inland Conveyor (flat deck self-unloading barge with bin walls)—which is owned by Cemex and chartered to Bernert Barge Lines. Schnitzer Steel uses Bernert Barge Lines as its tug company. The information provided by Bernert Barge Lines for air draft and air gap would apply to Schnitzer Steel since none of the Schnitzer Steel vessels is taller than the tugs. The vessels average two trips in March and four trips per month during all other months of the year.

Information on the project can be found at the website below.

Regards,

Brian

Brian Carrico

Interstate Bridge Replacement Program
Environmental Program

O: 360-823-6122 | **C:** 360-433-7775

E: brian.carrico@interstatebridge.org

interstatebridge.org

Federal Government

Agency: Port of Portland

Vessel:

- Dredge Oregon

The Port of Portland provided the following information to the IBR Program.

From: Myer, Fred <Fred.Myer@portofportland.com>
Sent: Tuesday, August 31, 2021 9:33 AM
To: Brian Carrico <Brian.Carrico@interstatebridge.org>
Subject: FW: Dredge Oregon and North Portland Harbor

As requested Brian – updated data for Dredge Oregon, and vessel call numbers for T-6, below. For berths 603-605, moving forward: those numbers will increase significantly. We've just added a second weekly container service, and have 2 charter operations that extend for at least a year.

Regs, Fred

Fred Myer
Manager, T6 Ops and Waterways
Marine Ops
T: 503.415.6542
C: 503.784.6564
Fred.Myer@portofportland.com

PORT OF PORTLAND
Possibilities in every direction since 1891.

From: Fischer, Randy <Randy.Fischer@portofportland.com>
Sent: Friday, August 27, 2021 3:55 PM
To: Myer, Fred <Fred.Myer@portofportland.com>; Tjostolvson, Don <Don.Tjostolvson@portofportland.com>; DeRosier, Neil <Neil.Derosier@portofportland.com>
Subject: RE: Dredge Oregon and North Portland Harbor

Fred,
Here's the vessel calls by berth for the last five years. I wouldn't call this entirely accurate, but it's pretty close. Needed to use three different data sets to assemble this, with all three having slightly different numbers due to some duplicate entries, and lay berth vessel calls. Data sources included my own, marine security logs, and the Columbia River Pilots. If Brian needs fully accurate numbers, this will take more time, but the counts below are likely fairly close to accurate. In short, 601 and 605 are the busiest berths, while 603 and 604 are rarely used. Berth 607 is in a state of transition currently with Hondas departure so uncertain what level of vessel call forecast to apply to 607

looking forward.

		Year				
		2016	2017	2018	2019	2020
Berth	601	64	60	57	68	66
	603	0	2	1	3	1
	604	0	1	5	4	0
	605	0	5	23	10	49
	607	71	45	71	39	12

Let me know if you have any questions.
Thanks,
Randy

From: Brian Carrico <Brian.Carrico@interstatebridge.org>
Sent: Tuesday, August 10, 2021 6:29 PM
To: Myer, Fred <Fred.Myer@portofportland.com>
Subject: Dredge Oregon and North Portland Harbor

EXTERNAL EMAIL:

Fred - I don't think I followed up with you after our call a couple weeks ago. As discussed, I am looking to confirm vessel specifics for Dredge Oregon and information on vessel use of Port berths on the Columbia River.

In regard to the dredge, attached is the information provided for the CRC effort. If you could review this information and confirm that it is accurate or provide updates, we can make sure our information is up to date.

For vessel use I am looking for is the number of calls per year for Berths 601, 603, 604, 605 and 607. It would be good to provide data for the last 5 years. You can provide the data in whatever format is easiest.

Thanks, and let me know if you have any questions. I would appreciate information by the end of August.

Brian Carrico
Interstate Bridge Replacement Program
Environmental Program
O: 360-823-6122 | **C:** 360-433-7775
E: brian.carrico@interstatebridge.org
interstatebridge.org

Marine Contractors

Owner: Port of Portland

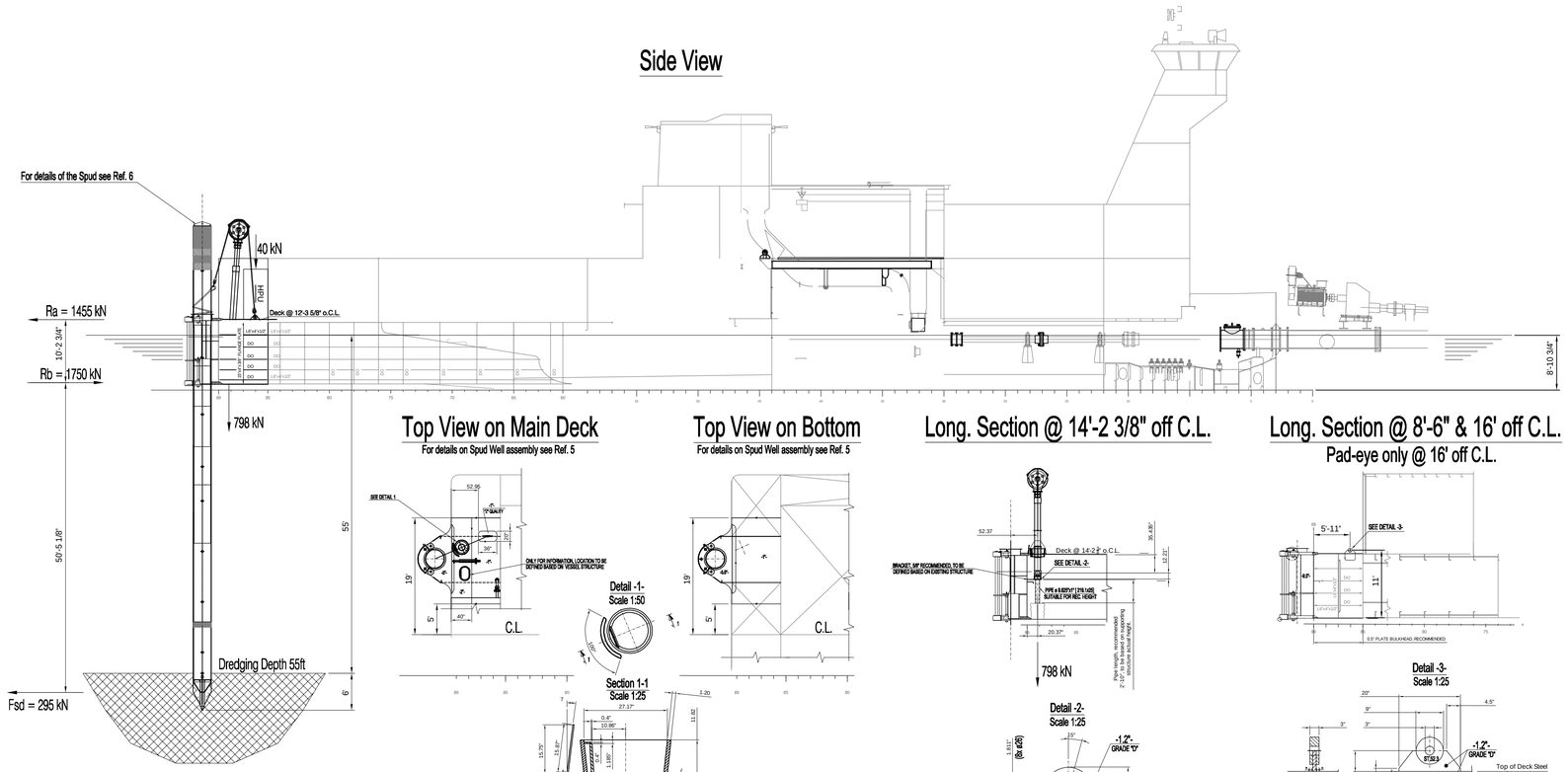
Vessel: Dredge OREGON

1. Company Name and/or Owner of Vessel and Contact Information
    a. Name of Company: Port of Portland
    b. Name of Contact: Captain Mark Wright
    c. Office Phone Number: 503-240-2203
    d. Cell Phone Number: 503-679-9794
    e. E-mail: mark.wright@portofportland.com
    f. Address: 6208 N Ensign Street
Portland, OR – 97217
    g. Vessel Name: Dredge OREGON
    h. Vessel Type: Cutter Suction Dredge
    i. USCG Official Number: 244814
    j. Hull Length Overall: 178 ft.
    k. Length Overall (Hull + Ladder): 265 ft.
    l. Draft (depth of hull below WL): 11 ft.
    m. Air Draft (highest point above WL): 63 ft.
    n. Desired Air Gap: 5 ft.
    o. Frequency of Passages Under I-5 Bridge: 0 times per month
    p. Historic Passages Under I-5 Bridge: 6
    q. Frequency of Passages through N PDX Harbor: 0 times per month
    r. Historic Passages through N PDX Harbor: 0
    s. Do you have a Business Plan? No plans currently. Defer to USACE.
    t. Other Miscellaneous:
        i. The Dredge utilizes ‘spuds’ to hold itself on position and navigate within the channel. When in the stowed position for transit, the spuds are the highest point on the dredge at approximately 75’ above the waterline. If the Dredge were required to transit upriver from the I-5 bridge, based on the frequency of historical requirements, it would be reasonable to hire a derrick barge and crane to remove the spuds at the Port’s facility in the Swan Island harbor and place them on a barge, and then re-install the spuds after the Dredge has been towed upriver from the I-5 bridge. The air draft of the spuds stowed for transit should not govern the height of the CRC.

Vessel Name: Dredge OREGON	
Owner: Port of Portland	
Point on Vessel	**Height Above Water:**
Top of A-Frame	45 feet
A-Frame Railing	47 feet
Top of Wheelhouse	47 feet
Highest Antenna	61 feet

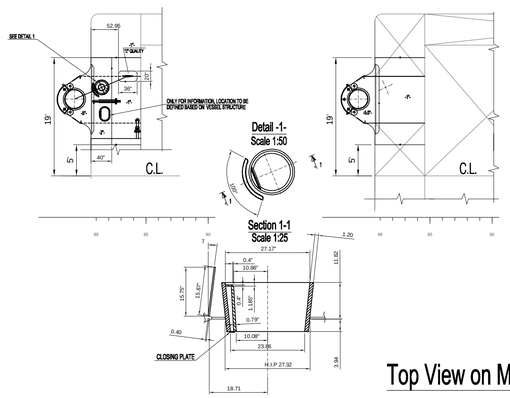
Revisions					
Rev.	Description	Constr.	Checked	Mat. check	Date
A	Correction on reaction forces	EG	DV		19-09-2019
B	Gerenal update base on latest information and 900mm IHC Spud	EG			14-03-2020
C	Deck & Bottom Insert plates thickness specified	EG			23-03-2020

Side View



Top View on Main Deck

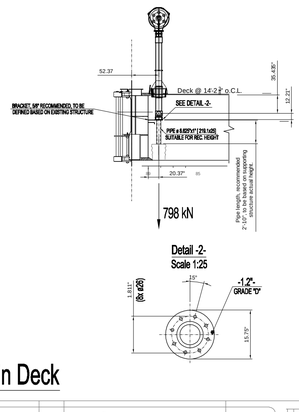
For details on Spud Well assembly see Ref. 5



Top View on Bottom

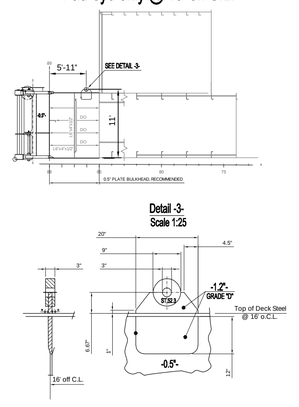
For details on Spud Well assembly see Ref. 5

Long. Section @ 14'-2 3/8" off C.L.

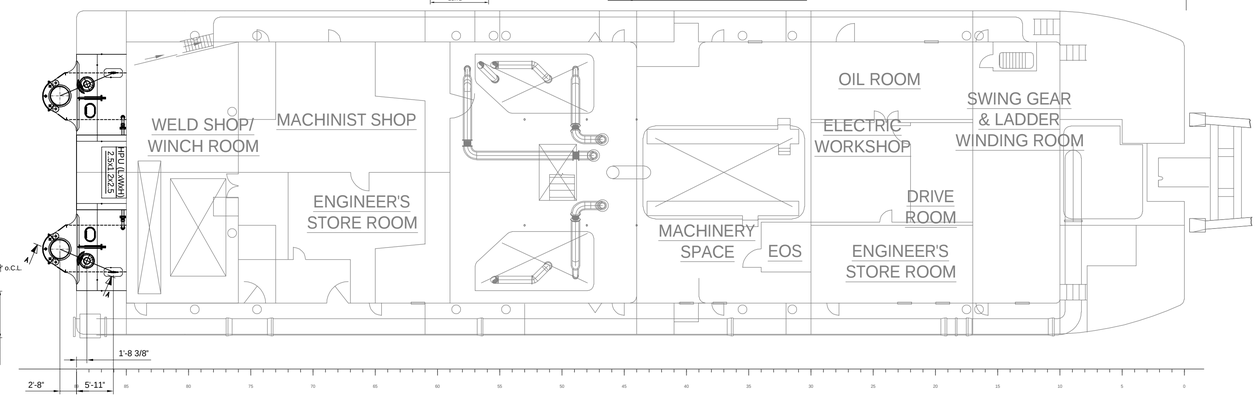


Long. Section @ 8'-6" & 16' off C.L.

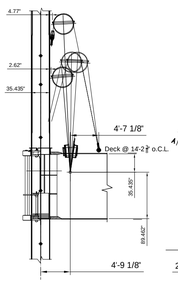
Pad-eye only @ 16' off C.L.



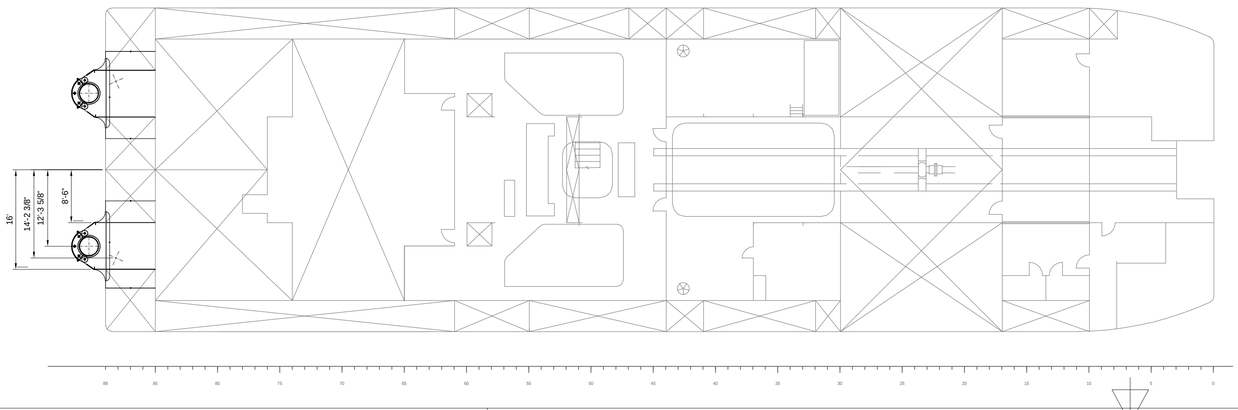
Top View on Main Deck



Section A-A



Top View on Bottom



GENERAL NOTES:

The present drawing constitutes a General Lay-Out drawing. Its purpose is to evidence the location of the main items related to the installation of the IHC Spud Lifting System. Consequently the information contained is generaly not to be used for fabrication purposes. However, Details 1, 2 & 3 as described in this drawing may be considered valid for fabrication subject to the following note:
All structural elements shown, and relevant information, are based on IHC standards and should be verified as required, against:
- U.S. standards;
- ABS rules (steel grade selection, strength calculations etc);

NOTES ON STRUCTURAL INDICATIONS:

- All dimensions are based on metric units converted to imperial units (inches, unless otherwise indicated). These should be checked and confirmed with imperial units during engineering;
- Mild Steel unless otherwise specified;
- Cylinder and cylinder tub support details to be further developed based on adjacent structures;
- Materials (e.g. steel grade vs. plate thickness) to be in accordance with ABS rules and U.S. standards;
- Tapering of plates to be in accordance with ABS rules.

NOTES ON LOADS ACTING ON THE VESSEL:

- The loads on the Spud base and on the Spud Gates have been determined for a dredging depth of 55', based on the bending capacity of the Original Spuds of the Oregon [Ref.2]. Therefore, it must be ensured that the actual force on the Spud, as resulting from actual operation of the Vessel (thus based on dredging force, swing winch force, current, wind etc.), always remains below 295 kN.
- The load associated to the Cylinder operation (798kN) is calculated based on the standard configuration of the Cylinder for use on the IHC B65.
- The load associated to the HPU (40kn) corresponds to the supply as descibed in [Ref.4] and is to be considered as approximate.

NOTES ON IHC SPUD LIFTING SYSTEM COMPONENTS:

- The Spud Gates and Spud keeps shown in the present drawing, deviate from the standard IHC design for B65 [Ref.3], as follows:
  - Both have been modified in height in order to fit the Oregon deck height;
  - A radious has been introduced on top and bottom gates for a smoother load introduction;
  - Longitudinal plating of Spud gates have been slightly adjusted in order to fit Oregon's transversal spacing;
  - For a detailed description of the Spud Well Gate see Ref. 5
- The HPU as per [Ref.4] has an estimated envelope size of 2500x1200x2500mm (LxWxH) and will be mounted on a painted carbon steel skid frame, they lay-out of which is unknown at the moment. The HPU will need to be hosted in a Technical Space. The latter has been drawn, for reference, on main deck but should be treated as preliminary since pending exact arrangement.

REFERENCES:

1. General Arrangement drawing of the modified Vessel - Received by IHC America, via email, on 03/09/2019.
2. Drw. CD DO 2002-01 Rev.C "SPUD PILE REPLACEMENT"
3. IHC B65 Spud Lifting System installation
4. IHC SAS-Hytop B.V. quotation Q44371-R0 for HPU & Manifolds for Spud stystem
5. 62408-0323-001 IHC Spud Gate Structural Drawing
6. 62408-2860-100 Spud Ø 900mm - 18m
7. NAVD 2019-502_As Negotiated_ET_20191119 by GLOSTEN N.A.

Number	Pos Nr.	Number for 1 x assoc.	Description	Material	Code Nr.	BBW Ink. / Action	Pattern Nr.	Net mass per ship Kg	Remarks
3									
2									
1									

Project- and Activity Nr.	Name		Date
	Constr.	EG	17-09-2019
	Checked	DV	17-09-2019
	Mat.check		

Destination	Approved	Date
	Class	
	Owner	
Date	Auth.	
	Other	

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P. O. BOX 50
2960 AB KINDERDIJK, THE NETHERLANDS
www.royalihc.com

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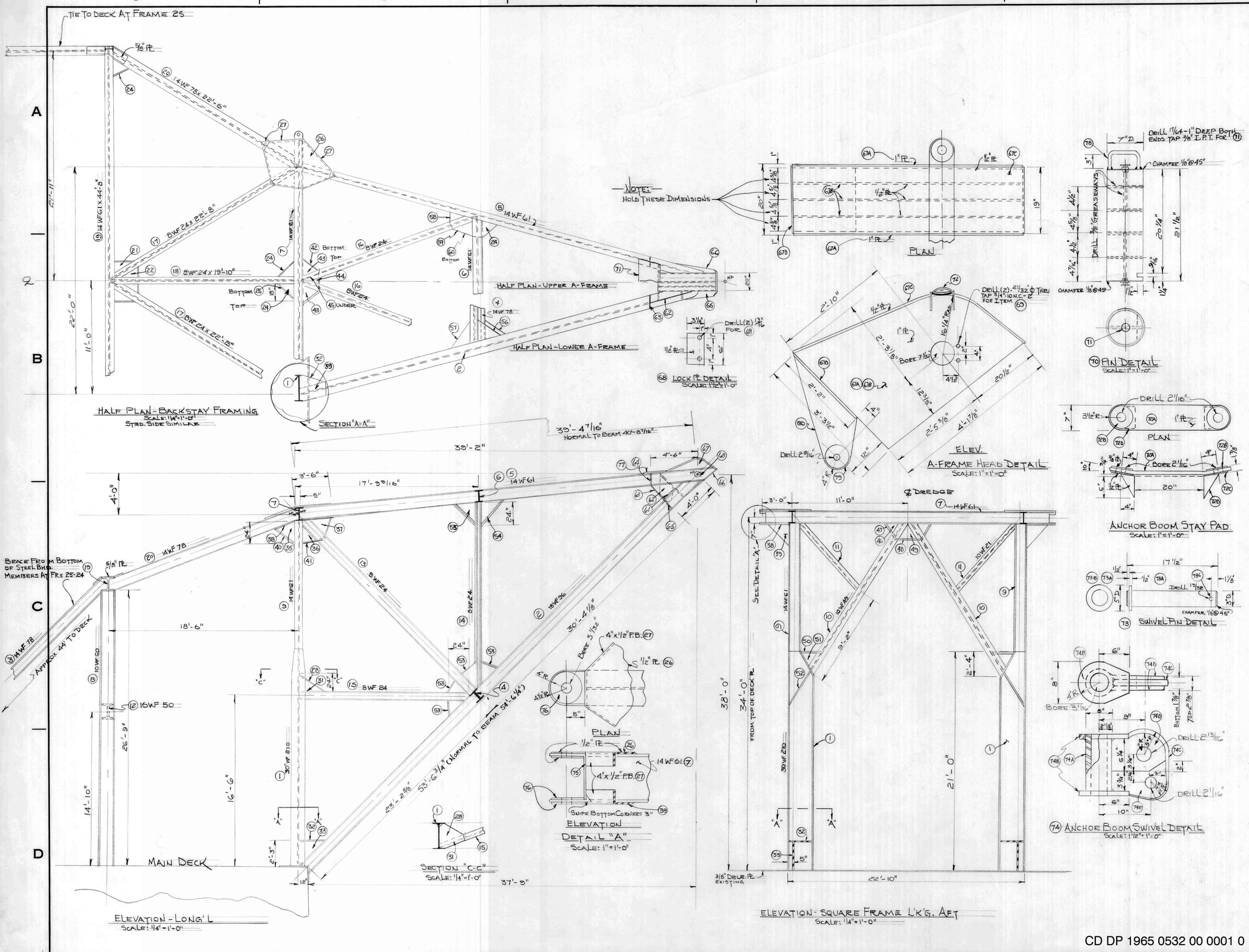
B65 IHC SPUD LIFTING SYSTEM LAY-OUT

900mm SPUD - CONVERTED DREDGE OREGON

Customer Dwg. Nr.	Belongs to: Section Nr.:	Compartm. Nr.:
Projection:	Drawing Nr.: 62408 – 0338 – 022	
Scale: 1:150	Sheet 1 of 1 sheets	Revision: C

A1



ALTERATIONS

NO.	REMARKS	DATE	BY	APP'V'D.

BILL OF MATERIAL

MARK	QTY.	DESCRIPTION	WEIGHT

GENERAL NOTES

FOR BILL OF MATERIAL SEE DWG. 0-B-116

DISTRIBUTION

YARD SUPT.	
MACH. SHOP	
PURCHASING	
ENGINEERING	
ALTERATION	
DATE PRINTED	
NO. PRINTED	

PRINT RECORD

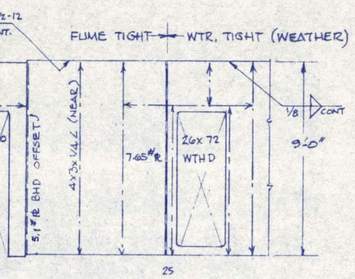
	FOR DREDGE
"A"-FRAME DETAILS	OREGON

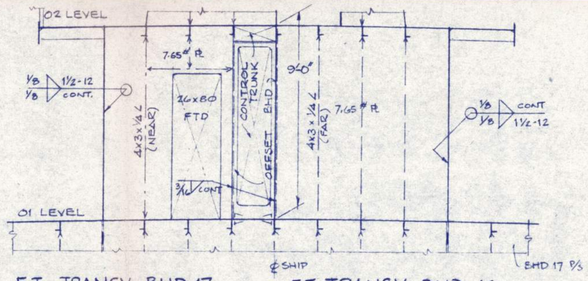
BAUER DREDGING Co. INC.
PORT LAVACA, TEXAS

REVISION	DATE: 3-4-65	DRAWING No.
	SCALE: SHOWN	0-C-123
	DRAWN BY: T.B.L.	
	CHECKED BY:	

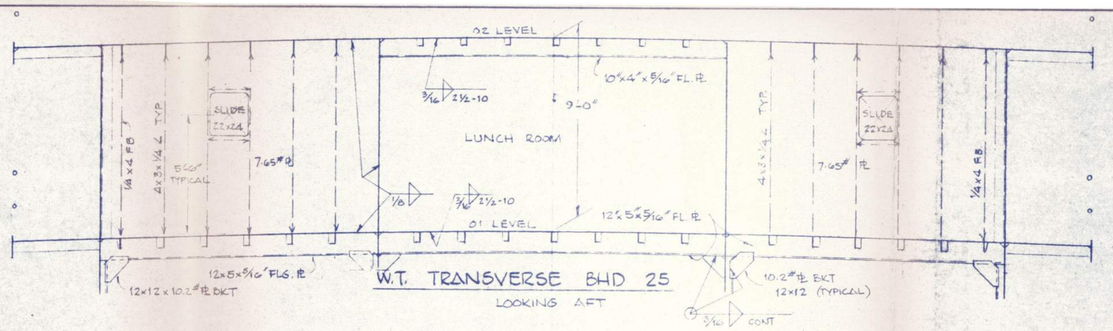
CD DP 1965 0532 00 0001 0

MICROFILMED DP65-532





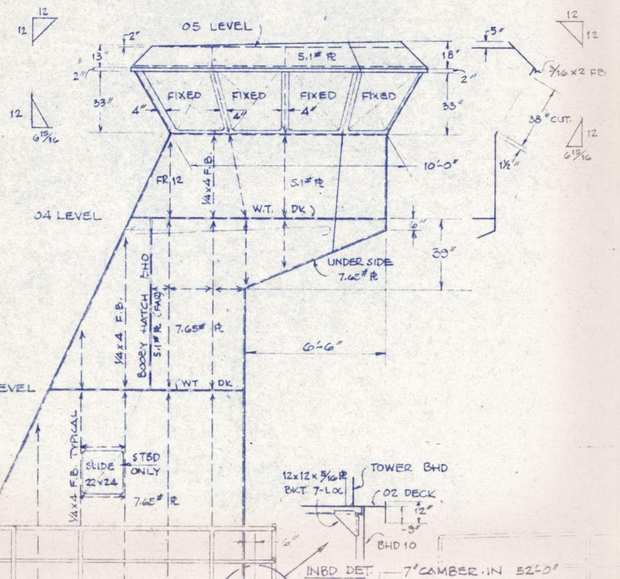
F.T. TRANSV. BHD 17
LOOKING AFT

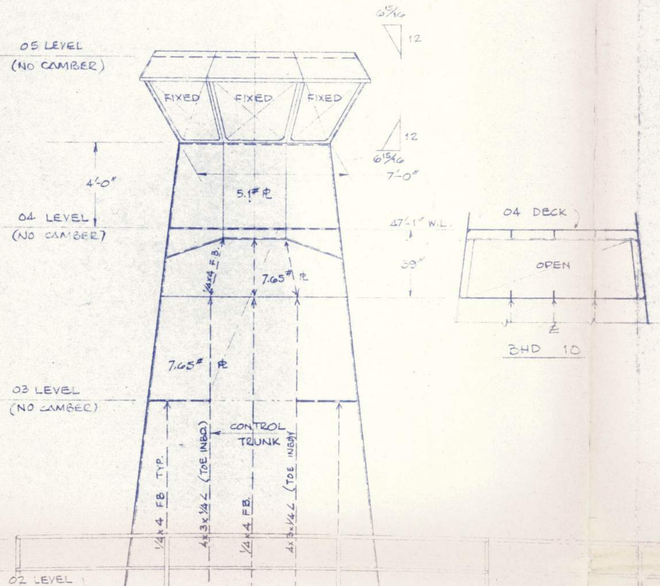


W.T. TRANSVERSE BHD 25
LOOKING AFT

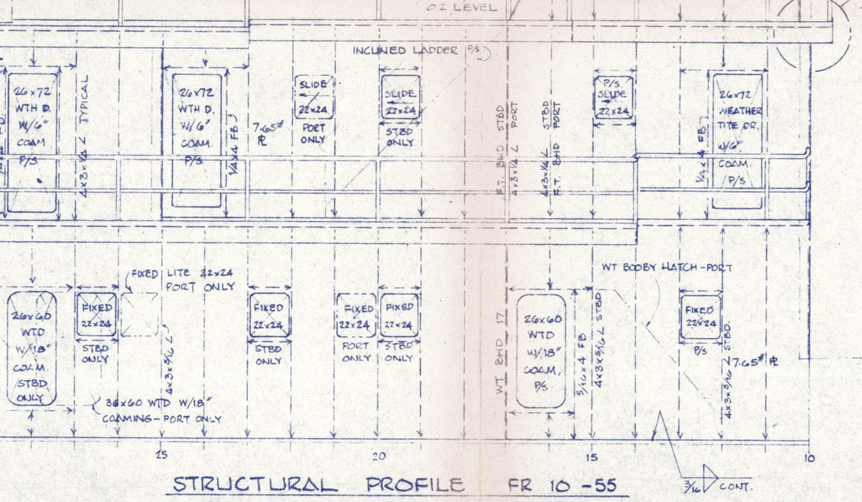
F.T. BHD (NEAR)
26x80 F.T.D
5.1# FR BHD OFFSET
4x3x1/4 L (FAR)
7.65# FR
26x72 W.T.H.D
1/8 1 1/2-12 CONT
30
25

25-41 STBD.
PORT

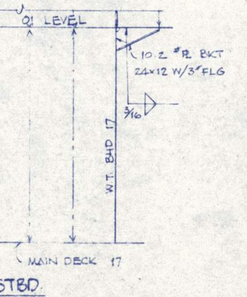




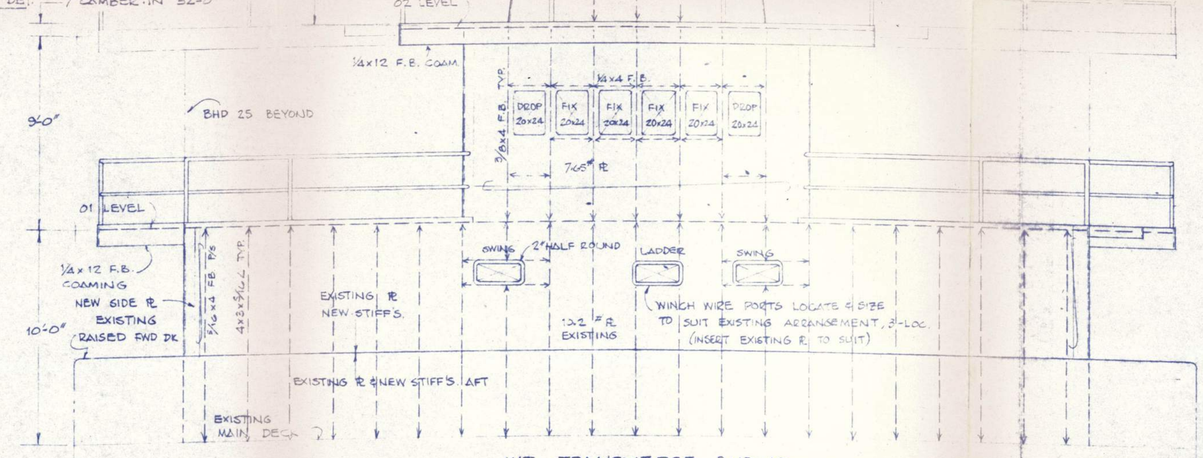
HAND RAIL: 1 1/2" IPS. TOP CHORD
℄ STANCHIONS W/ 1 1/4" IPS MIDDLE CHORD.
FR. 10-54 @ 02 LEVEL, FR 10-30 @ 01 LEVEL.



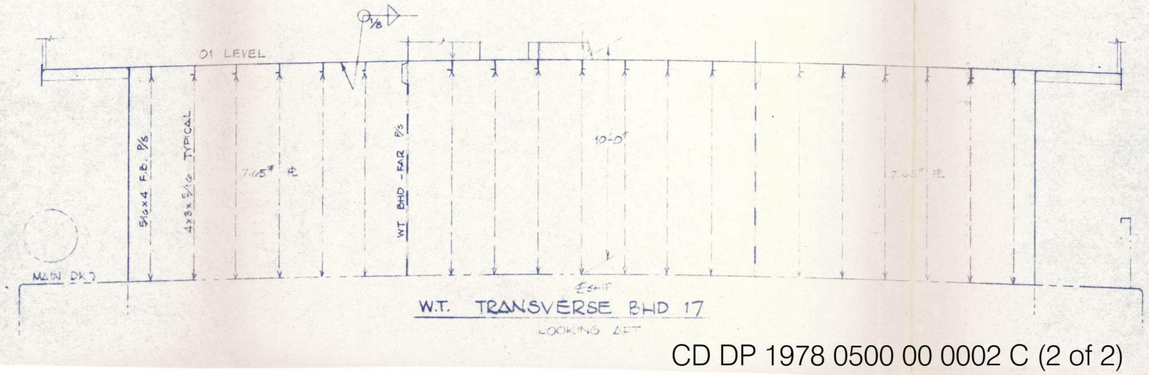
STRUCTURAL PROFILE FR 10 - 55
STBD SIDE SHOWN LKG TO PORT -
PORT SIDE SIMILAR TO OPP HAND



STBD.



W.T. TRANSVERSE BHD. 10
LOOKING AFT



W.T. TRANSVERSE BHD 17
LOOKING AFT

GENERAL NOTES

1. ALL STEEL TO BE ASTM A-36 PLATES & SHAPES WITH WHEEL-ABRATED SURFACE & ONE COAT SHOP PRIME BOTH SIDES.
2. ENDS OF ALL ~~BEAMS & STIFF'S~~ TO BE WELDED DOUBLE CONTINUOUS FOR 6".
3. WELDING OF INTERNAL STIFF'S TO BE STAGGERED 1 1/2-12 FILLETS 1/16" LESS THAN THE THINNEST MEMBER OF THE CONNECTION (NOT LESS THAN 1/8").
4. BHDS & DECKS EXPOSED TO WEATHER SHALL BE WELDED DOUBLE CONTINUOUS.
5. FUME TIGHT BHDS TO BE CONT. WELDED ONE SIDE, INTERMITTENT WELDED ON THE OTHER ALL AROUND (1 1/2-12).
6. BEAMS & STIFFENERS TO BE COPED IN WAY OF ATTACHED PLATE SEAMS.
7. PLATE SEAMS & BUTTS TO BE LOCATED TO SUIT WITH NO BUTT OR SEAM DIRECTLY ON A FRAME, BEAM OR BHD.
8. CUT-OUTS SHALL BE ADEQUATELY COMPENSATED WITH COAMINGS, INSERTS OR DOUBLERS.
9. PERIMETER OF WASHROOMS TO BE WELDED DOUBLE CONTINUOUS TO 18" ABOVE DECK.
10. LONG'LS ARE TO HAVE MATCHED PAIR OF WELDS ON BOTH SIDES OF PENETRATIONS THROUGH GIRDERS.
11. LONG'L BHDS SIMILAR IN CONSTRUCTION TO THAT SHOWN FOR INTERIOR LONG'L BHD 25-41 (01-02 LEVEL) ARE TO BE INSTALLED AT FR. 58-76 @ ℄ AND FR. 67-76 @ 15' TO STBD OF ℄, BETWEEN THE MAIN DECK AND 01 LEVEL (10').

    TRANSVERSE BHDS SIMILAR IN CONSTRUCTION TO THAT SHOWN FOR INTERIOR TRANSVERSE BHD. 40 (01-02 LEVEL) ARE TO BE INSTALLED AT FR. 67 FROM 15' TO 21' STBD OF ℄ AND AT FR. 72 FROM 21' PORT OF ℄ TO 15' STBD OF ℄.

SYMBOL	REVISION	DATE
F	REVISED 03 LEVEL BHDS TO SHOW AS BUILT CONDITION	6-5-79
E	ADD HANDRAIL NOTE, ALT'D BHD 25 VIEW, CONTR. TK @ 1C, LEV. RM. WINDOW CUT	1/8/79
D	LEV. RM. WINDOW HEIGHT.	11-9-78
C	MOD. TO BHD 10 - KEEP EXIST'G FR, DEL. BHD 25(3) MM. LEV. RM. WINDOW HEIGHT.	10-3-78
B	ADDED BOOBY HATCH BHDS @ MN. DK.	
A	ALT'D HAND RAILS & WELD DET. ADDED	9-22-78

FREDDRYCK M. BARFUET
NAVAL ARCHITECT & MARINE ENGINEER
6211 NORTH ENSIGN PORTLAND, OREGON 97217

PORT OF PORTLAND
DREDGE OREGON DECK HOUSE

TITLE
STRUCTURAL
PROFILE & BULKHEADS

DESIGNED FMB.	APPROVED ABS LTR. OF 11-21-78	DATE
DRAWN		
CHECKED	SCALE 1/4"=1'-0"	
DRAWING NO. 1111-2		REVISION F

CD DP 1978 0500 00 0002 C (2 of 2)
Page 467 of 726

Federal Government

Agency: Puget Sound Naval Shipyard

Vessels:

- Barge 40
- Barge 60
- Beluga
- Edgecumbe
- Future Barge 1
- Future Barge 2

Puget Sound Navel Shipyard provided data sheets to the IBR Program. The CRC NIR did not include additional vessel survey information or images.

From: Preisinger, Rachel A CIV USN NAVSHIPYDIMF PGS WA (USA)
To: Brian Carrico
Cc: Nicole McDermott
Subject: RE: Interstate Bridge Replacement Project - PSNS Vessel Use Columbia River
Date: Wednesday, June 16, 2021 2:56:28 PM
Attachments: IBRP_Vessel Data Sheets_Puget Sound Naval Shipyard_2021.pdf

Hello Brian,

Attached are the updated vessel data sheets.

Please note that the YP 701 and YTT 10 previously listed in 2012 are no longer expected.

Thank you for giving us the opportunity to provide input on the I-5 Bridge replacement.

Rachel Preisinger
Reactor Compartment
Disposal Division
Puget Sound Naval Shipyard &
Intermediate Maintenance Facility

From: Brian Carrico <Brian.Carrico@interstatebridge.org>
Sent: Tuesday, June 08, 2021 8:10 AM
To: Preisinger, Rachel A CIV USN NAVSHIPYDIMF PGS WA (USA) <rachel.preisinger@navy.mil>
Cc: Nicole McDermott <Nicole.McDermott@interstatebridge.org>
Subject: [Non-DoD Source] Re: Interstate Bridge Replacement Project - PSNS Vessel Use Columbia River

Hi Rachel, it has been a little while since I sent this. I wanted to check in to see if you have been able to review and confirm this information or if you need anything else from us to complete the effort.

Let me know if I can be of further assistance.

Brian

From: Brian Carrico
Sent: Wednesday, May 12, 2021 2:24 PM
To: Preisinger, Rachel A CIV USN NAVSHIPYDIMF PGS WA (USA) <rachel.preisinger@navy.mil>
Cc: Nicole McDermott <Nicole.McDermott@interstatebridge.org>
Subject: Re: Interstate Bridge Replacement Project - PSNS Vessel Use Columbia River

Thanks for getting back to me so quickly. Attached are a few things. The PDF files are the actual data used in the 2012 effort. We translated this into a new Word document (also

attached) that you could use to update information. Alternatively, you could access our online survey to input the information (at the link in the prior email).

Brian

From: Preisinger, Rachel A CIV USN NAVSHIPYDIMF PGS WA (USA)
Sent: Wednesday, May 12, 2021 12:13 PM
To: Brian Carrico
Subject: RE: Interstate Bridge Replacement Project - PSNS Vessel Use Columbia River

Hello Brian,

Thank you for contacting us about navigation needs for our shipments on the Columbia River. Please send me the prior information you need reviewed and verified, and myself or someone from my office will get back to you.

Thank you.

Rachel Preisinger
Reactor Compartment
Disposal Division
Puget Sound Naval Shipyard &
Intermediate Maintenance Facility

From: Brian Carrico <Brian.Carrico@interstatebridge.org>
Sent: Tuesday, May 11, 2021 1:11 PM
To: Preisinger, Rachel A CIV USN NAVSHIPYDIMF PGS WA (USA) <rachel.preisinger@navy.mil>
Subject: [Non-DoD Source] Interstate Bridge Replacement Project - PSNS Vessel Use Columbia River

Rachel,

I am part of the team working on the Interstate Bridge (IBR) Program for ODOT and WSDOT (https://www.interstatebridge.org/rivernavigation/). I am reaching to you as part of the projects efforts to complete a Navigation impact Report as part of the USCG permitting process for the new bridge. We are collecting information on vessel use of the Columbia River and you provided information for PSNS for the prior Columbia River Crossing Project. We are seeking to validate and update the previously provided information. Are you the correct person to do this? If so can I send you the prior information to review and confirm? Thanks in advance for your time and feel free to reach out if you have any questions specific to this

request or the program in general.

Brian Carrico
Interstate Bridge Replacement Program
Environmental Program
O: 360-823-6122 | **C:** 360-433-7775
E: brian.carrico@interstatebridge.org
interstatebridge.org

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Puget Sound Naval Shipyard

Vessel Name:
Barge 40

Vessel Type:
Freight Barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: National Defense

USCG Document Number:
1035597

Primary Mooring Location *(waterway milepoint, if known)*:
Bremerton, WA

Type and quantity of cargo, if applicable:
1 Package

Length (overall; ft):
250

Beam (width; ft):
68

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:
14.75, worst case

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
50 (combined barge and package above waterline)

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
15

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:
100

Transit speed under Interstate Bridge and Load Configuration:
10 knots
Full Load Displacement: 3302 long tons

Time of Year of Passage:
Shipments typically occur during mid-March to mid-April and September through October.
Shipment time and frequency can vary but averages two per year.

Tug Assistance Required:Yes

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ **Feb**_____ **Mar**___X_____ **Apr**___X_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**____X____ **Oct**____X_____ **Nov**_____ **Dec**_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ **Feb**_____ **Mar**_____ **Apr**_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**_____ **Oct**_____ **Nov**_____ **Dec**_____

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Company/Owner Name: Puget Sound Naval Shipyard

Vessel Name:
Barge 60

Vessel Type:
Freight Barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: National Defense

USCG Document Number:
630028

Primary Mooring Location *(waterway milepoint, if known)*:
Bremerton, WA

Type and quantity of cargo, if applicable:
1 Package

Length (overall; ft):
230

Beam (width; ft):
60

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:
14.75, worst case

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
43 (combined barge and package above waterline)

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
15

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:
100

Transit speed under Interstate Bridge and Load Configuration:
10 knots
Full Load Displacement: 2385 long tons

Time of Year of Passage:
Shipments typically occur during mid-March to mid-April and September through October.
Shipment time and frequency can vary but averages two per year.

Tug Assistance Required:Yes

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ **Feb**_____ **Mar**___X_____ **Apr**___X_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**____X____ **Oct**____X_____ **Nov**_____ **Dec**_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ **Feb**_____ **Mar**_____ **Apr**_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**_____ **Oct**_____ **Nov**_____ **Dec**_____

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Company/Owner Name: Puget Sound Naval Shipyard

Vessel Name:
Beluga

Vessel Type:
Freight Barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: National Defense

USCG Document Number:
586036

Primary Mooring Location *(waterway milepoint, if known)*:
Bremerton, WA

Type and quantity of cargo, if applicable:
1 Package

Length (overall; ft):
240

Beam (width; ft):
60

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:
14.75, worst case

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
43 (combined barge and package above waterline)

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
15

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:
100

Transit speed under Interstate Bridge and Load Configuration:
10 knots
Full Load Displacement: 2509 long tons

Time of Year of Passage:
Shipments typically occur during mid-March to mid-April and September through October.
Shipment time and frequency can vary but averages two per year.

Tug Assistance Required:Yes

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ **Feb**_____ **Mar**___X_____ **Apr**___X_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**____X____ **Oct**____X_____ **Nov**_____ **Dec**_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ **Feb**_____ **Mar**_____ **Apr**_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**_____ **Oct**_____ **Nov**_____ **Dec**_____

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Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Puget Sound Naval Shipyard

Vessel Name:
Edgecumbe

Vessel Type:
Freight Barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: National Defense

USCG Document Number:
591009

Primary Mooring Location *(waterway milepoint, if known)*:
Bremerton, WA

Type and quantity of cargo, if applicable:
1 Package

Length (overall; ft):
240

Beam (width; ft):
60

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:
14.75, worst case

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
43 (combined barge and package above waterline)

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
15

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:
100

Transit speed under Interstate Bridge and Load Configuration:
10 knots
Full Load Displacement: 2439 long tons

Time of Year of Passage:
Shipments typically occur during mid-March to mid-April and September through October.
Shipment time and frequency can vary but averages two per year.

Tug Assistance Required:Yes

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ **Feb**_____ **Mar**___X_____ **Apr**___X_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**____X____ **Oct**____X_____ **Nov**_____ **Dec**_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ **Feb**_____ **Mar**_____ **Apr**_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**_____ **Oct**_____ **Nov**_____ **Dec**_____

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Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Puget Sound Naval Shipyard

Vessel Name:
Future Barge 1

Vessel Type:
Freight Barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: National Defense

USCG Document Number:
NA

Primary Mooring Location *(waterway milepoint, if known)*:
Bremerton, WA

Type and quantity of cargo, if applicable:
1 Package

Length (overall; ft):
355

Beam (width; ft):
80

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:
17.75, worst case

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
53 (combined barge and package above waterline)

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
15

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:
100

Transit speed under Interstate Bridge and Load Configuration:
10 knots
Full Load Displacement: 8398 long tons

Time of Year of Passage:
Shipments typically occur during mid-March to mid-April and September through October.
Shipment time and frequency would vary, but could average two per year.

Tug Assistance Required:Yes

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ **Feb**_____ **Mar**___X_____ **Apr**___X_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**____X____ **Oct**____X_____ **Nov**_____ **Dec**_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ **Feb**_____ **Mar**_____ **Apr**_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**_____ **Oct**_____ **Nov**_____ **Dec**_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Puget Sound Naval Shipyard

Vessel Name:
Future Barge 2

Vessel Type:
Freight Barge

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: National Defense

USCG Document Number:
NA

Primary Mooring Location *(waterway milepoint, if known)*:
Bremerton, WA

Type and quantity of cargo, if applicable:
1 Package

Length (overall; ft):
276

Beam (width; ft):
78

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Draft (ft) - *depth of hull below waterline, fully laden*:

14.75, worst case

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

54 (combined barge and package above waterline)

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

15

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

100

Transit speed under Interstate Bridge and Load Configuration:

10 knots

Full Load Displacement: 4447 long tons

Time of Year of Passage:

Shipments typically occur during mid-March to mid-April and September through October.

Shipment time and frequency would vary, but could average two per year.

Tug Assistance Required:Yes

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ **Feb**_____ **Mar**___X_____ **Apr**___X_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**____X____ **Oct**____X_____ **Nov**_____ **Dec**_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ **Feb**_____ **Mar**_____ **Apr**_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**_____ **Oct**_____ **Nov**_____ **Dec**_____

Federal Government

Agency: Tongue Point Job Corps (Maritime Training Program)

Vessel:

- USCG M/V Ironwood buoy tender

Tongue Point did not respond to IBR request. Information below was included in CRC NIR.

Federal Government

Owner: Tongue Point Job Corps Maritime Training Program

Vessel: M/V Ironwood

Columbia River CROSSING

River User Data Sheet

By: TIM PUGH Date: 5/10/2012

1. Company name and/or owner of vessel and contact information

Name of company: TONGUE POINT JOB CORPS MARITIME TRNG PROGRAM

Name of contact: CAPT JAMES VANWORMER

Phone number (Office): 503-338-4977 (Cell): _____

Email: VANWORMER.JAMES@JOBCORPS.ORG

Address: 37573 OLD HWY 30

City: ASTORIA State: OR Zip code: 97146

3a. Vessel name: M/V IRONWOOD **3b. Vessel type:** TRAINING SHIP

3c. U.S. Coast Guard Document Number: WLB297 (EX USCG BUOY TENDER)

4a. Length Overall (LOA), **feet:** 180' **4b. Beam** (width), **feet:** 37

5. Draft (depth of hull below waterline, fully laden), **feet:** 14'

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), **feet:** 82'

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 6'

8. Frequency of one-way passage underneath I-5 main channel (typical per month):

Jan ___ Feb ___ Mar ___ Apr ___ May 1 Jun 1 Jul 1 Aug 1 Sep ___ Oct ___ Nov ___ Dec ___

9. Frequency of one-way passage underneath I-5 main channel (other historic events): 0 N/A

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

Jan ___ Feb ___ Mar ___ Apr ___ May 1 Jun 1 Jul 1 Aug 1 Sep ___ Oct ___ Nov ___ Dec ___

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): _____

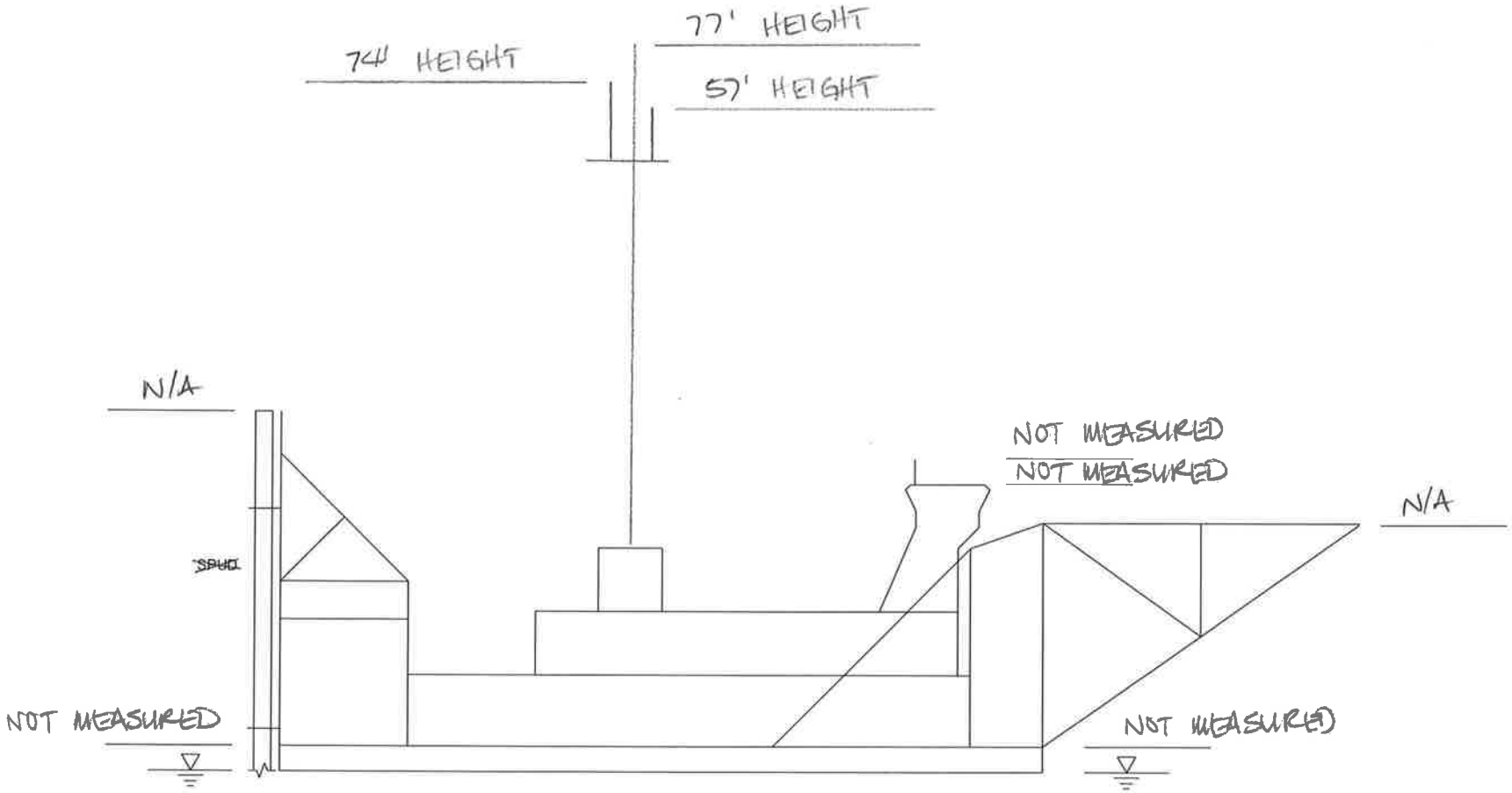
12. Do you have a business plan (e.g. 10 or 20 year plan)? N/A

What does it say related to vessels traveling under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? _____

May we have a copy? _____

13. Other (additional sheets may be attached.) _____

Jun 04 12 03:43p Patrick Albers 503-325-8761 p.2



IRONWOOD
NAME

TONGUE POINT, ASTORIA, OR
LOCATION

07-10-12
DATE

Vessel Name	Owner	Antenna Elev (ft)	Mast Elev (ft)	Spud Elev (ft)	Boom Crane Elev (ft)	Gantry Elev (ft)	Pivot Pt Elev (ft)	Cradle Elev (ft)	Water Elev (ft)	Height Above Water
Ironwood	Tongue Point Job Corps Maritime Training Program	60.2	N/M	N/A	N/A	N/A	N/A	N/A	3.4	57
		77.4	N/M	N/A	N/A	N/A	N/A	N/A	3.4	74
		80.5	N/M	N/A	N/A	N/A	N/A	N/A	3.4	77
Heidi Renee	J.E. McAmis	N/A	N/A	82.8	N/A	N/A	N/A	N/A	2.2	81
Carr	Bergerson Construction Inc.	N/A	N/A	79.1	N/M	N/M	N/M	N/A	1.8	77
		N/A	N/A	80.2	N/M	N/M	N/M	N/A	1.8	78
		N/A	N/A	N/M	53.5	N/M	N/M	N/A	1.8	52
		N/A	N/A	N/M	94.8	N/M	N/M	N/A	1.8	93
Betsy Ross	Bergerson Construction Inc.	N/A	N/A	71.0	NM	N/M	N/M	N/M	3.0	68
		N/A	N/A	N/M	69.3	N/M	N/M	N/M	3.0	66
		N/A	N/A	N/M	158.4	N/M	N/M	N/M	3.0	155
		N/A	N/A	71.4	NM	N/M	N/M	N/M	3.0	68

N/A - does not exist
N/M - exists but not measured

Vessel Height Verification Sheet

By: Karl Krcma Date: 10 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Tongue Point Job Corps
   b. Name of contact: Captain James VanWormer
   c. Phone number (Office): 503.338.4977 (Cell): 206.715.8174
   d. Email: vanwormer.james@jobcorps.org
   e. Address: 37573 Old Hwy 30 City: Astoria
      State: OR Zip code: 97146
2. Vessel
   a. ID: b. Name: M/V Ironwood
   c. Type: ex USCG Buoy tender d. USCG Document Number: WLB297
3. Vessel Configuration
   a. Identify vessel configuration:
   - Is a vessel specification sheet available? No
   - Configuration shown on the sheet: not shown, photo only
   - What is the lowest height configuration for transport? 77' (74' without antenna)

   b. What is the gantry configuration? N/A Estimated gantry height: N/A

   c. Does the barge have spuds? N/A
   - Height above waterline for travel? N/A
   - Can the spuds be removed for travel? N/A
   - Work and cost involved in removing spuds? N/A
4. Vessel Location
   a. Where is the vessel currently located? Tongue Point, Columbia River
   b. Is it working on a job? N/A Is it tied up to shore? Yes

c. What is the best time to make a trip to the vessel? Priot to end of July, Just need a few days advance notice.

5. Surveyed Measurements (all measurements NAVD 88)

Gantry Height:	N/A
Water Level:	N/A
Top of Boom:	N/A
Height of Boom Hinge Pin:	N/A
Boom Cradle:	N/A
Top of Spud:	N/A
Top of Deck:	N/A

6. Vessel Height

Self-Reported		Surveyed	
Air Draft:	82 feet	Air Draft:	77 feet
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet (CRD)	Water Level:	16 feet (CRD)
Total Height:	108 feet	Total Height:	103 feet

7. History Notes

Date	Item
5/10/2012	Contacted by Karl Krcma
5/10/2012	Data sheet submitted
6/28/2012	Contacted by Karl Krcma for field measurement
7/10/2012	Field measured
7/17/2012	New data sheet submitted

Federal Government

Agency: USACE

Vessel: Yaquina

USACE confirmed the information provided during the CRC NIR is still accurate (email confirmation included below). Vessel details that follow were included in the CRC NIR.

From: Hicks, Jeffrey T CIV USARMY CENWP (USA)
To: Brian Carrico
Cc: Nicole McDermott; Darlene Siegel
Subject: RE: Interstate Bridge Replacement Project - USACE vessels/Navigation needs
Date: Tuesday, June 8, 2021 8:43:19 AM
Attachments: image001.png
image002.png
image003.png
image004.png

Brian,

I did just get a response on the upcoming planned activities from our Operating Project Managers.

The Yaquina looks to be the tallest USACE vessel that we expect to transit through the area. Annual O&M dredging's in water work window is 1 August to 30 September but we need to have the ability to address shoals at any time of year. I believe that's how we landed on the river level + Yaq height clearance in our formal letter to the CRC.

As far as future work goes, our contractors often move equipment and materials via barge to construction projects. For example recent gate replacements, JD AWS electrical building, etc along with the large cranes mobilized to handle these. The largest crane I've heard coming up river was "The General" which I think Kiewit now owns.

I am trying to verify the dimensions of "the General" as well as the largest items we've moved under contract (likely The Dalles or John Day Gates). Otherwise there is nothing planned that would be impacted by the bridge height.

Thanks, Jeff

Jeff Hicks | Portland District Project Manager
☏: 503.710.8256| Jeffrey.T.Hicks@usace.army.mil

From: Brian Carrico <Brian.Carrico@interstatebridge.org>
Sent: Tuesday, June 8, 2021 8:14 AM
To: Hicks, Jeffrey T CIV USARMY CENWP (USA) <Jeffrey.T.Hicks@usace.army.mil>
Cc: Nicole McDermott <Nicole.McDermott@interstatebridge.org>; Darlene Siegel <Darlene.Siegel@interstatebridge.org>
Subject: [Non-DoD Source] Re: Interstate Bridge Replacement Project - USACE vessels/Navigation needs

Jeff, it has been a few weeks since sending this. I wanted to check in with you to see if you need further information from the team in order to complete this request and/or if you have

an estimate for when we may get the information. Thanks in advance.

Brian

From: Brian Carrico <Brian.Carrico@interstatebridge.org>
Sent: Thursday, May 13, 2021 10:22 AM
To: Hicks, Jeffrey T CIV USARMY CENWP (USA) <Jeffrey.T.Hicks@usace.army.mil>
Cc: Nicole McDermott <Nicole.McDermott@interstatebridge.org>; Darlene Siegel <Darlene.Siegel@interstatebridge.org>
Subject: Re: Interstate Bridge Replacement Project - USACE vessels/Navigation needs

Jeff - attached is the information provided for CRC.

Brian

From: Hicks, Jeffrey T CIV USARMY CENWP (USA) <Jeffrey.T.Hicks@usace.army.mil>
Sent: Thursday, May 13, 2021 10:16 AM
To: Brian Carrico <Brian.Carrico@interstatebridge.org>
Cc: Nicole McDermott <Nicole.McDermott@interstatebridge.org>; Darlene Siegel <Darlene.Siegel@interstatebridge.org>
Subject: RE: Interstate Bridge Replacement Project - USACE vessels/Navigation needs

Hey Brian,

Sorry for the slow response. I would be the correct contact to validate this information. I am working with our Navigation team to answer this question but as far as I'm tracking it was just the Yaquina. Hoping I can get you a formal response by tomorrow.

Thanks, Jeff

From: Brian Carrico <Brian.Carrico@interstatebridge.org>
Sent: Wednesday, May 12, 2021 8:01 AM
To: Hicks, Jeffrey T CIV USARMY CENWP (USA) <Jeffrey.T.Hicks@usace.army.mil>
Cc: Nicole McDermott <Nicole.McDermott@interstatebridge.org>; Darlene Siegel <Darlene.Siegel@interstatebridge.org>
Subject: [Non-DoD Source] Interstate Bridge Replacement Project - USACE vessels/Navigation needs

Jeff,

I am part of the team working on the Interstate Bridge (IBR) Program addressing the USCG permit. We are collecting information on vessel use of the Columbia River and are validating and updating the data provided by the USACE for the prior Columbia River Crossing Project.

The information at that time was provided by Marci Johnson. Would you be the best contact for validating the information? Specifically, I am looking to confirm information on the Yaquina, whether any other USACE vessels would be expected to transit through the area (either North Portland Harbor or the main channel) and whether there are any planned activities at upstream dams would require specific shipments under the bridge in the future.

Thanks in advance. Feel free to call or email if you have questions or need additional information.

Brian

Brian Carrico

Interstate Bridge Replacement Program
Environmental Program

O: 360-823-6122 | **C:** 360-433-7775

E: brian.carrico@interstatebridge.org

interstatebridge.org

Federal Government

Owner: US Army Corps of Engineers

Vessel: Yaquina

Columbia River CROSSING

River User Data Sheet

By: NWP Dredge OPS **Date:** Feb 27, 2012

1. Company Name and/or Owner of Vessel and contact information

Name of company: US Army Corps of Engineers, Portland District

Name of contact: Marci Johnson

Phone number (Office): (503) 808-4765 (Cell): _____

Email: Marci.E.Johnson@usace.army.mil

Address: 333 SW 1st Avenue, P.O. Box 2946

City: Portland State: OR Zip code: 97204

3a. Vessel Name: Yaquina **3b. Vessel Type:** Hopper Dredge

3c. US Coast Guard Document Number: CG000073

4a. Length Overall (LOA)**, feet:** 200 **4b. Beam** (width)**, feet:** 58

5. Draft (depth of hull below waterline, fully laden)**, feet:** 16

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen)**, feet:** 92

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge)**:** 8

8. Frequency of one-way passage underneath I-5 main channel (typical per month)**:** based on historical

Jan 2 **Feb** 2 **Mar** 2 **Apr** 2 **May** 2 **Jun** 2 **Jul** 2 **Aug** 4 **Sep** 4 **Oct** 2 **Nov** 2 **Dec** 2

9. Frequency of one-way passage underneath I-5 main channel (other historic events)**:** included in 8.

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month)**:**

Jan 0 **Feb** 0 **Mar** 0 **Apr** 0 **May** 0 **Jun** 0 **Jul** 0 **Aug** 0 **Sep** 0 **Oct** 0 **Nov** 0 **Dec** 0

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events)**:** none

12. Do you have a Business Plan (e.g. 10 or 20 year plan)**?** provided by letter dated Feb 23, 2012

What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)**?** _____

May we have a copy? _____

13. Other miscellaneous Historical information provided above does not represent future needs. Future needs were provided to CRC by letter dated Feb, 23 2012. As stated in Feb 23, 2012 letter, to ensure safe passage of the dredge Yaquina, the minimum bridge height required for current and future operational needs is 116 feet CRD.

B1-237 Interstate 5 Columbia River Crossing
Navigation Impact Report
Top of mast
Antenna
Top of Boom
Crow's Nest
Light Bar
WH Roof
YAQUINA
Pivot Pt
07.17.2012

Vessel Name	Owner	Antenna Elev (ft)	Mast Elev (ft)	Crow's Nest Elev (ft)	Boom Crane Elev (ft)	Light Bar Elev (ft)	Pivot Pt Elev (ft)	WH Roof Elev (ft)	Bow Deck Elev (ft)	Stern Deck Elev (ft)	Water Elev (ft)	Height Above Water
Yaquina	Army Corps of Engineers	91.3									1.3	90
			87.9								1.3	87
				70.7							3.0	68
					84.1						1.3	83
						69.7					1.3	68
							32.1				1.3	31
								46.5			1.3	45
									16.6		1.3	15
										17.1	0.9	16
		Note: At the time of measurements the bow draft was between 12-12.5 ft. and the stern draft was between 11-11.5 ft.										
		WH - Wheelhouse										

Vessel Height Verification Sheet

By: Karl Krcma Date: July 26, 2012

1. Company Name and/or Owner of Vessel and Contact Information

a. Name of company: US Army Corps of Engineers

b. Name of contact: Marci Johnson

c. Phone number (Office): (503) 808-4765 (Cell):

d. Email: Marci.E.Johnson@usace.army.mil

e. Address: 333 SW 1st Ave, PO Box 2946 City: Portland

State: OR Zip code: 97204

2. Vessel

a. ID: b. Name: Yaquina

c. Type: Hopper Dredge d. USCG Document Number: CG000073

3. Vessel Configuration

a. Identify vessel configuration: Self propelled hopper dredge

- Is a vessel specification sheet available? No
- Configuration shown on the sheet: N/A
- What is the lowest height configuration for transport? 92 feet

b. What is the gantry configuration? N/A Estimated gantry height: N/A

c. Does the barge have spuds? N/A

- Height above waterline for travel? N/A
- Can the spuds be removed for travel? N/A
- Work and cost involved in removing spuds? N/A

4. Vessel Location

a. Where is the vessel currently located? N/A

b. Is it working on a job? N/A Is it tied up to shore? N/A

c. What is the best time to make a trip to the vessel? N/A

5. Measurements from Spec Sheet

Gantry Height:	N/A
Water Level:	N/A
Top of Boom:	N/A
Height of Boom Hinge Pin:	N/A
Boom Cradle:	N/A
Top of Spud:	N/A

6. Vessel Height

Self-Reported		**Surveyed**	
Air Draft:	92	Air Draft:	90 (draft at bow 12-12.5 and draft stern 11-11.5)
Air Gap:	10	Air Gap:	10
Water Level:	16	Water Level:	16
Total Height:	**118 feet**	**Total Height:**	**116 feet**

7. History Notes

Date	**Item**
2/14/2012	Contacted by Karl Krcma
2/27/2012	River user data sheet submitted
7/17/2012	Surveyed

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, PORTLAND DISTRICT
PO BOX 2946
PORTLAND OR 97208-2946

REPLY TO
ATTENTION OF

Planning, Programs and Project
Management Division

FEB 23 2012

Ms. Heather Wills
Columbia River Crossing
700 Washington Street, Suite 300
Vancouver, Washington 98660

Dear Ms. Wills,

This letter is in response to the Columbia River Crossing (CRC), Interstate 5 (I-5) Project boat survey request for information regarding the Corps Dredges Yaquina and Essayons and our navigational needs upstream of the proposed new I-5 bridge project.

We determined that the proposed bridge height outlined in the Record of Decision would have serious impacts on our federal missions to maintain the navigation channel and provide emergency dredging upstream of the new bridge. After considering dredging requirements and potential future water release impacts to the Columbia River, we determined that the minimum prism needed for the new bridge is a height of 116 feet Columbia River Datum (121.4 NAVD88) for a width of 400 feet. A more detailed explanation of our requirements is enclosed.

We will forward a copy of this letter to Rear Admiral Keith Taylor, Commander 13th District United States Coast Guard, Jackson Federal Building, 915 Second Avenue, Seattle, WA 98174-1067, John McAvoy, FHWA, 610 East 10th Street, Vancouver, WA 98661; and Dave Hendricks, Multnomah County Drainage District No. 1, 1880 NE Elrod Dr., Portland, Oregon 97211.

We look forward to resolving these navigation concerns to ensure the CRC project does not have any unacceptable impacts to our federal projects. Please feel free to contact me at (503) 808-4500 or Ms. Marci Johnson of my staff at (503) 808-4765 or via e-mail at marci.e.johnson@usace.army.mil.

Sincerely,

John W. Eisenhauer, P.E.
Colonel, Army Corps of Engineers
District Commander

Enclosure

Printed on Recycled Paper

US Army Corps
of Engineers ®
Portland District

U. S. Army Corps of Engineers Federal Navigation Channel Maintenance Needs
Columbia River Crossing (I-5 Interstate Bridge at Vancouver, WA)
February 2012

Summary:

Minimum prism needed for new bridge is height 116 feet Columbia River Datum (CRD) (equal to 121.4 feet NAVD88) for width 400 feet (channel width of 300 feet plus 50 feet on each side of the channel).

Authorized project:

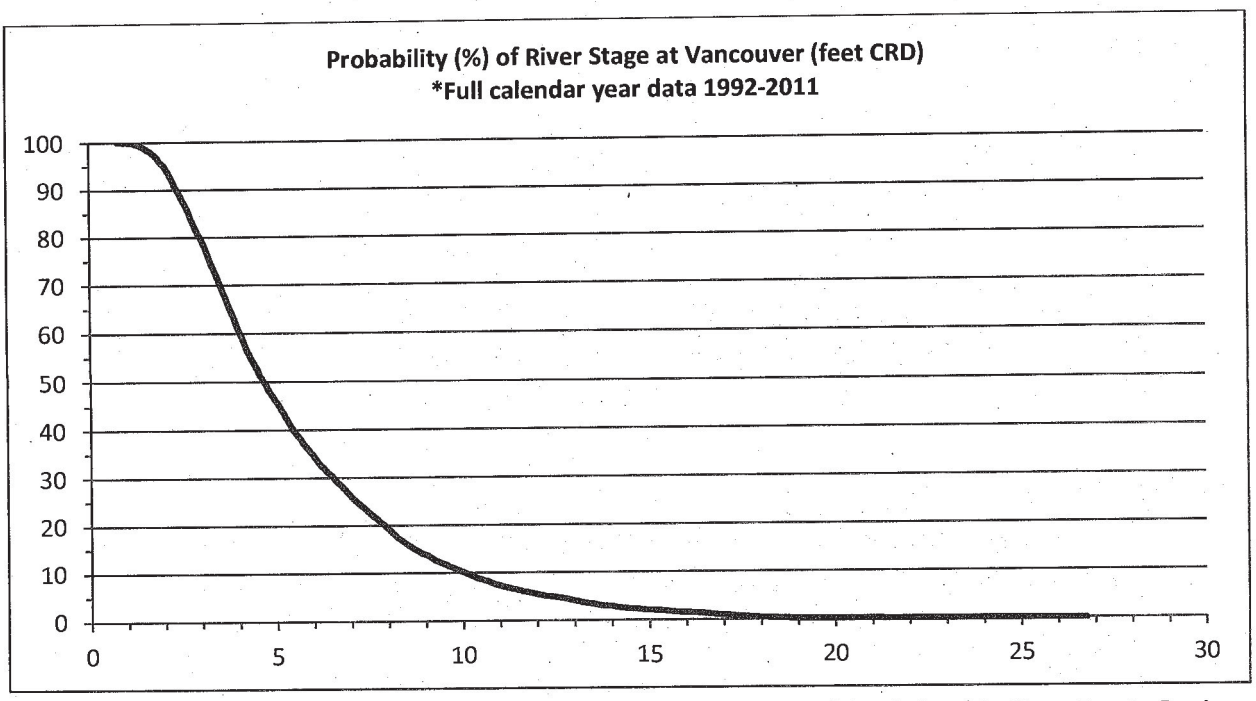
- The federal Navigation Channel immediately upstream of the Columbia River Crossing is authorized to 27 feet deep and 300 feet wide from Vancouver, WA, to The Dalles, OR. This channel supports the Columbia-Snake river system and transportation of 10 million tons of cargo annually. It is the largest wheat/barley export gateway in the U.S. and the third largest grain export gateway in the world.

Minimum bridge prism reasoning:

- The Corps' Dredge *Yaquina* performs annual channel maintenance dredging. The minimum prism needed for the new bridge is the vertical clearance required for this dredge to pass safely under the bridge at a specified river water level above CRD, and the horizontal clearance required for maintenance of the channel under the bridge.

Vertical clearance discussion:

- According to the USCG-licensed captains of the Dredge *Yaquina*, a 100-foot minimum vertical clearance from top of water to bottom of bridge is required (draft of 9 feet below the waterline gives a height of 92 feet above the waterline, plus an 8-foot minimum safety gap).
- The environmentally protective in-water work period as established by Federal and State agencies has changed in the past, and could continue to change as new species are listed, requiring work to be done during periods of higher river flow and stage.
- Year-round river flow levels must be considered as emergency operations could be required at any time. The probability of a river stage is shown below, using available data from the past 20 years.



- The uncertainty of future water levels must be considered. As part of the Columbia River Treaty Review, the Corps is collecting new data and performing studies to evaluate maintaining or potentially changing current levels of regulation for flood risk protection in this region of the Columbia River basin. The National Marine Fisheries Biological Opinion for the Federal Columbia River Power System also requires the Corps to spill water at its Columbia River dams to support salmon survival. These factors may lead to future operations resulting in elevated river levels (closer to ordinary high water) for longer durations compared with the past 20 years. Current Regulatory ordinary high water level at the Columbia River Crossing is 16 feet CRD (equivalent to 21.4 feet NAVD88).
- Bridge lift records show the lift height in feet above zero at the bridge pier elevation (39 feet CRD). Recent records show that the median lift for the Dredge *Yaquina* is 100 feet (equal to 139 feet CRD). The maximum lift shown was 136 feet (175 feet CRD). The minimum lift shown was 90 feet (129 feet CRD). Water levels shown on bridge records corresponding to these lifts ranged from 1 to 12 feet CRD.

Vertical clearance conclusion: A minimum vertical height of 116 feet CRD (121.4 feet NAVD88) is required. Year-round river level data from the past 20 years indicate that river levels were at or below 16 feet CRD approximately 98 percent of the time. Future river operations will likely increase river levels up to ordinary high water (16 feet CRD) for longer periods. Adding the 100-foot vertical clearance from waterline to bridge required for the Dredge *Yaquina* to 16 feet CRD yields a minimum vertical bridge height requirement of 116 feet CRD (121.4 NAVD88).

Horizontal clearance discussion:

- The Corps practices advanced width maintenance dredging (dredging up to 50-100 feet outside the channel width) to provide an area outside the channel for unstable side slope sloughing so that the full channel width remains clean.

Horizontal clearance conclusion: A horizontal width of 400 feet CRD is required at the vertical height specified above. This width includes the channel width (300 feet) plus 50 feet additional width on each side of the channel for advanced width maintenance dredging.

Federal Government

Agency: USCG, Marine Safety Unit

Vessel:

- Juniper-class buoy tender

USCG confirmed the information provided during the Hood River-White Salmon Bridge Replacement NIR is still accurate (email confirmation included below). Data sheets from the Hood River-White Salmon Bridge Replacement NIR are also included.

From: Brian Carrico
To: Nicole McDermott; River Navigation
Subject: Fw: Interstate Bridge Replacement Program
Date: Tuesday, May 11, 2021 9:40:31 AM
Attachments: image001.png
image002.png
image003.png
image004.png

From: Fischer, Steven M CIV <Steven.M.Fischer3@uscg.mil>
Sent: Tuesday, May 4, 2021 5:41 PM
To: Brian Carrico <Brian.Carrico@interstatebridge.org>
Cc: McReynolds, Danny G CIV <Danny.G.McReynolds@uscg.mil>; Garneau, Allen M CIV <Allen.M.Garneau@uscg.mil>; Smith, Carl F CTR <Carl.F.Smith@uscg.mil>; Moriarty, John F CIV <John.F.Moriarty@uscg.mil>
Subject: RE: Interstate Bridge Replacement Program

Brian,

Yes the Hood River USCG vessel data is correct and should be used in the IBP NIR.
BNSF is required to have an opening log that would not day and time of opening and type of vessel(s) and possibly names of vessels they have opened for. Do you need this and are unable to get it?
Good days for me are Tue, Thurs, Fri.

Thanks

Steve

From: Brian Carrico <Brian.Carrico@interstatebridge.org>
Sent: Tuesday, May 4, 2021 3:53 PM
To: Fischer, Steven M CIV <Steven.M.Fischer3@uscg.mil>
Cc: McReynolds, Danny G CIV <Danny.G.McReynolds@uscg.mil>
Subject: [Non-DoD Source] Interstate Bridge Replacement Program

Steve - I have a few requests for you associated with the IBR Program.

1. USCG vessel river use: The 2012 CRC report (from which we are starting) does not have any data for USCG vessel use related to the I-5 Bridge. For the recently completed Hood River Bridge Navigation Impact Report we included the Juniper Class Buoy Tender as a vessel that would be required to navigate under the bridge. Can you confirm that would also be the case and whether any other USCG vessels should be considered? The vessel

information used for Hood River Bridge is attached for your information. It is also includes a blank sheet for additional vessels if needed.

2. BNSF Bridge Data: We previously discussed obtaining information on BNSF bridge openings to get a better picture of overall river traffic (not just vessel traffic required a bridge opening. BNSF indicated that they did not have this data. You indicated previously that you may be able to assist in obtaining the data. Let me know if you have any thoughts on this.
3. Notice to Mariners: Do you anticipate getting the notice previously sent published in the Local Notice to Mariners soon or did i miss it in the recent publications?
4. Meeting: Can you let me know your availability for a coordination call with the IBR team this month? We want to keep you fully informed and have a few items to discuss as we move forward.

Thanks in advance for your time.

Regards,

Brian

Brian Carrico
Interstate Bridge Replacement Program
Environmental Program
O: 360-823-6122 | **C:** 360-433-7775
E: brian.carrico@interstatebridge.org
interstatebridge.org

VESSEL DATA SHEET

Please fill out the data sheet below. Please complete a data sheet for each vessel in your fleet that transits under the Hood River – White Salmon Bridge. In addition, please note any future vessel or cargo plans that might require different vessels to transit under the bridge.

Company Name: United State Coast Guard

Vessel Name:

USCGC Elm

Vessel Type:

Juniper Class Buoy Tender

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: National Defense

Primary missions is buoy tender; , all Coast Guard buoy tenders can perform other Coast Guard missions that include Search and Rescue, Maritime Law Enforcement and Marine Environmental Protection.

USCG Document Number: N/A

Primary Mooring Location *(waterway milepoint, if known)***:**

Astoria (Tongue Point)

Type and quantity of cargo, if applicable:

N/A

Length (overall; ft):

225’

Beam (width; ft):

46’

Draft (ft) - *depth of hull below waterline, fully laden*:

13’

VESSEL DATA SHEET, CONT.

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:
83’

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:
7’

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:
100’

Frequency of passage under HR-WS Bridge:
Dependent on operations and situations

Transit speed under HR-WS Bridge and Load Configuration:
8-10 knots

Time of Year of Passage:
Dependent on operations and situations. All weather capable vessel.

Tug Assistance Required:No

Ability to Modify *(If yes, provide details including cost of modification and who pays cost):*Choose an item.
No

Please identify any future vessel or cargo plans that might require different vessels to transit under the bridge. Attach additional pages as needed.

Passenger Cruise

Company: American Cruise Lines

Vessels:

- American Pride
- Queen of the West
- American Song

Company provide information through the online survey. Survey response is included below.

#40

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Wednesday, August 25, 2021 5:22:18 PM
Last Modified: Wednesday, August 25, 2021 5:53:37 PM
Time Spent: 00:31:18
IP Address: 76.28.124.51

Page 1: Introduction

Q1

Company Name

American Cruise Lines

Q2

Contact Information

Name	**Eric Dussault**
Email	**eric.dussault@americancruiselines.com**
Phone number	**2034536800**

Q3

Vessel Name (please complete one survey per vessel)

American Pride

Q4

Vessel Type

Cruise

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Commercial

Q7

USCG Document Number

1236505

Q8

Primary Mooring Location (waterway milepoint, if known)

Red Lion Portland, OR

Q9

Type and quantity of cargo, if applicable

Passengers

Q10

Length (total feet)

250

Q11

Beam (width in feet)

50

Q12

Draft (feet) - depth of hull below waterline, fully laden

9

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

63

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

10

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

150

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**0**
February	**0**
March	**0**
April	**16**
May	**16**
June	**16**
July	**16**
August	**16**
September	**16**
October	**16**
November	**16**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**0**
August	**0**
September	**0**
October	**0**
November	**0**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

8kts

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

N/A

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22

Do you have another vessel?

Yes

Page 2: Additional Vessel (1)

Q23

Vessel Name (please complete one survey per vessel)

Queen of the West

Q24

Vessel Type

Cruise

Q25

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q26

Vessel Category

Passenger Cruise

Q27

USCG Document Number

1033572

Q28

Primary Mooring Location (waterway milepoint, if known)

Red Lion Portland, OR

Q29

Type and quantity of cargo, if applicable

Passenger

Q30

Length (overall feet)

225

Q31

Beam (width in feet)

43

Q32

Draft (feet) - depth of hull below waterline, fully laden

9

Q33

Air Draft (feet) - height of highest fixed point above waterline, unladen

63

Q34

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

10

Q35

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

150

Q36

Frequency of passage under Interstate Bridge (main channel)

January	**0**
February	**0**
March	**0**
April	**16**
May	**16**
June	**16**
July	**16**
August	**16**
September	**16**
October	**16**
November	**16**
December	**0**

Q37

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**0**
August	**0**
September	**0**
October	**0**
November	**0**
December	**0**

Q38

Transit speed under Interstate Bridge and Load Configuration (if applicable)

8

Q39

Tug Assistance Required

No

Q40

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q41

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q42

Do you have another vessel?

Yes

Page 3: Additional Vessel (2)

Q43

Vessel Name (please complete one survey per vessel)

American Song

Q44

Vessel Type

Cruise

Q45

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q46

Vessel Category

Passenger Cruise

Q47

USCG Document Number

1282656

Q48

Primary Mooring Location (waterway milepoint, if known)

Red Lion Portland OR

Q49

Type and quantity of cargo, if applicable

passengers

Q50

Length (overall; feet)

325

Q51

Beam (width; feet)

58

Q52

Draft (feet) - depth of hull below waterline, fully laden

9

Q53

Air Draft (feet) - height of highest fixed point above waterline, unladen

56

Q54

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

10

Q55

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

150

Q56

Frequency of passage under Interstate Bridge (main channel)

January	**0**
February	**0**
March	**0**
April	**16**
May	**16**
June	**16**
July	**16**
August	**16**
September	**16**
October	**16**
November	**16**
December	**0**

Q57

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**0**
August	**0**
September	**0**
October	**0**
November	**0**
December	**0**

Q58

Transit speed under Interstate Bridge and Load Configuration (if applicable)

8

Q59

Tug Assistance Required

No

Q60

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q61

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q62

Do you have another vessel?

No

Passenger Cruise

Company: American Queen Steamboat Company

Vessel:

- American Empress

Company did not respond to IBR request. Information was not included in the CRC NIR. Information included below was provided for the Hood River-White Salmon Bridge Replacement NIR.

VESSEL DATA SHEET

Please fill out the data sheet below. Please complete a data sheet for each vessel in your fleet that transits under the Hood River – White Salmon Bridge. In addition, please note any future vessel or cargo plans that might require different vessels to transit under the bridge.

Company Name: AMERICAN QUEEN STEAMBOAT CO.

Vessel Name:
AMERICAN EMPRESS

Vessel Type:
PASSENGER VESSEL (INSPECTED)

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

NONE

Vessel Category: Choose an item.
4000 HP DIESEL ELECTRIC
OVERNIGHT CRUISES

USCG Document Number: # 1140867

Primary Mooring Location *(waterway milepoint, if known)*:
TROUTDALE OR. @ SUNDIAL MARINE

Type and quantity of cargo, if applicable:
220 PASSENGERS
84 CREW

Length (overall; ft):
364 FT.

Beam (width; ft):
60 FT.

Draft (ft) - *depth of hull below waterline, fully laden*:
12.5 FT

Scanned with CamScanner

VESSEL DATA SHEET, CONT.

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

52 FT.

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

10 FT

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

200 FT.

Frequency of passage under HR-WS Bridge:

1-2 TIMES EVERY WEEK

Transit speed under HR-WS Bridge and Load Configuration:

10-13 MPH

Time of Year of Passage:

MARCH – DECEMBER

Tug Assistance Required: Choose an item.

NO

Ability to Modify *(If yes, provide details including cost of modification and who pays cost):*Choose an item.

NO

Please identify any future vessel or cargo plans that might require different vessels to transit under the bridge. Attach additional pages as needed.

Scanned with CamScanner

Passenger Cruise

Company: American Waterways, Inc.

Vessels:

- Portland Spirit
- Columbia Gorge Sternwheeler
- Willamette Star
- Crystal Dolphin
- Explorer

Company provided information for the Portland Spirit to the IBR Program. Additional information included in the CRC NIR is also included below.

From: Dan Yates
To: River Navigation
Subject: Re: FOLLOW UP: Interstate Bridge Replacement (IBR) Program Navigation Impact Report Vessel Information Request
Date: Tuesday, May 18, 2021 7:14:19 AM
Attachments: image001.png
image002.png
image003.png
image004.png

Nicole…I see you have the information for our largest vessel the Portland Spirit. The Columbia Gorge is very similar in size and you can mirror the Spirit characteristics as hers too. We also operate other vessels..The Willamette Star, Crystal Dolphin and the Explorer, but they are much smaller…If the new bridge has enough clearance for the Portland Spirit the bridge will handle all our vessels..current and future…Thanks, Dan

------ Original Message ------
From: "River Navigation" <rivernav@interstatebridge.org>
To: "dan@portlandspirit.com" <dan@portlandspirit.com>
Sent: 5/17/2021 8:02:01 AM
Subject: FOLLOW UP: Interstate Bridge Replacement (IBR) Program Navigation Impact Report Vessel Information Request

> Dan,
> I am following up on a request for information related to vessels that operate on the Columbia River and travel under the Interstate Bridge (RM 106.5). Please see the attached letter and data sheets (originally sent on April 15th).
>
> Please don't hesitate to reach out should you have any questions regarding this request. Thank you in advance for your time.
>
> Sincerely,
> Nicole McDermott
>
> **Interstate Bridge Replacement Program**
> **Environmental Program**
> **O:** 360-859-0494 or 503-897-9218 or 711 (ADA)
> **E:** rivernav@interstatebridge.org
> interstatebridge.org

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: American Waterways, Inc.

Vessel Name:
Crystal Dolphin

Vessel Type:
Passenger cruise

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Choose an item.

USCG Document Number:

Primary Mooring Location *(waterway milepoint, if known)*:

Type and quantity of cargo, if applicable:

Length (overall; ft):
84

Beam (width; ft):
32

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

7

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

50

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

4

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: Choose an item.

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan _____ **Feb** _____ **Mar** _____ **Apr** 4 **May** 30 **June** 80

Jul 80 **Aug** 80 **Sep** 80 **Oct** 40 **Nov** 4 **Dec** 4

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan _____ Feb 2 **Mar** 2 **Apr** 4 **May** 30 **June** 80

Jul 80 **Aug** 80 **Sep** 80 **Oct** 40 **Nov** 4 **Dec** 4

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: American Waterways, Inc.

Vessel Name:
Portland Spirit

Vessel Type:
Passenger cruise

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial

USCG Document Number:
903414

Primary Mooring Location *(waterway milepoint, if known)*:
Portland, Oregon

Type and quantity of cargo, if applicable:

Length (overall; ft):
150

Beam (width; ft):
36

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

10

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

48

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

10

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

50

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: Choose an item.

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan 2 **Feb** 2 **Mar** 2 **Apr** 4 **May** 30 **June** 80

Jul 80 **Aug** 80 **Sep** 80 **Oct** 40 **Nov** 4 **Dec** 4

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan 2 Feb 2 **Mar** 2 **Apr** 4 **May** 30 **June** 80

Jul 80 **Aug** 80 **Sep** 80 **Oct** 40 **Nov** 4 **Dec** 4

Passenger Cruise

Owner: American Waterways, Inc.

Vessels: Crystal Dolphin

Portland Spirit

Vessel: Crystal Dolphin

Vessel: Portland Spirit

From http://www.portlandspirit.com

River User Data Sheet By: Ron Del Rosario Date: 2/22/2012

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: American Waterways, Inc (Portland Spirit)
   b. Name of contact: Dan Yates
   c. Phone number (Office): 503-224-3900 d. (Cell):
   e. Email: dan@portlandspirit.com
   f. Address: 111 Se Caruthers Street
   g. City: Portland
   h. State: Or i. Zip code: 97214

3a. Vessel Name: Crystal Dolphin 3b. Vessel Type: Passenger

3c. US Coast Guard Document Number: K Boats

4a. Length Overall (LOA), feet: 84 4b. Beam (width), feet: 32

5. Draft (depth of hull below waterline, fully laden), feet: 7
6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 50
7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 4
8. Frequency of one-way passage underneath I-5 main channel (typical per month):

   Jan ___ Feb ___ Mar___ Apr 4 May 30 Jun 80 Jul 80 Aug 80 Sep 80 Oct 40 Nov 4 Dec 4
9. Frequency of one-way passage underneath I-5 main channel (other historic events):
10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

    Jan ___ Feb 2 Mar 2 Apr 4 May 30 Jun 80 Jul 80 Aug 80 Sep 80 Oct 40 Nov 4 Dec 4
11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy?
13. Other miscellaneous

River User Data Sheet By: Ron Del Rosario Date: 2/22/2012

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: American Waterways, Inc (Portland Spirit)
   b. Name of contact: Dan Yates
   c. Phone number (Office): 503-224-3900 d. (Cell):
   e. Email: dan@portlandspirit.com
   f. Address: 111 Se Caruthers Street
   g. City: Portland
   h. State: Or i. Zip code: 97214

3a. Vessel Name: Portland Spirit 3b. Vessel Type: Passenger

3c. US Coast Guard Document Number: K Boats

4a. Length Overall (LOA), feet: 150 4b. Beam (width), feet: 36

5. Draft (depth of hull below waterline, fully laden), feet: 8
6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 54
7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 4
8. Frequency of one-way passage underneath I-5 main channel (typical per month):

   Jan 2 Feb 2 Mar 2 Apr 4 May 30 Jun 80 Jul 80 Aug 80 Sep 80 Oct 40 Nov 4 Dec 4
9. Frequency of one-way passage underneath I-5 main channel (other historic events):
10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

    Jan 2 Feb 2 Mar 2 Apr 4 May 30 Jun 80 Jul 80 Aug 80 Sep 80 Oct 40 Nov 4 Dec 4
11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy?
13. Other miscellaneous

Passenger Cruise

Company: Grays Harbor Historical Seaport

Vessel:

- Lady Washington

Company did not respond to IBR request. Information below was included in the CRC NIR.

Passenger Cruise

Owner: Grays Harbor Historical Seaport Authority

Vessel: The Lady Washington

River User Data Sheet By: Les Bolton Date: 2/21/12

1. Company Name and/or Owner of Vessel and contact information

   a. Name of company: GRAYS HARBOR HISTORICAL SEAPORT

   b. Name of contact: LES BOLTON

   c. Phone number (Office): 800.200.5239 d. (Cell): 360.581.1488

   e. Email: les@historicalseaport.org

   f. Address: 712 HAGARA STREET

   g. City: ABERDEEN

   h. State: WA i. Zip code: 98520

3a. Vessel Name: LADY WASHINGTON 3b. Vessel Type: SAILING

3c. US Coast Guard Document Number: 944970

4a. Length Overall (LOA), feet: 112 4b. Beam (width), feet: 22

5. Draft (depth of hull below waterline, fully laden), feet: 11

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 90

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 15

8. Frequency of one-way passage underneath I-5 main channel (typical per month):

   Jan ___ Feb ___ Mar___ Apr___ May 1 Jun 1 Jul___Aug___Sep___Oct 2 Nov___Dec___

9. Frequency of one-way passage underneath I-5 main channel (other historic events): 2X every 3 yrs +/-

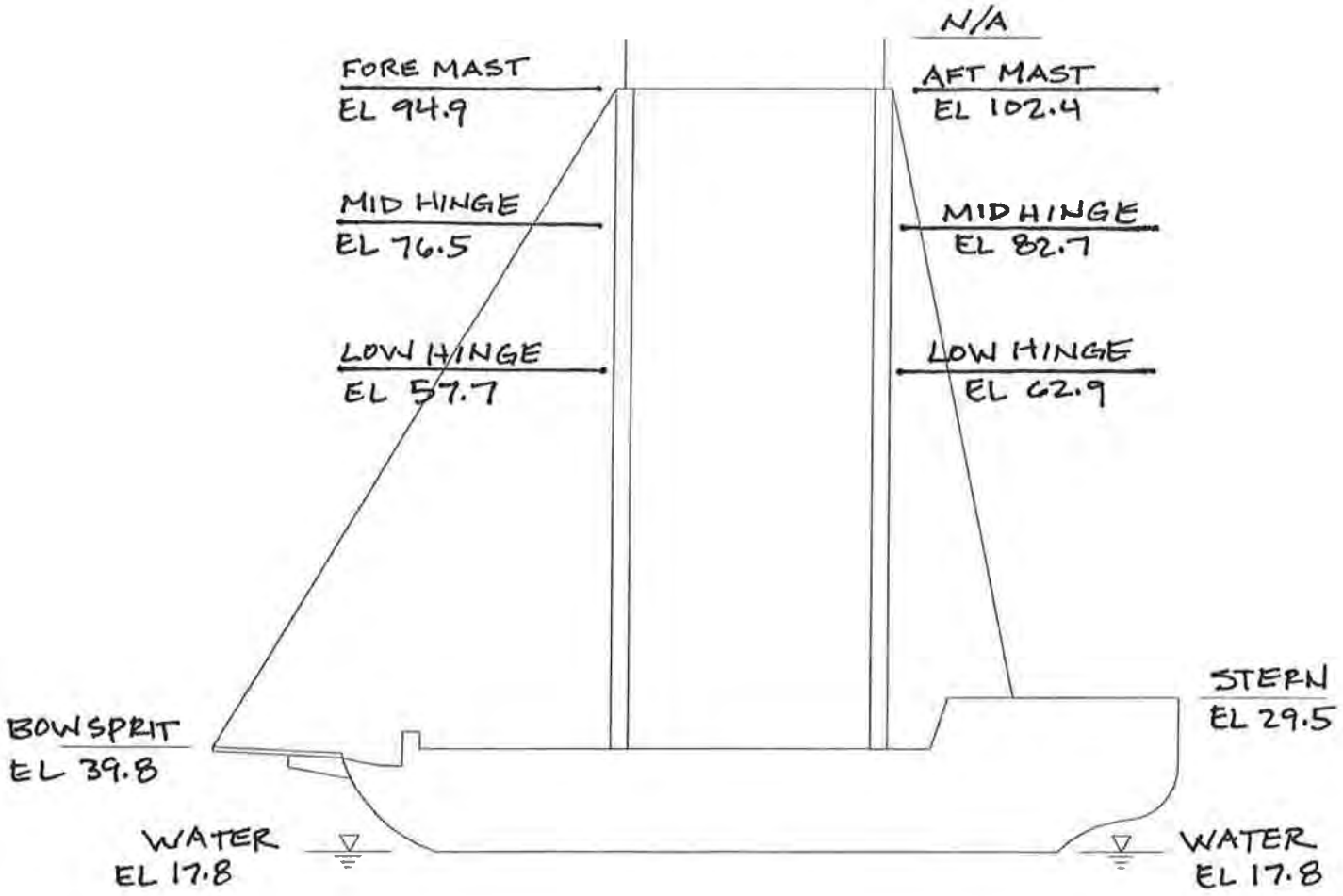
10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month):

    Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events):

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy? Our business plan refers to Columbia River Voyages. We sail up the Columbia 1-2X per year Providing Education Programs for youth and the general Public. We Sail all the Way to the Dalles and on rare occasions down rig the ships to provide Access to the Tri Cities area.

13. Other miscellaneous



LADY WASHINGTON
NAME

KIRKLAND, WA
LOCATION

8/31/2012
DATE

Passenger Cruise

Company: Lindblad/National Geographic Expeditions

Vessels:

- National Geographic Quest
- National Geographic Sea Lion
- National Geographic Sea Bird

Company provided data sheets to the IBR Program. Data sheets are included below, followed by the information included in the CRC NIR.

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Lindblad/National Geographic Expeditions

Vessel Name:
National Geographic Quest

Vessel Type:
Small passenger

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial

USCG Document Number:
1273675

Primary Mooring Location *(waterway milepoint, if known)*:
Clarkston or Portland

Type and quantity of cargo, if applicable:
Passengers

Length (overall; ft):
240

Beam (width; ft):
45

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

12

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

62

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

10

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

120

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required:No

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ **Feb**_____ **Mar**_____ **Apr**_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**____1_____ **Oct**____3_____ **Nov**_____ **Dec**_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough):

Jan_____ **Feb**_____ **Mar**_____ **Apr**_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**_____ **Oct**_____ **Nov**_____ **Dec**_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Linblad/National Geographic Exepeditions

Vessel Name:
National Geographic Sea Lion

Vessel Type:
Small Passenger

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:No

Vessel Category: Commercial

USCG Document Number:
648350

Primary Mooring Location *(waterway milepoint, if known)*:

Type and quantity of cargo, if applicable:

Length (overall; ft):
152

Beam (width; ft):
35

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

9.5

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

59

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

6

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: Choose an item.

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ **Feb**_____ **Mar**_____ **Apr**_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**_____3____ **Oct**_____1____ **Nov**_____ **Dec**_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough): None

Jan_____ **Feb**_____ **Mar**_____ **Apr**_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**_____ **Oct**_____ **Nov**_____ **Dec**_____

EXISTING VESSEL DATA SHEET

Please fill out the data sheet below. Note if the vessel is no longer in service or used on the waterway. If the vessel is still in service on the waterway, review and update vessel information and provide data where the field is blank. If you have new vessels that travel under the Interstate Bridge (main channel) and/or the North Portland Harbor Bridge (Oregon Slough), please use the following link to complete a waterway user survey: https://www.interstatebridge.org/rivernavigation. In addition, through the survey link, please note any future vessel or cargo plans you know of that might require different vessels to transit under the bridge.

Company/Owner Name: Linblad/National Geographic Exepeditions

Vessel Name:
National Geographic Sea Bird

Vessel Type:
Small passenger

Specialized Vessel *(e.g. limited maneuverability due to design or mode of operation. If yes, please describe)*:Choose an item.

Vessel Category: Commercial

USCG Document Number:
644046

Primary Mooring Location *(waterway milepoint, if known)*:

Type and quantity of cargo, if applicable:

Length (overall; ft):
152

Beam (width; ft):
35

VESSEL DATA SHEET, CONT.

Draft (ft) - *depth of hull below waterline, fully laden*:

9.5

Air Draft (ft) - *height of highest fixed point above waterline, unladen*:

59

Air Gap (ft) - *desired clearance from highest fixed point to lowest part of bridge*:

6

Safety Margin (ft) *horizontal clearance required by vessel to navigate through the bridge*:

Transit speed under Interstate Bridge and Load Configuration:

Time of Year of Passage:

Tug Assistance Required: Choose an item.

Frequency of passage under Interstate Bridge main channel (typical per month):

Jan_____ **Feb**_____ **Mar**_____ **Apr**_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**____3_____ **Oct**____4_____ **Nov**_____1____ **Dec**_____

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough): Zero

Jan_____ **Feb**_____ **Mar**_____ **Apr**_____ **May**_____ **June**_____

Jul_____ **Aug**_____ **Sep**_____ **Oct**_____ **Nov**_____ **Dec**_____

Passenger Cruise

Owner: Linblad Expeditions, Inc.

Vessels: National Geographic Sea Bird

National Geographic Sea Lion

Vessel: National Geographic Sea Bird

Vessel: National Geographic Sea Lion

From http://www.expeditions.com/

River User Data Sheet By: Michael Jones Date: March 19, 2012

1. Company Name and/or Owner of Vessel and contact information

a. Name of company: Lindblad Expeditions, Inc.

b. Name of contact: Michael Jones

c. Phone number (Office): 206-403-1512 d. (Cell): 206-499-1154

e. Email: mikej@expeditions.com

f. Address: 1415 Western Avenue, Suite 700

g. City: Seattle

h. State: WA i. Zip code: 98101

3a. Vessel Name: National Geographic Sea Bird 3b. Vessel Type: Small Passenger

3c. US Coast Guard Document Number: 644046

4a. Length Overall (LOA), feet: 152 4b. Beam (width), feet: 35

5. Draft (depth of hull below waterline, fully laden), feet: 9.5

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 59

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 6 feet

8. Frequency of one-way passage underneath I-5 main channel (typical per month):

Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep 3 Oct 4 Nov 1 Dec___

9. Frequency of one-way passage underneath I-5 main channel (other historic events): 7 or 8 one-way transits each Fall.

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month): Zero

Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): Zero

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy? There is not a copy of a business plan; however, our intention is to transit under the I-5 Bridge 7 or 8 one-way transits each Fall for the next 10 years.

13. Other miscellaneous: NA

River User Data Sheet By: **Michael Jones** Date: **March 19, 2012**

1. Company Name and/or Owner of Vessel and contact information

a. Name of company: **Lindblad Expeditions, Inc.**

b. Name of contact: **Michael Jones**

c. Phone number (Office): **206-403-1512** d. (Cell): **206-499-1154**

e. Email: **mikej@expeditions.com**

f. Address: **1415 Western Avenue, Suite 700**

g. City: **Seattle**

h. State: **WA** i. Zip code: **98101**

3a. Vessel Name: **National Geographic Sea Lion** 3b. Vessel Type: **Small Passenger**

3c. US Coast Guard Document Number: **648350**

4a. Length Overall (LOA), feet: **152** 4b. Beam (width), feet: **35**

5. Draft (depth of hull below waterline, fully laden), feet: **9.5**

6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: **59**

7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): **6 feet**

8. Frequency of one-way passage underneath I-5 main channel (typical per month):

Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep **3** Oct **1** Nov___ Dec___

9. Frequency of one-way passage underneath I-5 main channel (other historic events): **4 one-way transits each Fall.**

10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month): **Zero**

Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___

11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events): **Zero**

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy? **There is not a copy of a business plan; however, our intention is to transit under the I-5 Bridge 4 one-way transits each Fall for the next 10 years.**

13. Other miscellaneous: **NA**

Recreational Sailboats and Powerboats

Owner: Keith Thomson

Vessel:

- Highlander II

Information was submitted through the online survey. Survey response follows.

#1

INCOMPLETE

Collector: Web Link 1 (Web Link)
Started: Friday, April 23, 2021 2:54:08 PM
Last Modified: Friday, April 23, 2021 3:03:21 PM
Time Spent: 00:09:13
IP Address: 50.39.105.111

Page 1: Introduction

Q1

Company Name

KEITH THOMSON

Q2

Contact Information

Name	**KEITH THOMSON**
Email	**Keith_Thomson@msn.com**
Phone number	**5036452919**

Q3

Vessel Name (please complete one survey per vessel)

Highlander II

Q4

Vessel Type

Motor vessel

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

1188212

Q8

Primary Mooring Location (waterway milepoint, if known)

Portland Yacht Club moorage mile 108

Q9 **Respondent skipped this question**

Type and quantity of cargo, if applicable

Q10

Length (total feet)

63

Q11

Beam (width in feet)

17

Q12

Draft (feet) - depth of hull below waterline, fully laden

5

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

29

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

35

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

5

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**0**
February	**0**
March	**2**
April	**2**
May	**4**
June	**6**
July	**6**
August	**6**
September	**0**
October	**0**
November	**0**
December	**0**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**2**
July	**2**
August	**2**
September	**0**
October	**0**
November	**0**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

10 kts

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22

Do you have another vessel?

No

Recreational Sailboats and Powerboats

Owner: Terence L Thatcher

Vessel:

- Adavida

Information was submitted through the online survey. Survey response follows.

#2

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Tuesday, May 04, 2021 9:08:59 AM
Last Modified: Tuesday, May 04, 2021 9:20:30 AM
Time Spent: 00:11:30
IP Address: 97.120.85.125

Page 1: Introduction

Q1

Company Name

Respondent skipped this question

Q2

Contact Information

Name	**Terence L Thatcher**
Email	**adavida38@hotmail.com**
Phone number	**5039393545**

Q3

Vessel Name (please complete one survey per vessel)

Adavida

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

606350

Q8

Primary Mooring Location (waterway milepoint, if known)

Rose City Yacht Club, approx River Mile 105

Q9 **Respondent skipped this question**

Type and quantity of cargo, if applicable

Q10

Length (total feet)

38

Q11

Beam (width in feet)

12

Q12

Draft (feet) - depth of hull below waterline, fully laden

6

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

52

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

5

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

57

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**0**
February	**0**
March	**2**
April	**2**
May	**2**
June	**4**
July	**4**
August	**4**
September	**4**
October	**0**
November	**0**
December	**0**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**0**
August	**0**
September	**0**
October	**0**
November	**0**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

6 knots

Q19 Tug Assistance Required	**No**
Q20 Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.	**Respondent skipped this question**
Q21 Is there anything else you would like to add about your vessel or business plans?	**Respondent skipped this question**
Q22 Do you have another vessel?	**No**

Recreational Sailboats and Powerboats

Owner: Loren Beach

Vessel:

- Fresh Air

Information was submitted through the online survey. Survey response follows.

#3

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Saturday, May 08, 2021 9:46:21 AM
Last Modified: Saturday, May 08, 2021 9:50:47 AM
Time Spent: 00:04:26
IP Address: 73.37.0.251

Page 1: Introduction

Q1

Company Name

Respondent skipped this question

Q2

Contact Information

Name	**Loren Beach**
Email	**sailaway10@comcast.net**
Phone number	**5032440004**

Q3

Vessel Name (please complete one survey per vessel)

Fresh Air

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

Yes,
If yes, please describe:
Air Draft is approx 56 feet

Q6

Vessel Category

Recreational

Q7

USCG Document Number

none

Q8

Primary Mooring Location (waterway milepoint, if known)

RCYC 3737 NE Marine Drive,Portland

Q9

Type and quantity of cargo, if applicable

NA

Q10

Length (total feet)

34 feet

Q11

Beam (width in feet)

11 feet

Q12

Draft (feet) - depth of hull below waterline, fully laden

6 feet

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

56 feet

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

4 feet

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

20 feet

Q16

Frequency of passage under Interstate Bridge (main channel)

May	**1 time**
June	**2 times**
July	**4 times**
August	**3 times**

Q17

Respondent skipped this question

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

7 kts

Q19

No

Tug Assistance Required

Q20

Respondent skipped this question

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Q21

Is there anything else you would like to add about your vessel or business plans?

no

Q22

No

Do you have another vessel?

Recreational Sailboats and Powerboats

Owner: Sam Shogren

Vessel:

- SV FIKA

Information was submitted through the online survey. Survey response follows.

#6

COMPLETE

Collector:	Web Link 1 (Web Link)
Started:	Friday, May 14, 2021 8:48:28 AM
Last Modified:	Friday, May 14, 2021 9:18:37 AM
Time Spent:	00:30:09
IP Address:	50.39.101.12

Page 1: Introduction

Q1

Company Name

Shogren Consulting Group, LLC

Q2

Contact Information

Name	**Sam Shogren**
Email	**sam.shogren@gmail.com**
Phone number	**503-504-0770 (please lv. message)**

Q3

Vessel Name (please complete one survey per vessel)

SV FIKA

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

Yes,
If yes, please describe:
As a sailboat with aux. diesel the vessel does not back well and is limited its maneuverability between the bridges.

Q6

Vessel Category

Recreational

Q7

USCG Document Number

672015

Q8

Primary Mooring Location (waterway milepoint, if known)

Scappoose Bay Marine Park - Mile 89

Q9 **Respondent skipped this question**

Type and quantity of cargo, if applicable

Q10

Length (total feet)

35

Q11

Beam (width in feet)

12

Q12

Draft (feet) - depth of hull below waterline, fully laden

6

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

53

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

65

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

20

Q16

Frequency of passage under Interstate Bridge (main channel)

May	**1**
June	**1**
July	**2**
August	**2**
September	**2**
October	**1**
November	**1**
December	**2**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**I-5 bridge too low**
February	**I-5 bridge too low**
March	**I-5 bridge too low**
April	**I-5 bridge too low**
May	**I-5 bridge too low**
June	**I-5 bridge too low**
July	**I-5 bridge too low**
August	**I-5 bridge too low**
September	**I-5 bridge too low**
October	**I-5 bridge too low**
November	**I-5 bridge too low**
December	**I-5 bridge too low**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

4 knots

Q19

No

Tug Assistance Required

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

none

Q21

Respondent skipped this question

Is there anything else you would like to add about your vessel or business plans?

Q22

No

Do you have another vessel?

Recreational Sailboats and Powerboats

Owner: Thomas Keffer

Vessel:

- Velocity

Information was submitted through the online survey. Survey response follows.

#7

COMPLETE

Collector:	Web Link 1 (Web Link)
Started:	Friday, May 14, 2021 12:19:14 PM
Last Modified:	Friday, May 14, 2021 1:27:15 PM
Time Spent:	01:08:00
IP Address:	67.42.13.47

Page 1: Introduction

Q1

Company Name

Respondent skipped this question

Q2

Contact Information

Name	**Thomas Keffer**
Email	**tkeffer@gmail.com**
Phone number	**5414909507**

Q3

Vessel Name (please complete one survey per vessel)

Velocity

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

1093439

Q8

Primary Mooring Location (waterway milepoint, if known)

Portland Yacht Club

Q9 **Respondent skipped this question**

Type and quantity of cargo, if applicable

Q10

Length (total feet)

42

Q11

Beam (width in feet)

13

Q12

Draft (feet) - depth of hull below waterline, fully laden

7

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

58

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

4

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

25

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**0**
February	**0**
March	**0**
April	**1**
May	**1**
June	**1**
July	**1**
August	**1**
September	**1**
October	**0**
November	**0**
December	**0**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**0**
August	**0**
September	**0**
October	**0**
November	**0**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

6kn

Q19 Tug Assistance Required	**No**
Q20 Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.	**Respondent skipped this question**
Q21 Is there anything else you would like to add about your vessel or business plans?	**Respondent skipped this question**
Q22 Do you have another vessel?	**No**

Recreational Sailboats and Powerboats

Owner: Roger Rosenquist

Vessels:

- Calypso
- Peanut

Information was submitted through the online survey. Survey response follows.

#9

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Saturday, May 15, 2021 6:06:22 AM
Last Modified: Saturday, May 15, 2021 6:23:56 AM
Time Spent: 00:17:34
IP Address: 24.22.60.175

Page 1: Introduction

Q1

Company Name

Respondent skipped this question

Q2

Contact Information

Name	**Roger Rosenquist**
Email	**r.rosenquist@comcast.net**
Phone number	**5032831919**

Q3

Vessel Name (please complete one survey per vessel)

Calypso

Q4

Vessel Type

Motor vessel

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

Respondent skipped this question

Q8

Primary Mooring Location (waterway milepoint, if known)

North Portland Harbor mile 3.6

Q9 **Respondent skipped this question**

Type and quantity of cargo, if applicable

Q10

Length (total feet)

26 ft

Q11

Beam (width in feet)

8

Q12

Draft (feet) - depth of hull below waterline, fully laden

2

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

8

Q14 **Respondent skipped this question**

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

Q15 **Respondent skipped this question**

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**0**
February	**O**
March	**1**
April	**I**
May	**1**
June	**5**
July	**4**
August	**53**
September	**2**
October	**1**
November	**0**
December	**0**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**1**
April	**2**
May	**3**
June	**6**
July	**10**
August	**10**
September	**5**
October	**1**
November	**0**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

30 mph

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

No change

Q21

Is there anything else you would like to add about your vessel or business plans?

No

Q22

Do you have another vessel?

Yes

Page 2: Additional Vessel (1)

Q23

Vessel Name (please complete one survey per vessel)

Peanut

Q24

Vessel Type

Other (please specify):
RIB

Q25

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q26

Vessel Category

Recreational

Q27

USCG Document Number

Respondent skipped this question

Q28

Primary Mooring Location (waterway milepoint, if known)

NPH mile 3.6

Q29

Respondent skipped this question

Type and quantity of cargo, if applicable

Q30

Length (overall feet)

11

Q31

Beam (width in feet)

4

Q32

Draft (feet) - depth of hull below waterline, fully laden

1

Q33

Air Draft (feet) - height of highest fixed point above waterline, unladen

3

Q34

Respondent skipped this question

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

Q35

Respondent skipped this question

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

Q36

Frequency of passage under Interstate Bridge (main channel)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**1**
August	**1**
September	**0**
October	**0**
November	**0**
December	**0**

Q37

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**4**
August	**4**
September	**0**
October	**0**
November	**0**
December	**0**

Q38

Transit speed under Interstate Bridge and Load Configuration (if applicable)

30

Q39 Tug Assistance Required	**No**
Q40 Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.	**Respondent skipped this question**
Q41 Is there anything else you would like to add about your vessel or business plans?	**Respondent skipped this question**
Q42 Do you have another vessel?	**No**

Recreational Sailboats and Powerboats

Owner: Richard Sandefur

Vessel:

- Moonshadow

Information was submitted through the online survey. Survey response follows.

#11

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Wednesday, May 19, 2021 5:56:34 AM
Last Modified: Wednesday, May 19, 2021 6:11:02 AM
Time Spent: 00:14:27
IP Address: 71.237.197.94

Page 1: Introduction

Q1

Company Name

Mazamas

Q2

Contact Information

Name	**Richard Sandefur**
Email	**sailmoonshadow@hotmail.com**
Phone number	**9712638469**

Q3

Vessel Name (please complete one survey per vessel)

Moonshadow

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

579252

Q8

Primary Mooring Location (waterway milepoint, if known)

109

Q9

Respondent skipped this question

Type and quantity of cargo, if applicable

Q10

Length (total feet)

44

Q11

Beam (width in feet)

12

Q12

Draft (feet) - depth of hull below waterline, fully laden

6

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

58

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

5

Q15

Respondent skipped this question

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**4**
February	**4**
March	**4**
April	**4**
May	**4**
June	**6**
July	**8**
August	**8**
September	**6**
October	**6**
November	**4**
December	**4**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

Respondent skipped this question

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

3

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22	No
Do you have another vessel?	

Recreational Sailboats and Powerboats

Owner: Mike Jensen

Vessel:

- Motor vessel (no name provided)

Information was submitted through the online survey. Survey response follows.

#12

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Wednesday, May 19, 2021 12:59:39 PM
Last Modified: Wednesday, May 19, 2021 1:01:45 PM
Time Spent: 00:02:06
IP Address: 73.240.7.38

Page 1: Introduction

Q1

Company Name

Respondent skipped this question

Q2

Contact Information

Name	**mike jensen**
Email	**drmike@millplaindc.com**
Phone number	**3607988587**

Q3

Vessel Name (please complete one survey per vessel)

Respondent skipped this question

Q4

Vessel Type

Motor vessel

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

Respondent skipped this question

Q8

Primary Mooring Location (waterway milepoint, if known)

Respondent skipped this question

Q9

Respondent skipped this question

Type and quantity of cargo, if applicable

Q10

Length (total feet)

16

Q11

Beam (width in feet)

6

Q12

Draft (feet) - depth of hull below waterline, fully laden

2

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

6

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

10

Q15

Respondent skipped this question

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

Q16

Frequency of passage under Interstate Bridge (main channel)

June	**1**
July	**1**
August	**3**
September	**2**
October	**1**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

Respondent skipped this question

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

Washington

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22

Do you have another vessel?

No

Recreational Sailboats and Powerboats

Owner: Paul Floreck

Vessel:

- Meridian

Information was submitted through the online survey. Survey response follows.

#13

COMPLETE

Collector:	Web Link 1 (Web Link)
Started:	Wednesday, May 19, 2021 1:33:41 PM
Last Modified:	Wednesday, May 19, 2021 1:42:01 PM
Time Spent:	00:08:19
IP Address:	24.22.96.233

Page 1: Introduction

Q1

Company Name

N/A

Q2

Contact Information

Name	**Paul Floreck**
Email	**Paulie@easystreet.net**
Phone number	**503-708-5601**

Q3

Vessel Name (please complete one survey per vessel)

Meridian

Q4

Vessel Type

Cruise

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

N/A

Q8

Primary Mooring Location (waterway milepoint, if known)

Salpare Bay Marina

Q9

Type and quantity of cargo, if applicable

Humans X 6

Q10

Length (total feet)

36

Q11

Beam (width in feet)

12.5

Q12

Draft (feet) - depth of hull below waterline, fully laden

3.5

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

28

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

Respondent skipped this question

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

Respondent skipped this question

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**0**
February	**2**
March	**2**
April	**4**
May	**4**
June	**4**
July	**6**
August	**6**
September	**4**
October	**2**
November	**0**
December	**0**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**2**
August	**2**
September	**2**
October	**0**
November	**0**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

18-24

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22

Do you have another vessel?

No

Recreational Sailboats and Powerboats

Owner: Sean Kearns

Vessel:

- Our Tern

Information was submitted through the online survey. Survey response follows.

#14

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Thursday, May 20, 2021 5:28:06 AM
Last Modified: Thursday, May 20, 2021 5:33:25 AM
Time Spent: 00:05:18
IP Address: 209.180.174.92

Page 1: Introduction

Q1

Company Name

Respondent skipped this question

Q2

Contact Information

Name	**Sean Kearns**
Email	**puravida2dia@gmail.com**
Phone number	**3606087235**

Q3

Vessel Name (please complete one survey per vessel)

Our Tern

Q4

Vessel Type

Motor vessel

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

966601

Q8

Primary Mooring Location (waterway milepoint, if known)

Tidewater cove marina

Q9 **Respondent skipped this question**

Type and quantity of cargo, if applicable

Q10

Length (total feet)

42’

Q11

Beam (width in feet)

16’

Q12

Draft (feet) - depth of hull below waterline, fully laden

5’

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

25’

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

5’

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

30’

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**2**
February	**2**
March	**4**
April	**4**
May	**4**
June	**4**
July	**6**
August	**6**
September	**4**
October	**2**
November	**2**
December	**2**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**1**
July	**1**
August	**1**
September	**0**
October	**0**
November	**0**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

8 knots

Q19 Tug Assistance Required	**No**
Q20 Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.	**Respondent skipped this question**
Q21 Is there anything else you would like to add about your vessel or business plans?	**Respondent skipped this question**
Q22 Do you have another vessel?	**No**

Recreational Sailboats and Powerboats

Owner: Elizabeth Harris

Vessel:

- Wilderness kayak

Information was submitted through the online survey. Survey response follows.

#16

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Tuesday, May 25, 2021 10:15:22 PM
Last Modified: Tuesday, May 25, 2021 10:21:36 PM
Time Spent: 00:06:14
IP Address: 71.193.157.237

Page 1: Introduction

Q1

Company Name

None

Q2

Contact Information

Name	**Elizabeth harris**
Email	**Lizabeth.harris@gmail.com**
Phone number	**360-518-7377**

Q3

Vessel Name (please complete one survey per vessel)

Wilderness kayak

Q4

Vessel Type

Other (please specify):
Kayak

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

Yes,
If yes, please describe:
Paddle only

Q6

Vessel Category

Recreational

Q7

USCG Document Number

None

Q8

Primary Mooring Location (waterway milepoint, if known)

Portable, launch anywhere with access

Q9

Type and quantity of cargo, if applicable

One human

Q10

Length (total feet)

14’

Q11

Beam (width in feet)

3’

Q12

Draft (feet) - depth of hull below waterline, fully laden

6”

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

5’

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

Unknown

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

None

Q16

Frequency of passage under Interstate Bridge (main channel)

May	**3**
June	**5**
July	**10**
August	**10**
September	**10**
October	**8**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

April	**4**
May	**7**
June	**12**
July	**15**
August	**16**
September	**18**
October	**6**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

2 knots

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22

Do you have another vessel?

No

Recreational Sailboats and Powerboats

Owner: Greg Kelly

Vessel:

- Cranberry li

Information was submitted through the online survey. Survey response follows.

#17

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Thursday, May 27, 2021 6:17:28 AM
Last Modified: Thursday, May 27, 2021 6:24:47 AM
Time Spent: 00:07:18
IP Address: 24.20.22.136

Page 1: Introduction

Q1

Company Name

Respondent skipped this question

Q2

Contact Information

Name	**Greg Kelly**
Email	**gkelly15363@gmail.com**
Phone number	**4434725706**

Q3

Vessel Name (please complete one survey per vessel)

Cranberry Ii

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

1245285

Q8

Primary Mooring Location (waterway milepoint, if known)

Portland yacht club

Q9 **Respondent skipped this question**

Type and quantity of cargo, if applicable

Q10

Length (total feet)

34

Q11

Beam (width in feet)

12

Q12

Draft (feet) - depth of hull below waterline, fully laden

5

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

55

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

5

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

25

Q16

Frequency of passage under Interstate Bridge (main channel)

May	**4**
June	**8**
July	**8**
August	**6**
September	**6**
October	**4**
November	**2**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**0**
August	**0**
September	**0**
October	**0**
November	**0**
December	**0**

Q18

Respondent skipped this question

Transit speed under Interstate Bridge and Load Configuration (if applicable)

Q19

No

Tug Assistance Required

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22

Do you have another vessel?

No

Recreational Sailboats and Powerboats

Owner: Rick Zimmer

Vessels:

- SV Hector J
- RatPick

Information was submitted through the online survey. Survey response follows.

#18

INCOMPLETE

Collector: Web Link 1 (Web Link)
Started: Saturday, May 29, 2021 6:44:14 AM
Last Modified: Saturday, May 29, 2021 6:50:31 AM
Time Spent: 00:06:16
IP Address: 71.238.68.165

Page 1: Introduction

Q1

Company Name

Respondent skipped this question

Q2

Contact Information

Name	**Rick Zimmer**
Email	**rickpatzimmer@comcast.net**
Phone number	**5033417914**

Q3

Vessel Name (please complete one survey per vessel)

SV Hector J

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

Respondent skipped this question

Q8

Primary Mooring Location (waterway milepoint, if known)

Hayden Bay

Q9

Respondent skipped this question

Type and quantity of cargo, if applicable

Q10

Length (total feet)

35'

Q11

Beam (width in feet)

9

Q12

Draft (feet) - depth of hull below waterline, fully laden

6.5

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

50'

Q14

Respondent skipped this question

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

Q15

Respondent skipped this question

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

Q16

Frequency of passage under Interstate Bridge (main channel)

March	**1**
May	**1**
June	**5**
July	**5**
August	**5**
September	**2**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

Respondent skipped this question

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

Respondent skipped this question

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22

Do you have another vessel?

Yes

Page 2: Additional Vessel (1)

Q23

Vessel Name (please complete one survey per vessel)

RatPick

Q24

Vessel Type

Motor vessel

Q25

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q26

Vessel Category

Recreational

Q27

USCG Document Number

Respondent skipped this question

Q28

Primary Mooring Location (waterway milepoint, if known)

Hayden Bay

Q29

Type and quantity of cargo, if applicable

Respondent skipped this question

Q30

Length (overall feet)

14

Q31

Beam (width in feet)

5

Q32

Draft (feet) - depth of hull below waterline, fully laden

2

Q33

Air Draft (feet) - height of highest fixed point above waterline, unladen

Respondent skipped this question

Q34

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

Respondent skipped this question

Q35

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

Respondent skipped this question

Q36

Frequency of passage under Interstate Bridge (main channel)

May	**3**
June	**6**
July	**6**
August	**6**
September	**2**

Q37

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

Respondent skipped this question

Q38

Transit speed under Interstate Bridge and Load Configuration (if applicable)

Respondent skipped this question

Q39

Tug Assistance Required

No

Q40

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q41

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q42

Do you have another vessel?

No

Recreational Sailboats and Powerboats

Owner: Jim Sinclair

Vessel:

- Encore

Information was submitted through the online survey. Survey response follows.

#19

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Tuesday, June 01, 2021 2:36:23 PM
Last Modified: Tuesday, June 01, 2021 2:49:28 PM
Time Spent: 00:13:04
IP Address: 67.171.148.210

Page 1: Introduction

Q1

Company Name

NA

Q2

Contact Information

Name	**Jim Sinclair**
Email	**sinclair5171@gmail.com**
Phone number	**5037476611**

Q3

Vessel Name (please complete one survey per vessel)

Encore

Q4

Vessel Type

Motor vessel

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

NA

Q8

Primary Mooring Location (waterway milepoint, if known)

Portland Yacht Club

Q9 **Respondent skipped this question**

Type and quantity of cargo, if applicable

Q10

Length (total feet)

32'

Q11

Beam (width in feet)

11'6"

Q12

Draft (feet) - depth of hull below waterline, fully laden

3'9"

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

21'

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

4'

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

25'

Q16

Frequency of passage under Interstate Bridge (main channel)

March	**1**
April	**2**
May	**2**
June	**2**
July	**3**
August	**3**
September	**2**
October	**1**
November	**1**
December	**1**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

March	**1**
May	**1**
September	**1**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

6-9 knots

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22

Do you have another vessel?

No

Recreational Sailboats and Powerboats

Owner: Sewall Dana

Vessel:

- Rascal

Information was submitted through the online survey. Survey response follows.

#20

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Saturday, June 05, 2021 11:11:58 PM
Last Modified: Saturday, June 05, 2021 11:19:40 PM
Time Spent: 00:07:42
IP Address: 73.11.110.217

Page 1: Introduction

Q1

Company Name

Respondent skipped this question

Q2

Contact Information

Name	**Sewall Dana**
Email	**dlsewall@comcast.net**
Phone number	**5036668696**

Q3

Vessel Name (please complete one survey per vessel)

Rascal

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

Respondent skipped this question

Q6

Vessel Category

Recreational

Q7

USCG Document Number

Respondent skipped this question

Q8

Primary Mooring Location (waterway milepoint, if known)

Heyden Bay marina

Q9

Type and quantity of cargo, if applicable

People

Q10

Length (total feet)

30

Q11

Beam (width in feet)

9'4"

Q12

Draft (feet) - depth of hull below waterline, fully laden

4'3"

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

43'

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

10 feet

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

50 feet

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**0**
February	**0**
March	**1**
April	**2**
May	**2**
June	**5**
July	**5**
August	**8**
September	**8**
October	**3**
November	**1**
December	**1**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**0**
August	**0**
September	**0**
October	**0**
November	**0**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

4 mph

Q19

No

Tug Assistance Required

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

dlsewall@comcast.net

Q21

Respondent skipped this question

Is there anything else you would like to add about your vessel or business plans?

Q22

No

Do you have another vessel?

Recreational Sailboats and Powerboats

Owner: Fred Hazzard

Vessel:

- No name provided

Information was submitted through the online survey. Survey response follows.

#21

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Sunday, June 06, 2021 7:54:38 AM
Last Modified: Sunday, June 06, 2021 8:11:42 AM
Time Spent: 00:17:03
IP Address: 73.240.29.113

Page 1: Introduction

Q1

Company Name

Respondent skipped this question

Q2

Contact Information

Name	**Fred Hazzard**
Email	**fshazzard@gmail.com**
Phone number	**503 758 5117**

Q3

Vessel Name (please complete one survey per vessel)

Respondent skipped this question

Q4

Vessel Type

Other (please specify):
Fury

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

Respondent skipped this question

Q8

Primary Mooring Location (waterway milepoint, if known)

Portland Yacht Club

Q9 **Respondent skipped this question**

Type and quantity of cargo, if applicable

Q10

Length (total feet)

44

Q11

Beam (width in feet)

13.5

Q12

Draft (feet) - depth of hull below waterline, fully laden

8’6”

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

65’

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

67’

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

30’

Q16

Frequency of passage under Interstate Bridge (main channel)

April	**2**
May	**2**
June	**2**
July	**2**
August	**2**
September	**2**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

Respondent skipped this question

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

Or

Q19

Tug Assistance Required

Respondent skipped this question

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22

Do you have another vessel?

No

Recreational Sailboats and Powerboats

Owner: Gary Brown

Vessel:

- Get Set Go

Information was submitted through the online survey. Survey response follows.

#22

COMPLETE

Collector:	Web Link 1 (Web Link)
Started:	Sunday, June 06, 2021 8:24:49 AM
Last Modified:	Sunday, June 06, 2021 8:32:08 AM
Time Spent:	00:07:18
IP Address:	73.96.2.190

Page 1: Introduction

Q1

Company Name

Respondent skipped this question

Q2

Contact Information

Name	**Gary Brown**
Email	**gary@brownz.com**
Phone number	**503-201-4583**

Q3

Vessel Name (please complete one survey per vessel)

Get Set Go

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

1232093

Q8

Primary Mooring Location (waterway milepoint, if known)

Rose City Yacht Club, mile 109.1

Q9 **Respondent skipped this question**

Type and quantity of cargo, if applicable

Q10

Length (total feet)

36

Q11

Beam (width in feet)

12

Q12

Draft (feet) - depth of hull below waterline, fully laden

7.5

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

60

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

66

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

50

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**0**
February	**0**
March	**2**
April	**2**
May	**4**
June	**4**
July	**4**
August	**4**
September	**4**
October	**2**
November	**0**
December	**0**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**0**
August	**0**
September	**0**
October	**0**
November	**0**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

5

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22

Do you have another vessel?

No

Recreational Sailboats and Powerboats

Owner: No name provided

Vessel:

- Motor vessel (no name provided)

Information was submitted through the online survey. Survey response follows.

#23

INCOMPLETE

Collector: Web Link 1 (Web Link)
Started: Thursday, June 10, 2021 3:42:06 PM
Last Modified: Thursday, June 10, 2021 3:45:21 PM
Time Spent: 00:03:14
IP Address: 174.204.203.208

Page 1: Introduction

Q1

Company Name

Respondent skipped this question

Q2

Contact Information

Respondent skipped this question

Q3

Vessel Name (please complete one survey per vessel)

Respondent skipped this question

Q4

Vessel Type

Motor vessel

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

Respondent skipped this question

Q8

Primary Mooring Location (waterway milepoint, if known)

Washougal

Q9

Type and quantity of cargo, if applicable

Respondent skipped this question

Q10

Length (total feet)

25

Q11

Beam (width in feet)

Respondent skipped this question

Q12

Draft (feet) - depth of hull below waterline, fully laden

Respondent skipped this question

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

Respondent skipped this question

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

Respondent skipped this question

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

Respondent skipped this question

Q16

Frequency of passage under Interstate Bridge (main channel)

Respondent skipped this question

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

Respondent skipped this question

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

Respondent skipped this question

Q19

Tug Assistance Required

Respondent skipped this question

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22

Do you have another vessel?

Respondent skipped this question

Recreational Sailboats and Powerboats

Owner: Alan Boguslawski

Vessel:

- Summer Wind

Information was submitted through the online survey. Survey response follows.

#24

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Sunday, June 13, 2021 11:29:19 AM
Last Modified: Sunday, June 13, 2021 11:38:38 AM
Time Spent: 00:09:18
IP Address: 73.25.82.142

Page 1: Introduction

Q1

Company Name

Respondent skipped this question

Q2

Contact Information

Name	**ALAN BOGUSLAWSKI**
Email	**bogey@pacifier.com**
Phone number	**360-737-2689**

Q3

Vessel Name (please complete one survey per vessel)

Summer Wind

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

576416

Q8

Primary Mooring Location (waterway milepoint, if known)

River mile 110

Q9

Type and quantity of cargo, if applicable

NA

Q10

Length (total feet)

43

Q11

Beam (width in feet)

11

Q12

Draft (feet) - depth of hull below waterline, fully laden

6.5

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

63

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

2

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

20

Q16

Frequency of passage under Interstate Bridge (main channel)

April	**1**
May	**3**
June	**6**
July	**7**
August	**8**
September	**7**
October	**1**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

Respondent skipped this question

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

WA

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22

Do you have another vessel?

No

Recreational Sailboats and Powerboats

Owner: Richard Samuels

Vessel:

- Sailboat (No name provided)

Information was submitted through the online survey. Survey response follows.

#25

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Saturday, June 26, 2021 7:38:39 AM
Last Modified: Saturday, June 26, 2021 7:43:28 AM
Time Spent: 00:04:48
IP Address: 76.115.3.152

Page 1: Introduction

Q1

Company Name

Richard Samuels

Q2

Contact Information

Name	**Richard Samuels**
Email	**rick@samuels.com**
Phone number	**503-799-4255**

Q3 **Respondent skipped this question**

Vessel Name (please complete one survey per vessel)

Q4 **Sailboat**

Vessel Type

Q5 **No**

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

Q6 **Recreational**

Vessel Category

Q7

USCG Document Number

655273

Q8

Primary Mooring Location (waterway milepoint, if known)

109.8

Q9 **Respondent skipped this question**

Type and quantity of cargo, if applicable

Q10

Length (total feet)

33

Q11

Beam (width in feet)

11

Q12

Draft (feet) - depth of hull below waterline, fully laden

6' 3"

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

50'

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

5'

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

10'

Q16

Frequency of passage under Interstate Bridge (main channel)

March	**2**
May	**2**
July	**2**
September	**2**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

Respondent skipped this question

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

6 knots

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22

Do you have another vessel?

No

Recreational Sailboats and Powerboats

Owner: Gary Whitney

Vessel:

- KA-SL

Information was submitted through the online survey. Survey response follows.

#26

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Saturday, June 26, 2021 8:48:10 AM
Last Modified: Saturday, June 26, 2021 8:57:28 AM
Time Spent: 00:09:17
IP Address: 97.120.125.121

Page 1: Introduction

Q1

Company Name

Gary Whitney

Q2

Contact Information

Name	**gary whitney**
Email	**ka_sl28@ymail.com**
Phone number	**3602532427**

Q3

Vessel Name (please complete one survey per vessel)

KA-SL

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

Respondent skipped this question

Q8

Primary Mooring Location (waterway milepoint, if known)

Rose City Yacht Club

Q9 **Respondent skipped this question**

Type and quantity of cargo, if applicable

Q10

Length (total feet)

28

Q11

Beam (width in feet)

11

Q12

Draft (feet) - depth of hull below waterline, fully laden

6

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

42

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

10

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

10

Q16

Frequency of passage under Interstate Bridge (main channel)

June	**2**
July	**2**
August	**2**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

Respondent skipped this question

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

3 kn

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22

Do you have another vessel?

No

Recreational Sailboats and Powerboats

Owner: Jerry E Barnes

Vessel:

- Desperado

Information was submitted through the online survey. Survey response follows.

#27

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Saturday, June 26, 2021 10:37:17 AM
Last Modified: Saturday, June 26, 2021 10:43:20 AM
Time Spent: 00:06:02
IP Address: 67.42.158.118

Page 1: Introduction

Q1

Company Name

Jerry Barnes

Q2

Contact Information

Name	**Jerry E Barnes**
Email	**desperado.jerry@gmail.com**
Phone number	**5033603989**

Q3

Vessel Name (please complete one survey per vessel)

Desperado

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

647241

Q8

Primary Mooring Location (waterway milepoint, if known)

Tomahawk Bay , buoy 2 just above I5

Q9 **Respondent skipped this question**

Type and quantity of cargo, if applicable

Q10

Length (total feet)

37

Q11

Beam (width in feet)

12

Q12

Draft (feet) - depth of hull below waterline, fully laden

7

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

56

Q14 **Respondent skipped this question**

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

65

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**2**
February	**2**
March	**4**
April	**4**
May	**4**
June	**4**
July	**4**
August	**4**
September	**6**
October	**4**
November	**2**
December	**2**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**0**
August	**0**
September	**0**
October	**0**
November	**0**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

5 knots

Q19 Tug Assistance Required	**No**
Q20 Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.	**Respondent skipped this question**
Q21 Is there anything else you would like to add about your vessel or business plans?	**Respondent skipped this question**
Q22 Do you have another vessel?	**No**

Recreational Sailboats and Powerboats

Owner: James B Shaw

Vessel:

- JOSS

Information was submitted through the online survey. Survey response follows.

#28

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Saturday, June 26, 2021 11:41:42 AM
Last Modified: Saturday, June 26, 2021 11:51:08 AM
Time Spent: 00:09:25
IP Address: 70.57.122.249

Page 1: Introduction

Q1

Company Name

Portland Yacht Club

Q2

Contact Information

Name	**James B Shaw**
Email	**bruggie7@msn.com**
Phone number	**5033311552**

Q3

Vessel Name (please complete one survey per vessel)

JOSS

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

N/A

Q8

Primary Mooring Location (waterway milepoint, if known)

PYC

Q9 **Respondent skipped this question**

Type and quantity of cargo, if applicable

Q10

Length (total feet)

25

Q11

Beam (width in feet)

6

Q12

Draft (feet) - depth of hull below waterline, fully laden

4

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

36

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

40

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

8

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**1**
February	**1**
March	**1**
April	**1**
May	**3**
June	**3**
July	**4**
August	**4**
September	**3**
October	**3**
November	**1**
December	**1**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**0**
August	**0**
September	**0**
October	**0**
November	**0**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

4knts

Q19

No

Tug Assistance Required

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

N/A

Q21

Respondent skipped this question

Is there anything else you would like to add about your vessel or business plans?

Q22

Respondent skipped this question

Do you have another vessel?

Recreational Sailboats and Powerboats

Owner: Kenneth Stephens

Vessel:

- SV Aventura

Information was submitted through the online survey. Survey response follows.

#29

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Saturday, June 26, 2021 9:29:42 AM
Last Modified: Saturday, June 26, 2021 12:56:25 PM
Time Spent: 03:26:42
IP Address: 97.120.139.229

Page 1: Introduction

Q1

Company Name

Recreational Sailor

Q2

Contact Information

Name	**Kenneth Stephens**
Email	**kens@cad2cam.com**
Phone number	**5033294934**

Q3

Vessel Name (please complete one survey per vessel)

SV Aventura

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

Oregon OR 810 ABP

Q8

Primary Mooring Location (waterway milepoint, if known)

Rose City Yacht Club

Q9

Type and quantity of cargo, if applicable

N/A

Q10

Length (total feet)

28.8'

Q11

Beam (width in feet)

11

Q12

Draft (feet) - depth of hull below waterline, fully laden

4.5'

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

45'

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

5'

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

10

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**0**
February	**0**
March	**2**
April	**0**
May	**0**
June	**2**
July	**4**
August	**4**
September	**2**
October	**0**
November	**0**
December	**0**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**0**
August	**0**
September	**0**
October	**0**
November	**0**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

5 knots

Q19 **No**

Tug Assistance Required

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

N/A

Q21

Is there anything else you would like to add about your vessel or business plans?

No

Q22 **No**

Do you have another vessel?

Recreational Sailboats and Powerboats

Owner: Alan (no last name provided)

Vessel:

- Buena Veda

Information was submitted through the online survey. Survey response follows.

#30

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Saturday, June 26, 2021 10:09:48 PM
Last Modified: Saturday, June 26, 2021 10:17:04 PM
Time Spent: 00:07:15
IP Address: 24.21.193.6

Page 1: Introduction

Q1

Company Name

Respondent skipped this question

Q2

Contact Information

Name	**Alan**
Email	**alleyoop47@gmail.com**
Phone number	**5035028386**

Q3

Vessel Name (please complete one survey per vessel)

Buena Veda

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

Yes,
If yes, please describe:
Keel depth of 6+ ft

Q6

Vessel Category

Recreational

Q7

USCG Document Number

Respondent skipped this question

Q8

Primary Mooring Location (waterway milepoint, if known)

Hayden Bay

Q9

Respondent skipped this question

Type and quantity of cargo, if applicable

Q10

Length (total feet)

41

Q11

Beam (width in feet)

10.5

Q12

Draft (feet) - depth of hull below waterline, fully laden

6.5

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

63 ft

Q14

Respondent skipped this question

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

Q15

Respondent skipped this question

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

Q16

Frequency of passage under Interstate Bridge (main channel)

April	**1**
May	**1**
June	**2**
July	**2**
August	**3**
September	**1**
October	**1**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

Respondent skipped this question

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

4-5.5 knotsu

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22

Do you have another vessel?

No

Recreational Sailboats and Powerboats

Owner: Janet McCormick

Vessel:

- SV Wildheart

Information was submitted through the online survey. Survey response follows.

#31

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Sunday, June 27, 2021 8:07:47 AM
Last Modified: Sunday, June 27, 2021 8:16:07 AM
Time Spent: 00:08:19
IP Address: 24.20.93.168

Page 1: Introduction

Q1

Company Name

CRSA

Q2

Contact Information

Name	**Janet McCormick**
Email	**sunshade68@gmail.com**
Phone number	**9714091737**

Q3

Vessel Name (please complete one survey per vessel)

SV Wildheart

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

Yes

Q6

Vessel Category

Recreational

Q7

USCG Document Number

Respondent skipped this question

Q8

Primary Mooring Location (waterway milepoint, if known)

Tomahawk Bay Marina

Q9

Type and quantity of cargo, if applicable

NA

Q10

Length (total feet)

30

Q11

Beam (width in feet)

11

Q12

Draft (feet) - depth of hull below waterline, fully laden

5

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

55

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

10

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

10

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**0**
February	**0**
March	**0**
April	**0**
May	**2**
June	**2**
July	**2**
August	**2**
September	**2**
October	**2**
November	**0**
December	**0**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**0**
August	**0**
September	**0**
October	**0**
November	**0**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

WA

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

NA

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22

Do you have another vessel?

No

Recreational Sailboats and Powerboats

Owner: Gilbert Colistro

Vessel:

- BOAT

Information was submitted through the online survey. Survey response follows.

#32

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Saturday, June 26, 2021 5:01:25 PM
Last Modified: Sunday, June 27, 2021 11:02:53 AM
Time Spent: 18:01:28
IP Address: 67.189.10.11

Page 1: Introduction

Q1

Company Name

Respondent skipped this question

Q2

Contact Information

Name	**Gilbert Colistro**
Email	**palmerjoe36@hotmail.com**
Phone number	**5033491174**

Q3

Vessel Name (please complete one survey per vessel)

BOAT

Q4

Vessel Type

Cruise

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

688264

Q8

Primary Mooring Location (waterway milepoint, if known)

Scappoose OR Multnomah Channel

Q9 **Respondent skipped this question**

Type and quantity of cargo, if applicable

Q10

Length (total feet)

49'

Q11

Beam (width in feet)

14'

Q12

Draft (feet) - depth of hull below waterline, fully laden

5'

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

15'

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

5'

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

1'

Q16

Frequency of passage under Interstate Bridge (main channel)

May	**2**
June	**2**
July	**2**
August	**2**
September	**2**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**2**
June	**2**
July	**2**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

Washington

Q19 **No**

Tug Assistance Required

Q20 **Respondent skipped this question**

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Q21 **Respondent skipped this question**

Is there anything else you would like to add about your vessel or business plans?

Q22 **No**

Do you have another vessel?

Recreational Sailboats and Powerboats

Owner: Julie Schumann

Vessel:

- Blue Heron

Information was submitted through the online survey. Survey response follows.

#33

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Sunday, June 27, 2021 11:49:01 AM
Last Modified: Sunday, June 27, 2021 11:51:53 AM
Time Spent: 00:02:52
IP Address: 24.20.45.229

Page 1: Introduction

Q1

Company Name

Julie Schumann, private resident

Q2

Contact Information

Name	**Julie A Schumann**
Email	**jamwschum@gmail.com**
Phone number	**5033174028**

Q3

Vessel Name (please complete one survey per vessel)

Blue Heron

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

Respondent skipped this question

Q8

Primary Mooring Location (waterway milepoint, if known)

Respondent skipped this question

Q9

Type and quantity of cargo, if applicable

Respondent skipped this question

Q10

Length (total feet)

30'

Q11

Beam (width in feet)

11'

Q12

Draft (feet) - depth of hull below waterline, fully laden

5.5'

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

58

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

65

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

Respondent skipped this question

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**2**
February	**2**
March	**2**
April	**2**
May	**2**
June	**6**
July	**6**
August	**6**
September	**6**
October	**2**
November	**2**
December	**2**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

Respondent skipped this question

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

OR

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

Respondent skipped this question

Q22	No
Do you have another vessel?	

Recreational Sailboats and Powerboats

Owner: Roger Jorgensen

Vessel:

- Make It So

Information was submitted through the online survey. Survey response follows. Information included in the CRC NIR is also included below.

#34

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Sunday, June 27, 2021 4:58:12 PM
Last Modified: Sunday, June 27, 2021 5:13:51 PM
Time Spent: 00:15:39
IP Address: 98.246.88.71

Page 1: Introduction

Q1

Company Name

Respondent skipped this question

Q2

Contact Information

Name	**ROGER JORGENSEN**
Email	**rogerpdx@gmail.com**
Phone number	**5037805939**

Q3

Vessel Name (please complete one survey per vessel)

Make It So

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

672216

Q8

Primary Mooring Location (waterway milepoint, if known)

Salpare Bay Marina

Q9 **Respondent skipped this question**

Type and quantity of cargo, if applicable

Q10

Length (total feet)

65

Q11

Beam (width in feet)

18

Q12

Draft (feet) - depth of hull below waterline, fully laden

7

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

87

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

10

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

10

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**0**
February	**0**
March	**1**
April	**1**
May	**1**
June	**2**
July	**2**
August	**2**
September	**1**
October	**0**
November	**0**
December	**0**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**0**
August	**0**
September	**0**
October	**0**
November	**0**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

Washington 6 KTS

Q19

Tug Assistance Required

No

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Respondent skipped this question

Q21

Is there anything else you would like to add about your vessel or business plans?

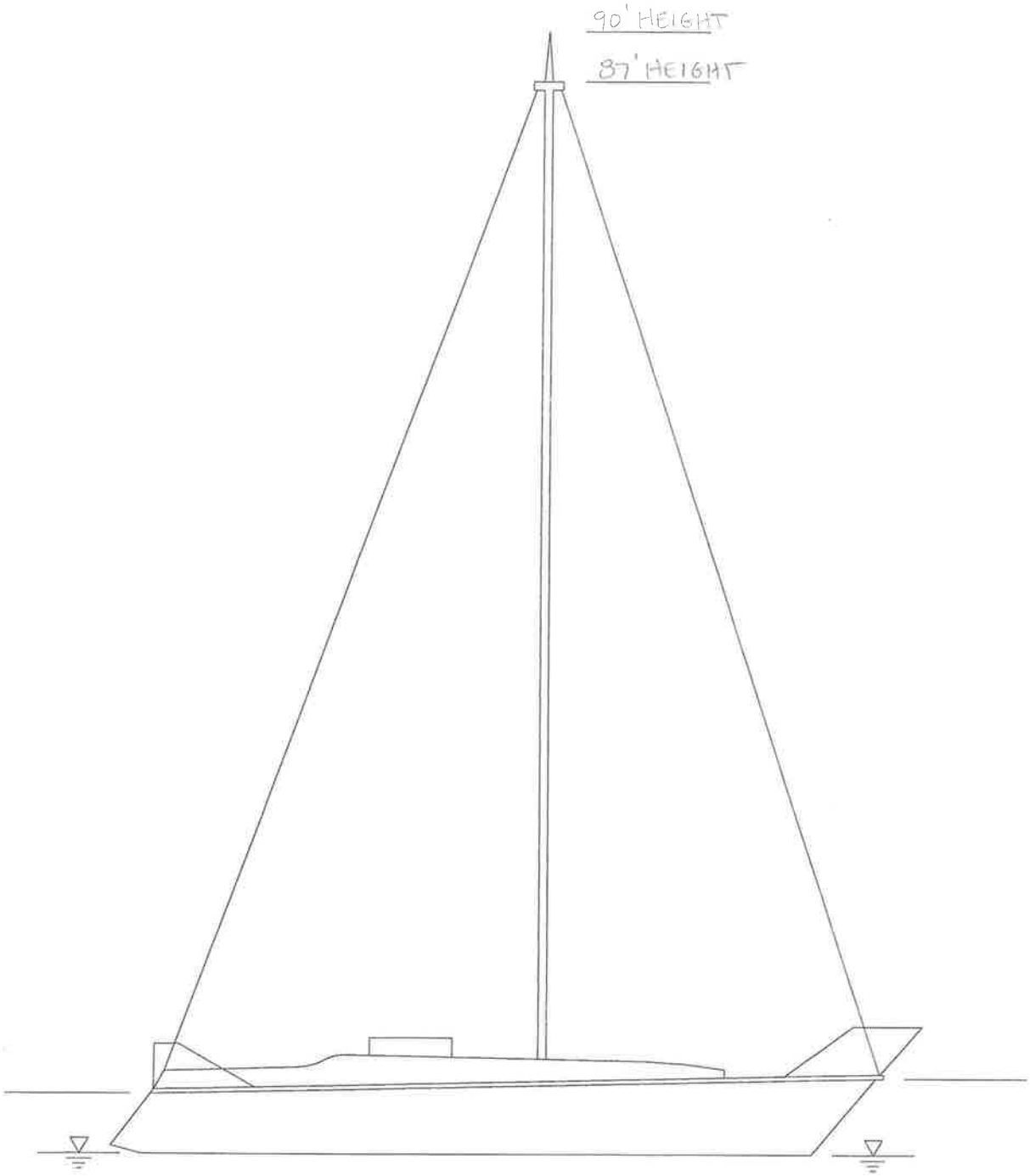
no

Q22

Do you have another vessel?

No

Recreational Sailboats and Powerboats
Owner: Unknown
Vessel: Make It So



MAKE IT SO
NAME

SALMON BAY MARINA
LOCATION

6-28-2012
DATE

Recreational Sailboats and Powerboats

Owner: Pam Corey

Vessel:

- ExTerra

Information was submitted through the online survey. Survey response follows.

#35

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Sunday, June 27, 2021 7:28:32 PM
Last Modified: Sunday, June 27, 2021 8:16:46 PM
Time Spent: 00:48:13
IP Address: 76.115.3.152

Page 1: Introduction

Q1

Company Name

n/a

Q2

Contact Information

Name	**Pam Corey**
Email	**cpcorey@gmail.com**
Phone number	**5036688524**

Q3

Vessel Name (please complete one survey per vessel)

ExTerra

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

679948

Q8

Primary Mooring Location (waterway milepoint, if known)

Rose City Yacht Club roughly rm 107

Q9

Type and quantity of cargo, if applicable

n/a

Q10 **Respondent skipped this question**

Length (total feet)

Q11

Beam (width in feet)

38

Q12

Draft (feet) - depth of hull below waterline, fully laden

5

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

56

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

5

Q15 **Respondent skipped this question**

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

Q16

Frequency of passage under Interstate Bridge (main channel)

July	**2**
August	**2**

Q17

Respondent skipped this question

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

5-6 NM

Q19

No

Tug Assistance Required

Q20

Respondent skipped this question

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

Q21

Is there anything else you would like to add about your vessel or business plans?

while recreational use is secondary to commercial traffic it is of importance to the Portland/Vancouver metropolitan area

Q22

No

Do you have another vessel?

Recreational Sailboats and Powerboats

Owner: Liv D Ormond

Vessel:

- Mischief

Information was submitted through the online survey. Survey response follows.

#36

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Sunday, June 27, 2021 8:29:53 PM
Last Modified: Sunday, June 27, 2021 8:37:51 PM
Time Spent: 00:07:58
IP Address: 107.77.211.165

Page 1: Introduction

Q1

Company Name

Private member of Rose City Yacht Club

Q2

Contact Information

Name	**Liv D Ormond**
Email	**Livsailor@gmail.com**
Phone number	**714-305-5285**

Q3

Vessel Name (please complete one survey per vessel)

Mischief

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

No

Q6

Vessel Category

Recreational

Q7

USCG Document Number

1048408

Q8

Primary Mooring Location (waterway milepoint, if known)

Rose city yacht club

Q9

Type and quantity of cargo, if applicable

NA

Q10

Length (total feet)

37.6

Q11

Beam (width in feet)

12.6

Q12

Draft (feet) - depth of hull below waterline, fully laden

5.5

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

64

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

5

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

20

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**1**
February	**0**
March	**0**
April	**1**
May	**2**
June	**1**
July	**0**
August	**2**
September	**1**
October	**1**
November	**0**
December	**0**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**0**
August	**0**
September	**0**
October	**0**
November	**0**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

NA

Q19 **No**

Tug Assistance Required

Q20

Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.

NA

Q21

Is there anything else you would like to add about your vessel or business plans?

Yes please provide 70ft of clearance year round so we don’t need to request an opening in May or earlier

Q22 **No**

Do you have another vessel?

Recreational Sailboats and Powerboats

Owner: Kevin Flanigan/Schooner Creek Boat Works

Vessel:

- Rage

Information was submitted through the online survey. Survey response follows.

#39

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Monday, July 12, 2021 2:05:18 PM
Last Modified: Monday, July 12, 2021 2:12:14 PM
Time Spent: 00:06:56
IP Address: 96.85.131.1

Page 1: Introduction

Q1

Company Name

schooner creek boat works

Q2

Contact Information

Name	**Kevin Flanigan**
Email	**kevinf@schoonercreek.com**
Phone number	**503-735-0569**

Q3

Vessel Name (please complete one survey per vessel)

Rage

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

Yes,
If yes, please describe:
10' drart

Q6

Vessel Category

Recreational

Q7

USCG Document Number

Respondent skipped this question

Q8

Primary Mooring Location (waterway milepoint, if known)

105

Q9

Type and quantity of cargo, if applicable

people

Q10

Length (total feet)

70

Q11

Beam (width in feet)

13

Q12

Draft (feet) - depth of hull below waterline, fully laden

10

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

90

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

10

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

100

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**1**
February	**1**
March	**5**
April	**7**
May	**10**
June	**10**
July	**10**
August	**7**
September	**5**
October	**1**
November	**1**
December	**1**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**0**
August	**0**
September	**0**
October	**0**
November	**0**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

OR

Q19 Tug Assistance Required	**No**
Q20 Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.	**Respondent skipped this question**
Q21 Is there anything else you would like to add about your vessel or business plans?	**Respondent skipped this question**
Q22 Do you have another vessel?	**No**

Recreational Sailboats and Powerboats

Owner: Steve Tidwell

Vessel:

- Easygoing

Information was submitted through the online survey. Survey response follows.

#41

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Sunday, September 19, 2021 5:25:21 PM
Last Modified: Sunday, September 19, 2021 5:42:18 PM
Time Spent: 00:16:56
IP Address: 216.87.232.218

Page 1: Introduction

Q1

Company Name

Respondent skipped this question

Q2

Contact Information

Name	**Steve Tidwell**
Email	**stidwell@centurytel.net**
Phone number	**5419793143**

Q3

Vessel Name (please complete one survey per vessel)

Easygoing

Q4

Vessel Type

Sailboat

Q5

Specialized Vessel (e.g. limited maneuverability due to design or mode of operation. If yes, please describe)

Respondent skipped this question

Q6

Vessel Category

Recreational

Q7

USCG Document Number

1240772

Q8

Primary Mooring Location (waterway milepoint, if known)

107

Q9 **Respondent skipped this question**

Type and quantity of cargo, if applicable

Q10

Length (total feet)

48.75

Q11

Beam (width in feet)

14.33

Q12

Draft (feet) - depth of hull below waterline, fully laden

5

Q13

Air Draft (feet) - height of highest fixed point above waterline, unladen

66

Q14

Air Gap (feet) - desired clearance from highest fixed point to lowest part of bridge

68

Q15

Safety Margin (feet) - horizontal clearance required by vessel to navigate through the bridge

35

Q16

Frequency of passage under Interstate Bridge (main channel)

January	**0**
February	**0**
March	**0**
April	**2**
May	**2**
June	**4**
July	**4**
August	**6**
September	**4**
October	**2**
November	**0**
December	**0**

Q17

Frequency of passage under the North Portland Harbor Bridge (Oregon Slough)

January	**0**
February	**0**
March	**0**
April	**0**
May	**0**
June	**0**
July	**0**
August	**0**
September	**0**
October	**0**
November	**0**
December	**0**

Q18

Transit speed under Interstate Bridge and Load Configuration (if applicable)

n/a

Q19 Tug Assistance Required	**No**
Q20 Please identify any future vessel, cargo, and/or business plans that might require different vessels to transit under the bridge. If plans are available online, please provide a link to the online source or email the plans to rivernav@interstatebridge.org.	**Respondent skipped this question**
Q21 Is there anything else you would like to add about your vessel or business plans?	**Respondent skipped this question**
Q22 Do you have another vessel?	**No**

Recreational Sailboats and Powerboats

Owner: Legendary Yachts

Vessel:

- Radiance

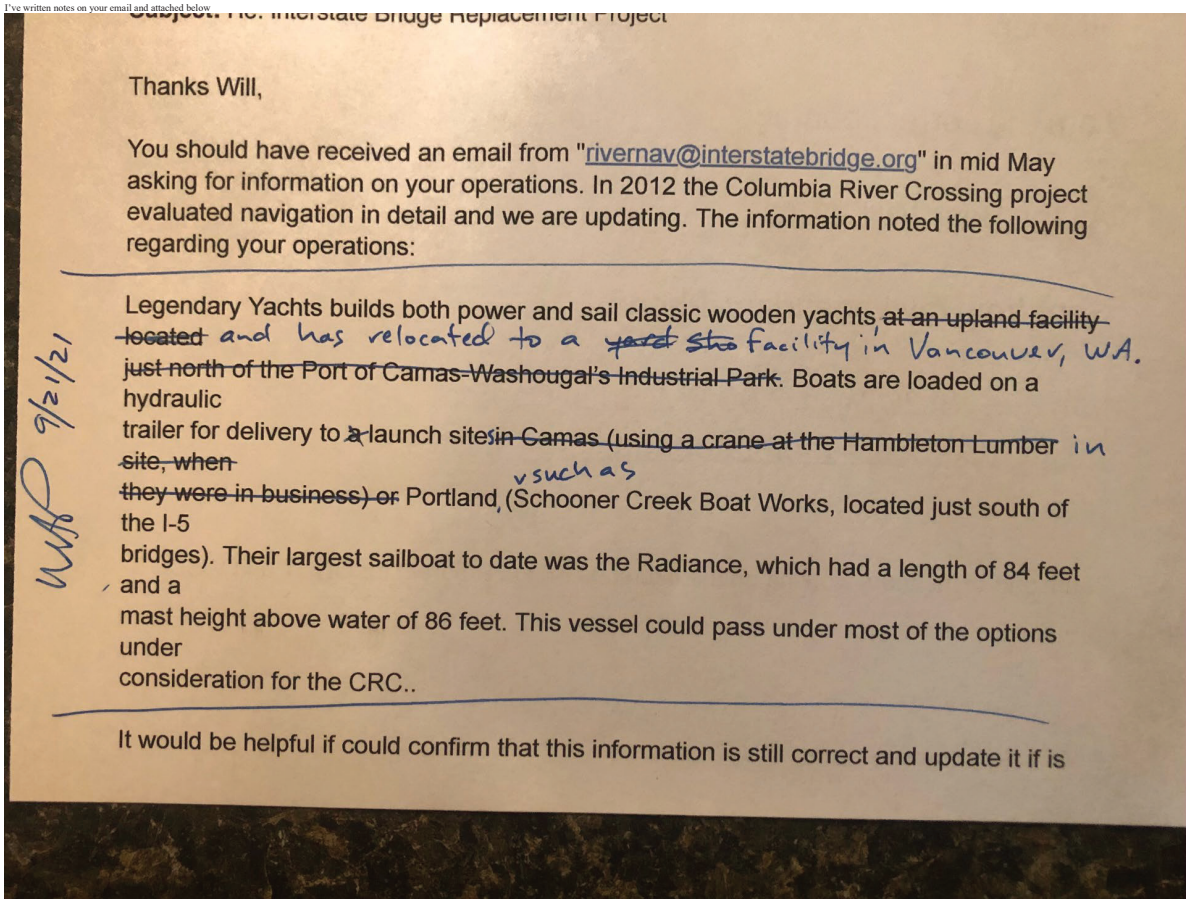
Confirmation was submitted via email to the IBR Program. Vessel characteristics were provided in the CRC NIR. Email confirmation and CRC NIR information are included below.

From: Will Pollard
To: Brian Carrico
Cc: Nicole McDermott
Subject: Re: Interstate Bridge Replacement Project
Date: Tuesday, September 21, 2021 11:22:24 AM

Hi Brian,

My apologies.

I've written notes on your email and attached below



Re: Interstate Bridge Replacement Project

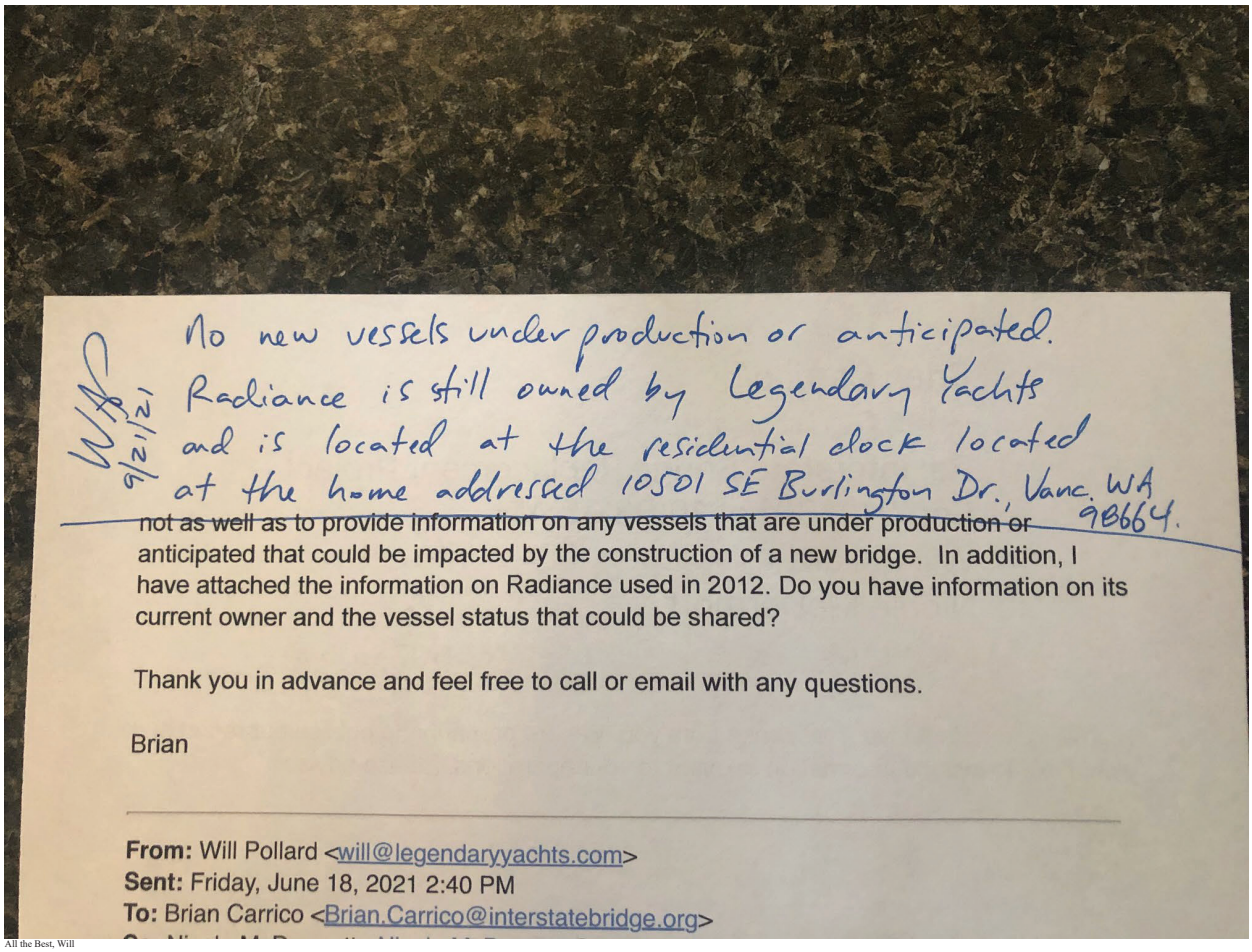
Thanks Will,

You should have received an email from "rivernav@interstatebridge.org" in mid May asking for information on your operations. In 2012 the Columbia River Crossing project evaluated navigation in detail and we are updating. The information noted the following regarding your operations:

Legendary Yachts builds both power and sail classic wooden yachts ~~at an upland facility located~~ and has relocated to a ~~yard~~ ~~site~~ facility in Vancouver, WA. ~~just north of the Port of Camas-Washougal's Industrial Park~~. Boats are loaded on a hydraulic trailer for delivery to ~~a~~ launch site ~~in Camas (using a crane at the Hambleton Lumber site, when they were in business) or~~ in Portland, such as (Schooner Creek Boat Works, located just south of the I-5 bridges). Their largest sailboat to date was the Radiance, which had a length of 84 feet and a mast height above water of 86 feet. This vessel could pass under most of the options under consideration for the CRC..

9/21/21

It would be helpful if could confirm that this information is still correct and update it if is



No new vessels under production or anticipated. Radiance is still owned by Legendary Yachts and is located at the residential dock located at the home addressed 10501 SE Burlington Dr., Vanc. WA 98664.

9/21/21

not as well as to provide information on any vessels that are under production or anticipated that could be impacted by the construction of a new bridge. In addition, I have attached the information on Radiance used in 2012. Do you have information on its current owner and the vessel status that could be shared?

Thank you in advance and feel free to call or email with any questions.

Brian

From: Will Pollard <will@legendaryyachts.com>
Sent: Friday, June 18, 2021 2:40 PM
To: Brian Carrico <Brian.Carrico@interstatebridge.org>

All the Best, Will

Sent from my Legendary iPhone

On Sep 21, 2021, at 10:03 AM, Brian Carrico <Brian.Carrico@interstatebridge.org> wrote:

Hi Will, I did not receive a response from you. We are preparing to publish our report and would like to include information relevant to your operations. Please advise.

Brian

From: Brian Carrico <Brian.Carrico@interstatebridge.org>
Sent: Wednesday, June 23, 2021 1:38 PM
To: Will Pollard <will@legendaryyachts.com>
Cc: Nicole McDermott <Nicole.McDermott@interstatebridge.org>
Subject: Re: Interstate Bridge Replacement Project

Thanks Will,

You should have received an email from "rivernav@interstatebridge.org" in mid May asking for information on your operations. In 2012 the Columbia River Crossing project evaluated navigation in detail and we are updating. The information noted the following regarding your operations:

Legendary Yachts builds both power and sail classic wooden yachts at an upland facility located just north of the Port of Camas-Washougal's Industrial Park. Boats are loaded on a hydraulic trailer for delivery to a launch site in Camas (using a crane at the Hambleton Lumber site, when they were in business) or Portland (Schooner Creek Boat Works, located just south of the I-5 bridges). Their largest sailboat to date was the Radiance, which had a length of 84 feet and a mast height above water of 86 feet. This vessel could pass under most of the options under consideration for the CRC..

It would be helpful if could confirm that this information is still correct and update it if is not as well as to provide information on any vessels that are under production or anticipated that could be impacted by the construction of a new bridge. In addition, I have attached the information on Radiance used in 2012. Do you have information on its current owner and the vessel status that could be shared?

Thank you in advance and feel free to call or email with any questions.

Brian

From: Will Pollard <will@legendaryyachts.com>
Sent: Friday, June 18, 2021 2:40 PM
To: Brian Carrico <Brian.Carrico@interstatebridge.org>
Cc: Nicole McDermott <Nicole.McDermott@interstatebridge.org>
Subject: Re: Interstate Bridge Replacement Project

Hi Brian,

I am the correct contact.

All the Best, Will

Sent from my Legendary iPhone

On Jun 18, 2021, at 2:00 PM, Brian Carrico <Brian.Carrico@interstatebridge.org> wrote:

I am part of the team working on the Interstate Bridge Program for ODOT and WSDOT, and we are updating information developed for the prior Columbia River Crossing project in 2012.

I am seeking information regarding the operatingstatus of Legendary Yachts and their current operations as part of the programs efforts to assess the impact of the proposed bridges on Columbia River navigation. If you could let me know if you are the correct individual with this information, it would be appreciated.

You can find out more about the program on the project website https://www.interstatebridge.org/ or by reaching out directly to me.

Regards,
Brian

I-5 Bridge Replacement Program

Recreational Sailboats and Powerboats
Owner: Legendary Yachts
Vessel: Radiance

River User Data Sheet By: Pat Scott Date: 3/28/2012

1. Company Name and/or Owner of Vessel and contact information
   a. Name of company: Legendary Yachts, Inc.
   b. Name of contact: Pat Scott
   c. Phone number (Office): 360-835-0342 d. (Cell): 360-798-4372
   e. Email: pscott@legendaryyachts.com
   f. Address: 2902 Addy St./ P.O. Box 720
   g. City: Washougal
   h. State: WA i. Zip code: 98671

3a. Vessel Name: RADIANCE 3b. Vessel Type: SAIL

3c. US Coast Guard Document Number: 1025262

4a. Length Overall (LOA), feet: 84' 4b. Beam (width), feet: 16'

5. Draft (depth of hull below waterline, fully laden), feet: 7'9"
6. Air Draft (Height of the highest fixed point of the vessel above the waterline, unladen), feet: 86
7. Air gap for vessel (desired clearance from the highest fixed point on the vessel to lowest part of bridge): 3'
8. Frequency of one-way passage underneath I-5 main channel (typical per month): .6

   Jan ___ Feb ___ Mar___ Apr___ May___ Jun_н_ Jul_н_Aug_н_Sep_н_Oct___Nov___Dec___
9. Frequency of one-way passage underneath I-5 main channel (other historic events): 2
10. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (typical per month): b2yŜ

    Jan ___ Feb ___ Mar___ Apr___ May___ Jun___ Jul___Aug___Sep___Oct___Nov___Dec___
11. Frequency of one-way passage through North Portland Harbor (Oregon Slough) (other historic events) 0

12. Do you have a Business Plan (e.g. 10 or 20 year plan)? What does it say regarding vessels transiting under the I-5 Bridge or into North Portland Harbor (Oregon Slough)? May we have a copy? I l·ØŜ yƵyŜ⌀ bκ!

13. Other miscellaneous⌀

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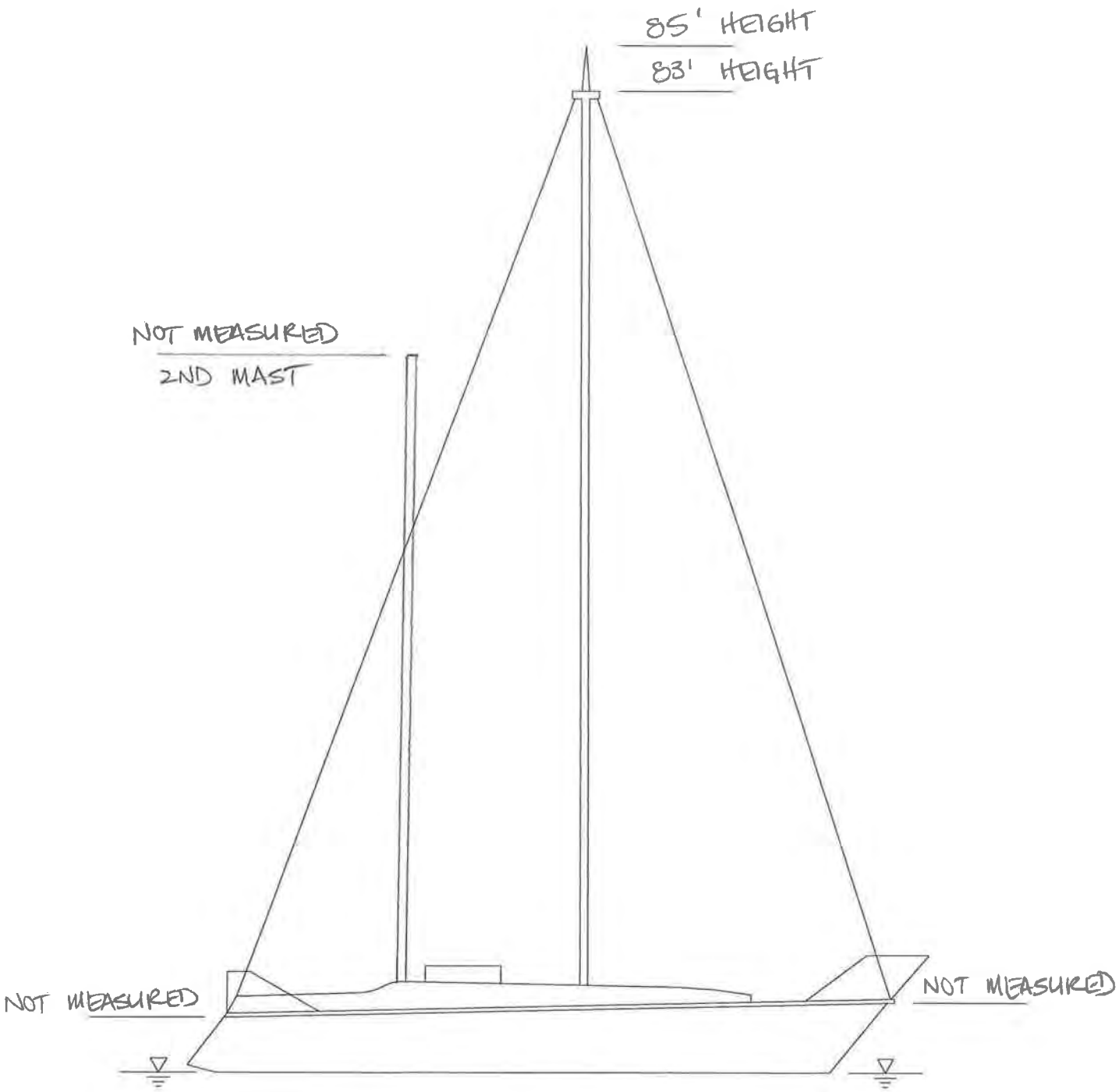
wƵdzűλyŜƒè ǿŜ Kl·ØŜ LƚNƵƵŜŎűă λƴűKŜ πpϥ Nƚ·yƎŜ ǿKλƒŜ ƵŎŎl·ăλƵyƚ·ƒƒè ǿŜ Kl·ØŜ űKŜƴ λƴűKŜ coϥ Nƚ·yƎŜ⌀



RADIANCE
NAME

(PRIVATE RESIDENCE)
10501 SE EVERGREEN HWY
VANCOUVER, WA
LOCATION

07-11-12
DATE

CRC Vessel Verification
Prepared by: David Evans and Associates, Inc.

Vessel Name	Owner	Antenna Elev (ft)	Mast Elev (ft)	Spud Elev (ft)	Boom Crane Elev (ft)	Gantry Elev (ft)	Pivot Pt Elev (ft)	Cradle Elev (ft)	Water Elev (ft)	Height Above Water
Radiance	Legendary Yachts, Inc	N/M	100.0	N/A	N/A	N/A	N/A	N/A	16.8	83
		101.7	N/M	N/A	N/A	N/A	N/A	N/A	16.8	85
Rage	Schooner Creek Boat Works	N/M	N/M	N/A	N/A	N/A	N/A	N/A	N/M	78 *
		N/M	N/M	N/A	N/A	N/A	N/A	N/A	N/M	80 **
		N/M	N/M	N/A	N/A	N/A	N/A	N/A	N/M	135 ***
		N/M	N/M	N/A	N/A	N/A	N/A	N/A	N/M	139 ****

* Per the owner's direction we made measurments with a tape measure from the top of the mast to the waterline.
** Antenna height is approximate.
***134-ft. (measured) length mast on the ground. Per the owner add 1-ft. to the mast length to determine the mast height above waterline.
**** A 4-ft. antenna will go on top of the above mast. Information per the owner.

N/A - does not exist
N/M - exists but not measured

Vessel Height Verification Sheet

By: Karl Krcma Date: 11 July 2012

1. Company Name and/or Owner of Vessel and Contact Information
   a. Name of company: Legendary Yachts
   b. Name of contact: Will Pollard
   c. Phone number (Office): 360.835.0342 (Cell): 360.798.7062
   d. Email:
   e. Address: 10501 SE Evergreen Hwy City: Vancouver
      State: WA Zip code: 98660
2. Vessel
   a. ID: b. Name: Radiance
   c. Type: Sailboat d. USCG Document Number:
3. Vessel Configuration
   a. Identify vessel configuration:
   - Is a vessel specification sheet available? No
   - Configuration shown on the sheet: not shown, photo only
   - What is the lowest height configuration for transport? 85' (83' without antenna)

   b. What is the gantry configuration? N/A Estimated gantry height: N/A
   c. Does the barge have spuds? N/A
   - Height above waterline for travel? N/A
   - Can the spuds be removed for travel? N/A
   - Work and cost involved in removing spuds? N/A
4. Vessel Location
   a. Where is the vessel currently located? Columbia River
   b. Is it working on a job? N/A Is it tied up to shore? Yes
   c. What is the best time to make a trip to the vessel? Anytime, just need a few days advance notice.

5. Surveyed Measurements (all measurements NAVD 88)

Gantry Height:	N/A
Water Level:	N/A
Top of Boom:	N/A
Height of Boom Hinge Pin:	N/A
Boom Cradle:	N/A
Top of Spud:	N/A
Top of Deck:	N/A

6. Vessel Height

Self-Reported		Surveyed	
Air Draft:	86 feet	Air Draft:	85 feet
Air Gap:	10 feet	Air Gap:	10 feet
Water Level:	16 feet (CRD)	Water Level:	16 feet (CRD)
Total Height:	112 feet	Total Height:	111 feet

7. History Notes

Date	Item
3/28/2012	Contacted by Ron Del Rosario
3/28/2012	Data sheet submitted
6/28/2012	Contacted by Karl Krcma for field measurement
7/11/2012	Field measured
7/17/2012	New data sheet submitted

Recreational Sailboats and Powerboats

Portland Yacht Club and Rose City Yacht Club

The Portland Yacht Club and Rose City Yacht Club did not respond to the IBR request. Information from these clubs provided in the CRC NIR is included below.

Summary Tables of Existing User Data

Company and/or Owner of Vessel	Vessel Name	Vessel Type	Length Overall (LOA), Feet	Beam, Feet	Draft, Feet	Air Draft, Feet	Data Source for Air Draft	Frequency of Passage Underneath Interstate-5 Bridges
Portland Yacht Club	High Flight	Sailboat				51	Surveyed	
Portland Yacht Club	Luscious	Sailboat				65	Surveyed	
Portland Yacht Club	Moondance	Sailboat				59	Surveyed	
Portland Yacht Club	Runaway	Sailboat	51	12 to 17	5 to 12	70	Surveyed	Fifteen to twenty trips per year.
Portland Yacht Club	Rya	Sailboat				66	Surveyed	
Portland Yacht Club	Saphira	Sailboat				54	Surveyed	
Portland Yacht Club	Sargasso	Sailboat				65	Surveyed	
Portland Yacht Club	Sovereign	Sailboat				58	Surveyed	
Portland Yacht Club	Sylvia	Sailboat				58	Surveyed	
Portland Yacht Club	Tropicale	Sailboat				61	Surveyed	
Portland Yacht Club	Whisper	Sailboat	57	12 to 17	5 to 12	74	Surveyed	Fifteen to twenty trips per year.
Rose City Yacht Club	Crystal Swan	Sailboat	40	14	6	63	Self-Reported	Three to four round trips per year.
Rose City Yacht Club	Down Wind Drift	Sailboat	42	8	6.5	59	Self-Reported	Three to four round trips per year.
Rose City Yacht Club	Draco	Sailboat	38	13	6.5	60	Self-Reported	Three to four round trips per year.
Rose City Yacht Club	Morgan Le Fay	Sailboat	50		6.5	58	Self-Reported	Three to four round trips per year.
Schooner Creek Boat Works	Rage	Sailboat	70	13	11	80	Surveyed	Approx. 4 times a month from March through September.
Scott Campbell	Riva	Sailboat	46	13.5	7.5	64.5	Self-Reported	Once in April and once in September.
Todd Hilbelink	Wakadui	Sailboat	49.5	14.8	7	66	Surveyed	Two times a month, May through September.
unknown	Make it So	Sailboat				90	Surveyed	
Wind Dancing LLC	Wind Dancing	Sailboat	47	13.9	9.6	66	Self-Reported	Two to four times a month, June through September.
Marine Contractors								
Advanced American Construction	DB 125	Crane barge				78	Drawings	Once to twice a month, all months of the year.
Advanced American Construction	DB 4000	Crane barge				79.5	Drawings	Once to twice a month, all months of the year.
Advanced American Construction	DB 4041	Crane barge				71	Drawings	Once to twice a month, all months of the year.
Advanced American Construction	DB 4100	Crane barge				92	Drawings	Once to twice a month, all months of the year.
Advanced American Construction	Linde Marie	Tug boat	58.4	16.5	5.5	35	Self-Reported	Once to twice a month, all months of the year.

APPENDIX D COLUMBIA AND SNAKE RIVER NAVIGATION CLEARANCES

Appendix D. Navigation Clearances for Facilities Crossing the Columbia and Snake Rivers

Table D-1 summarizes the navigation clearances for facilities (bridges, cables and locks) that cross or are in the Columbia River (from the mouth to Richland, Washington) and the Snake River (from the mouth to Lewiston, Idaho). This information is provided by river mile beginning at the mouth of the Columbia River and progressing upstream. Horizontal and vertical clearances are provided for bridges, horizontal clearances for navigation locks, and vertical clearances for overhead power lines. Most of the information provided in the table was obtained from the most recent National Oceanographic and Atmospheric Administration (NOAA) navigation chart available online (NOAA, 2012). Some of the bridge names (e.g., most of the railroad bridges upstream of The Dalles Dam) were obtained from the USCG bridge inspection logs available through the internet (USCG, 2011). In addition, USACE channel condition surveys were reviewed for additional information and for cross comparison with the information on the NOAA navigation charts.

Information differing materially between the NOAA charts and either the USACE charts or USCG bridge inspection logs are provided in the notes. In some cases, the reported river mile may be slightly different. The river miles provided in the tables were estimated to the nearest 1/10 statute mile based on river miles provided in the NOAA charts. In addition, the horizontal and vertical clearances were taken from the NOAA navigation charts. The datum for each reach of the river is controlled by the pool elevation of the various dams above Bonneville Dam. Below Bonneville Dam, the CRD is used except near the coast at the Astoria-Megler Bridge where Mean Lower Low Water (MLLW) is used.

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Table D-1. Columbia and Snake River Navigation Clearances

Bridge	River Mile	Horiz. Clr. (ft)	Vert. Clr. (ft)	Vert. Clr. at Center (ft)	Vert. Clr. w/Span Open (ft)	Location	NOAA Chart #	NOAA Chart (date)	Carries	Datum
Columbia River										
Astoria-Megler Bridge	13.5	1070	193	205	--	Astoria	18521	Aug-09	US 101	Mean Lower Low Water (MLLW)
Power Cable	40.0	--	230	--	--	Puget Island	18523	May-10	Power	Columbia River Datum (CRD)
Power Cable	62.4	--	216	--	--	Longview	18524	Jun-11	Power	CRD
Lewis & Clark Bridge	66.0	1120	187	--	--	Longview	18524		SR 433	CRD
Power Cable (main channel)	104.2	--	220	--	--	Vancouver-Portland	18525	Apr-09	Power	CRD
(North Portland Harbor)	1.6	--	160			Vancouver-Portland	18525		Power	CRD
BNSF Rail Bridge	105.6	200	39	--	Unlimited	Vancouver-Portland	18525		BNSF Rail Road (RR)	CRD
(North Portland Harbor)	3.2	125	39	--	Unlimited	Vancouver-Portland	18525			CRD
Interstate Bridge (lift bridge)	106.5	263	39	--	178	Vancouver-Portland	18525		I-5	CRD
(barge channel)		511	46	58	--	Vancouver-Portland	18525			CRD
(alt. barge channel)		260	72	--	--	Vancouver-Portland	18525			CRD
(North Portland Harbor)	4.5	215	35	--	--		18525			CRD
Power Cable (North Portland Harbor)	4.5	--	54	--	--	Vancouver-Portland	18525		Power	CRD
Glenn L. Jackson Memorial Bridge	112.7	469	136	144	--	Vancouver-Portland	18531	Sep-05	I-205	CRD
Power Cable	120.0	--	133	--	--	Camas-Troutdale	18531		Power	CRD
Bonneville Dam - Navigation Lock	145.1	86	--	--	--		18531			
Power Cable	145.1	--	210	--	--	Bonneville	18531		Power	CRD
Power Cable	146.6	--	190	--	--	Bonneville	18531		Power	Normal Pool (NP) (72 ft above Mean Sea Level (MSL))
Bridge of the Gods	148.3	655	135	--	--	Cascade Locks	18532	May-06	Pacific Crest Trail	NP (72 ft above MSL)
Hood River Bridge	169.8	246	67	--	148	Hood River	18532		SR 35	NP (72 ft above MSL)
Power Cable	171.1	--	155	--	--	Bingen	18532		Power	NP (72 ft above MSL)
Power Cable	173.8	--	159	--	--	Eighteen Mile Island	18532		Power	NP (72 ft above MSL)
Power Cable	186.2	--	155	--	--	The Dalles	18532		Power	NP (72 ft above MSL)
The Dalles Bridge (nav. lock approach)	191.6	250	100	--	--	The Dalles	18532		US 197	NP (72 ft above MSL)
(main span)		551	81	--	--	The Dalles	18532			
The Dalles Dam - Navigation Lock	191.8	86	--	--	--		18532			
Power Cable	191.9	--	125	--	--	The Dalles	18533	Sep-04	Power	NP (160 ft above MSL)
Power Cable	201.0	--	123	--	--	Wishram	18533		Power	NP (160 ft above MSL)
Celilo Bridge	201.2	300	20	--	79	Wishram	18533		BNSF RR	NP (160 ft above MSL)
Power Cable	204.5	--	115	--	--	Miller Island	18533		Power	NP (160 ft above MSL)
Sam Hill Memorial Bridge	209.1	300	88	--	--	Biggs	18533		US 97	NP (160 ft above MSL)
Power Cable	215.8	--	93	--	--	Biggs	18535	Aug-04	Power	NP (160 ft above MSL)
John Day Dam - Navigation Lock	216.6	86	--	--	--		18535			
Power Cable	263.3	--	95	--	--	Crowe Butte	18537	Jul-99	Power	NP (265 ft above MSL)
SR-82 Bridge, SB	291.0	335	85	--	--	Umatilla	18539	Mar-04	I-82, SR 395	NP (265 ft above MSL)
SR-82 Bridge, NB		400	71	--	--		18539			
Power Cable	291.2	--	82	--	--	Umatilla	18539		Power	NP (265 ft above MSL)
McNary Dam - Navigation Lock	292.6	86	--	--	--		18541	Mar-02		
McNary Dam Locks Bridge	292.6	86	15				18541		--	NP (340 ft above MSL)
Kalan Bridge	323.5	378	11	--	72	Burbank	18542	Jan-00	Union Pacific RR	NP (340 ft above MSL)
Power Cable	325.6	--	85	--	--	Kennewick-Pasco	18542		Power	NP (340 ft above MSL)
BNSF Rail Bridge	328.1	290	18		70	Kennewick-Pasco	18542		BNSF RR	NP (340 ft above MSL)
Benton-Franklin Intercounty Bridge	328.5	578	56	--	--	Kennewick-Pasco	18542		SR 397	NP (340 ft above MSL)
Power Cable	328.7	--	54	--	--	Kennewick-Pasco	18542		Power	NP (340 ft above MSL)
Pioneer Memorial Bridge	330.1	500	61		--	Kennewick-Pasco	18542		US 395	NP (340 ft above MSL)
Lee-Volpentest Bridges	336.1	400	73	--	--	Kennewick-Pasco	18542		I-182, US 12	NP (340 ft above MSL)

Bridge	River Mile	Horiz. Clr. (ft)	Vert. Clr. (ft)	Vert. Clr. at Center (ft)	Vert. Clr. w/Span Open (ft)	Location	NOAA Chart #	NOAA Chart (date)	Carries	Datum
Snake River										
BNSF Rail Bridge	1.5	380	14	--	60	Pasco-Burbank	18545	Sep-03	BNSF RR	NP (340 ft above MSL)
Vaughn Hubbard Bridge	2.2	400	61	--	--	Pasco-Burbank	18545		US 12	NP (340 ft above MSL)
Power Cable	4.0	--	68	--	--	Pasco-Burbank	18545		Power	NP (340 ft above MSL)
Power Cable	8.7	--	65	--	--	Ice Harbor Lock & Dam	18545		Power	NP (340 ft above MSL)
Power Cable	9.5	--	90	--	--	Ice Harbor Lock & Dam	18545		Power	NP (340 ft above MSL)
Ice Harbor Dam - Navigation Lock	9.7	86	--	--	--		18545			
Power Cable	16.0	--	80	--	--	1 mi. upstream of Dalton Lake	18545		Power	NP (440 ft above MSL)
Power Cable	40.1	--	148	--	--	Lower Monumental Dam	18545		Power	NP (440 ft above MSL)
Power Cable	41.0	--	94	--	--	Lower Monumental Dam	18545		Power	NP (440 ft above MSL)
Lower Monumental Dam - Navigation Lock	41.6	86	--	--	--		18546	Jan-04		
Joso Bridge	58.7	238	144	--	--	Lyons Ferry	18546		Union Pacific RR	NP (540 ft above MSL)
Lyons Ferry Bridge	59.2	200	74	--	--	Lyons Ferry	18546		SR 261	NP (540 ft above MSL)
Power Cable	59.6	--	178	--	--	Lyons Ferry	18546		Power	NP (540 ft above MSL)
Power Cable	60.6	--	178	--	--	Lyons Ferry	18546		Power	NP (540 ft above MSL)
Sargent Bridge	61.7	400	60	--	--	Tucannon	18546		Union Pacific RR	NP (540 ft above MSL)
Power Cable	69.1	--	95	--	--	Little Goose Lock & Dam	18546		Power	NP (540 ft above MSL)
Power Cable	69.3	--	90	--	--	Little Goose Lock & Dam	18546		Power	NP (540 ft above MSL)
Power Cable	70.0	--	93	--	--	Little Goose Lock & Dam	18546		Power	NP (540 ft above MSL)
Little Goose Dam - Navigation Lock	70.2	86	--	--	--		18547	Jul-99		
Elmer C. Huntley Bridge	83.2	520	60	--	--	Central Ferry	18547		SR 127	NP (638 ft above MSL)
Power Cable	83.3	--	80	--	--	Central Ferry	18547		Power	NP (638 ft above MSL)
Power Cable	85.3	--	95	--	--	2 mi. upstream of Central Ferry	18547		Power	NP (638 ft above MSL)
Power Cable	103.3	--	81	--	--	Almota	18547		Power	NP (638 ft above MSL)
Power Cable	104.3	--	75	--	--	Almota	18547		Power	NP (638 ft above MSL)
Lower Granite Dam - Navigation Lock	107.4	86	--	--	--		18548	Dec-02		
Power Cable	108.7	--	80	--	--	Lower Granite Dam	18548		Power	NP (738 ft above MSL)
Power Cable	110.2	--	101	--	--	Wawawai	18548		Power	NP (738 ft above MSL)
Power Cable	130.3	--	80	--	--	Near Silcott Island	18548		Power	NP (738 ft above MSL)
Power Cable	135.5	--	80	--	--	Wilma	18548		Power	NP (738 ft above MSL)
Red Wolf Crossing	137.3	400	60	--	--	Clarkston	18548		SR 128	NP (738 ft above MSL)
SR 12 Interstate Bridge	139.6	160	10	--	42	Clarkston-Lewiston	18548		US 12	NP (738 ft above MSL)
Lewiston/Clarkston Bridge	141.3	250	--	60	--	Clarkston-Lewiston	18548		Fleshman Way – Bryden Canyon Rd.	NP (738 ft above MSL)
Power Cable	141.4	--	80	--	--	Clarkston-Lewiston	18548		Power	NP (738 ft above MSL)
Power Cable	145.0	--	80	--	--	Asotin	18548		Power	NP (738 ft above MSL)
Clearwater River										
Power Cable	0.6	--	81	--	--	Lewiston-North Lewiston	18548		Power	NP (738 ft above MSL)
Camas Prairie Railroad Bridge	0.6	232	7	--	60	Lewiston-North Lewiston	18548		Camas Prairie RR	NP (738 ft above MSL)

References for Appendix D

National Oceanographic and Atmospheric Administration (NOAA) (2012), NOAA Nautical Chart online Viewer, Site accessed September 2021, https://charts.noaa.gov/InteractiveCatalog/nrnc.shtml

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APPENDIX E INTERSTATE DRAWBRIDGE OPERATIONS DATA

APPENDIX E

Interstate Drawbridge Operations Report

Appendix E includes data on I-5 bridge lift span openings collected from Jan 1, 2007 through May 24, 2022. Data from 2007 to 2011 is provided from the 2012 Columbia River Crossing dataset and includes maintenance and test lifts. Data from 2012 to 2021 was collected as part of the Interstate 5 Bridge Replacement project. This dataset does not include maintenance or test lift openings which are not relevant to vessel navigation but can be useful for other purposes related to vehicle traffic. Both datasets include time of gate closing and opening, total time opened, lift elevation, recorded vessel name, weather temperature, wind velocity, water level, vessel type and total height.

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
01/01/07	1	15:16pm	15:25pm	8	80	"Halsey", "Whisper", "Osprey" sailboats	up	cloudy 38	2	6.8	Sail
01/03/07	1	04:21am	04:30am	9	94	"Yaquina"	up	foggy 47	4	6.2	Federal
01/04/07	1	13:50pm	14:05pm	15	75	"Descutes" + 4 barges	-	sunny 50	6	9.1	Barge
01/04/07	2	22:17pm	22:28pm	11	65	Sundial + 4 barges	down	partly cloudy 39	3	9.7	Barge
01/05/07	1	02:58am	03:11am	13	95	"Chief" (3 barges)	down	cloudy 36	10	9.1	Barge
01/08/07	1	12:30pm	12:40pm	10	80	"Challenger"	down	cloudy 46	4	8.9	Barge
01/08/07	2	01:50am	02:00am	10	80	"Lori B"	down	cloudy 45	calm	8.9	Barge
01/12/07	1	05:07am	05:15am	8	85	"Challenger"	down	clear 26	3	6.3	Barge
01/26/07	1	14:14pm	14:20pm	6	45	"Runaway" sailboat	down	sunny 53	2	5.9	Sail
01/28/07	1	12:36pm	12:43pm	7	75	Runnaway (sailboat)	up	clear 46	4	5.6	Sail
01/30/07	1	10:05am	10:16am	11	120	Mary B	up	clear 35	calm	3.7	Barge
02/02/07	1	12:41pm	12:50pm	9	100	Yaquina dredge	down	partly cloudy 43	1	3.6	Federal
02/03/07	1	10:53am	11:02am	9	95	Crown of Camas	down	cloudy 37	1	3.9	Barge
02/05/07	1	11:05am	11:15am	10	100	Nova	up	cloudy 45	calm	4	Barge
02/06/07	1	13:16pm	13:26pm	10	75	"Washougal" spud	up	cloudy 48	1	3.7	Barge
02/07/07	1	09:30am	09:44am	14	100	Nova deric barg	down	cloudy 43	10	5	Barge
02/18/07	1	08:08am	08:20am	12	75	Rebel	down	partly cloudy 44	calm	7	Barge
02/19/07	1	10:06am	10:17am	11	100	"Daryle B"	up	cloudy 46	22	6	Barge
02/27/07	1	09:46am	10:00am	14	100	"nova" + barge + spud barge	-	snow/rain 36	22	4.9	Barge
02/28/07	1	13:43pm	13:53pm	11	80	Nova + spud barge	down	cloudy 41	6	6.1	Barge
03/01/07	1	23:14pm	23:27pm	13	68	East br test lift	-	cloudy 39	7	6.1	N/A
03/01/07	2	23:50pm	00:03am	13	45	West br test lift	-	cloudy 39	5	6.1	N/A
03/02/07	1	00:11am	00:20am	9	39	East br test lift	-	cloudy 39	5	5.8	N/A
03/02/07	2	00:25an	00:35an	10	35	West br test lift	-	cloudy 39	5	5.7	N/A
03/02/07	1	00:41am	00:44am	3		east br bypass test		cloudy 38	4		N/A
03/02/07	2	00:54am	00:58am	4		west br bypass test		cloudy 38	4		N/A
03/06/07	1	19:46pm	19:55pm	9	90	"Willamette" + 2 barges + 1 spud barge	up	cloudy 55	11	5.7	Barge
03/07/07	1	13:43pm	13:53pm	10	100	Lindy Mari + spud barge	down	cloudy 53	7	4.9	Barge
03/13/07	1	09:05am	09:21am	16	110	"Darryl B" Derrick barge	down	cloudy 45	2	5.3	Barge
03/13/07	1	09:42am	09:43am	1		extract maint crew from pier caps		cloudy 45	2		N/A
03/16/07	1	10:00am	10:08am	8	75	Runnaway (sailboat)	down	clear 51	1	6.4	Sail
03/16/07	2	10:35am	10:44am	9	80	Washugel + spud barge	down	clear 52	4	6.4	Barge
03/16/07	1	20:58pm	21:00pm	2		South B test					N/A
03/16/07	2	21:06pm	21:08pm	2		South B test					N/A
03/18/07	1	13:10pm	13:17pm	7	65	Runaway	up	cloudy 62	2	6	Sail
03/20/07	1	18:09pm	18:16pm	7	60	"Sivercorne" sailboat	up	clear 48	calm	7.7	Sail
03/20/07	2	20:25pm	20:37pm	12	28	test - west bridge only	-	clear 44	calm	8.2	N/A
03/20/07	3	21:09pm	21:24pm	16	28	test - east bridge only	-	clear 43	calm	8.2	N/A
03/20/07	4	22:23pm	22:35pm	12	28	test - west bridge only	-	clear 42	calm	8.1	N/A
03/20/07	5	22:46pm	22:54pm	8	23	test - west bridge only	-	clear 43	0	8	N/A
03/23/07	1	14:00pm	14:08pm	8	60	test lift SB E bridge	-	cloudy 55	8	8.6	N/A
03/23/07	2	10:10am	10:24am	14		stopped for road deck patching		cloudy 54			N/A
03/23/07	3	11:00am	11:06am	6		test lift (traffic stop only)		cloudy 54			N/A
03/24/07	1	13:46pm	13:53pm	7	60	Tango	up	cloudy 59	20	7.2	Sail
03/26/07	1	10:06am	10:08am			sign and siren test NB					N/A
03/28/07	1	18:01pm	18:10pm	9	85	"Arctic Lady"	up	clear 54	5	7.7	Fishing
03/28/07	1	10:00am	10:16am	16		SB only for maint (measure signs)		44	1		N/A
03/29/07	1	20:50pm	20:55pm	5	3	SB only test	-	-	-	-	N/A
03/29/07	2	21:01pm	21:11pm	10	86	SB only test	-	-	-	-	N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
03/29/07	3	21:35pm	21:45pm	10	86	NB only	-	-	-	-	N/A
03/29/07	4	21:53pm	21:58pm	5	30	SB only	-	-	-	-	N/A
03/29/07	5	22:02pm	10:09 PM	5	30	NB only	-	-	-	-	N/A
03/29/07	1	20:23pm	20:29pm	6		SB only					N/A
03/29/07	2	20:45pm	20:49pm	4		SB only					N/A
04/02/07	1	09:00am	09:09am	9	60	Tallulah	down	cloudy 43	1	8.3	Unknown
04/03/07	1	10:29am	10:33am	4		check NE Barrier NB		clear 45	3		N/A
04/05/07	1	09:51am	10:00am	9	65	sailing vessel "Windward"	down	sunny 55	1	8.1	Sail
04/05/07	1	20:03pm	20:09pm	6		maint (Dave)		clear 66	5		N/A
04/06/07	1	13:00pm	13:09pm	9	70	Windward	up	clear 70	5	7.6	Sail
04/07/07	1			11	70	Willamette 5 barges	down	clear 62	3	7.1	Barge
04/07/07	2	12:40pm	12:47pm	7	60	Runaway	-	rain 55	6	6.8	Sail
04/07/07	3	21:55pm	22:07pm	13	85	Umatilla seahawk	down	clear 55	2	6.4	Barge
04/08/07	1	16:25pm	16:36pm	11	75	"Legend" six pack	down	cloudy 57	5	5.6	Barge
04/09/07	1	13:18pm	13:26pm	8	70	sailboat	down	cloudy 47	3	6	Sail
04/11/07	1	10:42am	10:46am	4		tested back barrier NB only		53	12		N/A
04/14/07	1	18:52pm	19:00pm	8	70	"Rebecca B" sailboat	down	partly sunny 55	17	6.6	Sail
04/20/07	1	10:51am	11:00am	9	75	Whisper	down	clear 50	calm	7.9	Sail
04/21/07	1	04:32am	04:41am	9	85	Challenger + spud	down	overcast 46	11	6.7	Barge
04/22/07	1	13:27pm	13:34pm	7	60	Whisper	up	cloudy 55	7	7	Sail
04/24/07	1	10:34am	10:39am	5	20	West BR only - to reseat the span	-	cloudy 54	8	6.2	N/A
04/30/07	1	01:18am	01:23am	5	1	east br touch screen tests	-	cloudy 46	6	5.7	N/A
04/30/07	2	01:28am	01:34am	6	36	east br touch screen tests	-	cloudy 46	6	5.7	N/A
04/30/07	3	02:00am	02:07am	7	39	east br touch screen tests	-	cloudy 44	3	5.7	N/A
04/30/07	4	02:18am	02:24am	6	31	east br touch screen tests	-	cloudy 44	3	5.7	N/A
04/30/07	5	19:36pm	19:46pm	10	90	"Lewiston" + 1 barge + 1 spud barge	up	cloudy 57	10	6.4	Barge
04/30/07	1	00:15am	00:21am	6		east br touch screen tests		cloudy 46	6	6	N/A
04/30/07	2	00:44am	00:50am	6		east br touch screen tests		cloudy 46	6	6	N/A
04/30/07	3	01:07am	01:09am	2		east br touch screen tests		cloudy 46	6	6	N/A
05/02/07	1	21:32pm	21:45pm	13	90	"Deschutes" + 3 barges	down	cloudy 48	17	7.5	Barge
05/02/07	1	12:10pm	12:13pm			NB only for garbage from mack Hs's		cloudy 48	11		N/A
05/04/07	1	14:06pm	14:14pm	8	65	Bellissima sailboat	down	partly cloudy 55	1	7.9	Sail
05/04/07	2	18:51pm	18:58pm	7	60	Runaway	up	cloudy 54	12	7.5	Sail
05/05/07	1	17:57pm	18:07pm	10	70	"Bellissima" sailboat	up	clear 59	calm	7.6	Sail
05/07/07	1	00:11am	00:20am	9	40	test EB drive	-	cloudy 57	3	7.4	N/A
05/07/07	2	00:29am	00:35am	6	40	test EB drive	-	cloudy 57	3	7.4	N/A
05/07/07	3	01:07am	01:19am	12	136	test EB drive	-	cloudy 57	3	7.3	N/A
05/07/07	4	01:33am	01:38am	5	40	test EB drive	-	cloudy 56	3	7.3	N/A
05/09/07	1	22:23pm	22:45pm	22	136	E bridge only - maint	-	clear 57	7	6.4	N/A
05/09/07	1	13:37pm	13:38pm	1		remove trash SB lanes		clear 62	10		N/A
05/10/07	1	23:01pm	23:21pm	20	72	west bridge aux test + greasing	-	clear 54	5	6.6	N/A
05/10/07	2	23:35pm	23:55pm	20	136	west bridge aux test + greasing	-	clear 54	10	6.8	N/A
05/10/07	3	00:25am	00:48am	23	85	west bridge aux test + greasing	-	clear 54	5	7	N/A
05/10/07	4	00:55am	01:24am	28	136	west bridge aux test + greasing	-	clear 52	7	7	N/A
05/10/07	5	01:39am	01:55am	16	95	west bridge aux test + greasing	-	clear 51	8	7	N/A
05/10/07	6	02:02am	02:17am	15	136	west bridge aux test + greasing	-	clear 51	8	7	N/A
05/10/07	7	02:22am	02:36am	14	90	"Dauby" + 2 barges	down	clear 50	5	7	Barge
05/10/07	8	22:23pm	22:41pm	21	76	west br maint	-	cloudy 54	5	6.7	N/A
05/11/07	1	23:00pm	23:22pm	22	72	west br maint	-	clear 53	7	6.8	N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
05/11/07	2	23:31pm	23:58pm	W19/E22	E25/W82	maint both brs	-	clear 52	3	6.9	N/A
05/11/07	3	00:07am	00:31am	24	E25/W71	maint both brs	-	clear 51	9	7	N/A
05/11/07	4	00:39am	00:56am	16	E25/W71	west br only (EMS)	-	clear 51	9	7	N/A
05/11/07	5	01:05am	01:16am	11	69	west br only (EMS)	-	clear 51	5	7.1	N/A
05/11/07	6	01:25am	01:49am	24	25	east br only (VAC)	-	clear 49	9	7.1	N/A
05/11/07	7	02:02am	02:28am	26	25	west br only (VAC)	-	clear 48	9	7.3	N/A
05/11/07	8	12:55pm	13:02pm	7	75	Runaway	down	clear 61	10	7.1	Sail
05/12/07	1	01:51am	02:01am	10	70	Dauby	down	clear 52	2	7.4	Barge
05/13/07	1	05:29am	05:39am	10	67	"Legend" + 2 oil barges	down	cloudy light rain 47	6	7.6	Barge
05/13/07	2	14:10pm	14:16pm	6	60	Runaway	up	cloudy 56	4	6.6	Sail
05/14/07	1	02:16am	02:21am	5	25	test lift east br only	-	clear 49	2	6.7	N/A
05/15/07	1	10:51am	11:01am	10	90	"Crown of Camas" w/spuds	down	clear 70	4	8	Barge
05/17/07	1	09:00am	09:13am	13	87	Deschutes + barges	down	clear 54	5	8.4	Barge
05/17/07	2	11:43am	11:56am	13	86	maint lift	-	clear 57	4	8	N/A
05/17/07	3	20:34pm	20:39pm	5	25	test lift	-	clear 64	3	7.7	N/A
05/19/07	1	21:41pm	21:53pm	12	90	"Willamette" + 4 barges	down	cloudy 56	4	7.8	Barge
05/22/07	1	02:32am	02:43am	11	70	"Dauby" + 2 barges	down	cloudy 51	5	7.1	Barge
05/22/07	2	20:30pm	20:34pm	4	22	N Bound only test - Dave Johnson	-	clear 63	3	6.4	N/A
05/23/07	1	10:10am	10:19am	9	70	Osprey sailboat	down	clear 55	3	6.8	Sail
05/24/07	1	22:07pm	22:19pm	12	82	west br test	-	clear 66	7	6	N/A
05/24/07	2	22:27pm	22:35pm	8	100	east br test	-	-	-	-	N/A
05/24/07	3	22:36pm	22:45pm	9	6	west br test	-	-	-	-	N/A
05/25/07	1	22:51pm	22:57pm	6	50	east bridge test	-	clear 64	11	6	N/A
05/25/07	2	04:11am	04:22am	11	70	"Tidewater" + 2 barges	-	clear 57	0	7	Barge
05/25/07	3	09:08am	09:15am	7	70	Bram Brata	down	overcast 59	5	6.6	Unknown
05/26/07	1	01:49am	01:59am	10	70	Dauby + barges	down	dark 57	3	7	Barge
05/27/07	1	09:04am	09:14am	10	90	Artic Lady	down	cloudy 54	10	6	Fishing
05/29/07	1	18:36pm	19:04pm	30	70	Osprey	-	clear 84	4	6.1	Sail
05/29/07	2	19:47pm	19:51pm	4	12	test lift	-	clear 82	3	6	N/A
06/01/07	1	10:39am	10:49am	10	65	Biena Vita sailboat	down	clear 66	7	6.4	Sail
06/03/07	1	15:40pm	15:49pm	9	65	Biena Vida (sailboat)	up	partly cloudy 82	3	5	Sail
06/04/07	1	00:32am	00:38am	6	30	east bridge test lift	-	clouds 65	2	5.5	N/A
06/04/07	2	00:45am	00:50am	5	22	east bridge test lift	-	clouds 65	5	5.4	N/A
06/04/07	3	00:59am	01:02am	3	8	east bridge test lift	-	clouds 65	5	5.4	N/A
06/04/07	4	01:29am	01:35am	6	35	east bridge test lift	-	clouds 65	2	5.4	N/A
06/04/07	5	01:51am	01:57am	6	35	east bridge test lift	-	clouds 65	3	5.4	N/A
06/04/07	6	02:32am	02:36am	4	25	east bridge test lift	-	clouds 64	0	5.2	N/A
06/04/07	7	18:53pm	19:01pm	8	75	"Ironwood"	up	cloudy 69	6	5.2	Federal
06/07/07	1	19:11pm	19:20pm	9	90	Ironwood	down	cloudy 61	3	5.2	Federal
06/10/07	1	12:30pm	12:37pm	7	60	"Destinado ser asi"	down	cloudy 61	3	6.4	Sail
06/11/07	1	1:48pm	1:55pm	7	47	Test lift EB only	-	clouds 54	6	7.2	N/A
06/11/07	2	2:43pm	2:50pm	7	43	Test lift EB only	-	clouds 54	2	7.2	N/A
06/11/07	3	3:07pm	3:11pm	4	25	Test lift EB only	-	clouds 53	4	7.3	N/A
06/11/07	4	14:14pm	14:25pm	11	100	Lady Wash, Autumn Wind, Hawaiian Chieftan	-	cloudy 62	3	6	Sail
06/12/07	1	19:29pm	19:37pm	8	71	"Golded Oddyssy" sailboat	up	cloudy 73	2	6.1	Sail
06/13/07	1	11:28am	11:37am	9	70	"Destinada" sailboat	up	partly cloudy 63	4	6.5	Sail
06/13/07		20:04pm	20:17pm	13	100	Lady Washington + Hawaiian Chieftain	down	partly cloudy 61	6	6.3	Sail
06/15/07	1	09:33am	09:44am	11	75	Whisper sailboat	down	rain 58	3	6.8	Sail
06/18/07	1	00:34am	00:40am	6	40	test lift NB only	-	cloudy 56	4	4.7	N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
06/18/07	2	00:44am	00:51am	7	50	test lift NB only	-	cloudy 56	4	4.7	N/A
06/18/07	3	01:04am	01:12am	8	86	test lift NB only	-	cloudy 56	4	4.5	N/A
06/18/07	4	01:16am	01:26am	10	120	test lift NB only	-	cloudy 55	2	4.5	N/A
06/18/07	5	01:34am	01:40am	6	25	test lift NB only	-	cloudy 55	6	4.4	N/A
06/18/07	6	01:57am	02:01am	4	30	test lift NB only	-	cloudy 55	6	4.4	N/A
06/18/07	7	05:27am	05:34am	7	55	"Golden Odessy" sailboat	down	cloudy 53	10	4.2	Sail
06/19/07	1	11:47am	11:49am	2		pushed stalled car from B lane to C lane south bound		clear 66	5		N/A
06/20/07	1	04:47am	04:58am	11	90	"Rebel" w/spuds + crane	up	clear 58	3	5.4	Barge
06/23/07	1	01:39am	01:58am	19	136	Maverick (Derrick)	down	cloudy 55	3	5.3	Barge
06/23/07	2	09:01am	09:12am	11	110	Washougal	down	partly cloudy 61	3	4	Barge
06/25/07	1	00:19am	00:26am	7	50	Test lift east bridge	-	cloudy 55	4	4	N/A
06/25/07	2	00:55am	00:59am	4	25	Test lift east bridge	-	cloudy 55	4	4.1	N/A
06/25/07	3	09:25am	09:34am	9	86	east br maint	-	partly cloudy 61	2	3	N/A
06/27/07	1	20:11pm	20:19pm	8	75	"Whisper" sailboat	up	cloudy 73	1	3.4	Sail
06/29/07	1	18:05pm	18:12pm	7	70	Syren	up	cloudy 65	9	4	Sail
07/03/07	1	09:20am	09:32am	12	86	E bridge lift to remove materials from CWT	-	clear 69	5	4.5	N/A
07/10/07	1	18:31pm	18:39pm	8	73	"Siren" sailboat	down	sunny 95	14	3.4	Sail
07/10/07	2	22:39pm	22:40pm	4	11	test lift - west bridge only	-	clear 82	7	3.1	N/A
07/12/07	1	19:02pm	19:11pm	9	70	Whisper	down	clear 83	14	4.7	Sail
07/15/07	1	22:05pm	22:21pm	21	121	west bridge only - maint	-	clear 69	5	5.5	N/A
07/15/07	2	22:37pm	22:50pm	13	135	west bridge only - maint	-	clear 69	5	5.5	N/A
07/16/07	1	22:10pm	22:20pm	10	86	east bridge only - maint	-	clear 68	6	5.9	N/A
07/16/07	2	22:55pm	23:16pm	21	136	east bridge maint	-	clear 66	7	5.2	N/A
07/16/07	3	23:27pm	23:48pm	21	106	east bridge maint, * glitch in maint screen	-	clear 66	7	5.1	N/A
07/16/07	4	23:57pm	00:12am	15	136	east bridge maint, * glitch in maint screen	-	clear 65	5	5	N/A
07/16/07	5	00:21am	00:41am	20	136	east bridge maint, * glitch in maint screen	-	clear 65	5	4.9	N/A
07/16/07	6	01:21am	01:44am	23	136	west bridge maint	-	clear 64	4	4.8	N/A
07/16/07	7	01:54am	02:01am	7	4	west bridge maint	-	clear 64	4	4.8	N/A
07/16/07	8	02:15am	02:37am	22	136	west bridge maint	-	clear 63	4	4.5	N/A
07/16/07	9	02:39am	02:44am	5	4	west bridge maint	-	clear 63	0	4.5	N/A
07/16/07	10	03:15am	03:26am	11	86	east bridge maint	-	clear 63	4	4.5	N/A
07/16/07	11	03:42am	03:51am	9	86	east bridge maint	-	clear 62	4	4.6	N/A
07/16/07	1	04:00am	04:13am	13		e bridge maint		63	2		N/A
07/16/07	2	12:56pm	12:58pm	2		south debris pick-up					N/A
07/17/07	1	22:59pm	23:18pm	19	136	east br maint	-	cloudy 67	5	5.6	N/A
07/17/07	2	23:30pm	23:50pm	20	136	east br maint	-	cloudy 67	5	5.5	N/A
07/17/07	3	23:58pm	00:20am	22	136	west br maint	-	cloudy 66	4	5.4	N/A
07/17/07	4	00:56am	01:06am	10	86	east br maint	-	cloudy 66	4	5.4	N/A
07/17/07	5	01:26am	01:48am	22	82	west br maint	-	cloudy 66	4	5.2	N/A
07/17/07	6	01:58am	02:25am	27	82	west br maint	-	cloudy 66	4	5	N/A
07/17/07	7	02:04am	02:11am	7	86	east br maint	-	cloudy 66	4	5	N/A
07/17/07	8	02:34am	02:51am	17	82	west br maint	-	rain 64	1	4.9	N/A
07/17/07	9	03:03am	03:13am	10	136	west br maint	-	rain 63	1	4.9	N/A
07/17/07	10	03:19am	03:13am	7	86	east br maint	-	rain 62	0	4.8	N/A
07/17/07	11	03:32am	03:39am	7	86	east bridge maint	-	rain 61	1	4.9	N/A
07/17/07	12	03:55am	04:03am	8	86	east bridge maint	-	rain 61	1	4.9	N/A
07/17/07	13	04:18am	04:33am	15	136	east bridge maint	-	rain 61	2	4.9	N/A
07/17/07	14	22:26pm	22:35pm	9	65	e bridge only - test	-	cloudy 68	calm	5.9	N/A
07/17/07	1	01:54am	01:55am	1		east bridge only		cloudy 66	6		N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
07/17/07	2	02:30am	02:31am	1		east bridge only		cloudy 66	6		N/A
07/18/07	1	00:43am	00:51am	8	20	trng lift e br	-	66	3	5.5	N/A
07/18/07	2	00:54am	01:00am	6	20	trng lift w br	-	66	6	5.5	N/A
07/18/07	3	01:05am	01:11am	6	20	training lift e br	-	66	4	5.5	N/A
07/18/07	4	01:13am	01:18am	5	20	training lift w br	-	66	3	5.5	N/A
07/18/07	5	01:21am	01:26am	6	20	training lift e br	-	66	3	5.5	N/A
07/18/07	6	01:37am	01:50am	13	136	training lift e + w br	-	65	3	5	N/A
07/18/07	7	01:55am	02:09am	14	136	training lift e + w br	-	65	3	5	N/A
07/18/07	8	02:16am	02:32am	16	136	training lift e + w br	-	65	3	5	N/A
07/18/07	9	02:39am	02:52am	13	136	training lift e + w br	-	64	7	4.5	N/A
07/18/07	10	03:00am	03:15am	15	136	training lift e + w br	-	64	2	4.5	N/A
07/18/07	1	23:12pm	23:15pm	.3		trng r br		68	5		N/A
07/18/07	2	23:18pm	23:20pm	2		trng w br		68	5		N/A
07/18/07	3	23:27pm	23:29pm	2		trng r br		68	5		N/A
07/18/07	4	23:31pm	23:33pm	2		trng w br		68	5		N/A
07/18/07	5	23:36pm	23:38pm	2		trng r br		68	5		N/A
07/18/07	6	23:47pm	23:51pm	4		w - e br		68	5		N/A
07/18/07	7	00:07am	00:13am	6		w - e br		68	5		N/A
07/18/07	8	00:17am	00:22am	5		w - e br		68	5		N/A
07/18/07	9	00:28am	00:32am	4		w - e br		68	5		N/A
07/18/07	10	00:36am	00:40am	4		w - e br		68	5		N/A
07/19/07	1	23:52pm	23:58pm	6	10	training lifts w br	-	64	2	5	N/A
07/19/07	2	00:04am	00:14am	10	86	training lifts e br	-	64	3	5	N/A
07/19/07	3	00:21am	00:29am	8	82	training lifts w br	-	64	1	5	N/A
07/19/07	4	00:42am	00:51am	9	100	training lifts w br	-	64	3	5	N/A
07/19/07	5	00:57am	01:08am	11	136	training lifts e br	-	63	2	4.5	N/A
07/19/07	6	01:19am	01:28am	9	38	training lift w + e br	-	63	3	4.5	N/A
07/19/07	7	03:06am	03:20am	14	136	training lift w + e br	-	63	2	4.5	N/A
07/19/07	8	03:38am	03:46am	8	30	training lift w + e br	-	62	2	4.5	N/A
07/19/07	9	03:55am	04:08am	13	100	Dobie	-	62	2	4.5	Unknown
07/19/07	10	04:38am	04:48am	10	87	training lift w + e br	-	61	5	4	N/A
07/19/07	1	01:18am	01:19am	2		training traffic stop		63	3		N/A
07/19/07	2	01:33am	01:38am	5		training traffic stop w br		63	1		N/A
07/19/07	3	01:46am	01:48am	6		training traffic stop e br		63	2		N/A
07/19/07	4	01:53am	01:55am	6		training traffic stop w br		63	2		N/A
07/19/07	5	02:03am	02:05am	4		training traffic stop w br		63	2		N/A
07/20/07	1	23:17pm	23:29pm	12	50	training lift e + w br	-	68	3	5	N/A
07/20/07	2	23:47pm	23:58pm	11	60	training lift e + w br	-	68	0	5	N/A
07/20/07	3	00:12am	00:22am	10	20	training lift e + w br	-	68	0	5	N/A
07/20/07	4	00:33am	00:50am	17	136	training lift e + w br	-	68	0	5	N/A
07/20/07	5	00:57am	01:19am	22	128	training lift w br	-	68	1	4.5	N/A
07/20/07	6	01:31am	01:46am	15	54	training lift e br	-	68	2	4.5	N/A
07/20/07	7	01:58am	02:07am	9	66	training lift e br	-	67	1	4.5	N/A
07/20/07	8	02:27am	02:38am	11	80	training lift e + w br	-	66	0	4.5	N/A
07/20/07	9	03:03am	03:18am	15	4	training lift e br	-	67	1	4.5	N/A
07/20/07	10	03:30am	03:44am	14	2	training lift w br	-	67	1	4.5	N/A
07/20/07	11	03:51am	03:58am	7	2	training lift e br	-	65	2	4.5	N/A
07/20/07	12	04:08am	04:23am	15	30	training lift e + w br	-	65	3	4.5	N/A
07/20/07	13	04:32am	04:47am	15	40	training lift e + w br	-	66	5	3.8	N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
07/20/07	1	10:15am	10:24am	9		maint stop greasing barriers NB only					N/A
07/20/07	2	10:42am	10:51am	9		maint stop greasing barriers SB only					N/A
07/21/07	1	15:05pm	15:12pm	7	66	"Sargasso" sailboat	down	rain 70	4	3	Sail
07/23/07	1	23:20pm	23:29pm	9	60	maint lift e br	-	70	3	5	N/A
07/23/07	2	23:43pm	23:54pm	11	70	practice lift e + w br	-	70	2	5	N/A
07/23/07	3	00:30am	00:38am	8	85	training lift	-	partly cloudy 70	4	5	N/A
07/23/07	4	01:08am	01:21am	13	85	training lift east br only	-	partly cloudy 69	1	5	N/A
07/23/07	5	02:13am	02:21am	8	45	auxilary lift west br only	-	partly cloudy 68	6	4.6	N/A
07/23/07	6	02:37am	02:49am	12	39	auxilary lift west br only	-	partly cloudy 68	6	4.5	N/A
07/23/07	7	03:08am	03:20am	12	49	auxilary lift west br only	-	partly cloudy 68	2	4.4	N/A
07/23/07	8	03:44am	03:50am	6	10	training lift / n gate house stop	-	partly cloudy 67	3	4.3	N/A
07/23/07	9	23:13pm	23:35pm	12:26	30	test lift east only	-	cloudy 64	4	4.5	N/A
07/23/07	10	23:42pm	23:49pm	6:52	30	test lift both bridges	-	c loudy 63	4	4.5	N/A
07/23/07	1	03:56am	03:58am	2		training / south bound only		partly cloudy 67	-		N/A
07/23/07	2	04:04am	04:06am	2		training / south bound only		partly cloudy 67	5		N/A
07/23/07	3	04:14am	04:16am	2		training / south bound only		partly cloudy 67	3		N/A
07/23/07	4	04:32am	04:34am	2		training / north bound only		partly cloudy 67	3		N/A
07/23/07	5	04:38am	04:40am	2		training / north bound only		partly cloudy 67	3		N/A
07/23/07	6	04:43am	04:45am	2		training / north bound only		partly cloudy 67	3		N/A
07/24/07	1	00:00am	00:11am	11	50	training lift e + w br	-	63	5	5	N/A
07/24/07	2	00:45am	00:58am	11	50	training aux west bridge	-	cloudy 62	7	5	N/A
07/24/07	3	01:12am	01:20am	8	82	training lift west bridge	-	cloudy 62	12	5	N/A
07/24/07	4	01:24am	01:32am	8	100	training lift east bridge	-	cloudy 61	9	5	N/A
07/24/07	5	01:36am	01:43am	7	86	training lift east bridge	-	cloudy 61	6	5	N/A
07/24/07	6	02:53am	03:05am	12	60	training lift w + e br	-	cloudy 59	5	5	N/A
07/24/07	7	03:22am	03:34am	12	100	training lift w + e br	-	cloudy 58	7	5	N/A
07/24/07	8	03:53am	04:02am	9	40	training lift w + e br	-	cloudy 58	6	5	N/A
07/24/07	9	04:10am	04:25am	15	60	training lift wb	-	cloudy 57	4	4.5	N/A
07/24/07	10	04:30am	04:41am	11	68	training lift eb	-	cloudy 57	6	4.5	N/A
07/24/07	1	01:55am	01:57am	2		training west bridge only		cloudy 60	14		N/A
07/24/07	2	02:14am	02:16am	2		training east bridge only		cloudy 60	10		N/A
07/24/07	3	03:12am	03:14am	2		training traffic stop w br		cloudy 57	8		N/A
07/25/07	1	00:28am	00:46am	18	90	training lift	-	clear 66	6	2.7	N/A
07/25/07	2	00:58am	01:08am	10	61	training lift	-	clear 66	6	2.7	N/A
07/25/07	3	01:40am	02:00am	20	120	training lift e + w br	-	cloudy 62	8	3	N/A
07/25/07	4	02:06am	02:21am	15	86/82	training lift e + w br	-	cloudy 61	6	3	N/A
07/25/07	5	02:29am	02:44am	15	100	training lift e + w br	-	cloudy 61	4	4	N/A
07/25/07	6	02:51am	03:07am	16	136	training lift e br	-	cloudy 60	11	4.5	N/A
07/25/07	7	03:16am	03:32am	16	90	training lift e + w br	-	cloudy 60	11	4.5	N/A
07/25/07	8	03:38am	03:59am	21	80	training lift e + w br	-	cloudy 60	6	4.5	N/A
07/25/07	9	04:16am	04:33am	17	46	training lift e + w br	-	cloudy 59	8	4	N/A
07/25/07	10	04:46am	04:58am	12	12	training lift e + w br	-	cloudy 59	4	4	N/A
07/25/07	11	12:19pm	12:27pm	8	60	coast guard cutter Barracuda	up	clear 70	7	2.3	Federal
07/25/07	12	22:05pm	22:25pm	20	86	east bridge only - maint	-	clear 69	7	2.3	N/A
07/25/07	13	22:35pm	22:53pm	19	89	west bridge only - maint	-	clear 68	7	2.3	N/A
07/25/07	14	23:02pm	23:22pm	20	136	maint lift w br	-	clear 65	9	2.7	N/A
07/25/07	15	23:47pm	24:00pm	13	86	maint lift w br	-	64	5	3	N/A
07/26/07	1	00:07am	00:14am	7	86	maintenance lift e br	-	clear 63	8	4	N/A
07/26/07	2	00:24am	00:50am	26	136	maint lift e + w br	-	clear 63	5	4.5	N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
07/26/07	3	01:04am	01:27am	23	136	maint lift e br	-	clear 63	5	4.5	N/A
07/26/07	4	01:36am	01:45am	8	82	maint lift w br	-	clear 62	6	4.5	N/A
07/26/07	5	01:53am	02:07am	14	86	maint lift e br	-	clear 61	9	4.5	N/A
07/26/07	6	03:01am	03:26am	25	82	maint lift w br	-	clear 60	12	4.5	N/A
07/26/07	7	03:41am	04:03am	22	82	maint lift w br	-	clear 59	10	4.5	N/A
07/26/07	8	04:48am	05:10am	22	82	maint lift w br	-	clear 59	4	4.5	N/A
07/26/07	9	23:42pm	23:56pm	12	60	maint lift e br	-	cloudy 67	7	3	N/A
07/26/07	1	03:45am	03:46am	1		maint traffic stop e br		clear 60	9		N/A
07/26/07	2	04:20am	04:30am	10		maint traffic stop e br		clear 60	7		N/A
07/26/07	3	04:16am	04:17am	1		maint traffic stop w br		clear 60	5		N/A
07/26/07	4	04:35am	04:36am	1		maint traffic stop e br		clear 60	9		N/A
07/26/07	5	04:29am	04:35am	6		maint traffic stop w br		clear 60	7		N/A
07/26/07	6	05:15am	05:16am	1		maint traffic stop e br		clear 59	7		N/A
07/27/07	1	00:02am	00:11am	9	86	maint lift e br	-	cloudy 62	6	3	N/A
07/27/07	2	00:23am	00:37am	14	80	maint e + w br	-	partly cloudy 62	4	3	N/A
07/27/07	3	00:41am	00:57am	16	106	maint lift e + w br	-	cloudy 62	7	3.5	N/A
07/27/07	4	01:02am	01:18am	16	60	maint lift w br	-	cloudy 61	6	4	N/A
07/27/07	5	01:30am	01:47am	17	80	Lori B	down	cloudy 60	15	4	Barge
07/27/07	6	01:51am	02:11am	20	35	maint lift e br	-	cloudy 60	5	4.5	N/A
07/27/07	7	02:30am	02:42am	12	35	maint lift w br	-	cloudy 60	5	4.5	N/A
07/27/07	8	02:59am	03:15am	16	136	maint lift e + w br	-	cloudy 60	2	5	N/A
07/27/07	9	03:21am	03:46am	17	136	east br lift	-	cloudy 60	8	5.2	N/A
07/27/07	10	04:13am	04:31am	18	40	maint lift e + w br	-	cloudy 60	6	5.2	N/A
07/27/07	11	05:38am	05:51am	13	100	Ross Isle	-	clear 58	8	5	Barge
07/27/07	1	05:22am	05:28am	6		maint traffic stop		cloudy 58	8		N/A
07/28/07	1	09:12am	09:22am	10	86	"Washougal" w/ spuds	down	cloudy 63	3	4.4	Barge
07/28/07	2	14:34pm	14:43pm	9	76	sailboat Lungta	down	partly cloudy 65	3	2.8	Sail
07/29/07	1	22:25pm	22:50pm	25	136	west bridge only - maint	-	cloudy 64	8	3.3	N/A
07/30/07	1	23:06pm	23:30pm	24	136	west bridge maint	-	cloudy 63	12	3	N/A
07/30/07	2	00:02am	00:25am	23	136	east br maint	-	cloudy 61	4	3	N/A
07/30/07	3	00:45am	01:08am	23	136	east br maint w/crossover stop	-	cloudy 62	1	3	N/A
07/30/07	4	01:28am	01:35am	7	86	east br crossover	-	cloudy 59	5	2.6	N/A
07/30/07	5	01:50am	02:11am	21	28	east br maint	-	cloudy 59	6	2.6	N/A
07/30/07	6	02:18am	02:41am	23	64	east br maint	-	cloudy 59	7	2.7	N/A
07/30/07	7	02:52am	03:14am	22	88	east br maint	-	cloudy 59	7	3.2	N/A
07/30/07	8	03:17am	03:42am	25	109	east br maint	-	cloudy 58	2	3.8	N/A
07/30/07	9	03:53am	04:14am	21	121	east br maint	-	cloudy 58	2	4.1	N/A
07/30/07	10	04:18am	04:48am	30	136	east br maint	-	cloudy 58	2	4.6	N/A
07/30/07	11	04:56am	05:03am	7	86	east br maint	-	clouds 58	4	5.2	N/A
07/30/07	12	11:00am	11:10am	10	60	CG Cutter Barracuda	down	clear 68	9	4.2	Federal
07/30/07	13	22:10pm	22:13pm	8	86	east bridge only - maint	-	clear 67	12	4.1	N/A
07/30/07	14	22:35pm	22:53pm	18	27	west bridge only - maint	-	clear 67	12	4.1	N/A
07/30/07	15	23:10pm	23:32pm	22	57	west bridge only - maint	-	clear 67	12	4.1	N/A
07/30/07	16	23:35pm	23:58pm	23	81	west bridge only - maint	-	clear 67	12	4.1	N/A
07/30/07	1	23:08pm	23:13pm	5		transpoty grease to east br		clear 63	11		N/A
07/31/07	1	00:05am	00:26am	22	102	west br maint	-	clear 63	10	4	N/A
07/31/07	2	00:31am	00:56am	25	120	west br maint	-	clear 63	10	4	N/A
07/31/07	3	01:02am	01:29am	28	136	west br maint	-	clear 63	10	4	N/A
07/31/07	4	01:36am	02:00am	24	29/16	e-w br maint	-	clear 63	10	4	N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
07/31/07	5	02:06am	02:24am	18	82	west br maint	-	clear 63	1	3.5	N/A
07/31/07	6	02:47am	03:01am	15	87	e br maint	-	clear 63	1	3.5	N/A
07/31/07	7	03:19am	03:30am	11	15	e br maint	-	clear 63	1	3.5	N/A
07/31/07	8	03:55am	04:16am	21	47	e br maint	-	59	3	4	N/A
07/31/07	9	04:20am	04:42am	21	71	e br maint	-	59	3	4	N/A
07/31/07	10	04:49am	04:57am	8	87	e br maint crossover	-	59	3	4	N/A
07/31/07	11	05:01am	05:08am	8	87	crossover e br	-	clear 58	6	5	N/A
07/31/07	12	22:05pm	22:13pm	8	87	E bridge only - maint	-	clear 73	6	4.4	N/A
07/31/07	13	22:21pm	22:41pm	20	86	E bridge only - maint	-	clear 73	9	4.4	N/A
07/31/07	14	23:04pm	23:27pm	23	101	E bridge only - maint	-	clear 73	9	4.4	N/A
07/31/07	15	23:37pm	00:01am	24	111	E bridge only - maint	-	clear 73	9	4.4	N/A
08/01/07	1	00:12am	00:35am	23	120	e br maint	-	clear 69	6	4	N/A
08/01/07	2	00:43am	01:15am	32	136	e br maint	-	clear 69	6	4	N/A
08/01/07	3	01:31am	01:53am	21	30	w br maint	-	clear 69	6	4	N/A
08/01/07	4	01:57am	02:18am	21	63	w br maint	-	clear 69	6	4	N/A
08/01/07	5	02:26am	02:47am	21	87	w br maint	-	clear 69	6	4	N/A
08/01/07	6	02:51am	03:14am	23	108	w br maint	-	clear 69	6	4	N/A
08/01/07	7	03:18am	03:38am	20	120	w br maint	-	66	5	3.5	N/A
08/01/07	8	03:44am	04:10am	26	136	w br maint	-	66	5	3.5	N/A
08/01/07	9	04:12am	04:30am	18	18	e br maint	-	66	5	3.5	N/A
08/01/07	10	04:25am	04:44am	18	18	w br	-	66	5	3.5	N/A
08/01/07	11	04:35am	04:50am	15	87	e br maint	-	65	5	4	N/A
08/01/07	12	04:54am	05:05am	11	87	e br maint crossover	-	65	5	4	N/A
08/01/07	13	23:01pm	23:21pm	20	136	maint lift w + e br	-	clear 73	7	8	N/A
08/02/07	1	00:00am	00:22am	22	83	maint lift west bridge	-	clear 73	6	4.5	N/A
08/02/07	2	00:31am	00:51am	20	83	maint lift w bridge	-	clear 72	7	4.5	N/A
08/02/07	3	01:00am	01:24am	24	83	maint lift w bridge	-	clear 71	7	4.5	N/A
08/02/07	4	01:35am	01:57am	22	136	maint lift w bridge	-	clear 69	7	4.5	N/A
08/02/07	5	02:15am	02:30am	15	10	maint lift w bridge	-	clear 68	10	4.5	N/A
08/02/07	6	02:33am	02:42am	9	10	maint lift west bridge	-	clear 68	14	4.5	N/A
08/02/07	7	03:22am	03:37am	15	136	maint lift w + e br	-	clear 67	6	4	N/A
08/02/07	8	03:48am	03:59am	11	86	maint lift w + e br	-	clear 67	6	4	N/A
08/02/07	9	04:15am	04:27am	12	100	maint lift w + e br	-	clear 67	2	4	N/A
08/02/07	10	22:08pm	22:16pm	8	86	test lift	-	clear 86	calm	6	N/A
08/02/07	1	00:26am	00:27am	1		traffic stop e bridge		clear 72	9		N/A
08/02/07	2	01:03am	01:05am	2		traffic stop e bridge		clear 72	7		N/A
08/02/07	3	01:35am	01:36am	2		traffic stop e bridge		clear 70	6		N/A
08/03/07	1	00:36am	00:48am	12	86/83	practice lift e + b br	-	clear 63	4	5	N/A
08/03/07	2	00:57am	01:09am	12	86/83	practice lift e br	-	clear 62	3	5	N/A
08/03/07	3	01:21am	01:32am	11	86/82	practice lift e + w br	-	clear 62	1	5	N/A
08/03/07	4	01:38am	01:48am	10	70	practice lift e + w br	-	clear 62	5	5	N/A
08/03/07	5	01:54am	02:04am	10	70	practice lift e + w br	-	clear 62	3	5	N/A
08/03/07	6	02:09am	02:23am	14	136	practice lift e + w br	-	clear 62	4	5	N/A
08/03/07	7	02:29am	02:39am	10	60	practice lift e + w br	-	clear 62	1	5	N/A
08/03/07	8	02:52am	03:01am	9	40	practice lift e + w br	-	clear 62	1	4.5	N/A
08/03/07	9	03:06am	03:14am	8	40	practice lift e + w br	-	clear 62	3	4.5	N/A
08/03/07	10	03:19am	03:29am	10	86/82	practice lift e + w br	-	clear 62	4	4.5	N/A
08/03/07	11	23:25pm	23:41pm	16	136	Norton Bay spud (Megan Renee)	up	clear 63	7	5.3	Barge
08/04/07	1	23:12pm	23:21pm	9	90	Whisperer sailboat	up	clear 63	6	5.1	Sail

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
08/05/07	1	23:42pm	23:59pm	17	136	maint lift e br	-	clear 64	5	5	N/A
08/06/07	1	00:33am	00:46am	13	130	maint lift east br	-	clear 62	2	5	N/A
08/06/07	2	01:13am	01:30am	17	130	maint lift east br	-	clear 62	7	5	N/A
08/06/07	3	04:29am	04:49am	20	115	Norton Bay + barge	down	clear 61	2	4	Barge
08/08/07	1	23:13pm	23:26pm	13	120	maint lift e + w br	-	cloudy 66	1	3.4	N/A
08/08/07	2	23:48pm	00:04am	16	136	maint lift e + w br	-	cloudy 65	2	4	N/A
08/10/07	1	00:09am	00:21am	12	70	sailboat Treolee	down	cloudy 60	5	3	Sail
08/10/07	2	10:00am	10:07am	7	86	maint lift	-	cloudy 60	3	4	N/A
08/10/07	3	13:49pm	13:56pm	7	86	maint lift	-	clear 70	4	2.6	N/A
08/12/07	1	05:31am	05:41am	10	100	Dauby + derick barge	up	partly cloudy 58	4	6	Barge
08/13/07	1	20:30pm	20:35pm	5	10	for Dave Johnson test lift - w bridge only	-	clear 77	6	4.2	N/A
08/15/07	1	23:54pm	24:16am	22	-	-	-	cloudy 67	3	4	N/A
08/16/07	1	11:01am	11:09am	8	80	"Kisses" (yack)	up	cloudy 65	1	4.5	Yacht
08/16/07	2	20:28pm	20:32pm	4	12	test west br	-	-	-	-	N/A
08/16/07	3	20:53pm	20:56pm	3	10	test west br	-	-	-	-	N/A
08/17/07	1	19:43pm	19:54pm	11	90	Kisses	down	partly cloudy 69	13	4	Yacht
08/21/07	1	13:30pm	13:46pm	16	129	Lindy Marie + 2 barges	-	cloudy 63	7	1.5	Barge
08/21/07	1	13:30pm	13:46pm	16	129	Lindy Marie 2 barges	-	partly cloudy 72	4	1.7	Barge
08/23/07	1	05:56am	06:13am	17	70	"Rebel" + 4 barges	down	clear 59	2	3	Barge
08/23/07	2	20:11pm	20:21pm	4	15	test west bridge	-	clear	calm	2	N/A
08/25/07	1	06:00am	06:32am	32	136	maint lift e slides	-	clear 60	calm	3.5	N/A
08/25/07	2	06:53am	07:03am	10	86	maint east br	-	-	-	-	N/A
08/25/07	3	07:04am	07:34am	30	136	maint east br	-	-	-	-	N/A
08/30/07	1	20:19pm	20:23pm	4	12	test SB only	-	clear 78	8	3.8	N/A
09/04/07	1	10:36am	10:50am	14		clean out NB front barrier		partly cloudy 68	3		N/A
09/05/07	1	13:15pm	13:27pm	12	75	Kathryn B + spud barges	up	clear 70	4	2.2	Barge
09/06/07	1	20:10pm	20:14pm	4	13	West bridge test	-	-	-	-	N/A
09/09/07	1	11:50am	12:02pm	12	136	test lift w/br on gen	-	64	11	0.7	N/A
09/09/07	2	12:25pm	12:38pm	13	136	test lift e/br on gen	-	64	11	0.7	N/A
09/09/07	3	01:05am	01:16am	11	136	test lift w/br on gen	-	64	11	0.7	N/A
09/09/07	4	-	-	-	136	test lift both br's on gen	-	64	11	0.7	N/A
09/12/07	1	13:59pm	14:07pm	8	75	"Maridian" sailboat	down	clear 687	3	1.3	Sail
09/13/07	1	10:50am	10:59am	9	80	Washougal + spud barges	down	cloudy 60	1	2.3	Barge
09/13/07	2	20:13pm	20:17pm	4	13	west br test	-	cloudy 60	11	4	N/A
09/17/07	1	23:26pm	23:38pm	11	70	"Chief" + 5 barges	down	rain 56	6	2.4	Barge
09/20/07	1	20:05pm	20:09pm	4	13	west br maint	-	cloudy	calm	0.7	N/A
09/20/07	1	20:14pm	20:15pm	1		south bound only					N/A
09/22/07	1	18:41pm	18:53pm	12	80	Mary B	down	partly cloudy 32	11	1.5	Barge
09/22/07	2	19:45pm	19:50pm	5	10	test lift (ok) w/br	-	partly cloudy 60	5	1.5	N/A
09/24/07	1	00:00am	00:03am	3	10	test lift w br only	-	partly cloudy 54	6	0.6	N/A
09/24/07	2	00:08am	00:14am	6	3	test lift w br only	-	partly cloudy 54	6	0.6	N/A
09/24/07	3	01:39am	01:43am	4	3	test lift w br only	-	clouds 53	1	1.8	N/A
09/24/07	4	02:10am	02:13am	3	15	test lift w br only	-	clouds 53	1	2.2	N/A
09/24/07	5	09:09am	09:18am	9	90	dredge Yaquina	up	cloudy 57	calm	1	Federal
09/24/07	6	13:10pm	13:20pm	10	80	Linx	down	clear 58	5	0	Sail
09/26/07	1	10:35am	10:46am	11	100	Linx sailboat	down	cloudy 57	3	1.3	Sail
09/27/07	1	19:58pm	20:02pm	4	12	west br test	-	-	-	-	N/A
09/27/07	2	20:17pm	20:21pm	4	15	west br test	-	-	-	-	N/A
09/30/07	1	08:28pm	08:38pm	10	85	dredge Yaquina	down	rain 51	17	3	Federal

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
09/30/07	2	14:01pm	14:09pm	8	65	"Chief"	up	rain 53	8	1.5	Barge
10/01/07	1	23:43pm	23:50pm	7	25	test lift west br	-	rain 54	13	3.3	N/A
10/01/07	2	23:58pm	00:12am	14	136	test lift west br	-	54	10	3.2	N/A
10/01/07	3	00:50am	01:05am	15	136	test lift west br	-	53	9	3.2	N/A
10/01/07	4	01:20am	01:25am	5	15	test lift west br	-	53	5	3	N/A
10/01/07	1	23:38pm	23:39pm	1		east br traffic stop		rain 54	16		N/A
10/01/07	2	00:20am	00:22am	2		east br traffic stop		54	13		N/A
10/01/07	3	00:30am	00:38am	2		east br traffic stop		54	7		N/A
10/01/07	4	01:10am	01:12am	2		east br traffic stop		53	8		N/A
10/01/07	5	01:15am	01:16am	1		east br traffic stop		53	10		N/A
10/01/07	6	01:28am	01:30am	2		west br traffic stop		53	7		N/A
10/01/07	7	01:40am	01:43am	3		both br traffic stop		53	6		N/A
10/01/07	8	01:58am	02:02am	4		both br traffic stop		53	6		N/A
10/01/07	9	02:09am	02:12am	3		both br traffic stop		53	11		N/A
10/01/07	10	02:30am	02:33am	3		both br traffic stop		53	12		N/A
10/01/07	11	02:40am	02:43am	3		both br traffic stop		53	7		N/A
10/02/07	1	00:10am	00:17am	7	50	training lift w/bridge	-	56	4	3.2	N/A
10/02/07	2	00:20am	00:27am	7	50	training lift w/bridge	-	56	6	3.2	N/A
10/02/07	3	00:32am	00:38am	6	50	training lift w/bridge	-	56	6	3.2	N/A
10/02/07	4	00:43am	00:50am	7	70	training lift w/bridge	-	55	11	3.2	N/A
10/02/07	5	00:54am	01:01am	7	70	training lift w/bridge	-	55	9	3.2	N/A
10/02/07	6	01:06am	01:12am	6	50	training lift e/bridge	-	55	6	3	N/A
10/02/07	7	01:16am	01:22am	6	50	training lift e/bridge	-	56	5	3	N/A
10/02/07	8	01:32am	01:38am	6	50	training lift e/bridge	-	56	4	3	N/A
10/02/07	9	01:45am	01:52am	7	86	training lift e/bridge	-	56	4	3	N/A
10/02/07	10	01:57am	02:04am	7	86	training lift e/bridge	-	56	6	3	N/A
10/02/07	11	02:00am	02:17am	7	25	training lift both bridges	-	56	11	3	N/A
10/02/07	12	02:20am	02:27am	7	25	training lift both bridges	-	56	9	3	N/A
10/02/07	13	02:30am	02:36am	6	25	training lift both bridges	-	56	2	2.5	N/A
10/02/07	14	02:52am	02:58am	6	25	training lift both bridges	-	55	8	2.2	N/A
10/02/07	15	03:05am	03:11am	6	25	training lift both bridges	-	55	8	2.5	N/A
10/02/07	16	03:17am	03:23am	6	25	training lift both bridges	-	55	9	2.2	N/A
10/02/07	17	03:32am	03:38am	6	25	training lift both bridges	-	55	10	2	N/A
10/02/07	18	03:42am	03:50am	8	25	training lift both bridges	-	55	10	2	N/A
10/03/07	1	00:33am	00:42am	9	86/82	training b/bridges	-	54	2	3.7	N/A
10/03/07	2	01:00am	01:09am	9	86/82	training b/bridges	-	54	2	3.5	N/A
10/03/07	3	01:27am	01:40am	13	136	training b/bridges	-	54	2	3.5	N/A
10/03/07	4	02:01am	02:08am	7	25-Oct	training b/bridges	-	54	3	3.2	N/A
10/03/07	5	02:23am	02:30am	7	580/35	training b/bridges	-	54	1	3	N/A
10/03/07	6	02:43am	02:51am	8	55/70	training b/bridges	-	54	2	3	N/A
10/03/07	7	03:07am	03:07am	7	15/30	training b/bridges	-	54	2	2.7	N/A
10/03/07	8	23:20pm	23:27pm	7	42	practice lift	-	cloudy 49	5	4	N/A
10/04/07	1	23:46pm	23:52pm	8	40	training lifts b/bridges	-	49	8	4	N/A
10/04/07	2	00:54am	01:01am	7	40	training lifts w/bridge bypass	-	49	1	3.8	N/A
10/04/07	3	01:07am	01:14am	7	40	training lift e/bridge bypass	-	49	3	3.8	N/A
10/04/07	4	01:40am	01:48am	8	86/82	training lift b/bridges	-	50	5	3.5	N/A
10/04/07	5	02:01am	02:09am	8	86/82	training lift b/bridges	-	49	5	3.2	N/A
10/04/07	6	02:28am	02:40am	12	136	training lift b/bridges	-	50	6	3.2	N/A
10/04/07	7	02:56am	03:02am	8	70	training lift b/bridges	-	49	0	3	N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
10/04/07	1	00:28am	00:33am	5		west bridge back gate and barrier bypass		49	8		N/A
10/04/07	2	00:35am	00:39am	4		east bridge back gate and barrier bypass		50	8		N/A
10/04/07	3	20:01pm	20:05pm	4		West bridge test		-	-		N/A
10/05/07	1	23:40pm	23:46pm	6	50	test lift	-	cloudy 49	5	3	N/A
10/05/07	2	00:20am	00:29am	9	86	test lift	-	48	1	4	N/A
10/05/07	3	00:43am	00:53am	10	100	test lift b/bridges	-	47	1	4	N/A
10/05/07	4	01:00am	01:10am	10	11	test lift w/bridge	-	48	1	4	N/A
10/05/07	5	01:53am	02:04am	11	49	west br aux	-	cloudy 46	3	3.8	N/A
10/05/07	6	02:08am	02:14am	6	30	west br aux	-	cloudy 46	3	3.8	N/A
10/05/07	7	03:03am	03:29am	6	20	test b/bridges	-	45	3	3.5	N/A
10/05/07	8	03:35am	03:46am	11	86/82	test lift both br	-	cloudy 46	3	3.2	N/A
10/05/07	9	04:44am	04:51am	7	87	maint lift east br	-	cloudy 46	4	2.9	N/A
10/05/07	1	00:13am	00:14am	1		training w/bridge		49	2		N/A
10/05/07	2	00:17am	00:18am	1		training e/bridge		49	2		N/A
10/05/07	3	02:42am	02:45am	3		east br from gate house		cloudy 45	3		N/A
10/05/07	4	02:47am	02:49am	2		east br from gate house		cloudy 45	3		N/A
10/05/07	5	02:51am	02:53am	2		east br from gate house		cloudy 45	3		N/A
10/05/07	6	04:22am	04:38am	16		east br maint		cloudy 45	2		N/A
10/05/07	7	10:07am	10:17am	10		e br maint		-	-		N/A
10/05/07	8	10:33am	10:40am	7		w br maint		-	-		N/A
10/08/07	1	23:32pm	23:41pm	9	77	training lift	-	53	1	1.2	N/A
10/08/07	2	00:02am	00:15am	13	100	training lift	-	52	3	1.2	N/A
10/10/07	1	20:00pm	20:07pm	7	20	test lift west bridge only	-	cloudy 55	3	4.1	N/A
10/15/07	1	00:20am	00:25am	5	18	test lift w/bridge	-	clear 56	5	2.5	N/A
10/15/07	2	00:30am	00:34am	4	15	test lift w/bridge	-	clear 56	3	2.4	N/A
10/15/07	3	00:39am	00:44am	5	10	test lift w/bridge	-	clear 57	4	2.2	N/A
10/15/07	4	01:00am	01:04am	4	10	test lift w/bridge	-	clear 56	6	2	N/A
10/15/07	5	01:16am	01:22am	6	25	test lift w/bridge	-	clear 56	7	2	N/A
10/15/07	1	00:05am	00:07am	2		test w bridge		57	4		N/A
10/16/07	1	23:30pm	23:45pm	15	136	test lift e/bridge	-	cloudy 54	12	2.9	N/A
10/16/07	1	23:50pm	23:51pm	1		test e bridge		cloudy 54	8		N/A
10/18/07	1	20:06pm	20:10pm	4	17	test west bridge	-	rain 58	10	4	N/A
10/20/07	1	17:03pm	17:17pm	14	100	"Clarkston" "Noydena" + two barges	up	cloudy 52	3	2.7	Barge
10/22/07	1	00:14am	00:20am	6	30	test w bridge	-	cloudy 54	5	2.5	N/A
10/22/07	2	00:22am	00:33am	11	86/82	test b/bridges	-	cloudy 54	8	2.5	N/A
10/22/07	3	00:56am	01:14am	18	115	test b/bridges	-	cloudy 54	10	3	N/A
10/22/07	4	01:18am	01:24am	6	30	test b/bridges	-	cloudy 54	8	3	N/A
10/24/07	1	20:08pm	20:16pm	10	20	test for Dave	-	51	5	3.5	N/A
10/25/07	1	10:19am	10:22am	3		two tresh canon NB draw span removed by crew					N/A
10/29/07	1	00:10am	00:25am	16	75	Defiance	down	clear 47	0	2.9	Barge
10/29/07	2	00:31am	00:41am	10	115	test w/bridge	-	clear 48	0	2.9	N/A
10/29/07	3	00:47am	00:58am	11	122	test w/bridge	-	clear 47	3	2.9	N/A
10/29/07	4	01:10am	01:25am	15	130	test w/bridge	-	clear 46	0	2.5	N/A
10/29/07	5	02:00am	02:05am	5	-	test w/bridge	-	clear 46	1	2	N/A
11/05/07	1	00:10am	00:26am	16	100	Rebel	down	clear 49	2	1	Barge
11/10/07	1	08:30am	08:39am	9	80	Husky	up	cloudy 52	2	3.8	Barge
11/12/07	1	00:04am	00:15am	11	126	test w/bridge	-	cloudy 47	12	3	N/A
11/12/07	2	00:19am	00:30am	11	125	test w/bridge	-	cloudy 47	14	2.9	N/A
11/12/07	3	00:45am	00:52am	7	60	test w/bridge	-	cloudy 48	13	2.5	N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
11/12/07	4	00:55am	01:01am	6	30	test w/bridge	-	cloudy 47	12	2.5	N/A
11/12/07	5	01:10am	01:17am	7	60	test w/bridge	-	cloudy 47	6	2.4	N/A
11/12/07	6	01:24am	01:30am	6	60	test w/bridge	-	cloudy 47	9	2.3	N/A
11/14/07	1	11:59am	12:12pm	13	86	"Husky" + derrick	-	suny 52	19	2.7	Barge
11/14/07	2	20:30pm	20:33pm	3	15	test lift east bridge only	-	cloudy 48	19	4.3	N/A
11/19/07	1	05:18am	05:30am	12	100	Yaquina	up	cloudy 41	6	3.5	Federal
11/24/07	1	03:56am	04:06am	10	75	"Chief" + derrick	down	clear 33	0	4.6	Barge
11/26/07	1	20:12pm	20:17pm	5	30	north bound only - test	-	cloudy 38	7	5.1	N/A
11/26/07	2	21:25pm	21:32pm	2	20	both bridges - test	-	cloudy 38	4	5.1	N/A
11/26/07	1	10:07am	10:16am	9		maint		cloudy 38	21		N/A
11/26/07	2	10:33am	11:00am	27		maint - gates opened manually / lost power to bridge front		cloudy 38	17		N/A
11/26/07	3	20:54pm	20:58pm	4		north bound only - test		cloudy 38	7		N/A
11/27/07	1	12:18pm	12:27pm	9	80	"Chief"	down	cloudy 48	1	3.5	Barge
11/29/07	1	11:01am	11:12am	11	86	"Washougal" + 2 derricks 3 barges	-	rain 41	4	4.2	Barge
11/30/07	1	10:09am	10:16am	7	86	maint lift east br	-	cloudy 38	3	4.2	N/A
11/30/07	2	12:47pm	12:55pm	8	86	maint lift east br	-	cloudy 41	0	3.9	N/A
12/04/07	1	03:14am	03:26am	12	60	Dauby	down	rain 57	10	8.3	Barge
12/06/07	1	00:43am	00:53am	10	60	Dauby	down	rain 46	0	9	Barge
12/06/07	2	20:03pm	20:07pm	4	20	east br test	-	cloudy 47	calm	8.2	N/A
12/08/07	1	13:16pm	13:25pm	9	75	Legend	-	44	10	5	Barge
12/21/07	1	13:35pm	14:15pm	20	136	"Betty Lou" "Yaquina" "Rebel"	down	cloudy 43	1	6.5	Federal
12/24/07	1	02:05am	02:16am	11	70	Tidewater	down	rain 42	5	6.2	Barge
12/28/07	1	10:04am	10:15am	11	72	sail vessels "Whisper" "Ecstacy"	down	cloudy 44	4	7.8	Sail
12/28/07	2	20:00pm	20:03pm	3	20	test east br	-	rain 44	12	8	N/A
12/29/07	1	01:30am	01:43am	13	76	"Dauby" (2 barges)	down	rain 40	calm	7.7	Barge
12/30/07	1	12:50pm	12:59pm	9	50	Ecstasy	up	rain	17	6.7	Sail
12/31/07	1	00:10am	00:16am	6	33	test e bridge	-	rain 36	3	5.4	N/A
12/31/07	2	00:20am	00:26am	6	40	test e bridge	-	rain 36	3	5.4	N/A
12/31/07	3	00:33am	00:43am	10	125	test e bridge	-	cloudy 36	3	5.3	N/A
12/31/07	4	00:47am	00:57am	10	125	test e bridge	-	cloudy 35	3	5.2	N/A
12/31/07	5	01:46am	01:57am	11	125	test e bridge	-	cloudy 36	4	5.1	N/A
12/31/07	6	02:27am	02:38am	11	125	test e bridge	-	cloudy 36	1	4.9	N/A
12/31/07	7	02:55am	03:00am	5	20	test e bridge	-	cloudy 35	4	4.9	N/A
01/01/08	1	11:48am	11:57am	9	90	Whisperer	up	cloudy 43	22	4.8	Sail
01/03/08	1	9:10am	9:18am	8	86	East bridge only, lift for maintenance, bird cannons	-	cloudy 40	17	4.8	N/A
01/03/08	2	9:50am	9:58am	8	86	east bridge only, lift to bring maintenance crew down	-	cloudy 41	5	4.7	N/A
01/03/08	1	5:21am	5:27am	6		for tow truck/accident		cloudy 40	14		N/A
01/03/08	2	10:27am	10:32am	5		east machine house steel removal, east bridge only		rain 41	8		N/A
01/05/08	1	15:47pm	15:59pm	13	80	Willamette +4 barges	down	cloudy 42	3	6.7	Barge
01/07/08	1	9:40am	9:47am	7	87	maintenance east bridge only	-	cloudy	calm	6	N/A
01/07/08	2	10:19am	10:27am	8	86	""	-	-	-	-	N/A
01/07/08	3	19:37pm	19:43pm	6	82	west bridge only - maintenance	-	cloudy 40	13	7	N/A
01/07/08	4	19:47pm	19:54pm	7	86	east bridge only - maintenance	-	cloudy 39	14	7	N/A
01/07/08	1	00:18am	00:28am	10		test maintenance - east bridge only 126'		cloudy 37	2		N/A
01/07/08	2	00:56am	01:07am	11		maintenance / test lift - east bridge only 126'		cloudy 37	1		N/A
01/07/08	3	01:20am	01:31am	11		""		cloudy 37	2		N/A
01/07/08	4	01:35am	01:41am	6		"" 60'		cloudy 37	3		N/A
01/07/08	5	01:50am	01:55am	5		"" 25'		cloudy 37	1		N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
01/07/08	6	11:09am	11:11am	2		N.B. load equipment		-	-		N/A
01/07/08	7	12:23pm	12:25pm	2		N.B. ped. Light check		cloudy 37	7		N/A
01/08/08	1	9:36am	9:43am	7	86	east bridge cannon inspect.	-	rain 37	10	6.6	N/A
01/08/08	2	10:07am	10:14am	7	86	east bridge cannon inspect.	-	rain 37	14	6.9	N/A
01/09/08	1	01:37am	01:47am	10	70	"legend"	down	cloudy 38	3	7.1	Barge
01/14/08	1	00:10am	00:20am	10	45	test lift west bridge PLC screen	-	clear 38	4	7	N/A
01/14/08	2	00:46am	00:52am	6	45	test lift west bridge PLC screen	-	clear 38	4	7	N/A
01/14/08	3	00:56am	01:06am	10	126	test lift west bridge PLC screen	-	clear 38	4	6.9	N/A
01/14/08	4	01:13am	01:18am	5	35	test lift west bridge maint screen	-	clear 38	4	6.9	N/A
01/14/08	5	01:45am	01:56am	11	60	test lift east bridge PLC screen	-	clear 38	6	6.8	N/A
01/14/08	6	02:08am	02:14am	6	60	test lift east and west bridge PLC screen	-	clear 38	5	6.8	N/A
01/14/08	7	02:17am	02:23am	6	30	test lift east bridge maint screen	-	clear 38	8	6.7	N/A
01/14/08	8	02:33am	02:41am	8	45	test lift east and west bridge pullout drawer	-	clear 38	8	6.7	N/A
01/14/08	9	21:39pm	21:46pm	7	50	test lift - both bridges	-	cloudy 36	4	7	N/A
01/14/08	1	01:57am	02:05am	8		testing east and west bridge		clear 38	5		N/A
01/15/08	1	09:40am	09:47am	7	86	maint lift N.B. only	-	cloudy 37	5	7.2	N/A
01/15/08	2	10:03am	10:10am	7	87	maint lift N.B. only	-	cloidy 38	5	7.2	N/A
01/15/08	3	18:34pm	18:45pm	11	121	"Lindy Marie" + crane barge	up	clear 40	calm	6.5	Barge
01/16/08	1	11:40am	11:47am	7	86	N.B. only to return bird cannon to s. tower	-	fog 29	calm	6.5	N/A
01/16/08	2	12:12pm	12:19pm	7	86	N.B. only to bring maint. Crew back down	-	fog 30	calm	6.5	N/A
01/18/08	1	10:10am	10:18am	8	87	NB only (east br.) for bird cannon + maint	-	cloudy 37	1	5.4	N/A
01/18/08	2	10:39am	10:53am	14	82	SB only (west br.) for bird cannon, maint., and counter weight wheel inspection	-	cloudy 37	1	5.5	N/A
01/19/08	1	11:21am	11:27am	6	25	test N&S spans	-	rain 35	8	4.7	N/A
01/19/08	2	11:57am	12:05pm	8	87	east br. Maint	-	-	-	-	N/A
01/19/08	3	12:42pm	12:47pm	7	82	west br maint	-	-	-	-	N/A
01/19/08	4	17:01pm	17:08pm	7	82	west bridge only - maintenance	-	cloudy 38	2	6	N/A
01/19/08	5	17:20pm	17:27am	7	86	east bridge only - maintenance	-	cloudy 38	2	6	N/A
01/20/08	1	08:55am	09:04am	9	80	chief	-	cloudy 37	0	4.4	Barge
01/20/08	2	11:55am	12:02pm	7	82	west br only	-	-	-	-	N/A
01/20/08	3	12:40pm	12:49pm	9	82	west br only	-	-	-	-	N/A
01/20/08	4	13:05pm	13:13pm	8	82	west br only	-	-	-	-	N/A
01/20/08	5	13:30pm	13:37pm	7	82	west br only	-	-	-	-	N/A
01/20/08	6	14:25pm	15:04pm	9	100	test lift both bridges	-	cloudy 42	10	6	N/A
01/20/08	7	22:07pm	22:22pm	15	136	test lift both bridges	-	cloudy 35	11	4.5	N/A
01/20/08	8	22:33pm	22:46pm	13	126	test lift both bridges	-	cloudy 35	9	4.5	N/A
01/20/08	9	23:07pm	23:13pm	11	126	test lift both bridges	-	partly cloudy 34	11	4.3	N/A
01/20/08	10	23:23pm	23:33pm	10	126	test lift both bridges, maint. Screen	-	partly cloudy 35	18	4	N/A
01/21/08	1	10:05am	10:22am	23	87	east br main	-	clear 35	15	4	N/A
01/21/08	2	11:42am	11:50am	8	87	east br main	-	-	-	-	N/A
01/21/08	3	12:05pm	12:16pm	11	82	west br maint	-	-	-	-	N/A
01/21/08	4	13:38pm	13:46pm	8	82	west br maint	-	clear 36	18	4.8	N/A
01/22/08	1	11:20am	11:29am	9	87	maint. Lift E. Bridge	-	clear 35	0	4	N/A
01/22/08	2	12:50pm	13:01pm	11	87	maint. Lift E. Bridge	-	clear 40	10	3.9	N/A
01/22/08	3	13:07pm	13:15pm	8	8	maint. Lift W. Bridge	-	clear 40	7	3.9	N/A
01/23/08	1	10:02am	10:10am	8	87	N.B. only (east br.) lift for arial inspection	-	clear 30	6	4.5	N/A
01/23/08	2	10:24am	10:34am	10	82	S.B. only (west br.) lift for arial inspection	-	clear 31	10	4.4	N/A
01/23/08	3	10:53am	11:00am	7	87	N.B. only (east br.) lift for arial inspection	-	clear 32	6	4.4	N/A
01/24/08	1	02:30am	02:41am	11	70	"Hurricane"	down	clear 31	14	4.4	Barge
01/24/08	2	19:32pm	19:41pm	9	80	"Clarkston"	down	partly cloudy 33	16	6.4	Barge

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
01/24/08	3	20:32pm	20:42pm	10	80	"Sundial"	down	partly cloudy 33	9	6.3	Barge
01/24/08	4	23:50pm	24:00pm	10	71	"Willamette"	down	partly cloudy 31	9	5	Barge
01/25/08	1	09:02am	09:13am	11	80	"Out Law"	down	clear 32	4	5.4	Barge
01/25/08	2	12:13pm	12:22pm	9	91	"Lindy Marie" + Derrick Spud	down	clear 37	4	4.7	Barge
01/25/08	3	18:42pm	18:54pm	12	75	"Cascades"	down	clear 36	calm	5.8	Barge
01/26/08	1	18:59pm	19:11pm	12	80	"Umatlla" + 2 barges	down	rain 35	calm	5.5	Barge
01/27/08	1	12:13pm	12:25pm	12	70	captain bob	down	rain 38	5	5.3	Barge
01/27/08	2	1:10pm	1:20pm	10	70	Hurricane	down	rain 38	5	5.3	Barge
01/27/08	3	15:50pm	16:01pm	11	80	"Clearwater" + 4 barges	-	cloudy 39	10	4	Barge
01/28/08	1	06:11am	06:24am	13	70	"Lewiston" + 4 barges	down	cloudy 34	1	3.6	Barge
01/31/08	1	18:12pm	18:22pm	10	70	Willamette	down	rain 39	16	4.7	Barge
02/01/08	1	03:05am	3:15am	10	75	"clarkston" barges	down	cloudy 39	8	4.6	Barge
02/01/08	2	3:43am	3:53am	10	70	"outlaw" barges	down	cloudy 39	12	4.6	Barge
02/01/08	3	11:33am	11:51am	18	87/82	"cascades" barges	down	cloudy 40	14	5.2	Barge
02/03/08	1	3:35am	3:45am	10	71	"chief" barges	down	cloudy 35	3	6	Barge
02/03/08	2	4:51am	5:04am	14	73	"hurricane" barges	down	cloudy 36	3	6	Barge
02/03/08	3	13:23pm	13:30pm	7	60	mistrel	up	cloudy 42	calm	6.1	Sail
02/03/08	4	13:36pm	13:42pm	12	70	clearwater	down	cloudy	calm	6.3	Barge
02/03/08	5	20:48pm	21:01pm	13	80	"Defiance" + 4 barges	down	cloudy 40	calm	5.5	Barge
02/04/08	1	3:07am	3:20am	13	70	"lewiston" barges	down	clear 35	3	5	Barge
02/04/08	2	3:46am	3:59am	13	100	"noydena" crane barge	up	clear 35	3	5	Barge
02/04/08	3	9:00am	9:11am	11	70	Capt Bob	down	cloudy	calm	5	Barge
02/04/08	4	19:07pm	19:18pm	11	135	"Noydena" + 1 crane barge	down	cloudy 41	3	6	Barge
02/07/08	1	11:17am	11:25am	8		SB stop to remove materials from west machine house		rain 44	9		N/A
02/10/08	1	14:31pm	14:38pm	7	60	runaway	down	cloudy	4	5	Sail
02/13/08	1	23:24pm	23:37pm	13	135	maint lift west br. Only	-	clear 40	0	4.9	N/A
02/14/08	1	9:24am	9:33am	9	87	maint lift east br only, adjust up-hauls + camera work	-	cloudy 40	0	6.3	N/A
02/14/08	2	13:35pm	13:43pm	8	87	maint lift east br only, adjust up-hauls w. bridge	-	cloudy	5	6	N/A
02/14/08	3	14:20pm	14:31pm	11	136	maint. Lift to check up-haul cables	-	cloudy	3	5.9	N/A
02/14/08	4	18:50pm	19:00pm	10	70	Legend	-	cloudy 46	calm	4.8	Barge
02/15/08	1	2:23am	2:38am	15	135	"clarkston" derrick	up	partly cloudy 38	0	5	Barge
02/15/08	2	11:03am	11:11am	8	87	maint. Lift NB only camera inspection	-	partly cloudy 42	0	6.1	N/A
02/15/08	3	11:40am	11:47am	7	87	maint. Lift NB only camera inspection	-	partly cloudy 44	2	6.2	N/A
02/15/08	4	20:46pm	20:59pm	13	80	Mary B + derrick	up	cloudy	calm	4.3	Barge
02/16/08	1	11:01am	11:14am	13	136	west bridge	-	partly clear 42	2	4.4	N/A
02/16/08	2	7:23pm	7:30pm	7	86	east br maint	-	fog	calm	4.2	N/A
02/16/08	3	7:49pm	8:01pm	12	135	west br maint	-	fog	calm	4.2	N/A
02/16/08	4	8:13pm	8:27pm	14	136	west br maint	-	fog	calm	4.2	N/A
02/16/08	5	8:44pm	8:58pm	14	82	west br maint	-	fog	calm	4	N/A
02/17/08	1	21:35pm	21:47pm	12	90	"chief" + 3 barges	down	clear 49	2	3.1	Barge
02/18/08	1	00:07am	00:19am	12	133	test lift, PLC screen, e. bridge only	-	clear 42	2	2.5	N/A
02/18/08	2	00:53am	01:00am	7	50	test lift, pull out drawer, e. bridge only	-	clear 41	0	2.5	N/A
02/19/08	1	9:34am	9:42am	8	86	east br. Maint, cannons, cameras	-	clear 44	3	3.9	N/A
02/19/08	2	10:20am	10:29am	9	82	west br. Maint, cannons, cameras	-	clear 46	2	3.8	N/A
02/19/08	1	11:26am	11:31am	5		east br. Removing tools/supplies		clear 48	3		N/A
02/20/08	1	00:09am	00:21am	12	70	"capt Bob" 2 barges	down	cloudy 45	2	4.6	Barge
02/20/08	2	14:46pm	14:55pm	9	70	"roxanna" w/spuds	down	cloudy 49	4	4.4	Barge
02/21/08	1	20:08pm	20:13pm	5	25	E.B. test	-	cloudy 49	8	5.5	N/A
02/21/08	1	13:36pm	13:38pm	2		traffic stop south bound only to allow personal to cross highway		partly cloudy 53	1		N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
02/21/08	2	13:57pm	13:59pm	2		""		partly cloudy 54	0		N/A
02/22/08	1	00:53am	01:15am	23	80	"Outlaw" "Legend" barges	down	partly cloudy 47	11	4.2	Barge
02/22/08	2	10:48am	10:58am	10	85	"SeaTow" with sail boat	up	partly cloudy 53	21	4.5	Sail
02/24/08	1	20:31pm	20:44pm	13	80	"cascades" + 4 barges	down	cloudy 49	5	4.9	Barge
02/24/08	2	23:42pm	23:53pm	11	70	"leviston" + 2 barges	down	cloudy 47	8	3.8	Barge
02/25/08	1	00:27am	00:39am	12	134	test lift PLC screen east bridge only	-	cloudy 46	7	3.6	N/A
02/25/08	2	00:54am	01:05am	11	70	"sundial" 3 barges	down	cloudy 46	6	3.5	Barge
02/25/08	3	01:21am	01:35am	14	135	test lift PLC screen east bridge only	-	cloudy 46	5	3.4	N/A
02/25/08	4	01:50am	01:56am	6	25	test lift pullout drawer east bridge only	-	rain 46	3	3.2	N/A
02/27/08	1	13:46pm	13:53pm	7	82	lift S.B. only for maint. And to allow marc to out towers	-	partly cloudy 58	1	3.8	N/A
02/27/08	2	14:12pm	14:20pm	8	82	lift S.B. only for maint. + to bring Gross back down off tower	-	partly cloudy	4	3.5	N/A
02/27/08	1	12:38pm	12:42pm	4		traffic stop SB only to allow maint to access high span piers		clear 57	2		N/A
02/28/08	1	20:02pm	20:06pm	4	25	west br. Test	-	cloudy	calm	2.5	N/A
03/02/08	1	14:56pm	15:06pm	10	80	"indigo" sailboat	up	clear 50	7	3	Sail
03/03/08	1	00:10am	00:23am	13	135	test lift west br. PLC screen	-	cloudy 41	4	1.8	N/A
03/03/08	2	00:28am	00:41am	13	135	test lift west br. Maint screen	-	cloudy 41	5	1.8	N/A
03/03/08	3	00:52am	00:58am	6	60	test list east and west br. PLC screen	-	cloudy 41	1	1.8	N/A
03/03/08	4	9:15pm	9:22pm	7	86	east br. Lift - removing cannons	-	rain 40	12	2.2	N/A
03/03/08	5	9:41pm	9:49pm	9	86	east br. Lift - removing cannons	-	rain 41	9	2.2	N/A
03/03/08	1	11:21am	11:29am	8		east br. Unloading materials		cloudy 43	10		N/A
03/05/08	1	12:50pm	12:55pm	5		traffic stop south bound only for sign crew working at south end of bridge		clear 46	7		N/A
03/08/08	1	12:50pm	13:00pm	10	80	Roxanna, Derrick	down	cloudy	calm	3.5	Barge
03/10/08	1	00:08am	00:25am	17	135	test lift both bridges PLC screen	-	cloudy 50	6	4	N/A
03/10/08	2	00:32am	00:47am	15	99	""	-	cloudy 51	4	3.9	N/A
03/10/08	3	00:54am	01:06am	12	96	""	-	cloudy 52	5	3.8	N/A
03/10/08	4	01:15am	01:25am	10	60	"" Pull out drawer	-	cloudy 52	7	3.8	N/A
03/10/08	5	12:03pm	12:12pm	9	82	west br. Maint	-	cloudy	10	4.4	N/A
03/10/08	6	13:01pm	13:19pm	18	136	west br. Maint	-	cloudy	10	3.9	N/A
03/10/08	7	13:55pm	14:08pm	13	82	west br. Maint	-	cloudy	7	3.8	N/A
03/10/08	8	18:23pm	18:30pm	7	82	west bridge only - maintenance	-	cloudy 55	2	3.3	N/A
03/10/08	9	20:00pm	20:09pm	9	82	west bridge only - maintenance	-	rain 55	4	4.5	N/A
03/10/08	10	21:02pm	21:10pm	8	82	west bridge only - maintenance	-	cloudy 53	3	4.8	N/A
03/11/08	1	11:45am	12:00pm	15	38	east br. Maint	-	sunny 50	6	5	N/A
03/11/08	2	13:05pm	13:18pm	12	1	""	-	rain 46	5	4.7	N/A
03/11/08	3	13:15pm	13:30pm	15	82	west br. Maint	-	sunny rain 49	2	4.5	N/A
03/11/08	4	22:36pm	22:48pm	18	19	east br. Maint	-	clear 46	4	4.5	N/A
03/11/08	5	22:49pm	23:24pm	13	136	west br. Maint	-	clear 46	4	4.5	N/A
03/11/08	6	23:13pm	23:20pm	7	45	east bridge - test lift	-	clear 44	4	4.5	N/A
03/11/08	7	23:22pm	23:32pm	10	120	west bridge - test lift	-	clear 44	5	4.4	N/A
03/11/08	8	23:33pm	23:47pm	14	16	east bridge - test lift	-	clear 43	6	4.4	N/A
03/11/08	9	23:52pm	00:02am	10	120	west bridge - test lift	-	clear 43	4	4.3	N/A
03/12/08	1	00:11am	00:27am	16	121	west bridge test lift aux motor	-	clear 43	2	4.2	N/A
03/12/08	2	01:47am	02:00am	13	136	east bridge test lift	-	clear 42	0	3.6	N/A
03/12/08	3	02:07am	02:16am	9	120	east bridge test lift	-	clear 42	3	3.5	N/A
03/12/08	4	02:31am	02:40am	9	120	east bridge test lift	-	clear 41	0	3.4	N/A
03/12/08	5	02:45am	02:54am	9	120	east bridge test lift	-	clear 41	1	3.3	N/A
03/12/08	6	03:03am	03:28am	25	132	east bridge test lift aux motor	-	clear 41	1	3.2	N/A
03/12/08	7	05:02am	05:10am	8	3	east bridge torque test w/aux motor	-	clear 41	1	2.9	N/A
03/12/08	8	10:18am	10:34am	16	21	east bridge test lift	-	partly cloudy 43	4	5.5	N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
03/12/08	9	11:14am	11:24am	10	9	east bridge test lift	-	cloudy	2	5.1	N/A
03/12/08	10	12:02pm	12:10pm	8	9	east bridge test lift	-	cloudy	2	4.9	N/A
03/12/08	11	12:54pm	13:10pm	16	82	equipment placement test lift west bridge	-	cloudy 50	1	4.5	N/A
03/12/08	12	13:33pm	13:43pm	10	2	east bridge only test lift	-	cloudy 50	0	4.4	N/A
03/12/08	13	14:10pm	14:23pm	13	82	west br. Lift to bring equipment and personnel down	-	cloudy 52	3	4.2	N/A
03/12/08	14	22:25pm	22:39pm	14	10	east bridge only - maintenance	-	rain 44	6	4.3	N/A
03/12/08	15	22:56pm	23:13pm	17	11	east br. Test lift	-	rain 44	5	4.3	N/A
03/12/08	16	23:26pm	23:33pm	7	8	east br. Test lift	-	rain 44	6	4.3	N/A
03/12/08	1	03:49am	04:06am	17		east bridge torque test w/aux motor		clear 40	2		N/A
03/12/08	2	04:20am	04:30am	10		east bridge torque test w/aux motor		clear 40	3		N/A
03/12/08	3	04:40am	04:47am	7		east bridge torque test w/aux motor		clear 40	2		N/A
03/13/08	1	9:43am	9:55am	12	82	lift west bridge only for equipment and personnel	-	rain 48	9	6.1	N/A
03/13/08	2	10:53am	11:02am	10	82	""	-	rain 47	16	6	N/A
03/13/08	1	00:15am	00:19am	4		west br. Sensor test for contractors		rain 43	7		N/A
03/13/08	2	00:26am	00:30am	4		west br. Sensor test for contractors		rain 43	8		N/A
03/13/08	3	00:47am	00:51am	4		west br. Sensor test for contractors		rain 43	7		N/A
03/13/08	4	00:57am	01:00am	3		west br. Sensor test for contractors		rain 43	12		N/A
03/13/08	5	02:11am	02:17am	6		east br. Loading equipment for contractors		rain 43	9		N/A
03/13/08	6	13:22pm	13:25pm	3		east br. Loading equipment for contractors		rain 47	10		N/A
03/17/08	1	00:30am	00:43am	13	136	for dave, test lift east and west br. PLC screen	-	rain 41	8	3.4	N/A
03/17/08	2	1:07am	1:19am	12	136	test lift east br. PLC bridge	-	rain 41	10	3.5	N/A
03/17/08	3	1:32am	1:45am	13	136	test lift east br. PLC bridge	-	rain 41	12	3.6	N/A
03/17/08	4	1:54am	2:02am	8	45	test lift east and west br. Pullout drawer	-	rain 41	3	3.8	N/A
03/21/08	1	11:40am	11:51am	11	90	sailboat runaway	down	cloudy	1	5.8	Sail
03/23/08	1	3:40am	3:47am	7	80	Noidena w/Derrick	up	cloudy	13	4.3	Barge
03/28/08	1	9:30am	9:38am	8	70	Indigo Sailboat	down	rain 39	9	5.5	Sail
03/31/08	1	00:20am	00:33am	13	136	test lift both bridges PLC screen	-	cloudy 37	7	2.5	N/A
03/31/08	2	00:39am	00:46am	7	56	test lift both bridges PLC screen	-	cloudy 37	6	2.5	N/A
03/31/08	3	1:20am	1:25am	5	12	test lift both bridges pullout panel	-	cloudy 37	6	2.6	N/A
04/02/08	1	13:13pm	13:24pm	11	121	test lift with br. Only	-	clear 51	4	3.7	N/A
04/03/08	1	18:04pm	18:15pm	11	85	linde marie	down	hazy 59	calm	4.5	Barge
04/04/08	1	12:54pm	13:07pm	12	90	nian marie with derrick	down	partly cloudy 47	7	29	Barge
04/04/08	2	17:50pm	17:58pm	8	82	west br. Only	-	cloudy 47	calm	5	N/A
04/04/08	3	18:27pm	18:35pm	8	82	west br. Only	-	clooudy	calm	4.9	N/A
04/07/08	1	00:13am	00:19am	6	65	test list east and west br. PLC screen	-	cloudy 45	14	3.8	N/A
04/07/08	2	00:24am	00:30am	6	32	test lift east br. Maint screen	-	cloudy 44	16	3.8	N/A
04/07/08	3	00:33am	00:38am	5	32	test lift west br. Maint screen	-	cloudy 44	6	3.8	N/A
04/07/08	4	00:43am	00:50am	7	27	test lift east and west br. Pullout drawer	-	cloudy 44	14	3.7	N/A
04/09/08	1	9:12am	9:24am	12	136	difiance with 4 barges	down	rain 42	3	6.4	Barge
04/09/08	2	10:34am	10:50am	16	136	maint. Lift to check elevation calibration	-	cloudy 43	5	5.9	N/A
04/09/08	3	10:56am	11:12am	16	136	w. bridge onlt - maint lift to check elevation calibration	-	cloudy 44	6	5.8	N/A
04/12/08	1	15:16pm	15:26pm	10	80	"P.T. Brix" and Queen of the West	down	clear 75	13	3.9	Barge
04/12/08	2	18:24pm	18:35pm	11	96	"Willamette" + 4 barges	down	clear 75	9	3.3	Barge
04/13/08	1	16:48pm	16:54pm	6	65	tidewater + 1 barge	down	cloudy 62	10	4	Barge
04/16/08	1	11:15am	11:23am	7	87	lift N.B. only to get personnel up on tower	-	cloudy 49	1	3.7	N/A
04/16/08	2	12:38pm	12:46pm	8	86	lift N.B. only to bring personnel back down from s. tower	-	cloudy 50	0	3.8	N/A
04/20/08	1	8:32am	8:42am	10	75	willamette	down	cloudy 37	calm	4.5	Barge
04/23/08	1	1:25am	1:36am	11	80	desperado sail vessel	up	cloudy 45	12	5.5	Sail
04/23/08	2	2:29am	2:38am	9	70	Lori B and barge	down	cloudy 45	12	4.9	Barge

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
04/23/08	3	9:17am	9:32am	15	136	maint. Lift SB only to remove fake eggs	-	cloudy	19	5.8	N/A
04/24/08	1	1:01am	1:12am	11	70	Tidewater + barges	down	cloudy 44	1	5	Barge
04/24/08	2	18:30pm	18:37pm	7	60	Whisper	down	cloudy 50	13	4.5	Sail
04/25/08	1	3:16am	3:28am	12	70	outlaw + barges	down	cloudy 47	0	5	Barge
04/27/08	1	10:14am	10:21am	7	60	whisper	up	cloudy 57	calm	5.5	Sail
05/02/08	1	9:38am	9:50am	12	81	"chief" 4 barges	down	cloudy 52	1	5.7	Barge
05/04/08	1	3:08am	3:17am	9	80	tidewater with 6 barges	down	cludy 45	1	5.8	Barge
05/06/08	1	19:16pm	19:27pm	11	80	tidewater + 3 barges	down	partly cloudy 55	14	6.4	Barge
05/07/08	1	18:23pm	18:33pm	10	80	chief + 4 barges	down	overcast 53	18	6.3	Barge
05/08/08	1	23:23pm	23:33pm	10	70	"Lori B"	down	cloudy 47	4	7.3	Barge
05/10/08	1	3:43am	3:57am	14	110	"Dauby" - 3 barges	down	cloudy 49	7	8.6	Barge
05/11/08	1	6:25am	6:39am	14	90	"Hurricane" + 4 barges	-	cloudy 48	7	8.1	Barge
05/11/08	2	16:12pm	16:21pm	9	80	"Valkerizm" sailboat	down	overcast 55	8	7.5	Sail
05/13/08	1	11:44am	11:55am	11	80	"Lori B" - 1 barge	down	rain 52	5	7.8	Barge
05/14/08	1	1:01am	1:11am	10	70	"willamette" barges	down	cloudy 58	2	8	Barge
05/14/08	2	4:32am	4:41am	9	70	"hurricane" barges	down	cloudy 57	0	8.3	Barge
05/14/08	3	13:51pm	14:04pm	13	80	"Clearwater" barges	down	cloudy 65	6	7.4	Barge
05/15/08	1	11:00am	11:12am	12	70	"Lori B" / barges	down	clear 68	1	6.6	Barge
05/16/08	1	4:08am	4:18am	10	80	"Tidewater" + barges	-	clear 60	8	8.4	Barge
05/16/08	2	13:08pm	13:17pm	9	80	"Runaway" sailboat	down	partly cloudy 85	9	81	Sail
05/16/08	3	21:00pm	21:09pm	9	65	chief	down	clear 87	8	8.7	Barge
05/17/08	1	16:47pm	16:55pm	8	71	"Runaway" + "Pilot - sailboats	up	clear 92	5	8.8	Sail
05/18/08	1	12:16pm	12:23pm	7	60	Shearwater	down	clear 73	3	9.6	Unknown
05/19/08	1	9:03am	9:14am	11	70	chief	down	clear	calm	12.2	Barge
05/19/08	2	11:00am	11:06am	6	50	Kira Lynn	down	cloudy	calm	12.3	Sail
05/20/08	1	2:22am	2:33am	11	90	"Daubi" + barges	down	clear 60	10	13.3	Barge
05/20/08	2	13:35pm	13:42pm	7	86	test lift north only	-	cloudy 60	5	13.7	N/A
05/20/08	3	13:57pm	14:05pm	8	82	test lift south only	-	cloudy 60	10	13.7	N/A
05/20/08	4	14:20pm	14:26pm	6	82	test lift south only	-	cloudy 60	13	13.7	N/A
05/21/08	1	12:02pm	12:11pm	9	70	Umatilla with one barge	down	rain 52	2	14.4	Barge
05/22/08	1	2:10am	2:24am	14	80	"Daubi" + barges	down	cloudy 49	8	14.5	Barge
05/22/08	2	13:32pm	13:41pm	9	70	"Sail boat Katherine"	down	cloudy 56	6	14.8	Sail
05/23/08	1	10:06am	10:15am	9	70	monyey bar / nelson did this lift	down	cloudy 53	3	14.7	Sail
05/23/08	2	10:35am	10:45am	10	85	whisperer / nelson did this lift	down	cloudy 49	3	14.77	Sail
05/23/08	3	11:58am	12:07pm	9	80	molodez + 4 others	down	rain 50	3	14.7	Sail
05/23/08	4	12:16pm	12:26pm	10	70	deschutes / 4 barges	down	rain 51	5	14.7	Barge
05/23/08	5	12:54pm	13:03pm	9	70	sailboat "Southern Cross" + 1 other	down	rain 51	6	14.7	Sail
05/23/08	6	20:20pm	20:27pm	7	65	Autumn Wind	down	cloudy	calm	14.5	Sail
05/23/08	7	20:46pm	20:53pm	7	66	Sea Gypsy	down	cloudy	calm	14.5	Sail
05/24/08	1	2:04am	2:20am	16	80	"Daubi" + 2 barges	down	cloudy 52	0	14.5	Barge
05/24/08	2	9:49am	9:55am	6	50	Julia Max	down	cloudy	calm	14.3	Sail
05/24/08	3	11:37am	11:48am	11	65	Daubi + 3 sailboats	down	cloudy	calm	14.3	Barge
05/24/08	4	12:15pm	12:22pm	7	60	Tango	down	cloudy	calm	14.3	Sail
05/24/08	5	13:49pm	13:56pm	7	60	Crystal Swan	down	cloudy	calm	14	Sail
05/24/08	6	16:58pm	17:06pm	8	72	"New Era"	down	overcast 72	5	13.8	Sail
05/25/08	1	16:03pm	16:11pm	8	70	"Dublin Rover" sailboat	up	overcast 60	7	13.2	Sail
05/26/08	1	12:58pm	13:06pm	8	60	lucious + tango, crystal swan + 2	up	cloudy	calm	13	Sail
05/26/08	2	13:43pm	13:51pm	8	65	whisper + 4	up	cloudy	calm	13	Sail
05/26/08	3	16:10pm	16:18pm	8	80	"Juna Max" - sailboat	down	overcast 62	calm	12.8	Sail

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
05/27/08	1	14:00pm	14:18pm	18	50	laurie V kira lynn	-	cloudy 61	6	12	Sail
05/28/08	1	2:45am	2:59am	14	80	"Daubi" + "Tidewater" + barges	down	cloudy 59	3	12	Barge
05/28/08	2	18:05pm	18:12pm	7	82	west br. Maint lift only	-	cloudy 59	7	12.2	N/A
05/28/08	3	18:44pm	18:57pm	13	82	"Bruce M" + 2 barges	down	cloudy 57	2	12.3	Barge
05/28/08	4	22:20pm	22:32pm	12	75	"Outlaw" + 3 barges	down	cloudy 54	3	12.4	Barge
05/29/08	1	10:33pm	10:41pm	8	70	Sailboat "Lock Fine"	up	cloudy 54	4	12.9	Sail
05/30/08	1	3:15am	3:28am	13	80	"Dauby" - 3 barges	down	cloudy 52	4	13.6	Barge
05/30/08	2	9:57am	10:08am	11	72	sailboat Kira Lynn + sailboat Knauticos	down	cloudy 55	6	13.5	Sail
05/30/08	1	12:37pm	12:47pm	10		Grease NW barrier		partly cloudy 62	5		N/A
05/31/08	1	10:05am	10:12am	7	65	valpiriso	up	partly cloudy	4	13.5	Sail
05/31/08	2	20:16pm	20:28pm	12	95	"Deschutes" + 4 barges	down	overcast 61	6	13.3	Barge
06/01/08	1	15:22pm	15:31pm	9	75	"Kalos Nautikos" sailboat	up	overcast 56	3	13.5	Sail
06/01/08	2	16:12pm	16:19pm	7	60	"Coqui" sailboat	up	overcast	5	13.5	Sail
06/01/08	3	18:30pm	18:45pm	15	75	"Chief" + 4 barges	down	cloudy 55	7	13.6	Barge
06/02/08	1	2:27am	2:47am	20	65	Capt Bob	down	cloudy 52	1	13.5	Barge
06/02/08	2	19:05pm	19:14pm	9	100	Ironwood	up	rain 58	calm	13.7	Federal
06/03/08	1	1:14am	1:25am	11	70	Daubi	down	rain 52	8	13.5	Barge
06/04/08	1	10:50am	10:58am	8	66	sailboat Pama	down	cloudy 55	7	14.2	Sail
06/04/08	1	22:49pm	22:55pm	6		requested by WASHDOT, debrid in roadway to be removed		overcast 53	4		N/A
06/05/08	1	1:02am	1:15am	13	65	Daubi	down	cloudy 51	4	14.1	Barge
06/05/08	2	9:35am	9:42am	7	86	lift NB only to take ITS + Marc on towers	-	rain 52	8	14.4	N/A
06/05/08	3	10:48am	10:57am	9	86	Lift NB only to bring ITS + Gross back down	-	rain 52	9	14.3	N/A
06/05/08	4	12:38pm	12:50pm	12	71	"Challenger" + 5 barges	down	cloudy 52	8	14.3	Barge
06/05/08	5	14:15pm	14:25pm	10	70	"Clearwater" + 3 barges	down	cloudy 54	11	14.3	Barge
06/05/08	6	20:17pm	20:25pm	8	80	Ironwood	down	cloudy 56	3	14.3	Federal
06/06/08	1	2:42am	2:54am	12	65	lewiston/chief	down	cloudy 50	1	14.3	Barge
06/06/08	2	12:05pm	12:15pm	10	70	"tidewater" + 3 barges	down	cloudy 52	15	14.6	Barge
06/07/08	1	11:31am	11:45am	14	70	"Daubi" + 2 barges	down	cloudy 52	6	14.5	Barge
06/07/08	2	4:45pm	4:57pm	12	70	"Hurricane" + 4 barges	down	rain 51	5	14.2	Barge
06/08/08	1	19:24pm	19:33pm	9	85	"Challenger" + 4 barges	down	cloudy 64	3	12.9	Barge
06/09/08	1	23:15pm	23:26pm	11	55	Outlaw	down	cloudy 58	8	13	Barge
06/09/08	2	9:32am	9:40am	8	86	lift for cable splicing	-	cloudy	14	12.3	N/A
06/09/08	3	11:44am	11:53am	9	86	""	-	cloudy	16	12	N/A
06/09/08	4	13:48pm	13:45pm	7	86	""	-	cloudy	20	12	N/A
06/09/08	5	19:58pm	20:08pm	10	85	"Bruce M" + 1 barges	down	cloudy 53	12	11.5	Barge
06/10/09	1	2:29am	2:40am	11	75	"Daubi" + barges	down	rain 46	15	11.8	Barge
06/12/08	1	13:00pm	13:12pm	12	70	"Bruce M" + 2 barges	down	partly cloudy 58	4	12.5	Barge
06/12/08	2	21:57pm	22:06pm	9	65	Lewiston	down	clear 64	14	12.6	Barge
06/14/08	1	2:33am	2:42am	9	70	"Daubi" + 2 barges	down	clear 48	3	12.4	Barge
06/14/08	2	6:55am	7:02am	7	50	Ballisima	down	clear 62	8	12.2	Sail
06/17/08	1	3:35am	3:45am	10	70	"Daubi" + barges	down	cloudy 51	5	9.8	Barge
06/18/08	1	14:10pm	14:18pm	8	65	Pamo sailboat	up	partly cloudy 62	2	11.1	Sail
06/19/08	1	1:08am	1:18am	10	70	"Daubi" + barges	down	clear 55	0	11.2	Barge
06/19/08	2	9:52am	10:00am	8	55	Sailboat "Tango"	down	clear 63	1	11.4	Sail
06/20/08	1	2:57am	3:08am	11	65	"Katherine B" + barges	down	clear 59	3	11.1	Barge
06/20/08	2	18:20pm	18:27pm	7	60	valpiriso	down	hazy 82	calm	10.5	Sail
06/21/08	1	00:38am	00:49am	11	70	"Daubi" + barges	down	partly cloudy 66	4	10.9	Barge
06/21/08	2	6:06am	6:15am	9	65	"KokoPelli" sail vessel	down	partly cloudy 62	0	10.8	Sail
06/22/08	1	15:48pm	15:56pm	8	80	"Hole in the Water" sailboat	down	clear 70	7	9.8	Sail

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
06/22/08	2	18:46pm	18:55pm	9	60	"Stoker's Delight" sailboat	up	clear 71	6	9.6	Sail
06/23/08	1	2:08am	2:17am	9	70	"Lori B" + barge	down	cloudy 54	7	9.6	Barge
06/23/08	2	22:12pm	22:32pm	20	85	(Down Havis) west bridge only maint	-	clear 61	2	9	N/A
06/23/08	3	22:38pm	22:56pm	18	136	west br. Only -maint	-	clear 59	2	8.9	N/A
06/23/08	4	23:10pm	23:30pm	20	90	east br. Only - maint (Down Havis)	-	clear 57	3	8.9	N/A
06/23/08	5	23:40pm	23:54pm	14	136	east br. Only - maint	-	clear 57	2	8.9	N/A
06/24/08	1	00:15am	00:34am	19	118	east br. Only - maint (uphauls)	-	clear 57	2	8.9	N/A
06/24/08	2	1:05am	1:27am	22	135	west br. Only - maint (uphauls)	-	clear 56	2	8.9	N/A
06/24/08	3	2:10am	2:27am	17	115	"Daubi" + barge / west br uphauls maint	down	clear 54	8	8.9	Barge
06/24/08	4	2:33am	2:46am	13	132	west br only - maint	-	clear 53	1	8.8	N/A
06/24/08	5	3:00am	3:12am	12	136	east br only - maint (uphauls)	-	clear 53	2	8.8	N/A
06/24/08	6	3:30am	3:53am	23	132	east br only -maint	-	clear 52	3	8.8	N/A
06/24/08	7	4:05am	4:21am	16	86	east br only -maint	-	clear 52	0	8.7	N/A
06/24/08	8	11:57am	12:04pm	7	50	"Bueno Vida"	-	clear	7	8.7	Sail
06/24/08	9	22:10pm	22:18pm	8	86	east bridge only - maintenance	-	clear 65	13	9.2	N/A
06/24/08	10	23:00pm	23:19pm	19	136	east bridge only - maintenance (counter weight cables)	-	clear 64	10	9.3	N/A
06/25/08	1	23:55pm	00:15am	20	82	west br only - maint (counter weight cables)	-	clear 61	4	9.4	N/A
06/25/08	2	00:37am	00:52am	15	100	west br only - maint	-	clear 60	10	9.4	N/A
06/25/08	3	1:11am	1:33am	22	135	west br only - maint	-	clear 59	7	9.5	N/A
06/25/08	4	1:55am	2:03am	8	82	west br only - maint	-	clear 59	6	9.5	N/A
06/25/08	5	2:07am	2:26am	19	86	east br only -maint	-	clear 58	4	9.5	N/A
06/25/08	6	2:45am	2:52am	7	86	east br only -maint	-	clear 57	4	9.5	N/A
06/25/08	7	2:59am	3:21am	22	135	west br only - maint	-	clear 57	3	9.5	N/A
06/25/08	8	3:40am	3:59am	19	136	east br only -maint	-	clear 56	2	9.6	N/A
06/25/08	9	4:02am	4:09am	7	82	west br only - maint	-	clear 56	6	9.6	N/A
06/25/08	10	4:15am	4:28am	13	86	east br only -maint	-	clear 55	4	9.6	N/A
06/26/08	1	00:23am	00:35am	12	65	"Daubi" + barges	down	partly cloudy 55	5	10.4	Barge
06/26/08	2	11:40am	11:48am	8	76	sailboat "Tamar"	down	cloudy 58	3	9.9	Sail
06/27/08	1	3:26am	3:38am	12	70	Kathryn B / 3 barges	down	clear 58	6	9.8	Barge
06/27/08	2	11:06am	11:14am	7	70	Portland Steamer	up	clear 68	5	9.9	Yacht
06/27/08	3	18:38pm	18:44pm	6	50	Moments	down	clear 84	18	10	Sail
06/27/08	1	13:29pm	13:32pm	3		SB only , N Portland to install sign mounts, Pier 6		clear 76	9		N/A
06/27/08	2	13:50pm	13:54pm	4		SB only , N Portland to install sign mounts, Pier 10		clear 78	5		N/A
06/28/08	1	12:04am	12:18am	14	65	"Daubi"	down	clear 72	3	9.9	Barge
06/28/08	2	7:55am	8:05am	10	60	Deschutes	down	clear 72	7	10.4	Barge
06/28/08	3	14:54pm	15:00pm	6	60	"Welkin" sailboat	down	clear 90	9	9.9	Sail
07/01/08	1	00:33am	00:45am	12	70	"Daubi" + barges	down	cloudy 60	7	9.5	Barge
07/01/08	2	10:37am	10:46am	9	70	"Spaetlacy" sailboat / "Challenger" (2 barges)	down	cloudy 64	7	9.4	Barge
07/03/08	1	00:56am	1:07am	11	65	"Daubi" + barges	down	cloudy 66	5	9.4	Barge
07/03/08	2	12:42pm	12:50pm	18	56	Defiance / Medetrina (sailboat)	down	cloudy 71	2	10	Barge
07/04/08	1	10:26am	10:35am	9	65	sailboat "Hole in the Water"	up	partly cloudy	8	10.3	Sail
07/04/08	2	14:24pm	14:33pm	9	85	sailboat "Cathryn"	up	cloudy 69	0	9.9	Sail
07/05/08	1	9:30am	9:37am	7	50	Tango	-	cloudy	calm	9.5	Sail
07/06/08	1	12:14pm	12:21pm	7	60	sailboat Cathrine	down	cloudy 66	9	8.5	Sail
07/07/08	1	12:21pm	12:28pm	7	60	sailboat Windward	down	clear	calm	7	Sail
07/07/08	2	13:30pm	13:38pm	8	60	Bruce M	down	clear	8	7	Barge
07/07/08	3	18:05pm	18:13pm	8	80	"Mad Dog" sailboat	up	clear 78	12	6.5	Sail
07/08/08	1	4:46am	4:57am	11	86	maint - trunnion greasing	-	clear 61	0	7.2	N/A
07/08/08	2	9:22am	9:38am	16	86	maint crossover for crew	-	sunny 69	calm	7.2	N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
07/08/08	3	13:22pm	13:32pm	10	86	maint + "Promiss"	up	sunny 79	5	6.8	Sail
07/08/08	4	20:40pm	20:47pm	7	70	"Promises" sailboat	down	clear 81	9	6.5	Sail
07/10/08	1	20:45pm	20:52pm	7	60	Ladyess	down	clear	7	5	Sail
07/11/08	1	9:58am	10:08am	10	90	Radience	up	clear 70	6	5.3	Barge
07/16/08	1	10:51am	11:03am	12	86	NB only maint - lift to take up supplies for greasing	-	clear 64	5	4	N/A
07/16/08	2	13:23pm	13:36pm	13	86	NB maint lift to bring maint crew down	-	clear 70	6	3.1	N/A
07/16/08	3	14:16pm	14:25pm	9	90	sailboat Preditor	up	clear 72	8	3	Sail
07/17/08	1	9:40am	9:48am	8	86	NB only - maint lift to take up personnel	-	cloudy 59	0	3.9	N/A
07/17/08	2	11:07am	11:15am	8	86	NB only - maint lift, personnel cross-over	-	partly cloudy 62	10	3.4	N/A
07/17/08	3	12:03pm	12:12pm	9	86	NB only - maint lift to bring down maint personnel	-	clear 62	6	3.1	N/A
07/17/08	4	12:40pm	12:48pm	8	86	NB only - maint life to bring down personnel and elec.	-	clear 65	9	2.9	N/A
07/17/08	1	13:05pm	13:12pm	7		traffic stop SB only - electricians to repait SW barrier light		clear 66	5		N/A
07/18/08	1	4:41am	4:55am	14	110	"Lucy II" + Derricks	up	cloudy 57	5	4.9	Barge
07/18/08	2	13:50pm	13:59pm	9	100	Lissy II	down	cloudy	calm	2.9	Barge
07/18/08	3	14:20pm	14:30pm	10	60	Hurricane	down	cloudy	calm	2.9	Barge
07/18/08	4	21:55pm	22:03pm	8	86	maint lift	-	clear	calm	4	N/A
07/18/08	5	22:33pm	22:46pm	13	15	maint SB	-	clear	calm	4	N/A
07/18/08	6	22:59pm	23:12pm	13	31	maint SB	-	clear 59	calm	3.8	N/A
07/18/08	7	23:23pm	23:39pm	16	54	maint SB	-	clear 58	calm	3.4	N/A
07/18/08	8	23:53pm	00:10am	17	75	maint SB	-	clear	6	3.2	N/A
07/19/08	1	00:20am	00:38am	18	96	maint SB	-	clear 57	8	3.1	N/A
07/19/08	2	00:45am	1:08am	23	115	maint SB	-	clear 56	3	3.1	N/A
07/19/08	3	1:14am	1:35am	21	127	maint SB	-	clear 56	8	2.9	N/A
07/19/08	4	1:44am	1:52am	8	30	maint SB	-	clear 55	3	2.8	N/A
07/19/08	5	1:56am	2:17am	21	135	maint SB	-	clear 55	3	2.8	N/A
07/19/08	6	2:40am	2:56am	16	24	maint EB	-	clear 56	4	2.8	N/A
07/19/08	7	3:02am	3:20am	18	54	maint EB	-	clear 55	6	3	N/A
07/19/08	8	3:25am	3:44am	19	69	maint EB	-	clear 55	9	3.1	N/A
07/19/08	9	3:50am	4:09am	19	84	maint EB	-	clear 55	8	3.5	N/A
07/19/08	10	4:15am	4:35am	20	100	maint EB	-	clear 55	4	3.8	N/A
07/19/08	11	4:39am	5:00am	21	112	maint EB	-	cloudy 56	8	4.2	N/A
07/19/08	12	5:04am	5:25am	21	121	maint EB	-	cloudy 56	4	4.5	N/A
07/19/08	13	5:37am	6:06am	29	136	maint EB	-	cloudy 56	2	5	N/A
07/19/08	14	6:17am	6:26am	9	86	maint EB	-	cloudy 56	7	5.3	N/A
07/19/08	15	22:17pm	22:37pm	20	82	maint lift - SB only	-	clear 67	calm	4.2	N/A
07/19/08	16	22:50pm	23:08pm	18	136	maint lift - SB only	-	clear 64	7	4.1	N/A
07/19/08	17	23:35pm	23:52pm	17	86	maint lift - NB only	-	clear 62	3	4	N/A
07/20/08	1	00:02am	00:18am	16	136	NB only - maint	-	clear 61	8	3.7	N/A
07/21/08	1	11:26am	11:30am	4		NB OP House garbage removal		cloudy 69	7		N/A
07/22/08	1	9:11am	9:20am	9	86	east bridge only maint lift	-	cloudy 58	5	4.8	N/A
07/22/08	2	9:44am	9:52am	8	86	east bridge only maint lift	-	cloudy 59	3	4.7	N/A
07/22/08	3	10:32am	10:39am	7	86	east bridge only maint lift	-	cloudy 59	5	4.4	N/A
07/25/08	1	3:56am	4:07am	11	70	"Tidewater"	down	clear 72	2	3.8	Barge
07/25/08	2	18:54pm	19:03pm	9	70	"Mad Dog"	down	clear 81	10	2	Unknown
07/27/08	1	23:20pm	23:34pm	14	136	test lift for dave johnson, west br only	-	cloudy 75	6	4	N/A
07/27/08	2	23:55pm	23:58pm	3	4	test lift west br only	-	cloudy 75	10	4.6	N/A
07/28/08	1	9:09am	9:16am	7	86	NB only - cable greasing	-	clear 62	calm	3.2	N/A
07/28/08	2	11:14am	11:25am	11	86	"Valkeraza" sailboat	up	clear 67	calm	2.6	Sail
07/28/08	3	13:47pm	13:54pm	7	86	NB only - cable greasing	-	clear 75	calm	2.8	N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
07/29/08	1	3:45am	3:55am	10	70	"Daubi" + barges	down	clear 60	0	5.7	Barge
07/29/08	2	10:39am	10:47am	8	75	Tammra sailboat	up	cloudy 61	8	3.3	Sail
07/30/08	1	9:03	9:04am	1		remove a dead cat from A + B lanes SB					N/A
07/30/08	2	13:00pm	13:04pm	4		fixing back gates and ped gate SB					N/A
07/30/08	3	13:20pm	13:34pm	14		fixing back gates and ped gate SB					N/A
07/30/08	4	14:04pm	14:14pm	10		fixing back gates and ped gate SB					N/A
07/31/08	1	9:36am	9:37am	1		SB with br only traffic stop, checking back gate lights					N/A
08/02/08	1	1:51am	2:02am	11	85	"Challenger" + 4 barges	down	clear 55	6	2.9	Barge
08/12/08	1	9:52am	9:59am	7	60	sailboat "Anamcara"	up	cloudy 67	0	1.9	Sail
08/15/08	1	10:07am	10:22am	15	80	"Washugal" + Derrick + sailboat "Bonnie Vie"	down	clear 80	7	2.4	Barge
08/15/08	2	19:49pm	19:55pm	6	86	east br maint	-	clear 88	11	3.5	N/A
08/15/08	3	20:11pm	20:17pm	6	82	west br maint	-	clear			N/A
08/30/08	1	7:10am	7:20am	10	95	lungta (touch screen)	down	cloudy 55	5	5.3	Sail
08/31/08	1	3:15am	3:25am	10	72	Daubi (touch screen)	down	partly cloudy	calm	2.5	Barge
08/31/08	2	18:57pm	19:07pm	10	90	"Nancy Ann" sailboat (used touch screen)	up	cloudy 54	5	4.8	Sail
09/05/08	1	9:00am	9:13am	13	93	Lindy Marie with Derrick	up	clear 63	10	2.2	Barge
09/06/08	1	4:27am	4:42am	15	100	"Lissy Too" w/ 2 Derricks	up	c loudy 60	12	1.7	Barge
09/10/08	1	9:30am	9:38am	8	86	east bridge only to take maint up on N tower	-	clear 59	0	0.3	N/A
09/10/08	2	11:38am	11:45am	7	87	bring maint down	-	clear 65	7	-0.06	N/A
09/14/08	1	20:31pm	20:41pm	10	95	"Yaqina"dredge / used touch screen	up	clear 76	5	2.4	Federal
09/16/08	1	5:45am	5:56am	11	95	"Yaquina"	down	clear 61	0	3.1	Federal
09/16/08	2	19:34pm	19:43pm	9	100	"Yaquina"	up	clear 80	3	4.7	Federal
09/18/08	1	13:24pm	13:37pm	13	90	washugal with 2 spuds / derrick	up	cloudy 61	0	2	Barge
09/19/08	1	12:06pm	12:19pm	13	130	"Lindy Marie" with Derrick	down	cloudy 60	3	2.1	Barge
09/20/08	1	15:03pm	15:17pm	14	95	"Yaquina" touch screen	down	cloudy 63	calm	1.1	Federal
09/20/08	2	18:54pm	19:07pm	13	80	"Orca" sailboat, touch screen	up	cloudy 62	5	2.2	Sail
09/21/08	1	22:39pm	22:41pm	7	50	test lift for dave johnson	-	cloudy 59	calm	3.8	N/A
09/22/08	1	12:03pm	12:14pm	11	87	maint east br	-	partly cloudy	calm	1.9	N/A
09/22/08	2	13:32pm	13:39pm	7	87	maint east br	-	partly cloudy	calm	2	N/A
09/23/08	1	6:12am	6:21am	10	87	maint - east bridge only, pullout drawer	-	cloudy 48	5	0.8	N/A
09/23/08	2	12:43pm	12:54pm	11	86	""	-	clear 59	5	0.4	N/A
09/27/08	1	18:30pm	18:37pm	7	50	test lift both bridges, dave johnson, touch screen	-	clear 69	5	2.9	N/A
09/27/08	2	20:49pm	20:51pm	7	40	test lift both bridges, johnson	-	clear 69	5	2.9	N/A
09/27/08	3	21:12pm	21:19pm	11	131	test lift both bridges, dave johnson, touch screen	-	clear 66	5	2.5	N/A
10/09/08	1	9:23am	9:31am	8	87	NB only to take maint up on S tower	-	partly cloudy 48	0	-0.04	N/A
10/09/08	2	10:55am	11:04am	9	87	NB only maint personnel to cross over to N tower	-	partly cloudy 52	1	-0.05	N/A
10/09/08	3	11:14am	11:23am	9	87	NB only to bring maint personnel down	-	partly cloudy 54	0	0.05	N/A
10/09/08	4	18:00pm	18:08pm	8	65	make it so	up	rain 46	0	1.8	Sail
10/16/08	1	9:46am	9:56am	10	82	maint lift SB only to take personnel up on N tower	-	cloudy 52	10	2.5	N/A
10/16/08	2	13:30pm	13:39pm	9	82	maint lift SB only to bring maint personnel down	-	partly cloudy 58	5	1.3	N/A
10/17/08	1	9:34am	9:44am	10	82	maint lift SB only to take personnel up on S tower	-	fog 52	0	3	N/A
10/17/08	2	12:54pm	13:04pm	10	82	maint lift SB only to bring maint personnel back down	-	clear 62	0	2.5	N/A
10/23/08	1	9:21am	9:31am	10	87	maint lift to take personnel up on SE counter weight (ladders) east bridge only	-	cloudy 47	1	0.5	N/A
10/23/08	2	13:45pm	13:55pm	10	87	maint lift east bridge only to bring down maint personnel	-	clear 57	2	2.8	N/A
10/24/08	1	4:23am	4:33am	10	100	"Lewiston" for assist, "P.J. BriX" + Derrick	down	clear 41	2	2.4	Barge
10/28/08	1	11:05am	11:14am	9	86	east bridge maint lift	-	fog 50	calm	1.4	N/A
10/28/08	2	12:10pm	12:17pm	7	86	east bridge maint lift	-	cloudy 54	calm	1.1	N/A
10/30/08	1	11:40am	11:50am	10	90	"Patricia" w/spuds	up	cloudy 52	1	1.9	Barge
11/03/08	1	10:24am	10:35am	12	100	Buth and Manitowok	up	cloudy 52	10	2.5	Barge

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
11/24/08	1	10:25am	10:33am	8	87	maint lift	-	partly cloudy 47	3	1.9	N/A
11/24/08	2	11:34am	11:44am	10	86	maint lift	-	partly cloudy 49	3	2.3	N/A
11/24/08	3	12:08pm	12:18pm	10	86	maint lift	-	partly cloudy 49	0	2.5	N/A
11/25/08	1	11:25am	11:34am	9	95	make it so	down	cloudy 41	4	2.2	Sail
12/05/08	1	3:59am	4:18am	19		maint		clear 37	2		N/A
12/05/08	2	4:25am	4:39am	14		maint		clear 36	3		N/A
12/06/08	1	12:40pm	12:50pm	10	70	"Pegasus" sailboat	down	clear 44	calm	3.4	Sail
12/11/08	1	19:26pm	19:39pm	13	120	P.J. Brix + derrick	down	cloudy	calm	3.8	Barge
12/15/08	1	13:07pm	13:20pm	13	125	P.J. Brix + derrick	-	clear 25	25	3	Barge
12/23/08	1	1:36am	2:37am	61		east bridge clearing snow off of drawspan		cloudy 26			N/A
12/23/08	2	2:43am	4:20am	96		west bridge clearing snow off of drawspan		cloudy 27			N/A
12/26/08	1	23:45pm	23:50pm	5		maint		rain 41			N/A
12/27/08	1	2:06am	2:21am	15	136	test lift both bridges	-	rain 42		4.2	N/A
12/27/08	2	11:33am	11:45am	12	70	Orca	down	rain 49	12	3.5	Sail
12/27/08	1	00:01am	00:06am	5		maint		rain 41			N/A
12/29/08	1	21:08pm	21:20pm	12	90	ocean going tug "Pacific Freedom" + 1 barge a "PJ Brix"	down	cloudy 41	0	6.7	Barge
01/04/09	1	13:35pm	13:43pm	8	70	runaway	-	cloudy 35		9.4	Sail
01/05/09	1	10:57am	11:10am	13	136	test lift both bridges	-	cloudy 47	2	9.3	N/A
01/06/09	1	13:05pm	13:14pm	9	73	runaway	up	cloudy 53	6	9.6	Sail
01/07/09	1	9:53am	10:06am	13		traffic stop - NB only to grease barriers		cloudy 53	n/a		N/A
01/07/09	2	10:26am	10:38am	12		traffic stop - SB only to grease barriers		cloudy 53	n/a		N/A
01/08/09	1	4:09am	4:22am	13	100	"captain bob" + barges	down	rain 48		12.5	Barge
01/08/09	2	9:03am	9:17am	14	136	cascades with 4 barges	down	rain 48	n/a	12.8	Barge
01/08/09	3	9:10am	10:03am		125	ruth with Derrick	up	rain 48	n/a		Barge
01/09/09	1	1:30am	1:49am	19	136	automatic screen, test lift both bridges	-	cloudy 40		12.7	N/A
01/09/09	2	2:00am	2:24am	24	100	auto test lift both bridges, "outlaw" and barges	down	cloudy 40		12.7	Barge
01/09/09	3	2:31am	2:51am	20	136	pull out drawer, test lift both bridges	-	cloudy 38		12.6	N/A
01/09/09	4	3:04am	3:18am	14	136	auto, test lift both bridges	-	cloudy 39		12.5	N/A
01/09/09	5	5:10am	5:22am	12	125	auto - Yaquina Dredge, "Betty Lou" "Maverick"	up	cloudy 37		12.4	Federal
01/10/09	1	11:00am	11:11am	11	80	hurricane + 6	-	cloudy 36	calm	10.8	Barge
01/10/09	2	10:52am	11:03am	11	83	PJ Brix with barge	up	cloudy	n/a	10	Barge
01/11/09	1	9:07am	9:19am	12	70	Capt Bob	down	rain 44		8.9	Barge
01/12/09	1	00:14am	00:27am	13	136	auto test lift both bridges	-	fog 45		8.4	N/A
01/12/09	2	00:49am	00:58am	9	70	auto test lift both bridges	-	fog 45		8.4	N/A
01/12/09	3	1:08am	1:16am	8	83	auto test lift both bridges	-	fog 45		8.3	N/A
01/12/09	4	1:48am	1:55am	7	86	auto east bridge only	-	fog 45		8.2	N/A
01/12/09	5	2:15am	2:23am	8	86	auto west bridge only	-	fog 45		8.1	N/A
01/12/09	6	2:30am	2:43am	13	136	auto test lift both bridges	-	fog 45		8.1	N/A
01/12/09	7	2:50am	3:00am	10	crossover 86/82	pull out drawer, test lift both bridges	-	fog 45		8.1	N/A
01/12/09	8	9:43am	9:51am	8	86	east bridge maint	-	wet 45		8.2	N/A
01/12/09	9	11:09am	11:18am	9	86	east bridge maint	-	cloudy 45		8	N/A
01/12/09	1	12:44pm	13:00pm	16		east bridge maint					N/A
01/13/09	1	18:03pm	18:17pm	14	86	"willamette" + 4 barges (TS)	down	cloudy + fog 49	calm	8.8	Barge
01/14/09	1	9:44am	9:55am	11	120	"Ruth" w/Derrick	down	cloudy 39		7.5	Barge
01/14/09	2	21:33pm	21:45pm	12	86	"Lori B" + 1 barge	down	clear 39	calm	8.1	Barge
01/15/09	1	11:30am	11:45am	15	86	"Legend" w/4 barges	down	light fog 36		8.4	Barge
01/16/09	1	4:24am	4:38am	14	70	auto screen Lori B + Outlaw + barges	down	clear 35	calm	7.7	Barge
01/16/09	2	14:10pm	14:20pm	10	70	"Umatilla" w/steamer port., auto screen	down	clear 47		7.8	Barge

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
01/17/09	1	12:46pm	12:57pm	11	86	"Deschutes" + 4 barges (TS)	down	clear 41	3	7.1	Barge
01/17/09	2	16:41pm	16:54pm	13	85	"Chief" + 4 barges (TS)	down	clear 40	7	6.5	Barge
01/23/09	1	10:52am	11:04am	12	90	"Casey H" w/Derrick	up	cloudy 35	calm	4	Barge
01/23/09	2	21:36pm	21:47pm	9	100	PJ Brix	-	cloudy 37		4.5	Barge
01/27/09	1	10:10am	10:40am	30	90	Nakoa	up	snow 32	10	5	Barge
01/29/09	1	11:02am	11:10am	8	86	NB only to take maint + elec on towers	-	fog 34	calm	4.1	N/A
01/29/09	2	11:23am	11:31am	8	86	NB only to take bring personnel down	-	fog 33	calm	4	N/A
01/30/09	1	9:38am	9:47am	9	90	tug "Nikoa"	down	fog 32	calm	4.6	Barge
02/02/09	1	13:05pm	13:07pm	2		NB only					N/A
02/03/09	1	13:13pm	13:25pm	12	90	tug "Ruth" + Derrick barge	down	clear 52	4	3.8	Barge
02/06/09	1	10:10am	10:18am	8	86	maint lift NB only to take personnel up on N tower	-	rain 38	calm	2.5	N/A
02/06/09	2	11:25am	11:34am	9	86	maint lift NB only to bring down personnel	-	cloudy 41	calm	3.5	N/A
02/06/09	3	12:43pm	12:53pm	10	86	maint lift NB + SB both to bring down Roussea + elev	-	cloudy 45	4	3.8	N/A
02/10/09	1	12:36pm	13:00pm	24	136	ruth + Derrick barge	up	rain/snow 36	19	2.5	Barge
02/11/09	1	19:40pm	19:56pm	16	13	"Maverick" + 1 crane barge	up	clear 40	6	5.9	Barge
02/12/09	1	11:48am	11:57am	9	85	crown of camas w/Derrick	down	cloudy 36	calm	4.6	Barge
02/13/09	1	10:58am	11:07a,	9	86	NB only to take maint + elec on N tower	-	cloudy 43	12	4.7	N/A
02/13/09	2	13:09pm	13:17pm	8	86	NB only to bring maint + elec down from N tower	-	cloudy 44	8	4.8	N/A
02/15/09	1	22:40pm	22:47pm	7	80	auto west bridge only - test	-	cloudy 38	3	3.3	N/A
02/15/09	2	23:05pm	23:16pm	11	136	auto west bridge - test	-	cloudy 38	4	3.1	N/A
02/15/09	3	23:34pm	23:41pm	7	86	auto east bridge - test	-	cloudy 35	4	3	N/A
02/15/09	4	23:47pm	23:59pm	12	136	auto east bridge - test	-	cloudy 38	calm	3	N/A
02/16/09	1	00:32am	00:47am	15	136	drawer, both bridges - test	-	cloudy 38	calm	2.9	N/A
02/16/09	2	13:50pm	14:01pm	11	120	Lindy Marie	-	cloudy 49	calm	3.5	Barge
02/19/09	1	23:18pm	23:38pm	20	40	east and west bridge aux training	-	clear 44	5	1	N/A
02/19/09	2	23:50pm	23:59pm	9	40	east and west bridge aux training	-	clear 42		1.3	N/A
02/20/09	1	00:17am	00:28am	11	40	east and west bridge aux training	-	clear 42	calm	1.3	N/A
02/20/09	2	00:40am	00:53am	13	40	east and west bridge aux training	-	clear 42	calm	1.2	N/A
02/20/09	3	1:18am	1:32am	14	68	pull out drawer and maint screen	-	clear 41	calm	2.1	N/A
02/20/09	4	1:39am	1:48am	9	30	pull out drawer and maint screen	-	clear 40	calm	2.1	N/A
02/20/09	5	2:00am	2:14am	14	38	utilizing bypasses	-	clear 40	calm	2.3	N/A
02/20/09	6	3:11am	3:23am	12	40	east and west bridge aux	-	clear 40	calm	2.8	N/A
02/20/09	7	3:34am	3:44am	10	40	west bridge aux	-	clear 40	calm	2.8	N/A
02/20/09	8	4:13am	4:28am	15	30	east and west bridge maint screen and bypasses	-	clear 38	calm	2.8	N/A
02/20/09	9	13:07pm	13:21pm	14	120	Betty Lou, Maverick, Yaquinto	down	clear 51	calm	3.7	Federal
02/20/09	1	4:00am	4:05am	5		north gate house pennant training		clear 38	calm		N/A
02/22/09	1	15:51pm	15:59pm	8	70	"Barents Sea"	up	cloudy 42	17	4.8	Unknown
02/23/09	1	9:32am	9:42am	10	120	Betty Lou	down	rain 42	calm	2.5	Barge
02/23/09	2	10:18am	10:31am	13	80	Barents Sea	down	raim 42	calm	2.5	Unknown
02/27/09	1	19:06pm	19:19pm	13	90	"Aries" + Derrick	down	cloudy	calm	5.8	Barge
03/01/09	1	14:07pm	14:15pm	8	70	Annacara	down	rain 42	5	3.8	Unknown
03/03/09	1	10:39am	10:52am	13	110	Lindy Marie	down	cloudy 48	calm	5.6	Barge
03/06/09	1	1:17am	1:31am	14	80	construction barge "PJ Brix" and "Betsy L"	down	clear 40	calm	3.8	Barge
03/07/09	1	11:50am	12:12pm	17	85	touch screen "Defiance" + 4 barges	down	cloudy 44	9	4	Barge
03/07/09	2	17:24pm	17:37pm	13	100	touch screen "Lindy Marie" + 2 barges / 1 crane	up	cloudy 42	4	4.4	Barge
03/10/09	1	9:42am	9:43am	1		pier cap cleaning 5,6,7,8		cloudy 40	7		N/A
03/10/09	2	10:49am	10:53am	4		pier cap cleaning 5,6,7,8		cloudy 41	calm		N/A
03/10/09	3	11:35am	11:36am	1		pier cap cleaning 5,6,7,8		cloudy 42	4		N/A
03/19/09	1	4:51am	5:00am	9	85	PJ Brix + barge	down	cloudy 45	6	3.8	Barge

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
03/21/09	1	9:38am	9:45am	7	70	Annacara	up	cloudy	calm	2.5	Unknown
03/22/09	1	15:54pm	16:03pm	9	70	touch screen "Coqui" sailboat	down	cloudy 46	6	4.2	Sail
03/25/09	1	13:23pm	13:37pm	9	85	"Jim Moore" 1 barge	up	cloudy 50	calm	3.2	Barge
03/30/09	1	13:05pm	13:15pm	10	80	"Jim Moore" 1 barge	down	cloudy 45	5	5.9	Barge
03/31/09	1	19:00pm	19:10pm	10	80	touch screen "Alsea" fishing boat	up	partly cloudy 44	10	4.7	Fishing
04/02/09	1	6:12am	6:22am	10	80	sail vessel "Bonnevie"	down	cloudy 47	4	4.3	Sail
04/02/09	2	13:26pm	13:38pm	12	70	"Legend" w/4 barges	down	cloudy 49	6	5.9	Barge
04/04/09	1	12:40pm	12:49pm	9	70	make it so	up	clear	calm	4.8	Sail
04/07/09	1	12:25pm	12:34pm	9	80	maint east bridge only	-	clear 66	4	3.9	N/A
04/08/09	1	11:11am	11:19am	8	100	test lift east bridge only	-	cloudy 55	S-11	4.4	N/A
04/09/09	1	18:01pm	18:10pm	9	82	Bruce M	down	cloudy	W-3	5.8	Barge
04/14/09	1	10:57am	11:05am	8	73	runaway - sailboat	down	partly cloudy 45	SW 3	7.4	Sail
04/16/09	1	18:00pm	18:09pm	9	90	Daryl B	down	clear 64	S-11	6.1	Barge
04/17/09	1	11:08am	11:18am	10	81	maint lift SB only to remove roof used drawer, pier 2	-	clioudy 53	W-2	6.2	N/A
04/19/09	1	15:53pm			90	touch screen "Lori B" + 1 barge	down	clear 77	S 4	5.6	Barge
04/20/09	1	9:44am	9:58am	14	120	"Lindy Marie" + 1 Derek	-	clear 58	SW 2	5.3	Barge
04/23/09	1	3:16am	3:27am	11	85	"Legend" + fuel barge	down	clear 43	0	7	Barge
04/23/09	2	18:02pm	18:10pm	8	75	whisperer	down	cloudy	calm	7.5	Sail
04/24/09	1	21:58pm	22:08pm	10	85	"minnow"	-	clear 51	calm	9.2	Sail
04/25/09	1	6:00am	6:43am	43	2	maint lift for vactor NE corner (drawer)	-	cloudy 44	calm	10	N/A
04/25/09	2	7:54am	8:04am	10	12	lift to inspect NB/E Bridge (drawer)	-	cloudy 46	S-1	10	N/A
04/25/09	3	13:05pm	13:12pm	7	65	"fury"	-	cloudy	SW 8	10	Sail
04/26/09	1	10:15am	10:25am	10	65	willamette	down	cloudy	calm	9	Barge
04/26/09	2	12:41pm	12:52pm	11	70	"Ecstasty" "Whisperer" "Fury"	up	cloudy	calm	9.2	Sail
04/27/09	1	1:47am	1:59am	11	85	(drawers) "Lori B" + 1 big barge	down	cloudy 47	0	8.4	Barge
04/28/09	1	5:57am	5:59am	2	2	test lift NB only	-	rain 47	0	8.2	N/A
04/28/09	2	9:10am	9:21am	11	80	"minnow" sailboat	-	cloudy 47	calm	8.7	Sail
04/28/09	3	11:11am	11:21am	10	100	"lewiston"	-	cloudy 46	calm	8.8	Barge
04/29/09	1	1:47am	2:02am	15	80	"Lori B" cement barge	down	rain 45	1	7.8	Barge
04/30/09	1	20:17pm	20:27pm	10	70	Cascades	down	clear	calm	6.2	Barge
05/01/09	1	9:03am	9:15am	12	70	TSL - sailboat	up	clear 53	0	6.4	Sail
05/02/09	1	7:00am	7:07am	7	70	Annacara	down	rain	E-10	5.7	Sail
05/02/09	2	8:40am	8:47am	7	70	vallpariso	down	cloudy	E-12	5.4	Sail
05/02/09	3	17:24pm	17:34pm	10	85	touch screen vallpariso sailboat	up	partly cloudy 59	S-6	5.4	Sail
05/03/09	1	6:07am	6:14am	7	70	puralandra	down	cloudy	calm	6.1	Unknown
05/04/09	1	1:30am	1:44am	14	80	willamette barges	down	clear 50	5	5.5	Barge
05/05/09	1	14:01pm	14:10pm	9	100	make it so	down	cloudy 58	SW 10	6.1	Sail
05/07/09	1	18:01pm	18:09pm	8	75	make it so	up	cloudy	W-6	9.8	Sail
05/08/09	1	5:28am	5:37am	9	75	"tidewater" and barges	down	clear 43	0	10.3	Barge
05/08/09	2	10:01am	10:08am	7	70	sailboat "Seren"	down	clear 49	W-4	9.6	Sail
05/09/09	1	6:08am	6:22am	14	70	"defiance"	down	clear 45	N-9	9.3	Barge
05/09/09	2	14:30pm	14:53E 14:38W	23	60	runaway	up	clear	W-9	8	Sail
05/09/09	3	15:46pm	15:49pm	3	3	test - east bridge only	-	clear 67	W-4	8.1	N/A
05/09/09	4	16:10pm	16:13pm	3	3	test - east bridge only	-	clear 67	NW-4	8.1	N/A
05/09/09	5	22:50pm	22:53pm	3	3	test - east bridge only	-	clear 55	W-5	8.5	N/A
05/10/09	1	18:42pm	18:52pm	10	85	touch screen "serene" sailboat	up	cloudy 67	SE-1	7.4	Sail
05/12/09	1	9:20am	9:33am	13	90	lady washington	up	cloudy 48	8	7.8	Sail
05/12/09	2	12:50pm	13:03pm	13	90	hawaiian chiefton	up	partly cloudy 51	11	7.4	Sail
05/15/09	1	9:50am	10:02am	12	70	sailboat Valparizo	down	clear 30	SW-2	7.4	Sail

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
05/15/09	2	11:17am	11:24am	7	86	maint lift to take taurus + fisher on N tower	-	clear 54	W-3	7.4	N/A
05/15/09	3	12:50pm	12:57pm	7	86	maint lift to bring workers down	-	clear 58	w-4	7.2	N/A
05/15/09	4	13:24pm	13:33pm	9	70	sailboat Fury	-	clear 60	W-3	7.2	Sail
05/16/09	1	12:18pm	12:28pm	10	50	sailboat "Coqui" (drawers)	up	clear 65	4	7.4	Sail
05/17/09	1	7:12am	7:19am	7	86	maint lift to take Bush and Sallenger on S tower to band falcon	-	clear 53	W-3	7	N/A
05/17/09	2	8:03am	8:10am	7	86	maint lift to bring perssonel down	-	clear 55	W-3	7	N/A
05/17/09	3	13:47pm	14:00pm	13	90	"Deschutes" + 4 barges (drawer)	down	clear 74	3	7	Barge
05/17/09	4	16:55pm	17:10pm	10	85	touch screen "Fury" + "Valparizo" sailboats	up	clear 79	W-10	6.8	Sail
05/17/09	5	18:43pm	18:54pm	11	85	touch screen "Makina Girl" sailboat	up	clear 80	W-4	6.9	Sail
05/18/09	1	10:40am	10:46am	6		west bridge hoist removal		clear 61	W-2		N/A
05/20/09	1	18:26pm	18:36pm	10	70	albatross	down	clear 63	7	8.6	Sail
05/20/09	2	22:10pm	22:22pm	12	70	Capt Bob	down	clear 56	5	8.7	Barge
05/21/09	1	00:31am	00:42am	11	75	willamette (2 barges) drawer	down	cloudy 52	W-4	8.7	Barge
05/22/09	1	2:08am	2:22am	14	75	"tidewater" and barges	down	clear 52	10	9.6	Barge
05/22/09	2	12:46pm	12:55pm	9	75	sailboat "Jilani" auto screen	down	clear 65	7	9.5	Sail
05/22/09	3	19:04pm	19:11pm	7	65	tango	down	clear 69	9	9.5	Sail
05/23/09	1	11:51am	11:58am	7	50	sailboat Fury	down	clear	NW-10	10.2	Sail
05/23/09	2	19:22pm	19:32pm	11	85	touch screen "Chief" + 4 barges	down	clear 70	NW-4	9.4	Barge
05/24/09	1	20:58pm	21:10pm	12	85	touch screen "descutes" + 4 barges	down	clear 64	W-2	8.8	Barge
05/25/09	1	5:15am	5:27am	12	75	Tidewater + barges	down	clear 47	0	9.4	Barge
05/25/09	2	14:48pm	14:58pm	10	85	touch screen "tango" sailboat	up	clear 66	W-3	9.3	Sail
05/25/09	3	22:03pm	22:13pm	10	85	touch screen "Kiangle" sailboat	up	clear 62	NW-3	9.9	Sail
05/25/09	4	23:13pm	23:24pm	11	85	"Legend" + barges	down	clear 61	NW-10	9.8	Barge
05/27/09	1	18:09pm	18:19pm	10	70	sailboat "Genesis" drawer	up	clear 75	W-6	10.5	Sail
05/27/09	2	18:44pm	18:53pm	9	70	Descutes 2 barges (drawer)					Barge
05/29/09	1	10:38am	10:48am	10	80	sailboat "autumn wind"	down	clear 69	W-4	10.4	Sail
05/30/09	1	16:19pm	16:25pm	16	85	touch screen "Legend" + 2 barges	down	clear 85	W-10	10	Barge
05/30/09	2	21:24pm	21:35pm	11	85	touch screen "Chief" + 4 barges	down	clear 78	W-5	9.8	Barge
05/31/09	1	2:30am	2:40am	10	65	"Deschutes" with 3 barges	down	clear 64	calm	10.2	Barge
05/31/09	2	13:38pm	13:48pm	10	60	auto Willamette 4 barges	-	clear	W-3	10	Barge
06/01/09	1	1:20am	1:32am	12	75	Lori B w/barge (knife river)	down	clear 60	4	10.2	Barge
06/02/09	1	5:45am	5:52am	7	60	tidewater + 4 barges	down	rain 61	N-2	10.3	Barge
06/02/09	2	11:01am	11:09am	8	60	Lock Fine sailboat	down	cloudy 61	W-3	10	Sail
06/03/09	1	13:13pm	13:23pm	10	75	PT Thompson / Tug	up	cloudy 77	W-6	9.9	Barge
06/03/09	2	18:03pm	18:12pm	9	70	touch screen "Point Thompson" - tug	down	clear 86	W-6	9.9	Barge
06/03/09	3	21:41pm	21:51pm	10	75	touch screen "Legend" + 4 barges	down	cloudy 80	NW-3	9.9	Barge
06/04/09	1	12:11pm	12:24pm	13	100	willamette w/PT Thompson	up	cloudy 70	calm	10	Barge
06/04/09	2	19:05pm	19:12pm	7	70	autumn wind	up	cloudy	E-14	10	Sail
06/05/09	1	14:02pm	14:12pm	10	65	tidewater w/4 barges	down	rain 60	calm	10	Barge
06/06/09	1	6:40am	6:49am	9	75	autumn wind	down	cloudy 56	SE-6	10.6	Sail
06/06/09	2	7:28am	7:37am	9	65	Deschutes	down	cloudy 56	SE-5	10.6	Barge
06/08/09	1	2:46am	2:57am	11	70	"outlaw" + barges	down	cloudy 56	1	10	Barge
06/08/09	2	18:42pm	19:51pm	9	70	touch screen "Vagabond" sailboat	up	clear 71	W-2	10	Sail
06/09/09	1	9:03am	9:13am	10	95	auto screen Make It So sailboat	down	clear 60	0	11	Sail
06/09/09	2	10:06am	10:17am	11	90	fishing boat "alsea"	down	clear 61	1	10.9	Fishing
06/10/09	1	11:23am	11:34am	11	85	sailboat "albatross"	up	cloudy 59	E-3	10.4	Sail
06/11/09	1	9:08am	9:20am	12	25	maint west bridge	-	cloudy 59	4	9.4	N/A
06/11/09	2	12:01pm	12:20pm	19	136	willamette / assist tugs with barge	down	cloudy 63	2	9	Barge
06/11/09	3	21:21pm	21:30pm	9	60	tidewater	down	cloudy 64	6	8.5	Barge

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
06/12/09	1	00:23am	00:41am	18	80	"Lori B" + barges	down	cloudy 59	NW-4	8.4	Barge
06/12/09	2	9:52am	10:05am	13	90	"willamette" - 1 barge, 2 -assist tugs, 2 police escorts	up	cloudy 60	NW-2	7.9	Barge
06/13/09	1	10:18am	10:26am	9	65	clearwater	down	cloudy	calm	7	Barge
06/13/09	2	15:34pm	15:43pm	9	66	touch screen "wanderer" sailboat	up	overcast 68	calm	6.5	Sail
06/13/09	3	16:53pm	17:00pm	7	65	touch screen BonneVie and Symmetry sailboats	down	overcast 69	calm	6.6	Sail
06/14/09	1	00:49am	1:00am	11	75	auto screen "Deschutes" + 3 barges	down	cloudy 59	2	7	Barge
06/16/09	1	10:10am	10:25am	15	100	hawaiian chiefton, lady washington	down	partly cloudy 61	2	5.3	Sail
06/17/09	1	9:42am	9:49am	7	86	maint lift east bridge only	-	cloudy 62	2	5.5	N/A
06/17/09	2	11:07am	11:15am	8	86	maint lift east bridge only	-	cloudy 63	3	5.5	N/A
06/17/09	3	12:00pm	12:07pm	7	86	maint lift east bridge only	-	cloudy 64	4	5.5	N/A
06/18/09	1	18:14pm	18:28pm	14	115	willametter, cascades + large barge	down	partly cloudy	calm	5	Barge
06/19/09	1	9:47am	10:03am	16	125	cascades + willamette + large barge	up	cloudy 63	SE-3	6.5	Barge
06/19/09	2	13:52pm	14:00pm	8	90	"argosy" fishing vessel	up	rain 62	S-2	6.4	Fishing
06/20/09	1	2:22am	2:36am	14	80	defiance + barges	down	cloudy 57	3	7	Barge
06/20/09	2	18:37pm	18:46pm	9	60	deschutes + 4 barges	down	cloudy 59	NW-W-5	7.4	Barge
06/20/09	1	23:54pm	00:22am	28		west bridge sign crew work		cloudy 59	4		N/A
06/23/09	1	9:13am	9:21am	8	86	east bridge maint oiling CWT tails	-	clear 56	W-2	7.3	N/A
06/23/09	2	10:47am	11:12am	25	136	clearwater/PT Thompson w/large barge + police escorts	down	clear 61	W-4	6.8	Barge
06/23/09	3	12:35pm	12:42pm	7	86	east bridge maint crew down from towers	-	clear 65	w-4	6.4	N/A
06/24/09	1	5:18am	5:28am	10	120	PT Thompson + barge, willamette, clearwater	up	clear 59	NW-3	7.9	Barge
06/25/09	1	9:02am	9:10am	8	87	maint lift	-	cloudy 60	SE-2	8.4	N/A
06/25/09	2	10:09am	10:19am	9	86	maint lift	-	cloudy 61	W-6	8.2	N/A
06/26/09	1	22:42pm	23:03pm	21	136	west bridge only - maint	-	clear 61	NW-11	6.8	N/A
06/26/09	2	23:07pm	23:18pm	11	87	east bridge only - maint	-	clear 61	NW-11	6.8	N/A
06/26/09	3	23:21pm	23:24pm	22	136	west bridge only - maint	-	clear 60	NW-5	6.8	N/A
06/27/09	1	00:18am	00:39am	21	136	east bridge only - maint	-	clear 59	NW-5	6.6	N/A
06/27/09	2	00:54am	1:15am	21	136	east bridge only - maint	-	clear 57	NW-6	6.4	N/A
06/27/09	3	2:25am	2:36am	11	86	east bridge only - maint	-	clear 55	NW-10	6	N/A
06/27/09	4	2:52am	3:05am	13	86	east bridge only - maint	-	clear 54	NW-4	6	N/A
06/27/09	5	3:08am	3:29am	21	136	west bridge only - maint	-	clear 54	NW-4	6	N/A
06/27/09	6	3:30am	3:40am	10	86	east bridge only - maint	-	clear 54	calm	6	N/A
06/27/09	7	4:37am	3:47am	20	136	west bridge only - maint	-	clear 54	calm	5.9	N/A
06/27/09	8	3:44am	3:50am	6	3	east bridge only - maint	-	clear 54	calm	5.9	N/A
06/27/09	9	4:06am	4:32am	26	136	east bridge only - maint	-	clear 53	NW-3	5.8	N/A
06/27/09	10	4:36am	4:55am	19	136	east bridge only - maint	-	clear 52	NW-2	5.6	N/A
06/27/09	11	5:05am	5:17am	12	86	east bridge only - maint	-	clear 51	NW-4	6.5	N/A
06/27/09	12	8:26am	8:46am	20	100	PT Thompson	down	clear	calm	6	Barge
07/02/09	1	5:40am	5:47am	7	80	"Tamar" sail vessel	down	clear 42	NW-3	4.9	Sail
07/02/09	2	10:03am	10:12am	9	80	auto screen "Whisper" sailboat	down	clear 70	3	3.5	Sail
07/02/09	3	22:30pm	22:37pm	7	76	argosy	down	clear 76	W-4	2.7	Fishing
07/05/09	1	13:30pm	13:37pm	7	65	whisper	up	cloudy 78	calm	2	Sail
07/06/09	1	4:19am	4:35am	16	120	"Mt. Hood" Derrick barge	down	cloudy 57	SE-4	5	Barge
07/09/09	1	12:01pm	12:10pm	9	90	Pacific Wolf tug	up	partly cloudy 64	SW-W-3	4.7	Barge
07/09/09	2	18:10pm	18:17pm	7	75	pacific wolf	down	clear	NW-7	4	Barge
07/11/09	1	6:10am	6:18am	8	70	Wakadui sailboat	down	clear 60	E-4	5	Sail
07/11/09	2	16:58pm	17:07pm	9	70	sailboat (couldn't verify name)	up	cloudy 74	E-1	3.4	Sail
07/13/09	1	9:31am	9:36am	5		SB only					N/A
07/15/09	1	5:25am	5:37am	12	130	Bruce M Derrick	up	clear 58	NW-6	3.6	Barge
07/16/09	1	9:41am	9:49am	8	95	Catamaran "ALII NV II"	up	clear 68	W-3	2.8	Sail

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
07/16/09	2	13:18pm	13:26pm	8	95	"ALII NV II"	down	clear 81	W-5	3	Sail
07/17/09	1	10:55am	11:09am	15	86	maint lift (grease delivery)	-	sunny 74	4	2.2	N/A
07/17/09	2	22:03pm	22:14pm	11	86	maint east bridge	-	-	-	-	N/A
07/17/09	3	22:35pm	22:50pm	15	18	west bridge	-	-	-	-	N/A
07/17/09	4	23:04pm	23:17pm	13	32	west bridge maint	-	clear 74	NW-2	3.6	N/A
07/17/09	5	23:22pm	23:33pm	11	86	east bridge maint	-	clear 75	NW-2	3.8	N/A
07/17/09	6	23:36pm	23:53pm	17	47	west bridge maint	-	clear 73	NW-1	4.1	N/A
07/17/09	7	23:57pm	00:04am	7	86	east bridge maint	-	clear 72	NW-4	4.2	N/A
07/17/09	8	00:04am	00:23am	19	69	west bridge maint	-	clear 72	NW-2	4.5	N/A
07/18/09	1	00:32am	00:52am	20	90	west bridge maint	-	clear 71	NW-7	4.7	N/A
07/18/09	2	00:58am	1:22am	24	102	west bridge maint	-	clear 70	NW-4	5	N/A
07/18/09	3	1:28am	1:51am	23	114	west bridge maint	-	clear 69	NW-3	5.2	N/A
07/18/09	4	1:59am	2:25am	26	126	west bridge maint	-	clear 69	NW-1	5.2	N/A
07/18/09	5	2:30am	3:02am	32	136	west bridge maint	-	clear 68	NW-5	5.2	N/A
07/18/09	6	3:20am	3:39am	19	30	east bridge maint	-	clear 67	NW-3	5.1	N/A
07/18/09	7	3:47am	4:04am	17	51	east bridge maint	-	clear 65	NW-6	4.8	N/A
07/18/09	8	4:18am	4:40am	22	72	east bridge maint	-	clear 65	5	4.6	N/A
07/18/09	9	4:44am	5:04am	20	92	east bridge maint	-	clear 64	9	4.4	N/A
07/18/09	10	5:08am	5:28am	20	103	east bridge maint	-	clear 62	3	4.2	N/A
07/18/09	11	5:32am	5:54am	22	112	east bridge maint	-	clear 62	NW-4	4	N/A
07/18/09	12	6:00am	6:25am	25	124	east bridge maint	-	clear 61	NW-3	3.9	N/A
07/18/09	13	6:31am	6:58am	27	136	east bridge maint	-	clear 62	NW-8	3.8	N/A
07/18/09	14	7:10am	7:19am	9	86	east bridge maint	-	-	-	-	N/A
07/18/09	15	21:58pm	22:07pm	9	86	east bridge only - maint	-	clear 68	NW-4	2.1	N/A
07/18/09	16	22:17pm	22:25pm	8	86	east bridge only - maint	-	clear 68	NW-4	2.2	N/A
07/18/09	17	22:33pm	22:41pm	8	86	east bridge only - maint	-	clear 68	NW-11	2.2	N/A
07/18/09	18	22:44pm	23:04pm	20	60	west bridge only - maint	-	clear 65	NW-8	2.3	N/A
07/18/09	19	23:18pm	23:43pm	25	136	west bridge only - maint	-	clear 64	NW-3	2.5	N/A
07/19/09	1	00:07am	00:27am	20	70	west bridge only - maint	-	clear 62	NW-6	3.2	N/A
07/19/09	2	00:36am	00:57am	21	136	west bridge only - maint	-	clear 60	NW-4	3.8	N/A
07/19/09	3	1:07am	1:15am	8	86	west bridge only - maint	-	clear 59	NW-3	4.2	N/A
07/19/09	4	1:22am	1:30am	8	86	west bridge only - maint	-	clear 59	NW-3	4.3	N/A
07/20/09	1	10:01am	10:14am	13	86	maint lift east bridge	-	clear 67	NW-6	3	N/A
07/20/09	2	18:40pm	18:50pm	10	80	Iron Wood	-	clear 88	NW-9	4	Federal
07/22/09	1	18:30pm	18:39pm	9	80	whisper sailboat	down	sunny 76	NW-10	4.4	Sail
07/23/09	1	18:48pm	18:57pm	9	75	Iron Wood	down	clear	W-5	3	Federal
07/27/09	1	13:16pm	13:24pm	8	70	"Last Resort" sailboat	up	clear 86	W-4	3.2	Sail
07/30/09	1	12:53pm	13:04pm	11	100	sailboat "radiance"	up	clear 83	W-1	3.3	Sail
07/31/09	1	12:18pm	12:26pm	8	70	sailboat "Sweet Dreams"	down	clear 73	W-3	2.9	Sail
08/01/09	1	4:50am	4:59am	9	75	sailboat "wakadooi"	up	clear 63	N-2	3.8	Sail
08/01/09	2	12:11pm	12:18pm	7	85	"Last Resort" sailboat	down	clear 62	n-4	3.1	Sail
08/03/09	1	2:20am	2:22am	2		training / west bridge		clear 63	NW-5		N/A
08/03/09	2	3:03am	3:05am	2		training / west bridge		clear 63	NW-6		N/A
08/03/09	3	3:42am	3:45am	3		training / west bridge		clear 63	NW-6		N/A
08/03/09	4	3:51am	3:53am	2		training / east bridge		clear 63	NW-6		N/A
08/03/09	5	4:01am	4:03am	2		training / east bridge		clear 63	NW-6		N/A
08/03/09	6	4:25am	4:27am	2		training / east bridge		clear 63	NW-6		N/A
08/04/09	1	4:00am	4:11am	11	82	drawer training west bridge	-	clear 59	NW-3	4.5	N/A
08/04/09	2	4:16am	4:24am	8	60	drawer training west bridge	-	clear 59	NW-3	4.5	N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
08/04/09	3	4:30am	4:40am	10	60	drawer training east bridge	-	clear 59	NW-3	4.5	N/A
08/04/09	4	4:41am	4:52am	11	50	drawer training east bridge	-	clear 59	NW-3	4.5	N/A
08/04/09	5	23:39pm	23:49pm	10	50	drawer training west bridge	-	partly cloudy 61	NW-4	2	N/A
08/04/09	1	12:35pm	12:37pm	2		training / west bridge		clear 78	NW-4		N/A
08/04/09	2	12:44pm	12:46pm	2		training / east bridge		clear 78	NW-4		N/A
08/04/09	3	12:51pm	12:54pm	3		training / west bridge		clear 78	NW-4		N/A
08/04/09	4	12:59pm	1:02pm	3		training / east bridge		clear 78	NW-4		N/A
08/04/09	5	1:20pm	1:22pm	2		training / west bridge		clear 78	NW-4		N/A
08/04/09	6	1:24pm	1:26pm	2		training / east bridge		clear 78	NW-4		N/A
08/04/09	7	1:31pm	1:33pm	2		training / west bridge		clear 78	NW-4		N/A
08/04/09	8	1:37pm	1:40pm	3		training / east bridge		clear 78	NW-4		N/A
08/04/09	9	1:44pm	1:46pm	2		training / west bridge		clear 78	NW-4		N/A
08/04/09	10	1:50pm	1:52pm	2		training / east bridge		clear 78	NW-4		N/A
08/04/09	11	1:54pm	1:56pm	2		training / west bridge		clear 78	NW-4		N/A
08/04/09	12	2:06pm	2:08pm	2		training / east bridge		clear 78	NW-4		N/A
08/04/09	13	3:17pm	3:20pm	3		training both east/west		clear 78	NW-4		N/A
08/04/09	14	3:25pm	3:28pm	3		training both east/west		clear 78	NW-4		N/A
08/04/09	15	3:37pm	3:40pm	3		training both east/west		clear 78	NW-4		N/A
08/04/09	16	3:46pm	3:49pm	3		training both east/west		clear 78	NW-4		N/A
08/05/09	1	00:14am	00:29am	15	136	pull put drawer. Training east and west bridge	-	clear 60	NW-3	2	N/A
08/05/09	2	00:44am	1:06am	22	136	Ledgen and barges	up	clear 60	NW-6	1.8	Barge
08/05/09	3	1:18am	1:37am	19	136	training / both spans	-	clear 59	NW-5	1.8	N/A
08/05/09	4	1:44am	2:00am	16	136	training / both spans	-	clear 59	NW-3	1.8	N/A
08/05/09	5	2:25am	2:38am	13	136	training / both spans	-	clear 58	NW-0	2.5	N/A
08/05/09	6	2:45am	3:01am	16	136	training / both spans	-	clear 59	NW-3	2.8	N/A
08/05/09	7	3:10am	3:17am	7	30	training east span	-	clear 58	NW-4	2.8	N/A
08/05/09	8	3:23am	3:30am	7	50	training west span	-	clear 58	NW-5	2.8	N/A
08/05/09	9	3:37am	3:44am	7	86	training east span	-	clear 58	NW-2	3	N/A
08/05/09	10	3:54am	4:01am	7	82	training west span	-	clear 58	NW-1	3.8	N/A
08/05/09	11	4:13am	4:21am	8	70	training east span	-	clear 58	NW-3	4	N/A
08/05/09	1	4:37am	4:41am	4		gate close and open training		clear 58	NW-5		N/A
08/05/09	2	23:54pm	23:57pm	3		training east gates/barrier		clear 61	NW-2		N/A
08/06/09	1	00:46am	1:02am	16	136	auto screen east and west bridge	-	clear 59	NW-2	2.5	N/A
08/06/09	2	1:15am	1:32am	17	136	auto screen east and west bridge	-	clear 59	NW-5	2	N/A
08/06/09	3	1:38am	1:51am	13	136	auto screen east and west bridge	-	clear 59	NW-6	2.5	N/A
08/06/09	4	2:15am	2:30am	15	136	auto screen east and west bridge	-	clear 59	NW-7	2.5	N/A
08/06/09	5	2:44am	2:55am	11	70	auto screen east and west bridge	-	clear 60	NW-4	2.5	N/A
08/06/09	6	2:59am	3:05am	6	60/80	auto screen east and west bridge	-	clear 60	NW-6	2.5	N/A
08/06/09	7	3:13am	3:21am	9	54/60	auto screen east and west bridge	-	clear 60	NW-6	3	N/A
08/06/09	8	3:25am	3:35am	10	55/54	auto screen east and west bridge	-	clear 60	NW-2	2.8	N/A
08/06/09	9	3:34am	3:45am	11	35	maint screen west bridge	-	clear 60	NW-6	3.2	N/A
08/06/09	10	4:15am	4:21am	6	35	auto screen east and west bridge	-	clear 60	NW-6	3	N/A
08/06/09	11	4:27am	4:37am	10	35	maint screen east bridge	-	clear 60	NW-2	4	N/A
08/06/09	1	00:03am	00:06am	3		training west bridge		clear 61	NW-6		N/A
08/06/09	2	00:16am	00:20am	4		training east bridge		clear 61	NW-1		N/A
08/06/09	3	00:28am	00:32am	4		training west bridge		clear 61	NW-5		N/A
08/06/09	4	3:55am	4:05am	10		training west bridge maintenance control		clear 60	NW-5		N/A
08/06/09	5	9:50am	9:53am	3		traffic stop to check out NB - back gates no function on NW back gate elec notified		cloudy 61	W-2		N/A
08/06/09	6	10:14am	10:18am	4		traffic stop to check SB - front gates no indicator light on NW gate on touch screen		cloudy 61	W-2		N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
08/06/09	7	12:02pm	12:04pm	2		traffic stop SB for elec + D Johnson for NE gate test		cloudy 62	S-2		N/A
08/06/09	8	12:59pm	13:02pm	3		"same as last stop"		cloudy 63	E-5		N/A
08/06/09	9	13:37pm	13:39pm	2		"same as last stop"		cloudy 65	E-3		N/A
08/06/09	10	13:53pm	13:55pm	2		Dave found a computer erroe, says problem with SB - E gate is fixed		cloudy 65	E-4		N/A
08/06/09	11	23:44pm	23:52pm	3		NGH pen station		cloudy 63	W-4		N/A
08/06/09	12	23:57pm	00:03am	6		NGH pen station		cloudy 63	W-4		N/A
08/07/09	1	00:45am	1:04am	19	20	west bridge aux	-	cloudy 63	NW-2	2.2	N/A
08/07/09	2	1:09am	1:23am	14	82	west bridge aux	-	cloudy 63	NW-2	2.1	N/A
08/07/09	3	2:16am	2:28am	12	20	east bridge aux	-	cloudy 62	NW-2	2	N/A
08/07/09	4	2:53am	3:02am	9	20	west bridge drawer	-	cloudy 62	NW-2	1.9	N/A
08/07/09	5	3:07am	3:21am	14	136	west bridge drawer	-	cloudy 62	NW-2	1.9	N/A
08/07/09	6	3:44am	3:59am	13	100	west bridge maint	-	cloudy 61	NW-2	1.9	N/A
08/07/09	7	4:10am	4:19am	9	90	west bridge auto	-	cloudy 61	NW-2	2.3	N/A
08/07/09	8	19:12pm	19:30pm	18	80	whisperer sailboat	up	cloudy	4	3.9	Sail
08/07/09	1	00:12am	00:19am	7		SGH east and west bridge		cloudy 63	NW-2		N/A
08/07/09	2	00:22am	00:25am	3		SGH east and west bridge		cloudy 63	NW-2		N/A
08/07/09	3	1:28am	1:38am	10		NGH E bridge barrier test		cloudy 62	NW-2		N/A
08/07/09	4	1:58am	2:01am	3		e bridge barrier test		cloudy 61	NW-2		N/A
08/07/09	5	18:45pm	18:52pm	7		test gates / barriers		cloudy 67	3		N/A
08/10/09	1	00:40am	00:53am	13	75	training east /west	-	clear 62	NW-3	2.6	N/A
08/10/09	2	1:14am	1:23am	9	70	training east /west	-	clear 61	NW-3	2.3	N/A
08/10/09	3	2:05am	2:25am	20	100	training east /west	-	clear 60	NW-2	2	N/A
08/10/09	4	9:00am	9:10am	10	90	"Lewiston" + Derrick barge	up	clear 62	E-6	3.6	Barge
08/11/09	1	3:33am	3:49am	16	136	training / idzardi	-	clear 64	NW-3	2.8	N/A
08/11/09	2	3:55am	4:13am	18	136	training / idzardi	-	clear 64	NW-3	1.8	N/A
08/12/09	1	22:07pm	22:25pm	E -20 W - 22	136	test lift both bridges	-	clear 64	NW-3	4.3	N/A
08/13/09	1	22:48pm	23:01pm	13	136	test lift	-	cloudy 63	4	4.4	N/A
08/13/09	2	23:11pm	23:23pm	12	136	test lift	-	cloudy 62	4	4.4	N/A
08/14/09	1	1:42am	1:53am	11	100	"Lewiston" + Derrick	up	cloudy 58	1	3.5	Barge
08/16/09	1	23:30pm	23:45pm	15	136+10	test lift west bridge - johnson	-	clear 66	W-NW-4	1.4	N/A
08/17/09	1	00:02am	00:14am	12	136	test lift west bridge for johnson	-	clear 63	NW-3	2.5	N/A
08/22/09	1	3:26am	3:40am	14	136	"Dredge Yaquina"	up	cloudy 62	W-3	2.1	Federal
08/24/09	1	9:02am	9:13am	11	86	maint EB only	-	partly cloudy	calm	3.9	N/A
08/24/09	2	9:36am	9:43am	7	86	maint EB only	-	partly cloudy	calm	3.9	N/A
08/24/09	3	13:25pm	13:33pm	8	86	maint EB only	-	clear 67	W-2	2.3	N/A
08/25/09	1	4:54am	5:06am	12	100	"Yaquina" Dredge	down	cloudy 56	SE-5	1.7	Federal
08/25/09	2	10:40am	10:58am	18	86	maint lift	-	cloudy 56	2	3.1	N/A
08/25/09	3	18:51pm	19:02pm	11	90	"Yaquina" Dredge	up	clear 69	W-6	1.9	Federal
08/26/09	1	9:01am	9:09am	8	86	lift NB only to take personnel on towers	-	clear 55	W-1	1.9	N/A
08/26/09	2	10:10am	10:20am	10	95	make it so	up	clear 59	W-2	2.4	Sail
08/26/09	3	13:03pm	13:10pm	7	86	lift to bring maint personnel down NB only	-	clear 69	W-4	1.9	N/A
08/27/09	1	9:00am	9:13am	13	86	maint lift NB only to retrieve equipment from tower	-	clear 67	W-2	1.3	N/A
09/01/09	1	9:08am	9:24am	16	100	Uquina	-	cloudy 59	NW-0	1.5	Federal
09/01/09	2	18:38pm	18:50pm	12	90	"Yaquina" Dredge	up	clear 73	NW-3	2.8	Federal
09/01/09	1	10:16am	10:24am	8		grease southwest barrier		61	NW-2		N/A
09/01/09	2	10:37am	10:44am	7		grease southeast barrier		62	NW-2		N/A
09/02/06	1	9:16am	9:23am	7	86	maint lift to take EMST personnel on towers	-	partly cloudy 58	W-3	1.5	N/A
09/02/06	2	10:14am	10:23am	9	86	maint lift so personnel can cross over to south tower	-	partly cloudy 62	calm	1.1	N/A
09/02/06	3	10:50am	10:58am	8	86	maint lift to bring down personnel	-	clear 64	S-3	1	N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
09/03/09	1	11:16am	11:30am	14	100	"Yaquina"	-	cloudy 68	SW-1	1	Federal
09/03/09	2	19:08pm	19:16pm	8	75	Sweet Dreams	up	clear	calm	3	Sail
09/10/09	1	00:18am	00:34am	16	110	"Mary B" Derrick barge	down	cloudy 62	NW-2	2.2	Barge
09/14/09	1	4:13am	4:26am	13	136	"Maverick" + Derrick barge	up	cloudy 61	E-3	2.5	Barge
09/17/09	1	9:14am	9:25am	11	110	"Darryl B" w/Derrick	down	cloudy 58	W-1	2	Barge
09/26/09	1	7:20am	7:48am	28	136	NB maint	-	clear	calm	1	N/A
09/26/09	2	8:06am	8:39am	33	136	NB maint	-	clear	calm	1	N/A
09/26/09	3	9:03am	9:24am	21	86	NB maint	-	partly cloudy	calm	0.08	N/A
10/01/09	1	9:28am	9:51am	23		maintenance		55	SE-4		N/A
10/03/09	1	3:39am	3:51am	12	100	training	-	cloudy 47	N-0	2.5	N/A
10/03/09	2	4:40am	4:52 AM	12	100	training	-	cloudy 47	N-1	2.9	N/A
10/03/09	3	5:25am	5:35am	10	28	training	-	cloudy 47	NW-2	3	N/A
10/12/09	1	00:39am	00:44am	5	50	test lift east bridge only	-	clear 48	1	3.4	N/A
10/14/09	1	9:58am	10:11am	13	100	lady washington	up	cloudy 51	E-11	2.6	Sail
10/20/09	1	13:09pm	13:12pm	3		SB only material pick-up		cloudy 53	calm		N/A
10/24/09	1	5:20am	5:33am	13	100	test	-	47	NW-1	0.8	N/A
10/24/09	2	5:49am	6:00am	11	86	test	-	48	SW-1	0.8	N/A
10/29/09	1	11:19am	11:29am	10	86	sailing vessel Spirit	down	rain 45	E-11	0.9	Sail
10/31/09	1	4:43am	4:57am	14	91	"Legend" + 4 barges	down	rain 55	NW-2	3.4	Barge
11/02/09	1	00:05am	00:11am	6	50	test NB only for D. Johnson	-	clear 44	W-1	1.5	N/A
11/02/09	2	00:31am	00:37am	6	50	test NB only for D. Johnson	-	clear 43	W-4	1.4	N/A
11/09/09	1	9:31am	9:42am	11	80	"Nova" w/Derrick	up	rain 48	E-5	4	Barge
11/10/09	1	11:25am	11:34am	9	100	Northbound maint lift for D. Johnson	-	cloudy 52	5	4.5	N/A
11/17/09	1	4:10am	4:20am	10	90	"Willamette" Derrick	up	rain 48	SE-2	4.5	Barge
11/17/09	2	10:55am	11:05am	10	100	lady washington	down	rain 48	S-3	4.3	Sail
11/23/09	1	11:18am	11:34am	16	136	"Lindy Marie" with Derrick	up	clear 47	E-7	4.2	Barge
11/24/09	1	10:08am	10:21am	13	115	"Lindy Marie" with Derrick	down	cloudy 47	E-2	3.9	Barge
11/25/09	1	12:16pm	12:28pm	12	90	"Huskey" + Spud + Derrick	down	sunny 52	E-1	3.9	Barge
12/02/09	1	5:07am	5:19am	12	126	"Maverick" - Dredge, Yaquina	up	cloudy 37	W-4	4.2	Federal
12/04/09	1	11:33am	11:45am	12	100	"Huskey" + Spud + Derrick	down	clear 35	calm	3.2	Barge
12/22/09	1	13:27pm	13:40pm	13	90	"Invader" + 2 barges + 1 spud	down	cloudy 40	W-11	4.8	Barge
12/24/09	1	12:36pm	12:45pm	9	85	"Lewiston" + spud barge	down	foggy 30	W-NW-2	4.8	Barge
12/31/09	1	10:04am	10:13am	9	60	"Bruce M" + 3 chip barges	down	rain 37	E-6	3.8	Barge
11/11/10	1	10:55am	11:08am	12	86	NB lift only to take maint up w/bird cannons	-	cloudy 42	E-3	4.9	N/A
11/11/10	2	11:59am	12:07pm	8	86	NB lift only for maint to cross-over to south end/tower	-	cloudy 43	E-3	5.4	N/A
01/13/10	1	22:24pm	22:52pm	22	136	test	-	cloudy 48	S-3	5.8	N/A
01/14/10	1	8:38am	8:39am	1		sarkinen materials drop in Gore Point		cloudy 44	E-5		N/A
01/16/10	1	7:31am	7:41am	10	85	Tug "Sirus"	up	rain 44	E-3	6	Barge
01/20/10	1	13:08pm	13:14pm	6	86	maint - east bridge only	-	cloudy 46	0	6	N/A
01/20/10	2	14:11pm	14:17pm	7	86	maint - east bridge only	-	cloudy 48	0	5.8	N/A
01/22/10	1	13:30pm	13:40pm	10	120	"Nova" + Derrick barge	up	cloudy 46	SE-2	5.6	Barge
01/25/10	1	9:01am	9:08am	7	86	maint lift NB only to retrieve propane bottles and turn off cannons	-	cloudy 41	E-5	4.4	N/A
02/01/10	1	9:27am	9:39am	12	86	maint lift NB only to restart bird cannons	-	cloudy 41	W-1	5	N/A
02/11/10	1	10:25am	10:29am	4		clearance light pier #7		74	E-9		N/A
02/11/10	2	10:50am	10:53am	3		completion of maint (Light pier #7)		74	E-7		N/A
02/17/10	1	9:48am	10:00am	12	130	Umatilla	-	sunny 43	NW-3	4.2	Barge
02/19/10	1	13:15pm	13:32pm	17	136	Clarkston / Yaquina	-	clear 57	W-11	3.5	Federal
02/25/10	1	12:33pm	12:51pm	18	125	Maverick	-	cloudy 52	E-4	4.8	Barge

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
02/26/10	1	11:19am	11:35am	16	100	Maverick	-	rain 46	E-5	3.2	Barge
03/03/10	1	9:13am	9:20am	8	86	maintenance lift	-	cloudy 43	W-1	5.7	N/A
03/03/10	2	9:38am	9:50am	12	86	maintenance lift	-	cloudy 44	E-1	5.5	N/A
03/09/10	1	12:22pm	12:25:30pm	3.5							N/A
03/13/10	1	22:22pm	22:35pm	13	130	"Howard Olsen" + oil platform	down	clear 43	calm	3.1	Barge
03/15/10	1	10:25am	10:27am	2		maint to cross road deck southbound to get to high span piers (5-8)		hazy 47	W-4		N/A
03/15/10	2	10:54am	10:57am	3		maint to cross road deck southbound to get to high span piers (5-8)		hazy 48	W-5		N/A
03/15/10	3	11:26am	11:28am	2		" " for return to sidewalk		hazy 50	W-5		N/A
03/15/10	4	11:57am	11:59am	2		traffic stop SB so maint can pick up debris (span - 8)		hazy 53	W-2		N/A
03/17/10	1	19:34pm	19:46pm	12	100	"TJ Brix" + Derrick + tug	-	clear 52	NW-6	4.3	Barge
03/20/10	1	00:22am	00:30am	8	110	"Nancy Ann" + spud barge	up	clear 56	W-11	2.7	Barge
03/21/10	1	10:22am	10:34am	12	80	Tug "Sirus"	down	cloudy 51	E-5	4.6	Barge
03/25/10	1	5:52am	6:04am	12	120	Jim Moore (tug), PJ Brix w/Lucky logger (crane)	up	rain 46	SE-5	2.5	Barge
03/25/10	2	21:10pm	21:23pm	13	110	Jim Moore, PJ Brix - lucky logger	down	cloudy 47	SE-5	1.8	Barge
03/28/10	1	17:31pm	17:39pm	8	80	sailboat "Anamcam"	down	cloudy 53	SE-2	5.7	Sail
04/04/10	1	2:08am	2:25am	17	85	"Outlaw"	down	42	E-13	5	Barge
04/06/10	1	18:30pm	18:45pm	15	130	"Christy T" + 1 Derrick barge	up	cloudy 52	W-6	3.7	Barge
04/08/10	1	9:10am	9:25am	15	130	Ramona III	down	cloudy 40	W-7	3.3	Sail
04/14/10	1	10:15am	10:25am	10	80	Betty Lue	up	45	W-4	4	Sail
04/17/10	1	9:10am	9:19am	9	80	"Autumn Carra" (sailboat)	up	cloudy 52	E-7	5.2	Sail
04/18/10	1	19:24pm	19:36pm	12	90	"Arctic Lady" fishing boat	up	clear 71	NW-2	3.3	Fishing
04/22/10	1	00:59am	1:14am	15	70	Rebel + 6 barges	down	cloudy 46	W-10	4.8	Barge
04/30/10	1	9:48am	9:56am	9	80	Tango	down	partly cloudy 49	SW-3	6.5	Sail
05/01/10	1	8:34am	8:43am	9	80	"Valperezzo" (sailboat)	down	cloudy 49	S-2	6.5	Sail
05/01/10	2	17:39pm	17:48pm	9	90	"Valperezzo" (sailboat)	up	cloudy 56	NW-11	4.9	Sail
05/04/10	1	00:54am	1:07am	13	70	"Dauby" + 2 barges	-	cloudy 43	S-5	5.8	Barge
05/11/10	1	6:00am	6:11am	11	75	Adam cara, unidentified vessel	down	cloudy 50	0	5.5	Sail
05/14/10	1	00:00am	00:13am	13	30	aux motor test east and west bridge	-	59	6	5	N/A
05/14/10	2	00:23am	00:35am	12	|	aux motor test east and west bridge	-	59	6	5	N/A
05/14/10	3	00:43am	00:55am	12	|	aux motor test east and west bridge	-	59	6	5	N/A
05/14/10	4	1:06am	1:17am	11	|	aux motor test east and west bridge	-	59	6	5	N/A
05/14/10	5	1:20am	1:36am	16	75	Lori B	-	58	1	5	Barge
05/14/10	6	1:48am	1:58am	10	30	aux motor test east and west bridge	-	57	1	5	N/A
05/14/10	7	3:46am	3:54am	8	30	maint lift	-	54	0	5.9	N/A
05/14/10	8	4:08am	4:21am	13	136	maint test lift	-	53	0	6	N/A
05/14/10	1	2:24am	2:31am	7		trng traffic stops east and west bridge		57	1		N/A
05/14/10	2	2:38am	2:43am	5		trng traffic stops east and west bridge		57	1		N/A
05/14/10	3	2:50am	2:56am	6		trng traffic stops east and west bridge		57	1		N/A
05/14/10	4	3:01am	3:07am	6		trng traffic stops east and west bridge		55	1		N/A
05/14/10	5	3:08am	3:15am	7		trng traffic stops east and west bridge		55	NW-3		N/A
05/14/10	6	3:16am	3:24am	8		trng traffic stops east and west bridge		55	0		N/A
05/18/10	1	9:05am	9:20am	15		SB only barrier greasing		57	E-3		N/A
05/18/10	2	9:32am	9:45am	13		NB only barrier greasing		57	3		N/A
05/18/10	3	10:01am	11:00am			east and west bridge traffic stop for text		59	S-5		N/A
05/20/10	1	13:45pm	13:58pm	13	70	"Daubi"	-	partly cloudy 52	SW-5	6.5	Barge
05/21/10	1	11:28am	11:40am	12	50	maint lift	-	cloudy 47	E-10	6.4	N/A
05/21/10	2	1:15am	1:30am	15	19	maint lift	-	cloudy 46	E-4	6.8	N/A
05/21/10	3	1:45am	2:00am	15	20	maint lift	-	cloudy 46	E-1	6.8	N/A
05/21/10	4	2:51am	3:00am	9	20	maint lift	-	cloudy 46	E-4	6.5	N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
05/21/10	5	13:30pm	13:36pm	6	30	maint lift	-	cloudy 49	E-2	7	N/A
05/21/10	1	2:16am	2:24am	8		maint test		cloudy 46	E-4		N/A
05/21/10	2	2:30am	2:38am	8		maint test		cloudy 46	E-4		N/A
05/21/10	3	2:44am	2:50am	6		maint test		cloudy 46	E-6		N/A
05/22/10	1	6:12am	6:29am	17	50	shadow line (could not open bridge)	down				Sail
05/22/10	2	7:33am	7:42am	9	50	shadow line	down	cloudy 44	SE-2	7.5	Sail
05/22/10	3	23:47pm	23:52pm	5	25	test lift west bridge	-	49	W-0	6.9	N/A
05/23/10	1	00:04am	00:15am	11	30	test lift	-	48	W-2	7	N/A
05/23/10	2	00:19am	00:46am	17	136	test lift east bridge	-	48	SW-0	7.2	N/A
05/23/10	3	00:58am	1:14am	16	136	test lift west bridge	-	48	SW-0	7.3	N/A
05/23/10	4	1:28am	1:44am	17	30	test lift east bridge	-	48	SW-1	7.4	N/A
05/23/10	5	1:46am	2:00am	14	30	test lift west bridge	-	47	SW-1	7.7	N/A
05/25/10	1	1:56am	2:05am	9	60	Dauby + 2 sand barges	-	cloudy 54	E-5	7.4	Barge
05/25/10	2	22:02pm	22:15pm	13	65	Bruce M + 2 chip barges, Legend + 3 barges	down	rain 54	W-2	7	Barge
05/27/10	1	3:34am	3:48am	14	65	Dauby + 2 gravel barges	down	clear 47	0	6.8	Barge
05/27/10	2	5:01am	5:10am	9	75	Genesis (sailboat)	down	cloudy 47	0	7.5	Sail
05/27/10	3	11:52am	12:00pm	9	80	whisper/spirit	down	cloudy 57	W-4	6.2	Sail
05/28/10	1	19:34pm	19:41pm	7	80	"autumn wind"	-	rain 41	SE-1	6.4	Sail
05/29/10	1	23:40pm	23:53pm	13	136	test lift	-	53	NW-3	5.5	N/A
05/30/10	1	11:26am	11:37am	11	100	"smooth sailing" "Whisper"	up and down	57	E-2	6.1	Sail
05/31/10	1	14:04pm	14:14pm	10	80	sailboat "Tango"	up	cloudy 65	S-3	6.6	Sail
06/02/10	1	3:07am	3:17am	10	75	Dauby + 2 sand barges	down	rain 58	E-9	6	Barge
06/03/10	1	5:37am	5:45am	8	65	Ceste fivon (sailboat)	down	sunny 48	E-1	7.5	Sail
06/04/10	1	3:03am	3:14am	11	70	"Dauby" + 2 barges	down	rain 49	NW-4	10.2	Barge
06/04/10	2	9:00am	9:10am	10	100	Make It So	down	rain 52	W-2	10.8	Sail
06/04/10	3	10:33am	10:47am	15	60	"Lori B"	down	clear 55	N-12	11.8	Barge
06/05/10	1	3:59am	4:14am	13	60	Cascade	down	49	NW-11	12	Barge
06/06/10	1	9:12am	9:21am	9	60	"sailboat Onnie"	down	rain 57	calm	13.4	Sail
06/07/10	1	9:13am	9:23am	10	70	"chief"	down	cloudy 58	S-1	13.4	Barge
06/07/10	1	2:09am	2:13am	4		training - west bridge only		cloudy 56	0		N/A
06/07/10	2	3:12am	3:16am	4		training - west bridge only		cloudy 56	0		N/A
06/07/10	3	3:26am	3:28am	2		training - west bridge only		cloudy 56	NE-1		N/A
06/07/10	4	3:45am	3:47am	2		training - east bridge only		cloudy 56	0		N/A
06/07/10	5	4:02am	4:05am	3		training - east bridge only		cloudy 56	0		N/A
06/07/10	6	4:36am	4:38am	2		training - east bridge only		cloudy 55	NW-1		N/A
06/07/10	7	4:51am	4:52am	1		training - west bridge only		cloudy 55	NW-1		N/A
06/07/10	8	5:05am	5:07am	2		training - east bridge only		cloudy 54	NW-4		N/A
06/08/10	1	2:12am	2:22am	10	60	Dauby + 2 sand barges	down	cloudy 55	W-5	13.7	Barge
06/08/10	1	1:44am	1:46am	2		training - west bridge only		cloudy 55	W-4		N/A
06/08/10	2	2:45am	2:47am	2		training - east bridge only		cloudy 54	NW-4		N/A
06/08/10	3	3:00am	3:02am	2		training - east bridge only		cloudy 53	0		N/A
06/08/10	4	3:10am	3:12am	2		training - west bridge only		cloudy 53	0		N/A
06/08/10	5	3:29am	3:31am	2		training - west bridge only		cloudy 52	0		N/A
06/08/10	6	3:34am	3:36am	2		training - west bridge only		cloudy 52	0		N/A
06/08/10	7	4:07am	4:09am	2		training - east bridge only		cloudy 52	0		N/A
06/08/10	8	4:12am	4:14am	2		training - west bridge only		cloudy 52	0		N/A
06/08/10	9	4:27am	4:30am	3		training east and west bridge		cloudy 52	N-2		N/A
06/08/10	10	4:41am	4:44am	3		training east and west bridge		cloudy 52	N-3		N/A
06/08/10	11	4:57am	5:00am	3		training east and west bridge		clear 51	NW-2		N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
06/09/10	1	1:40am	1:50am	10	30	training lift east bridge	-	cloudy 53	SE-5	14	N/A
06/09/10	2	2:02am	2:08am	6	30	training lift west bridge	-	cloudy 53	E-5	14	N/A
06/09/10	3	2:21am	2:27am	6	30	training lift east bridge	-	rain 53	SE-5	14	N/A
06/09/10	4	2:49am	2:57am	8	60	training lift west bridge	-	rain 53	4	14	N/A
06/09/10	5	3:05am	3:13am	8	60	training lift east bridge	-	rain 52	E-6	14	N/A
06/09/10	6	3:30am	3:41am	8	86/82 crossover	training lift east and west crossover	-	rain 53	E-6	14	N/A
06/09/10	7	3:59am	4:06am	7	30	training lift east and west	-	rain 53	E-5	14	N/A
06/09/10	8	4:22am	4:36am	14	136	training lift east and west	-	rain 53	E-6	14.1	N/A
06/09/10	9	4:57am	5:05am	8	30	training lift east and west	-	rain 53	E-4	14.1	N/A
06/09/10	10	9:15am	9:25am	10	70	Bruce M + 2 sawdust barges	down	cloudy 59	E-4	14	Barge
06/09/10	11	13:57pm	14:07pm	10	60	Sundial	-	cloudy 60	SE-3	14	Barge
06/09/10	1	1:06am	1:09am	3		training east and west bridge		cloudy 54	SE-6		N/A
06/09/10	2	1:22am	1:25am	3		training east and west bridge		cloudy 54	SE-6		N/A
06/10/10	1	00:42am	00:49am	7	30	training lift east and west	-	cloudy 53	SE-2	13.9	N/A
06/10/10	2	1:02am	1:11am	9	60	training lift east and west drawer	-	cloudy 53	SE-2	13.9	N/A
06/10/10	3	1:27am	1:36am	9	50	training lift east and west drawer	-	cloudy 52	SE-2	13.9	N/A
06/10/10	4	1:46am	1:53am	7	10	training lift east and west drawer	-	cloudy 52	SE-5	14	N/A
06/10/10	5	2:34am	2:50am	16	75	hurricane and a six pack	down	rain 52	0	14	Barge
06/10/10	6	3:01am	3:09am	8	83	training lift east bridge	-	rain 52	S-3	14	N/A
06/10/10	7	3:15am	3:23am	8	87	training lift west bridge	-	rain 52	0	14	N/A
06/10/10	8	3:29am	3:40am	11	100	Dauby + 2 barges	down	rain 52	0	14	Barge
06/10/10	9	3:50am	3:59am	9	125	training lift east bridge	-	rain 52	0	14	N/A
06/10/10	10	4:04am	4:20am	16	136	Chief + 3 barges	down	rain 52	0	14	Barge
06/10/10	11	5:01am	5:10am	9	65	PJ Brix + Jim Moore + 1 barge	up	rain 52	S-2	14	Barge
06/10/10	12	9:05am	9:19am	14	70	clearwater	down	rain 53	S-2	14.2	Barge
06/10/10	13	10:46am	10:58am	12	60	"Catherine B"	down	rain 54	S-3	14.2	Barge
06/10/10	14	19:59pm	20:10pm	11	60	"Cascades" + "Spirit of 98"	down	cloudy 56	W-5	14	Barge
06/10/10	1	4:30am	4:33am	3		training traffic stop east bridge		rain 52	S-2		N/A
06/10/10	2	4:39am	4:42am	3		training traffic stop west bridge		rain 52	S-2		N/A
06/10/10	3	4:50am	4:52am	2		training traffic stop east bridge		rain 52	0		N/A
06/11/10	1	00:29am	00:36am	7	30	training bridge lift east and west bridge	-	cloudy 53	W-2	14.1	N/A
06/11/10	2	1:00am	1:08am	8	40	training bridge lift east and west bridge	-	cloudy 53	NW-3	14.1	N/A
06/11/10	3	1:22am	1:36am	14	136	training bridge lift east and west bridge	-	cloudy 53	NW-2	14.1	N/A
06/11/10	4	2:08am	2:22am	14	136	training bridge lift east and west bridge	-	cloudy 53	SW-1	14.1	N/A
06/11/10	5	2:41am	2:49am	8	30E / 40W	training bridge lift east and west bridge	-	cloudy 53	SW-1	14.1	N/A
06/11/10	6	4:04am	4:11am	7	40E / 30W	training bridge lift east and west bridge	-	cloudy 53	SW-1	14.1	N/A
06/11/10	7	4:20am	4:27am	7	30E / 40W	training bridge lift east and west bridge	-	cloudy 53	SW-1	14.1	N/A
06/11/10	8	4:42am	4:49am	7	35E / 30W	training bridge lift east and west bridge	-	cloudy 52	SW-1	14.2	N/A
06/11/10	9	5:52am	6:02am	10	65	"Lori B" 65' lift east and west	down	cloudy 52	NW-1	14.25	Barge
06/11/10	10	11:15am	11:25am	9	65	Tropical	up	partly cloudy 56	NW-4	14.3	Unknown
06/11/10	11	12:48pm	13:00pm	12	70	Chief	down	partly cloudy 57	W-5	14.3	Barge
06/11/10	1	23:54pm	23:58pm	4		training traffic stop west bridge		cloudy 54	W-3		N/A
06/11/10	2	00:11am	00:14am	3		training traffic stop east bridge		cloudy 54	W-2		N/A
06/12/10	1	3:26am	3:40am	14	66	Defiance	down	53	NW-2	14.5	Barge
06/12/10	2	10:35am	10:44am	9	66	"raven"	down	clear 58	W-4	14.6	Unknown
06/13/10	1	6:06am	6:20am	14	60	Deschutes	down	56	NW-1	14.5	Barge
06/13/10	2	8:40am	8:49am	9	60	PJ Brix + Jim Moore	down	clear 59	W-3	14.4	Barge
06/13/10	3	20:45pm	20:56pm	11	73	California Girl sailboat	up	clear 61	W-10	13	Sail
06/14/10	1	23:34pm	23:43pm	9	120	training lift east and west	-	clear 53	W-4	12.7	N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
06/14/10	2	00:21am	00:32am	11	80	training lift east and west	-	clear 52	NW-3	12.6	N/A
06/14/10	3	00:13am	1:30am	17	30	Hurricane + Maverick + barges	down	clear 51	NW-3	12.5	Barge
06/14/10	4	1:57am	2:05am	8	30	trng	-	clear 51	NW-3	12.5	N/A
06/14/10	5	2:23am	2:30am	8	85	trng	-	clear 51	NW-3	12.5	N/A
06/14/10	6	3:06am	3:17am	11	86/83	trng	up	clear 50	N-5	12.3	N/A
06/14/10	7	4:05am	4:19am	14	50/50	training	-	clear 49	0	12.1	N/A
06/14/10	8	4:25am	4:35am	10	65	training	-	clear 49	N-12	12.1	N/A
06/14/10	9	9:42am	9:51am	9	65	"Symmetry"	down	clear 51	N-3	12.1	Sail
06/14/10	10	10:52am	11:04am	12	70	"chief"	down	cloudy 53	W-3	11.7	Barge
06/15/10	1	00:13am	00:23am	10	80	training lift east and west	-	cloudy 52	W-11	10.5	N/A
06/15/10	2	00:30am	00:43am	13	80	Dauby + 2 barges	down	cloudy 52	W-11	10.5	Barge
06/15/10	3	1:03am	1:13am	10	abort	training lift east and west	-	cloudy 52	W-14	10.5	N/A
06/15/10	4	1:25am	1:40am	15	136 full	training lift east and west	-	cloudy 51	W-7	10.5	N/A
06/15/10	5	2:16am	2:25am	9	80	training lift east and west	-	cloudy 51	W-7	10.5	N/A
06/15/10	6	2:30am	2:33am	3		traffic stop	-	cloudy 51	W-5	10.5	N/A
06/15/10	7	3:53am	3:03am	10	100	training bridge east and west	-	cloudy 51	W-4	10.4	N/A
06/15/10	8	3:14am	3:26am	12	86	training east bridge	-	cloudy 51	W-5	10.3	N/A
06/15/10	9	3:41am	3:47am	6	abort	training east and west	-	cloudy 50	W-5	10.3	N/A
06/15/10	10	3:59am	4:07am	8	70	training east and west	-	cloudy 50	W-3	10.3	N/A
06/15/10	11	4:21am	4:34am	13	10/25, 82/31	training lift	-	cloudy 50	W-1	10.2	N/A
06/15/10	12	4:42am	4:53am	11	5	training lift in bypass mode	-	cloudy 50	0	10.2	N/A
06/15/10	13	5:00am	5:10am	10	6	training lift in bypass mode	-	cloudy 50	W-1	10.2	N/A
06/15/10	14	6:20am	6:30am	10	100	Arctic lady 100'	-	cloudy 50	W-3	10.4	Fishing
06/16/10	1	9:44am	9:54am	10	60	Athesa	up	51	SE-3	10.8	Sail
06/17/10	1	2:05am	2:19am	14	80	Dauby + two barges	down	cloudy 54	SW-2	11	Barge
06/17/10	2	10:06am	10:18am	12	75	Rapscallion	down	cloudy 55	W-2	11.1	Sail
06/17/10	3	18:23pm	18:32pm	9	75	"Tango"	down	cloudy 59	N-4	10.8	Sail
06/18/10	1	00:37am	00:49am	12	80	"chief" 2 barges	down	cloudy 53	NW-5	11.2	Barge
06/18/10	2	18:01pm	18:12pm	11	70	sailboat "St Marie" + "Lori B"	down	cloudy 66	NW-3	10.7	Barge
06/19/10	1	5:39am	6:02am	23	30	maint east bridge north end	-	cloudy 53	0	11	N/A
06/19/10	2	6:13am	6:42am	29	30	maint east bridge north end	-	cloudy 53	0	11	N/A
06/19/10	3	6:52am	7:19am	27	30	east bridge north end	-	cloudy 54	SE-3	10.8	N/A
06/19/10	4	7:29am	7:55am	26	30	west bridge north end	-	cloudy 53	SE-1	10.8	N/A
06/19/10	5	8:16am	8:46am	30	30	west bridge north end	-	cloudy 53	SE-3	10.4	N/A
06/19/10	6	8:56am	9:24am	26	30	east bridge south end	-	cloudy 53	SE-3	10.3	N/A
06/20/10	1	8:49am	9:01am	12	70	"Clearwater" + 4 barges	down	rain 53	0	8.9	Barge
06/20/10	2	9:29am	9:40am	11	70	"legend" + 3 barges	down	rain 53	0	8.8	Barge
06/20/10	3	15:28pm	15:38pm	10	70	sailboat "St Marie"	up	rain 58	SE-5	8.7	Sail
06/22/10	1	1:27am	1:39am	12	85	Dauby + 2 barges	down	cloudy 57	NW-4	9	Barge
06/22/10	2	18:56pm	19:05pm	9	80	"Lori B" + barges	down	cloudy 72	NW-8	9.5	Barge
06/26/10	1	9:07am	9:18am	11	70	sailboats - "Jenny's Joy" + Legend	down	cloudy 56	W-5	10	Sail
06/23/10	1	13:44pm	13:55pm	11	55	Bruce M	down	clear 74	W-3	9.8	Barge
06/23/10	2	9:32am	9:37am	5		pub equipment		clear 63	W-3		N/A
06/24/10	1	00:55am	1:07am	12	80	"chief" + barge	down	clear 62	NW-2	9.9	Barge
06/24/10	2	5:15am	5:28am	13	80	"Cascade"	down	clear 57	NW-3	10.5	Barge
06/25/10	1	1:31am	1:44am	13	80	"rebel" + 2 barges	down	clear 60	NW-5	9.9	Barge
06/29/10	1	13:21pm	13:30pm	9	70	"Wind Raven" sail vessel	down	partly cloudy 61	0	8.2	Sail
06/29/10	2	21:45pm	21:53pm	8	80	Affamation (sailboat)	down	clear 60	NW-9	8.9	Sail
07/01/10	1	3:02am	3:12am	10	60	Dauby + 2 barges	down	57	W-NW-4	8.7	Barge

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
07/01/10	2	18:05pm	18:13pm	7	65	St Marie	down	cloudy 60	E-1	8.5	Sail
07/02/10	1	19:05pm	19:13pm	8	80	"Wakadui" sailboat	down	clear 60	calm	5.9	Sail
07/03/10	1	13:53pm	14:05pm	12	90	"Sirius" (tug)	up	clear 62	N-2	6	Barge
07/03/10	2	22:47pm	23:00pm	13	80	"Sirius"	-	clear 61	NW-6	6.2	Barge
07/05/10	1	4:25am	4:35am	10	90	"Autumn Cara" sailing vessel	up	cloudy 53	NW-2	4.6	Sail
07/05/10	2	15:21pm			80	"St Marie" (sailboat)	up	cloudy 63	NW-8	3.9	Sail
07/06/10	1	10:10am	10:22am	12	105	Willamette spud, Lassen spud, barge	up	clear 64	8	4	Barge
07/06/10	2	13:16pm	13:25pm	9	90	Lassen and spud barge	down	clear 76	9	3.8	Barge
07/11/10	1	10:07am	10:17am	10	100	"radiant"	down	cloudy	W-3	5.3	Sail
07/12/10	1	18:44pm	18:52pm	8	80	"Afimation" sailboat	up	clear 64	NW-7	4.9	Sail
07/14/10	1	5:16am	5:39am	23	86	maintenance lift	-	cloudy 54	NW-1	4.9	N/A
07/14/10	2	12:03pm	12:27pm	25	86	maintenance lift	-	clear 70	NW-9	5	N/A
07/14/10	1	5:51am	6:08am	17		washington drillinh equipment locating		clear 54	NW-1		N/A
07/15/10	1	5:32am	5:40am	8	86	maintenance lift	-	clear 60	N-3	4	N/A
07/15/10	2	11:23am	11:34am	11	86	maintenance lift	-	clear 69	NW-5	4.9	N/A
07/16/10	1	2:58am	3:11am	13	80	"Chief" + 2 barges	down	clear 54	NW-6	4.7	Barge
07/17/10	1	16:51pm	16:59pm	8	80	"Maddog" sailboat	up	clear 71	W-5	3.3	Sail
07/18/10	1	13:16pm	13:36pm	20	136	"Willamette" w/one massive barge loaded	down	partly cloudy 61	W-2	3.3	Barge
07/20/10	1	9:20am	9:39am	19	87	west bridge cable scrape	-	cloudy 54	NW-8	3.4	N/A
07/21/10	1	3:51am	4:11am	20	136	maintenance lift	-	cloudy 55	NW-7	4.4	N/A
07/21/10	2	4:19am	4:30am	11	38	maintenance lift	-	cloudy 55	NW-5	4.3	N/A
07/21/10	3	4:42am	4:58am	16	27	maintenance lift	-	cloudy 55	NW-3	4.2	N/A
07/21/10	4	5:10am	5:19am	9	39	maintenance lift	-	cloudy 55	NW-4	4	N/A
07/21/10	5	9:48am	10:07am	19	86	maintenance lift (east bridge)	-	cloudy 58	NW-2	2.5	N/A
07/21/10	6	12:34pm	12:42pm	8	75	Valbare ZO	-	clear 63	W-2	2	Unknown
07/21/10	7	21:47pm	22:05pm	18	70	maint - west bridge only	-	clear 72	NW-2	2.2	N/A
07/21/10	8	22:15pm	22:34pm	19	136	maint - west bridge only	-	clear 69	NW-4	2.2	N/A
07/21/10	9	21:47pm	22:13pm	27	136	maint - west bridge only	-	clear 68	W-4	2.1	N/A
07/21/10	10	23:32pm	00:01am	29	136	maint - west bridge only	-	clear 64	W-6	2.8	N/A
07/22/10	1	00:43am	00:52am	9	86	maintenance list east bridge	-	clear 61	NW-2	3.6	N/A
07/22/10	2	00:21am	1:49am	28	136	maint lift west only	-	clear 59	0	4.5	N/A
07/22/10	3	2:01am	2:30am	29	136	maint lift west only	-	clear 59	NW-1	4.7	N/A
07/22/10	4	3:00am	3:09am	9	86	maint lift east only	-	clear 57	NW-2	5	N/A
07/22/10	5	9:00am	9:17am	17	85	willamette	-	clear 59	NW-2	3.9	Barge
07/22/10	6	14:05pm	14:16pm	9	80	whisper	-	clear 68	NW-6	2	Sail
07/23/10	1	21:25pm	21:40pm	15	7	maint lift east bridge onlt adjust shims - south end	-	clear 73	NW-6	3.1	N/A
07/25/10	1	19:37pm	19:47pm	10	90	"Radiance" sailboat	up	clear 85	NW-5	4.4	Sail
07/26/10	1	18:10pm	18:19pm	9	80	Ironwood	up	clear 86	NW-11	3.4	Federal
07/29/10	1	18:00pm	18:09pm	9	80	Ironwood	down	clear 79	N-9	2.7	Federal
07/31/10	1	14:51pm	15:01pm	10	80	"Wakadui" sailboat	up	partly cloudy 63	W-2	2	Sail
08/01/10	1	12:23pm	12:38pm	15	136	Willamette with Derrick	down	partly cloudy 64	W-4	2.3	Barge
08/02/10	1	18:53pm	19:02pm	9	80	"whisper" sailboat	up	clear 75	NW-3	0.9	Sail
08/03/10	1	10:12am	10:21 AM	9	100	Tug "Lassen" with Derrick + 3 assist tug	up	cloudy 59	NW-2	1.3	Barge
08/03/10	2	11:50am	12:03pm	13	100	"Lassen" w/ 1 spud, 1 Derrick. 3 tug, "chinook"	down	cloudy 61	W-2	1.5	Barge
08/04/10	1	21:40pm	21:58pm	18	73	east bridge only - maint	-	partly cloudy 75	NW-2	2.1	N/A
08/04/10	2	22:20pm	22:44pm	24	136	east bridge only - maint	-	partly cloudy 72	N-1	3.5	N/A
08/04/10	3	23:13pm	23:31pm	18	107	east bridge only - maint	-	partly cloudy 72	N-1	3.5	N/A
08/04/10	4	23:43pm	23:58pm	16	136	east bridge only - maint	-	partly cloudy 72	N-1	4.3	N/A
08/05/10	1	00:15am	00:37am	22	136	east bridge maint lift	-	cloudy, calm	2	5	N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
08/05/10	2	1:16am	1:25am	9	86	east bridge maint lift	-	cloudy, calm	2	5	N/A
08/05/10	3	1:45am	2:08am	22	136	east bridge maint lift	-	cloudy, calm	2	5	N/A
08/05/10	4	2:17am	2:39am	2	136	east bridge maint lift	-	cloudy, calm	2	4.5	N/A
08/05/10	5	3:11am	3:28am	16	86	east bridge maint lift	-	cloudy, calm	2	4.5	N/A
08/10/10	1	10:07am	10:17am	10	20	west bridge HVAC delivery	-	rain 57	calm	3.4	N/A
08/10/10	1	9:01am	9:06am	5		NB HVAC delivery		cloudy 58	NW-2		N/A
08/12/10	1	13:55pm	14:05pm	10	75		down	clear 72	W-2	2.8	N/A
08/12/10	2	10:25am	10:29am	4		traffic stop NB					N/A
08/14/10	1	7:23am	7:34am	11	115	Nakoa	up	clear 66	NW-1	3	Barge
08/16/10	1	1:03am	1:22am	19		traffic stop for WDOT crack sealing		clear 70	NW-4		N/A
08/16/10	2	1:28am	1:48am	20		traffic stop for WDOT crack sealing		clear 69	0		N/A
08/16/10	3	1:55am	2:17am	22		traffic stop for WDOT crack sealing		clear 67	0		N/A
08/16/10	4	2:22am	2:44am	22		traffic stop for WDOT crack sealing		clear 65	NW-1		N/A
08/16/10	5	2:52am	3:16am	24		traffic stop for WDOT crack sealing		clear 65	NW-2		N/A
08/17/10	1	2:52am	3:06am	14	86	practice/maint + sail vessel	-	clear 69	0	3.4	Sail
08/17/10	1	00:44am	1:05am	21		traffic stop WDOT work		clear 76	0		N/A
08/17/10	2	1:12am	1:29am	17		traffic stop WDOT work		clear 74	0		N/A
08/17/10	3	1:35am	1:54am	19		traffic stop WDOT work		clear 73	0		N/A
08/17/10	4	2:00am	2:22am	22		traffic stop WDOT work		clear 73	0		N/A
08/17/10	5	10:19am	10:21am	2		maint - east bridge only		clear 72	W-2		N/A
08/18/10	1	9:09am	9:20am	11	85	Willamette chap	-	cloudy 60	NE-1	1.8	Barge
08/19/10	1	9:28am	9:43am	15	86	(cross-over) maintenance	-	cloudy 58	E-1	1.9	N/A
08/20/10	1	12:23pm	12:34pm	11	84	Lissy II	-	clear 62	NW-6	1.7	Barge
08/20/10	2	21:56pm	22:06pm	10	86	maint lift east bridge only take personnel up on towers	-	cloudy 62	W-7	1.4	N/A
08/20/10	3	22:25pm	22:48pm	23	30	east bridge only	-	cloudy	W-2	1.3	N/A
08/20/10	4	23:13pm	23:34pm	21	48	east bridge only	-	cloudy 59	NW-7	1.3	N/A
08/20/10	5	23:50pm	00:11am	21	69	east bridge only	-	cloudy 58	NW-5	1.5	N/A
08/20/10	6	00:24am	00:47am	24	89	east bridge only	-	cloudy 57	NW-4	2	N/A
08/20/10	7	00:58am	1:27am	29	110	east bridge only	-	cloudy 56	NW-5	2.5	N/A
08/20/10	8	1:42am	2:04am	26	124	east bridge only	-	cloudy 55	NW-1	3.3	N/A
08/20/10	9	2:21am	2:52am	31	136	east bridge only	-	cloudy 54	NW-3	3.8	N/A
08/20/10	10	3:13am	3:33am	20	24	west bridge greasing	-	cloudy 55	NW-2	4	N/A
08/20/10	11	3:37am	4:00am	22	22	west bridge greasing	-	cloudy 54	NW-1	4.2	N/A
08/20/10	12	4:05am	4:31am	26	68	west bridge greasing	-	cloudy 54	NW-3	4	N/A
08/20/10	13	4:37am	4:59am	22	89	west bridge greasing	-	cloudy 53	NW-2	3.8	N/A
08/20/10	14	5:04am	5:28am	24	113	west bridge greasing	-	cloudy 53	NW-2	3.5	N/A
08/20/10	15	5:33am	6:00am	27	136	west bridge greasing - completed	-	cloudy 53	NW-1	2.9	N/A
08/20/10	16	6:24am	6:35am	11	86	86' crossover	-	cloudy 53	NW-1	2.8	N/A
08/21/10	1	22:37pm	23:02pm	25	90	maint - west bridge only	-	clear 62	NW-6	1.8	N/A
08/21/10	2	11:13am	11:35am	22	136	maint - west bridge only	-	clear 60	NW-3	1.3	N/A
08/21/10	3	12:04pm	12:29pm	25	99	maint east bridge	-	clear 55	NW-2	1.2	N/A
08/22/10	1	00:04am	00:29am	25	99	maint east bridge	-	clear 55	NW-2	1.2	N/A
08/22/10	2	00:39am	00:59am	20	136	maint east bridge	-	clear 59	NW-3	1	N/A
08/22/10	3	1:12am	1:25am	13	86	crossover	-	clear 59	0	1.6	N/A
08/26/10	1	10:44am	10:56am	12	86	Washougal	-	partly cloudy 63	NW-7	2.5	Barge
08/27/10	1	10:13am	10:22am	15	70	Bruce M	down	partly cloudy 59	NW-3	2.7	Barge
08/28/10	1	1:48am	1:50am	2		test southbound gates fronts		clear 58	NW-2		N/A
08/31/10	1	12:41pm	12:50pm	9	85	Trilogy II (sailboat)	up	cloudy 60	SE-2	1.2	Sail
08/31/10	2	18:43pm	18:52pm	9	85	Trilogy 2 sailboat	down	cloudy 61	SE-5	0.9	Sail

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
08/31/10	3	19:23pm	19:40pm	17	90	"Casey H" + "Nakoa"	down	cloudy 61	SE-5	1.5	Barge
09/06/10	1	18:59pm	19:09pm	10	95	"Make It So" sailboat	up	partly cloudy 70	W-2	2.9	Sail
09/09/10	1	18:43pm	18:52pm	9	80	sailboat "Nancy Riley"	up	cloudy 63	0	4.6	Sail
09/13/10	1	10:00am	10:11am	11	86	lift NB only to take up personnel + supplies	-	cloudy 62	W-4	2.8	N/A
09/13/10	2	13:47pm	13:57pm	10	86	lift nb only to bring down personnel	-	cloudy 69	W-7	1.1	N/A
09/15/10	1	12:48pm	13:00pm	12	100	"Christy T" w/Derrick	up	cloudy 67	E-3	2.2	Barge
09/17/10	1	9:30am	9:42am	12	100	"Christy T" w/Derrick	down	cloudy 63	W-4	0.5	Barge
09/17/10	2	18:16pm	18:27pm	11	110	Bruce M	down	cloudy 66	E-6	1.9	Barge
09/19/10	1	7:05am	7:17am	12	70	"Tidewater" + 4 barges, Maverick assisting	down	cloudy 61	E-3	1.9	Barge
09/19/10	2	8:55am	9:07am	12	100	"Christy T"	down	cloudy 62	E-6	1.5	Barge
09/19/10	3	21:18pm	21:30pm	12	100	"Bruce M" + 1 barge	down	rain 60	E-4	1.6	Barge
09/20/10	1	13:57pm	14:07pm	10	70	sailboat Scout	down	cloudy 63	W-6	1	Sail
09/21/10	1	00:01am	00:14am	13	110	Dredge Aquina	up	cloudy, calm 58	0	0.7	Federal
09/21/10	2	21:41pm	21:52pm	11	90	"Lassen" + 1 Derrick	down	cloudy 59	W-5	2.3	Barge
09/27/10	1	12:49pm	12:58pm	9	100	"Yaquina"	down	clear 77	SE-E-2	1.4	Federal
10/03/10	1	00:03am	00:18am	15	80	Dauby	up	clear 58	NW-2	3.4	Barge
10/13/10	1	19:12pm	19:19pm	7	74	"Smooth sailing" sail vessel	up	clear 64	E-3	2	Sail
10/14/10	1	6:15am	6:29am	14	120	Bruce M + spud barge	up	cloudy 49	0	1.7	Barge
10/16/10	1	14:58pm	15:07pm	14	125	Bruce M + 1 Derrick	down	overcast 59	W-5	2.7	Barge
10/20/10	1	5:16am	5:32am	16	100	Betty Lou towing the Yaquina, Maverick pushing	up	clear 50	NW-2	2.9	Federal
10/27/10	1	9:50am	10:01am	11		maint on car walks		clear 48			N/A
10/30/10	1	11:50am	12:00pm	10	80	"Luntka"	down	rain 49	E-6	3.4	Sail
11/02/10	1	18:02pm	18:13pm	11	100	"Christy B" + 1 spud barge	up	clear 62	NW-3	4.4	Barge
11/05/10	1	9:25am	9:30am	5		maintenance		foggy 53	SE-1		N/A
11/06/10	1	7:00am	7:10am	10	100	"Adriatic Sea" tug	up	rain 53	W-3	4.9	Barge
11/09/10	1	12:14pm	12:38pm	24	136	Willamette Champion, Bruce M (Derricks)	up	rain 45	E-16	3.7	Barge
11/15/10	1	18:38pm	18:50pm	12	100	"Patricia" + spud + Derrick	down	cloudy 58	S-5	2.5	Barge
11/16/10	1	3:28am	3:33am	5		traffic stop northbound		overcast 51	W-6		N/A
11/16/10	2	3:38am	3:40am	2		traffic stop northbound		overcast 51	W-6		N/A
11/16/10	3	3:44am	3:48am	4		traffic stop northbound		overcast 51	W-6		N/A
11/16/10	4	3:48am	3:51am	3		traffic stop northbound		overcast 51	W-6		N/A
11/16/10	5	3:52am	3:54am	2		traffic stop northbound		overcast 51	W-6		N/A
11/16/10	6	4:00am	4:02am	2		traffic stop southbound		rain 50	W-3		N/A
11/16/10	7	4:03am	4:05am	2		traffic stop southbound		rain 50	W-3		N/A
11/16/10	8	4:07am	4:11am	4		traffic stop N/S bound		rain 50	W-3		N/A
11/16/10	9	4:22am	5:25am	63		traffic stop N/S bound		rain 50	0		N/A
11/16/10	10	5:38am	6:03am	25		traffic stop northbound - repair		cloudy 49	SW-3		N/A
11/16/10	11	9:56am	10:01am	5		traffic stop NB, NE Barrier inspection + repair		partly sunny 52	W-3		N/A
11/16/10	12	10:31am	10:33am	2		traffic stop NB, NE Barrier repair		mostly cloudy 52	W-5		N/A
11/17/10	1	2:21am	2:32am	11	30	training lift	-	48	E-6	3	N/A
11/17/10	2	2:37am	2:50am	13	30	training lift	-	48	E-6	3	N/A
11/17/10	3	2:57am	3:07am	10	86	training lift	-	48	E-6	3	N/A
11/17/10	4	3:13am	3:27am	14	136	training lift	-	48	E-6	3	N/A
11/17/10	5	3:36am	3:43am	7	50	training lift	-	48	E-6	3	N/A
11/17/10	6	3:50am	3:59am	9	30	training lift	-	48	E-6	3	N/A
11/17/10	7	4:08am	4:25am	17	75	training lift	-	48	E-6	3	N/A
11/17/10	8	22:28pm	22:47pm	19	136	full lift, maintenance	-	rain 41	E-16	3	N/A
11/17/10	9	23:25pm	22:39pm	14	136	full lift, maintenance	-				N/A
11/17/10	1	2:04am	2:06am	2		traffic stop training		48	E-6		N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
11/17/10	2	4:35am	4:40am	5		traffic stop training		48	E-6		N/A
11/17/10	3	4:55am	4:58am	3		traffic stop training		48	E-6		N/A
11/17/10	4	10:21am	10:24am	3		barrier repair		50	SE-6		N/A
11/17/10	5	11:45am	11:49am	4		barrier repair		49	SE-10		N/A
11/17/10	6	12:33pm	12:37pm	4		barrier repair		49	SE-6		N/A
11/17/10	7	14:20pm	14:26pm	6		barrier repair		49	SE-11		N/A
11/17/10	8	21:01pm	21:19pm	18		NB only, limit switch replace (max)		rain 44	N-3		N/A
11/17/10	9	22:02pm	22:07pm	5		NB only, Max limit switch replace		rain 42	NE-7		N/A
11/18/10	1	1:12am	1:22am	10	30	E/W training lifts	-	rain 38	E-8		N/A
11/18/10	2	1:29am	1:40am	11	32	E/W training lifts	-	rain 38	E-8		N/A
11/18/10	3	1:56am	2:05am	11	50	E/W training lifts	-	rain 38	E-8		N/A
11/18/10	4	2:21am	2:32am	11	30	training lifts east	-	rain 38	E-10		N/A
11/18/10	5	2:55am	3:01am	6	30	training lifts east	-	rain 38	E-10		N/A
11/18/10	6	3:09am	3:18am	9	86	training lifts east	-	rain 38	E-3		N/A
11/18/10	7	3:23am	3:31am	8	50	training lifts west	-	rain 38	E-3		N/A
11/18/10	8	3:38am	3:47am	9	100	training lifts west	-	rain 38	E-3		N/A
11/18/10	9	4:10am	4:22am	12	100	E/W training lifts	-	rain 38	E-3		N/A
11/18/10	10	4:29am	4:40am	11	75	E/W training lifts	-	rain 38	E-3		N/A
11/18/10	11	4:29am	4:45am	16	136	E/W training lifts	-	cloudy 41	E-4		N/A
11/18/10	12	5:52am	5:00am	8	32	training lifts east	-	cloudy 41	E-4		N/A
11/18/10	13	23:49pm	00:00am	11	25	training lift - west bridge auxillary motor test	-	rain 41	E-8	3.6	N/A
11/18/10	1	10:04am	10:16am	12		traffic stop NB only for emergency barrier repair		rain 39	SE-2		N/A
11/18/10	2	10:27am	10:48am	21		traffic stop NB only for emergency barrier repair		rain	E-2		N/A
11/19/10	1	00:10am	00:18am	8	25	training lift - west bridge auxillary motor test	-	rain 41	E-8	3.5	N/A
11/19/10	2	1:41am	2:00am	19	8	traffic lifts	-	rain 41	E-8	3.5	N/A
11/19/10	3	2:19am	2:29am	10	60	traffic lifts N/S	-	rain 41	E-8	3.5	N/A
11/19/10	4	2:34am	2:45am	11	80	traffic lifts N/S	-	rain 41	E-8	3.5	N/A
11/19/10	5	2:51am	3:10am	19	136	traffic lifts N/S	-	rain 41	E-8	3.5	N/A
11/19/10	6	3:21am	3:42am	21	136	traffic lifts N/S	-	rain 41	E-8	3.5	N/A
11/19/10	7	4:02am	4:23am	21	100	traffic lifts N/S	-	rain 41	E-8	3.5	N/A
11/19/10	1	00:50am	00:52am	2		east bridge training ft gate + barrier - s gatehouse		rain 41	E-8		N/A
11/19/10	2	00:54am	00:56am	2		east bridge training ft gate + barrier - s gatehouse		rain 41	E-6		N/A
11/19/10	3	1:04am	1:06am	2		west bridge training ft gate + barrier - n gatehouse		rain 41	E-5		N/A
11/19/10	4	1:07am	1:09am	2		west bridge training ft gate + barrier - n gatehouse		rain 41	E-6		N/A
11/23/10	1	13:48pm	13:49pm	1		wires pulled out, maintenance test west front gates		27	NW-2		N/A
11/30/10	1	9:55am	10:12am	17	120	"Christy T" MG	up	rain 37	E-19	3.2	Barge
12/01/10	1	12:50pm	13:10pm	20	110	"Ruth"	-	overcast 42	E-5	6	Barge
12/01/10	1	10:20am	10:26am	6		maint stop east bridge		41	E-4		N/A
12/05/10	1	3:57am	4:09am	12	70	Willamette	-	clear 42	0	5.5	Barge
12/06/10	1	10:01am	10:13am	12	120	Bruce M w/Derrick	up	cloudy 39	E-4	4.4	Barge
12/07/10	1	19:54pm	20:04pm	10	90	"Maverick" + 1 barge	down	rain 40	SE-5	5.8	Barge
12/08/10	1	1:55am	2:06am	11	80	"Rebel" 80'	down	rain 41	SE-4	4.2	Barge
12/08/10	2	13:59pm	14:09pm	10	70	"Chief"	-	cloudy 44	E-13	4.3	Barge
12/13/10	1	13:02pm	13:19pm	17	136	"Nancy Ann" w/Derrick	down	cloudy 56	E-4	7.5	Barge
12/14/10	1	23:43pm	23:58pm	15	136	maint lift	-	cloudy 43	S-9	9.2	N/A
12/15/10	1	12:15pm	12:24pm	9	75	"Runaway"	up	partly cloudy 47	S-5	9.8	Sail
12/20/10	1	10:38am	10:49am	11	95	"Casy-H" pushing the Adriatic Sea	down	rain 37	E-18	6.4	Barge
12/20/10	2	18:01pm	18:12pm	11	95	"Casy-H" pushing the Adriatic Sea	up	cloudy 38	E-12	7.5	Barge
12/22/10	1	10:49am	10:59am	10	95	Adriatic/Hernelly	down	cloudy 39	E-11	6.5	Barge

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
12/22/10	2	13:30pm	13:43pm	13	100	Adriatic/Hernelly/Bruce M	up and down	cloudy 41	E-6	5.8	Barge
12/27/10	1	14:03pm	14:12pm	9		remove wires / maintenance		rain 45	SW-6		N/A
12/28/10	1	9:32am	9:46am	14	87	maint lift for east bridge only, bird cannons	-	rain 46	W-2	6.6	N/A
12/29/10	1	9:17am	9:25am	8	86	maint / crossover	-	rainy 38	E-7	7.2	N/A
12/29/10	2	10:06am	10:13am	7	86	maint / crossover	-	rainy 37	E-7	7.5	N/A
01/05/11	1	12:05pm	12:13pm	8	70	Columbiaharan Asst	down	rainy 38	E-6	6.6	Unknown
01/12/11	1	9:01am	9:10am	9	95	Adriatic Sea	down	rain 41	E-6	4.9	Barge
01/12/11	2	14:01pm	14:10pm	9	95	Adriatic Sea	up	rain 51	SE-3	5.5	Barge
01/13/11	1	5:37am	5:47am	10	90	Adriatic Sea	down	rain 52	SE-6	4.7	Barge
01/17/11	1	12:44pm	12:50pm	11	105	"Betty Lou" w/clarkston pushing the Yaquina	down	cloudy 51	E-3	12	Federal
01/17/11	2	22:30pm	22:44pm	14	120	"Nancy Ann" + Derrick	up	cloudy 44	calm	12.5	Barge
01/20/11	1	12:02pm	12:16pm	14	120	Husky / Derek barge	up	partly cloudy 36	E-2	12.7	Barge
01/22/11	1	10:07am	10:19am	12	110	Maverick w/Derrick	down	partly cloudy	W-4	10.8	Barge
01/25/11	1	12:19pm	12:29pm	10	75	Runaway	down	cloudy 49	W-3	10.9	Sail
01/26/11	1	20:32pm	20:40pm	8	60	test lift west bridge only	-	cloudy 44	NE-1	8.5	N/A
01/26/11	2	20:50pm	20:59pm	9	100	test lift west bridge only	-	cloudy 44	0	8.5	N/A
01/26/11	3	21:07pm	21:20pm	13	136	test lift west bridge only	-	cloudy 43	0	8.5	N/A
01/27/11	1	12:54pm	13:04pm	10	72	Runaway	up	clear 46	0	9.5	Sail
01/27/11	1	12:25pm	12:37pm	12		runaway / bridge, problems					N/A
01/28/11	1	18:04pm	18:14pm	10	100	"Bruce M" + spud + Derek	-	cloudy 52	S-4	8.9	Barge
02/04/11	1	20:50pm	21:02pm	12	100	Maverick + spud barge	up	clear 45	E-NE-1	6.2	Barge
02/12/11	1	8:48am	9:01am	13	70	Daubi + 3 barges	down	cloudy 43	E-12	5.4	Barge
02/13/11	1	15:11pm	15:21pm	10	65	"Presto" - sailboat	up	cloudy 47	W-2	5.6	Sail
02/13/11	2	17:42pm	17:58pm	16	136	"Nany Ann" + Crane	down	rain 46	E-7	5	Barge
02/15/11	1	12:42pm	12:56pm	14	90	Barge + assist tug Christy T, "ATV Nathan E. Stewart"	down	cloudy 42	E-13	6.5	Barge
02/16/11	1	18:30pm	18:38pm	8	80	"Runaway" sailboat	up	cloudy 38	E-4	8.5	Sail
02/18/11	1	4:58am	5:19am	17	80	Hurricane + barges	down	cloudy 35	E-10	8.1	Barge
02/19/11	1	15:15pm	15:23pm	8	80	"Presto" - sailboat	down	clear 47	NW-6	7	Sail
02/23/11	1	21:37pm	21:52pm	15	130	"Husky" + crane barge	up	cloudy 35	S-1	6.4	Barge
02/24/11	1	9:33am	10:50am	17	130		down	clear/pt 34	S-1	6.8	Unknown
02/26/11	1	3:05am	3:17am	12	65	"Hurricane" + 4 barges	down	clear 21	0	4.6	Barge
02/27/11	1	7:48am	7:58am	10	85	"Ible's World" name on the boat was "Victory"	down	cloudy 37	S-5	3.9	Sail
02/28/11	1	21:38pm	21:50pm	12	120	"Clarkston" + crane barge	up	rain 37	E-9	5.9	Barge
03/01/11	1	19:59pm	20:10pm	11	125	"Clarkston" + crane barge	down	cloudy 38	NW-2	8	Barge
03/07/11	1	9:58am	9:59am	1		SB traffic stop so maint can cross the hyway (pier cleaning)		partly cloudy 36	S-2		N/A
03/07/11	2	12:16pm	12:17pm	1		" " return to sidewalk		cloudy 45	E-1		N/A
03/16/11	1	9:45am	9:54am	9	70	"Riva" sail vessel	down	rain 41	SE-3	8.6	Sail
03/16/11	2	22:50pm	23:02pm	12	120	"Maverick" + Derrick	up	rain 41	E-35	8.7	Barge
03/17/11	1	13:28pm	13:40pm	11	80	tug "seahawk", towing oil barge "Casey H" assisting	up	cloudy 45	E-10	8.9	Barge
03/17/11	2	18:00pm	18:14pm	14	115	"Maverick" w/Derrick, Sea Hawk joined in	down	rain 46	E-9	9.9	Barge
03/18/11	1	13:00pm	13:09pm	9	80	sailboats "Spirit" "Wind Raven" " Ruffian"	down	cloudy 42	E-12	9.7	Sail
03/20/11	1	12:45pm	12:55pm	10	70	Spirit / Wind Raven (sailboats)	up	cloudy 50	E-16	8.8	Sail
03/21/11	1	4:40am	4:57am	17	110	"Maverick" + Derrick	up	cloudy 43	E-11	8.5	Barge
03/21/11	2	9:00am	9:14am	14	110	"Maverick" + Derrick	down	rain 44	0	9.3	Barge
03/25/11	1	13:10pm	13:22pm	12	80	Daubi + barge	down	partly cloudy 45	6	8.4	Barge
03/26/11	1	4:42am	4:54am	12	80	"Captain Bob" + 2 barges	down	rain 42	E-12	7.5	Barge
03/26/11	2	15:10pm	15:25pm	15	110	"Bruce M" + crane barge, "Captain Bob" + crane barge	down	cloudy 48	SW-3	8	Barge
03/28/11	1	9:39am	9:49am	10	86	maint lift to bring down bird cannons	-	cloudy 45	S-3	7.4	N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
03/29/11	1	13:10pm	13:17pm	7		WashDot request, pot hole patching		rain 49	S-5		N/A
03/30/11	1	4:32am	4:46am	14	80	Deschutes + barges	down	cloudy 52	S-6	8	Barge
03/30/11	2	10:30am	10:44am	14	120	Patricia / Washougal / crane barge	up	cloudy 55	E-SE-3	8.3	Barge
04/02/11	1	11:35am	11:44am	9	65	Tidewater 3 barges	down	partly cloudy 44	W-SW-5	11.4	Barge
04/03/11	1	21:52pm	22:06pm	14	105	"sundial" + 4 barges	down	cloudy 50	calm	13	Barge
04/03/11	2	22:24pm	22:37pm	13	100	"Chief" + 4 barges	down	cloudy 49	calm	13	Barge
04/04/11	1	1:56am	2:12am	16	100	"Legend" + 4 barges	down	cloudy 45	SE-6	13	Barge
04/04/11	2	12:12pm	12:22pm	10	70	"Cascades" + 4 barges	down	rain 46	E-9	13.1	Barge
04/05/11	1	9:01am	9:15am	14	90	"Hurricane" + 4 barges	down	partly cloudy 43	SE-2	13.8	Barge
04/06/11	1	10:45am	10:55am	10	75	"Chief" + 3 barges	down	partly cloudy 43	SW-3	14.4	Barge
04/06/11	2	11:41am	11:50am	9	70	Crystal Swar sailboat	down	rain 39	SW-W-2	14.4	Sail
04/06/11	3	18:20pm	18:28pm	8	65	Tidewater 3 barges	down	cloudy 43	NE-5	13.9	Barge
04/07/11	1	9:15am	9:25am	10	67	"Bruce M" + 2 chip barges	down	cloudy 39	NW-3	13.8	Barge
04/07/11	2	9:49am	10:00am	11	65	"Lori B" + 4 barges	down	partly cloudy 38	NW-5	13.8	Barge
04/07/11	3	10:37am	10:47am	10	65	Outlaw + 4 barges	down	cloudy 40	N-2	13.8	Barge
04/07/11	4	11:10am	11:18am	8	60	La Cieta sailboat	down	partly cloudy 41	N-4	13.8	Sail
04/08/11	1	4:07am	4:17am	10	65	Captain B and log barge	down	37	0	12.3	Barge
04/08/11	2	23:12pm	23:24pm	10	70	"Chief" + barge	down	clear 48	W-1	11.5	Barge
04/09/11	1	8:55am	9:08am	12	65	"Sun Dial" w/	down	cloudy 42	?	10.8	Barge
04/09/11	2	22:19pm	22:32pm	13	90	"Willamette" + 4 barges	down	cloudy 48	-	11.1	Barge
04/10/11	1	3:32am	3:45am	13	65	"Hurricane" + 3 barges	down	rain	?	11	Barge
04/10/11	2	14:12pm	12:26pm	14	65	"Legend" + 3 barges	down	cloudy 52	SE-7	11.3	Barge
04/10/11	3	17:59pm	18:10pm	11	85	"Challenger" + 4 barges	down	cloudy 54	SW-6	11	Barge
04/10/11	4	19:02pm	19:13pm	11	85	"Clearwater" + 3 barges	down	cloudy 55	SW-5	10.9	Barge
04/10/11	5	22:17pm	22:29pm	12	85	"Outlaw" + 3 barges	down	rain 47	-	10.9	Barge
04/13/11	1	9:01am	9:11am	10	90	"Sirius" tug boat	up	cloudy 43	SE-5	9.9	Barge
04/14/11	1	3:53am	4:02am	9	80	Hiedi L Brisco" empty gravel barge	up	rain 43	S-3	9.8	Barge
04/14/11	2	11:36am	11:48am	12	60	"Challenger" + 3 barges	down	rain 45	SE-9	9.2	Barge
04/16/11	1	23:07pm	23:21pm	14	80	Hiedi L Brisco - 1 barge, "Catherine B" - 2 barges	down	rain 51	E-5	9.2	Barge
04/16/11	2	6:35am	6:58am	23	70	Outlaw + 4 grain barges	down	cloudy 51	S-1	10.2	Barge
04/16/11	3	8:41am	8:51am	10	70	"Chief" + 4 barges	down	overcast 51	W-NW-2	9.9	Barge
04/16/11	4	12:55pm	13:06pm	11	70	Tidewater 4 barges	down	overcast 52	W-3	9.6	Barge
04/16/11	5	13:32pm	13:40pm	8	65	"Riva" sailboat	up	overcast 53	W-3	9.5	Sail
04/16/11	6	23:00pm	23:10pm	10	80	"Sirius" tug boat	down	cloudy 43	W-6	9.6	Barge
04/17/11	1	17:05pm	17:12pm	7	80	Anamcar - sail vessel	down	partly cloudy 50	W-4	9.8	Sail
04/18/11	1	00:54am	1:05am	11	70	"Legend" + 4 barges	down	clear 42	NW-8	10	Barge
04/19/11	1	11:56am	12:06pm	10	70	Chief + 4 barges	down	clear 47	calm	10.9	Barge
04/19/11	2	19:23pm	19:36pm	13	85	"Willamette" + 4 barges	down	clear 54	NW-4	10.8	Barge
04/20/11	1	10:31am	10:48am	17	90	husky grain barges, spud umpqua	up	overcast 45	W-NW-7	10.9	Barge
04/20/11	2	14:00pm	14:12pm	12	110	husky grain barges	up	overcast 53	calm	10.7	Barge
04/21/11	1	19:17pm	19:31pm	14	65	"Lori B" + 3 barges	down	partly cloudy 48	NW-4	9.6	Barge
04/21/11	2	22:30pm	22:44pm	14	80	"Legend" + 3 barges	down	partly cloudy 44	0	10	Barge
04/22/11	1	5:05am	5:20am	15	75	"Kathryn B" 1 barge	s	38	NE-0	9.5	Barge
04/22/11	2	10:44am	10:54am	10	65	Cascades - 4 grain barges	down	clear 44	W-2	10.02	Barge
04/23/11	1	11:54am	12:07pm	13	136	"Olaf J" w/2 Derricks, "Daryl B" assisting	down	clear 56	W-3	9.4	Barge
04/23/11	2	13:23pm	13:43pm	20	136	"Nancy Ann" w/Derrick, "Christy T" assisting	up	clear 62	W-2	9.3	Barge
04/24/11	1	13:21pm	13:35pm	14	65	"Clearwater" + 4 barges	down	cloudy 52	S-3	8.3	Barge
04/28/11	1	21:41pm	21:53pm	12	75	"Chief" + 4 barges	down	cloudy 42	W-1	8.4	Barge
04/29/11	1	23:20pm	23:38pm	18	80	"Challenger" + 3 barges	down	cloudy 42	S-1	8.3	Barge

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
04/29/11	2	23:55pm	00:08am	13	80	"Legend" + 3 barges	down	cloudy 41	SE-4	8.7	Barge
04/29/11	3	12:39pm	12:50pm	11	70	"Wind Raven" sailboat	down	partly cloudy 52	W-2	8.2	Sail
04/29/11	4	13:57pm	14:08pm	11	70	"Dauby" + 2 barges	down	partly cloudy 52	W-2	8.2	Barge
05/01/11	1	12:47pm	12:55pm	8	80	"Annabella" sailboat	up	clear 53	W-2	7	Sail
05/02/11	1	4:30am	4:43am	13	75	"Legend" + 4 barges	down	clear 51	E-9	8.1	Barge
05/04/11	1	23:22pm	23:33pm	11	70	"Hurricane" + 4 barges	down	clear 58	NW-2	7.9	Barge
05/06/11	1	9:30am	9:40am	9	66	"Wind dancing" SB	up	cloudy 49	E-5	7.7	Sail
05/06/11	2	20:12pm	20:20pm	8	75	"Orcinius" sailing vessel	up	rain 48	E-4	7.4	Sail
05/07/11	1	2:54am	3:07am	13	90	"Catherine B" + 2 barges	down	cloudy 49	SE-9	7.6	Barge
05/07/11	2	6:34am	6:42am	8	80	"Anamcara" sailboat	down	cloudy 49	S-7	7.9	Sail
05/08/11	1	12:16pm	12:24pm	8	75	sailboat "Orcinius"	down	partly cloudy 48	SW-2	7.5	Sail
05/08/11	2	16:32pm	16:40pm	8	80	"Riba" sailboat	down	partly cloudy 53	W-6	7	Sail
05/08/11	3	23:11pm	23:21pm	10	60	"Willamette" + 4 barges	down	cloudy 58	W-8	7.6	Barge
05/12/11	1	20:04pm	20:15pm	11	65	"Legend" + 4 barges	down	partly cloudy 59	W-1	7.9	Barge
05/13/11	1	12:17pm	12:27pm	10	70	sail vessels "Bonnevie" "Symmetry"	down	partly cloudy 61	W-5	9	Sail
05/13/11	2	14:01pm	14:08pm	7	70	sail vessel "Maia Doran"	down	partly cloudy 67	W-10	9.3	Sail
05/13/11	3	18:00pm	18:13pm	13	85	sailboat Ata Marie - inbound, sailboat Ma Cherie - outbound	up	cloudy 68	N-4	9.7	Sail
05/14/11	1	3:37am	3:47am	10	90	"Dauby" + 2 barges	down	clear 53	W-2	10.5	Barge
05/14/11	2	10:13am	10:25am	12	70	"Tidewater" + 3 barges	down	cloudy 55	W-3	10.7	Barge
05/14/11	3	15:00pm	15:14pm	14	80	"Rebel" + 4 barges	down	cloudy 62	SE-4	10.8	Barge
05/15/11	1	3:33am	3:43am	10	60	"willamette" + barges	down	rain 51	0	11.4	Barge
05/15/11	2	5:06am	5:18am	12	60	"Capt Bob" + barges	down	rain 50	0	11.6	Barge
05/15/11	3	13:23pm	13:37pm	14	70	"Symmetry" + Bonnevie" + Maia Doran + Ma Cherie	up	rain 52	S-2	11.4	Sail
05/15/11	4	16:13pm	16:26pm	13	80	"Clearwater" + 3 barges	down	cloudy 54	SW-4	11.7	Barge
05/16/11	1	5:00am	5:12am	12	75	"Legend" + 4 barges	down	cloudy 47	S-1	13.1	Barge
05/17/11	1	00:49am	1:01am	12	60	"Daubi" + gravel barge	down	clear 48	NW-3	14.3	Barge
05/17/11	2	9:11am	9:20am	9	68	"Marilyn J" sailboat	down	cloudy 46	W-5	14.9	Sail
05/18/11	1	1:25am	1:36am	11	75	Tidewater + 3 barges	down	cloudy 52	0	15.3	Barge
05/18/11	2	12:45pm	12:55pm	10	125	"Kathryn B" + barge	down	sunny 61	W-S-3	15.6	Barge
05/18/11	3	18:16pm	18:29pm	13	90	"Cascades" + 3 barges	down	clear 69	NW-3	15.5	Barge
05/18/11	4	20:13pm	20:26pm	13	90	"Deschutes" + 3 barges	down	clear 64	NW-7	15.6	Barge
05/19/11	1	2:50am	3:01am	11	60	"Daubi" + gravel barge	down	cloudy 52	W-4	15.7	Barge
05/19/11	2	12:06pm	12:18pm	12	68	"Hurricane" + 3 barges	down	clear 60	calm	15.9	Barge
05/19/11	3	19:44pm	19:56pm	12	70	"Chief" + 3 barges	down	clear 67	N-7	15.8	Barge
05/20/11	1	9:11am	9:22am	11	86	"Catherine B" + Log barge, Ryan + Jim Toops to top	down	clear 52	W-2	15.8	Barge
05/20/11	2	10:07am	10:15am	8	61	sailing vessel "Elizabeth"	down	clear 54	W-4	15.8	Sail
05/20/11	3	12:48pm	12:56pm	8	80	sailing vessels "Galical" "Mara Doran" "Blue Heron"	down	clear 64	W-3	15.8	Sail
05/21/11	1	3:56am	4:10am	14	85	"Outlaw" + 3 barges	down	light rain 51	NW-2	16	Barge
05/21/11	2	6:30am	6:44am	14	80	"rebel" + 3 barges	down	high clouds 50	0	15.7	Barge
05/21/11	3	7:16am	7:27am	11	65	"Tidewater" + 1 barge	down	cloudy	0	15.8	Barge
05/21/11	4	8:09am	8:21am	12	80	"Pandora Red" also the "Solarity"	up	cloudy 52	W-2	15.9	Sail
05/21/11	5	11:33am	11:40am	7	65	sailboat "Luscious"	down	cloudy 57	W-2	15.9	Sail
05/21/11	6	11:55am	12:10pm	15	65	"Deschutes" + 3 barges	down	cloudy 57	W-1	15.9	Barge
05/21/11	7	13:58pm	14:07pm	9	65	sailboat "Kalysta"	down	cloudy 58	NW-6	15.9	Sail
05/21/11	8	19:26pm	19:40pm	14	90	"Sundial" + 3 barges	down	cloudy 55	NW-3	15.8	Barge
05/21/11	9	21:21pm	21:31pm	10	85	"Clearwater" + 3 barges	down	cloudy 54	NW-4	15.8	Barge
05/22/11	1	12:16pm	12:29pm	13	70	sailboatd - Luscious + Galatea, Hurriance + 2 barges	up and down	cloudy 55	NW-6	15.6	Sail
05/22/11	2	16:08pm	16:17pm	9	70	"Blue Heron" sailboat	up	cloudy 56	W-3	15.5	Sail
05/22/11	3	17:01pm	17:10pm	9	70	"Maia Doran" sailboat	up	cloudy 54	W-3	15.6	Sail

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
05/22/11	4	18:31pm	18:38pm	7	70	"Barlavento" sailboat	down	cloudy 55	W-2	15.6	Sail
05/23/11	1	2:30am	2:39am	9	60	"Willamette" + 2 barges	down	cloudy 50	NW-6	15.5	Barge
05/23/11	2	11:43am	11:54am	75	75	"Chief" + 3 barges	down	cloudy 53	W-2	15.6	Barge
05/23/11	3	22:12pm	22:22pm	80	80	"Capt Bob" + 2 barges	down	partly cloudy 55	NW-4	15.8	Barge
05/24/11	1	4:06am	4:19am	13	65	"Lori B" + log barge	down	cloudy 48	0	15.9	Barge
05/24/11	2	5:20am	5:30am	10	65	"Willamette" + 2 barges	down	cloudy 47	N-1	15.9	Barge
05/24/11	3	6:02am	6:15am	13	65	"Daubi" + 2 barges	down	cloudy 47	0	15.9	Barge
05/24/11	4	9:18am	9:33am	15	65	"Tidewater" 3 barges	down	cloudy 50	SW-1	15.8	Barge
05/24/11	5	13:50pm	14:05pm	15	60	Outlaw 3 barges	down	partly sunny 61	SE-1	15.8	Barge
05/24/11	6	18:19pm	18:29pm	10	75	Deschutes + 2 barges	down	partly cloudy 63	W-3	15.8	Barge
05/24/11	7	21:21pm	21:34pm	13	75	Clearwater + 3 barges	down	partly cloudy 62	NW-3	15.8	Barge
05/25/11	1	4:24am	4:34am	10	65	"Lori B"	down	cloudy 55	W-2	15.9	Barge
05/25/11	2	9:50am	10:02am	12	68	Queen of the West	down	rain 51	NE-3	15.8	Yacht
05/25/11	3	13:19am	13:31am	12	60	"Dabuy" 2 barges	down	overcast 54	E-5	15.8	Barge
05/26/11	1	5:30am	5:42am	12	65	"Lori B"	down	cloudy 45	E-2	16	Barge
05/26/11	2	9:08am	9:18am	10	60	"Grace" sailboat, "Shell Boogie" sailboat	down	cloudy 49	SE-3	16	Sail
05/26/11	3	9:55am	10:12am	17	70	"Whisper" sailboat, "Ecstasy" sailboat	down	cloudy 51	SE-2	16	Sail
05/26/11	4	11:32am	11:48am	16	8	maintenance lift	-	cloudy 52	S-2	16	N/A
05/26/11	5	13:03pm	13:13pm	10	70	"Moon Dance" sailboat, "Molodez" sailboat	-	rain 51	0	16	Sail
05/27/11	1	3:44am	3:55am	11	65	"Lori B" + 1 barge, "Daubi" + 2 barges	down	cloudy 50	SE-5	15.9	Barge
05/27/11	2	12:58pm	13:08pm	10	66	"Luscious" sailboat, "Spirit" sailboat	down	overcast 54	S-2	16	Sail
05/27/11	3	18:36pm	18:45pm	9	72	Autumn Wind sailboat	down	partly cloudy 51	SE-3	16.3	Sail
05/28/11	1	10:09am	10:17am	8	80	sailing vessels "Blue Fin" "Dazzle"	down	cloudy 51	N-3	16.4	Sail
05/28/11	2	11:51am	12:05pm	14	80	"Deschutes" + 2 barges, sailing vessels Lightspeed and Marylinn J	down	cloudy 53	S-2	16.4	Barge
05/28/11	3	14:55pm	15:13pm	13	80	"Queen of the West", "Sundial" + 3 barges	down	partly cloudy 56	NW-4	16.4	Barge
05/28/11	4	19:51pm	20:04pm	13	80	"Outlaw" + 3 barges	down	partly cloudy 57	NW-7	16.6	Barge
05/29/11	1	00:50am	1:04am	14	70	"Chief" + 2 barges	down	cloudy 49	NW-4	16.8	Barge
05/29/11	2	19:10pm	19:19pm	9	80	"Willamette" + 2 barges	down	cloudy 55	E-2	16.9	Barge
05/29/11	1	13:10pm	13:13pm	3		clean mattress of SB (alarm?)					N/A
05/30/11	1	2:52am	3:05am	13	70	"Challenger" + 2 barges	down	cloudy 51	0	16.9	Barge
05/30/11	2	4:04am	4:15am	11	65	"Lori B" + 1 log barge	down	cloudy 51	NE-2	17	Barge
05/30/11	3	10:06am	10:16am	10	70	"Deschutes" 2 barges	down	partly cloudy 53	SE-1	17	Barge
05/30/11	4	10:35am	10:44am	8	60	"Rose Petals" sailboat	down	partly cloudy 53	SE-3	17	Sail
05/30/11	5	11:25am	11:35am	10	70	"Willamette" 2 barges	down	partly cloudy 55	E-3	17	Barge
05/30/11	6	12:37pm	12:48pm	11	60	"Hurricane" 3 barges	down	partly cloudy 57	SE-2	17	Barge
05/30/11	7	13:05pm	13:19pm	14	75	"Whisper" / "Tropaica" / Luscious / Dazzle	up	partly cloudy 57	SE-2	17	Sail
05/30/11	8	13:58pm	14:05pm	12	60	"rebel" 2 barges	down	partly cloudy 60	SE-2	17	Barge
05/30/11	9	15:03pm	15:11pm	8	73	"Granuaile" sailboat	down	partly cloudy 60	SE-2	17.1	Sail
05/30/11	1	14:48pm	14:55pm	7		stopped traffic for lift, truck stopped on lift span, wouldn't go, so release traffic		partly cloudy 60	SE-3		N/A
05/31/11	1	00:20am	00:30am	10	70	"Lisa Melinda" 85' fishing boat	up	cloudy 54	S-5	17.2	Fishing
05/31/11	2	14:08pm	14:15pm	7	65	Gracy sailboat	up	partly cloudy 55	W-2	17.1	Sail
06/01/11	1	4:56am	5:07am	11	70	"Chief" + 3 barges	down	rain 51	0	17.3	Barge
06/01/11	2	11:46am	11:54am	8	65	"deschutes" + 2 grain barges	down	cloudy 54	E-1	17.3	Barge
06/02/11	1	00:13am	00:22am	9	65	"Outlaw" + 3 barges	down	cloudy 52	NW-1	17.3	Barge
06/02/11	2	5:18am	5:33am	9	70	"Patricia" + 2 barges	down	cloudy 47	E-3	17.3	Barge
06/02/11	3	6:02am	6:11am	15	70	"Cascade" + 2 barges	down	cloudy 47	E-3	17.3	Barge
06/02/11	4	9:14am	9:28am	14	60	"Kathryn B" + Bruce M + 2 barges	down	partly cloudy 52	2	17.4	Barge
06/02/11	5	10:49am	11:00am	11	60	Thirsty sailboat	up	partly cloudy 54	S-5	17.4	Sail
06/02/11	6	18:00pm	18:12pm	12	60	"Challenger" + 2 barges	down	partly cloudy	W-1	17.2	Barge

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
06/02/11	7	22:13pm	22:28pm	15	70	"rebel" + 3 barges	down	cloudy 54	E-4	17.3	Barge
06/03/11	1	13:45pm	13:53pm	8	70	cool change sailboat	up	sunny 69	N-4	17.1	Sail
06/03/11	2	19:28pm	19:42pm	14	70	"Tidewater" + 3 barges	down	clear 75	NE-5	17	Barge
06/03/11	3	20:47pm	20:57pm	10	70	"Willamette" + 2 barges	down	clear 72	NW-3	17	Barge
06/04/11	1	7:24am	7:34am	10	70	columbia river marine assist towing sailboat	up	clear 56	N-2	17.2	Barge
06/04/11	2	11:28am	11:41am	13	80	"Chief" + 3 barges	down	clear 77	E-11	17.3	Barge
06/04/11	3	14:01pm	14:13pm	12	75	"Deschutes" + 2 barges	down	partly cloudy 81	N-6	17.3	Barge
06/04/11	4	17:09pm	17:18pm	9	80	clearwater + 2 barges	down	clear 83	NE-2	17.3	Barge
06/04/11	5	19:23pm	19:31pm	8	70	"edna Lavine" sailboat	down	clear 81	NW-7	17.3	Sail
06/05/11	1	1:15am	1:30am	15	75	"Rebel" + 2 barges	down	clear 66	0	17.2	Barge
06/05/11	2	4:00am	4:13am	13	65	"Outlaw" + 3 barges	down	cloudy 63	W-3	17.3	Barge
06/05/11	3	5:03am	5:17am	14	65	"Sundial" + 2 barges	down	cloudy 63	NW-5	17.3	Barge
06/05/11	4	12:04pm	12:12pm	8	65	"Sea Moore" sailboat	down	cloudy 67	W-5	17.4	Sail
06/05/11	5	13:03pm	13:12pm	9	70	"Foreigner" sailboat	down	cloudy 68	W-4	17.3	Sail
06/05/11	6	13:43pm	13:58pm	15	90	"Maverick" with asst. "Daniel" + sailboat "sargaso"	down	cloudy 70	W-3	17.3	Barge
06/05/11	7	17:00pm	17:10pm	10	75	"Willamette" + 2 barges	down	cloudy 74	W-5	17.2	Barge
06/05/11	8	19:02pm	19:13pm	11	75	"Hurricane" + 3 barges	down	cloudy 75	W-4	17.2	Barge
06/05/11	9	20:52pm			75	"Legend" + 2 barges	down	cloudy 74	NW-4	17.2	Barge
06/06/11	1	10:52am	11:00am	8	75	sailboat "Winema"	down	cloudy 59	W-2	17.3	Sail
06/06/11	2	19:33pm	19:42pm	9	75	"Seymore" sailboat	up	cloudy 66	S-1	17.3	Sail
06/07/11	1	11:38am	11:49am	11	80	"Chief" + 3 barges	down	cloudy 58	N-6	17.1	Barge
06/07/11	2	18:52pm	19:00pm	8	75	"Ramrod" sailboat	down	partly cloudy 59	W-10	17	Sail
06/08/11	1	4:08am	4:17am	9	65	"Tidewater" + 3 barges	down	cloudy 54	0	17	Barge
06/08/11	2	9:00am	9:08am	8	80	"Blue Fin"	down	cloudy 55	S-2	16.9	Sail
06/08/11	3	9:34am	9:43am	9	80	"Queen of the West"	down	partly cloudy 56	E-2	16.9	Yacht
06/08/11	4	13:16pm	13:30pm	14	80	"Bruce M" + 2 loaded chip barges	down	cloudy 59	NW-6	17	Barge
06/08/11	5	19:17pm	19:28pm	11	75	"Sundial" + 3 barges	down	cloudy 60	NW-2	17	Barge
06/09/11	1	00:50am	00:58am	8	70	"Willamette" + 2 barges	-	cloudy 57	NW-4	16.9	Barge
06/09/11	2	5:19am	5:31am	12	70	"Lori B" + 2 barges	-	cloudy 52	NW-4	16.9	Barge
06/09/11	3	11:30am	11:42am	12	70	"Chief" + 3 barges	down	partly cloudy 62	W-4	16.8	Barge
06/09/11	4	13:39pm	13:52pm	13	70	"Hurricane" + 3 barges, "Santana" sailboat	down	partly cloudy 65	W-4	16.8	Barge
06/09/11	5	18:00pm	18:15pm	15	70	"Cascades" + 2 barges	down	cloudy 68	N-9	16.8	Barge
06/10/11	1	22:43pm	22:54pm	11	65	"clearwater" + 2 barges	down	cloudy 57	NW-3	16.7	Barge
06/11/11	1	6:58am	7:13am	15	70	"outlaw" + 2 barges, waited above Ryan's point for full open!	down	cloudy 54	W-3	16.7	Barge
06/11/11	2	8:34am	8:43am	9	85	sailing vessel "Tango"	down	cloudy 55	W-3	16.7	Sail
06/11/11	3	10:30am	10:38am	8	70	sailing vessel "Sea Moore"	down	cloudy 57	NW-3	16.6	Sail
06/11/11	4	11:44am	11:56am	12	80	sailboats "Barlavento" + Indigo + Misty Isle	up and down	cloudy 59	0	16.6	Sail
06/11/11	5	12:39pm	12:53pm	14	70	"Bruce M" + 2 barges	down	cloudy 60	N-3	16.6	Barge
06/11/11	6	13:27pm	13:36pm	9	60	sailboat "SLA Rose"	down	cloudy 61	W-2	16.6	Sail
06/11/11	7	14:14pm	14:23pm	9	80	"Queen of the West"	down	cloudy 62	W-3	16.6	Yacht
06/11/11	8	22:55pm	23:03pm	8	70	legend + 2 barges	down	clear 58	NW-5	16.5	Barge
06/12/11	1	3:21am	3:33am	12	70	"Willamette" + 2 barges	down	cloudy 52	NW-2	16.5	Barge
06/12/11	2	7:28am	7:37am	9	65	sailboat "Black Acre"	down	clear 52	NW-2	16.5	Sail
06/12/11	3	10:13am	10:21am	8	75	sailboat "Spatlese"	down	cloudy	S-1	16.5	Sail
06/12/11	4	12:06pm	12:14pm	8	65	sailboat "Kiitos"	down	cloudy 62	E-1	16.4	Sail
06/12/11	5	13:53pm	14:05pm	12	70	sailboat "Sea Marie" + "Classic Lady"	up and down	cloudy 65	0	16.4	Sail
06/12/11	6	15:19pm	15:28pm	9	70	"Ingrid Princess" sailboat	up	cloudy 65	NE-2	16.5	Sail
06/13/11	1	5:17am	5:26am	9	75	"Symmetry" sailboat	down	cloudy 56	S-4	16.52	Sail
06/13/11	2	6:13am	6:23am	10	75	"Sam-B" + 1 barge	up	cloudy 56	S-5	16.53	Barge

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
06/13/11	3	23:50pm	23:59pm	9	75	"Daubi" + 2 barges	down	cloudy 56	N-6	16.11	Barge
06/14/11	1	3:55am	4:06am	11	70	clarkston + 2 barges	down	cloudy 55	NW-3	16.5	Barge
06/14/11	2	19:03pm	19:14pm	11	80	"Catherine B" + 2 barges	down	cloudy 60	NW-16	16.6	Barge
06/14/11	3	22:48pm	22:57pm	9	85	"Willamette"	down	cloudy 55	NW-5	16.5	Barge
06/15/11	1	00:20am	00:30am	10	75	"Legend" + 2 barges	down	cloudy 54	NW-6	16.5	Barge
06/15/11	2	9:08am	9:19am	11	90	Ata Marie, Make It So	down	53	W-5	16.6	Sail
06/15/11	3	11:11am	11:19am	8	60	"deschutes" + 2 grain barges	down	cloudy 54	W-2	16.6	Barge
06/15/11	4	12:10pm	12:18pm	8	80	"SLA Rose" sailboat	up	partly cloudy 57	W-5	16.6	Sail
06/15/11	5	12:49pm	13:00pm	11	70	Clearwater	down	partly cloudy 56	W-4	16.6	Barge
06/15/11	6	20:38pm	20:50pm	12	75	"Tidewater" + 3 barges	down	clear 58	W-8	16.5	Barge
06/15/11	7	22:29pm	22:39pm	10	86	"Dauby" + 1 barge	down	clear 55	W-3	16.5	Barge
06/16/11	1	5:38am	5:48am	10	75	"Hurricane" + 2 barges	down	partly cloudy 50	NW-2	16.6	Barge
06/16/11	2	13:01pm	13:08pm	7	70	"Endeavor" sailboat	up	partly cloudy 60	E-2	16.5	Sail
06/16/11	3	13:31pm	13:50pm	19	70	Bruce M + 2 barges	down	partly cloudy 61	calm	16.5	Barge
06/16/11	4	18:46pm	18:57pm	11	75	sailboats - Rapscallion and Rose Pedal	up and down	partly cloudy 67	W-5	16.6	Sail
06/17/11	1	11:04am	11:13am	9	70	Mark-4, Moon River, Golden Goose sailboats	down	clear 58	W-3	16.6	Sail
06/17/11	2	13:13pm	13:20pm	7	60	Mandoken sailboat	down	clear 64	N-NW-1	16.6	Sail
06/18/11	1	00:40am	00:51am	11	70	"Daubi" + 2 barges	down	clear 59	NW-2	16.53	Barge
06/18/11	2	8:43am	8:58am	15	70	"Deschutes" + 2 barges	down	rain 53	E-3	16.5	Barge
06/18/11	3	9:24am	9:37am	13	60	sailboat "Ramrod"	up	rain 53	E-2	16.4	Sail
06/18/11	4	13:54pm	14:03pm	9	65	sailboat "Glori Jana"	down	rain 57	SE-3	16.3	Sail
06/18/11	5	17:53pm	18:04pm	11	80	"Catherine B" + 2 barges	down	rain 59	calm	16	Barge
06/19/11	1	2:14am	2:23am	9	75	"Tidewater" + 2 barges	down	cloudy 57	W-10	15.9	Barge
06/19/11	2	4:00am	4:16am	16	90	"Sam B" + 1 barge	down	cloudy 56	0	15.9	Barge
06/19/11	3	14:52pm	15:01pm	9	75	sailboats "Dew Drop" + Maia Doran	up	cloudy 63	E-2	15.5	Sail
06/20/11	1	22:53pm	23:03pm	10	80	"Willamette" + 2 barges	down	clear 65	NW-6	14.5	Barge
06/21/11	1	9:51am	9:58am	7	87	maint NB only	-	sunny 58	W-3	14.1	N/A
06/21/11	2	10:58am	11:06am	10	87	sailing vessel Wind Dancing	down	sunny 62	W-5	14.1	Sail
06/21/11	3	11:25am	11:34am	9	60	fishing vessel "Lisa Melinda"	down	sunny 64	W-5	14.1	Fishing
06/21/11	4	12:34pm	12:43pm	9	87E/65N	"Bread + Roses"	down	sunny 68	W-4	14.1	Unknown
06/21/11	5	22:16pm	22:27pm	11	80	"Bruce M" + 1 barge	down	clear 73	NW-13	14.1	Barge
06/22/11	1	4:45am	4:53am	8	70	"Tidewater" + 2 barges	down	cloudy 59	NW-4	14	Barge
06/22/11	2	9:42am	9:53am	11	70	"Queen of the West"	down	cloudy 61	NW-2	14	Yacht
06/22/11	3	12:20pm	12:31pm	11	70	"Hurricane"	down	cloudy 64	W-4	14.1	Barge
06/22/11	4	18:01pm	18:21pm	20	75	"Catherine B" + "Legend"	down	cloudy 66	W-4	14.1	Barge
06/22/11	5	21:13pm	21:22pm	9	75	"Cascades" + 2 barges	down	cloudy 60	NW-7	14.1	Barge
06/23/11	1	10:16am	10:24am	8	65	sailing vessel "Ecstasy"	down	cloudy 58	S-1	14	Sail
06/23/11	2	18:00pm	18:16pm	16	136	"Maverick" + 2 Derricks	down	partly cloudy 63	NW-4	13.9	Barge
06/24/11	1	9:07am	9:14am	7	70	Aghassi	down	cloudy 58	2	14.1	Unknown
06/25/11	1	8:53am	9:04am	11	70	sailboats "Tropical" + "Trio Lee"	down	clear 55	NW-4	15.4	Sail
06/25/11	2	12:18pm	12:27pm	9	70	sailboat "Ramrod"	down	clear 63	W-9	15.4	Sail
06/25/11	3	13:07pm	13:17pm	10	70	"Legend" + 2 barges	down	clear 64	0	15.3	Barge
06/25/11	4	15:11pm	15:22pm	11	75	"Queen of the West"	down	clear 68	NW-10	15.4	Yacht
06/26/11	1	11:40am	11:49am	9	80	sailboat "Coqui"	up	clear 63	W-2	14.4	Sail
06/26/11	2	13:53pm	14:05pm	12	70	"Willamette" + 2 barges	down	cloudy 69	W-2	14.2	Barge
06/26/11	3	16:33pm	16:40pm	7	70	"Coqui" sailboat	down	cloudy 71	W-3	14.1	Sail
06/27/11	1	10:00am	10:27am	27	136	maint list for Gross can check out counter weight west bridge wheels	-	cloudy 66	0	13.3	N/A
06/27/11	2	21:59pm	22:12pm	13	70	"Tidewater" + 3 barges	down	cloudy 68	0	13	Barge
06/28/11	1	00:44am	00:55am	11	70	"Daubi" + 2 barges	down	rain 64	S-1	13	Barge

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
06/28/11	2	9:06am	9:17am	11	120	"Daniel Foss" (Derrick)	up	rain 62	NW-2	13.1	Barge
06/28/11	3	10:36am	10:45am	9	100	"Adriatic Sea" (tug only)	up	rain 63	NW-1	13	Barge
06/28/11	4	11:10am	11:20am	10	80	Runaway (sailboat)	up	rain 63	NW-1	12.9	Sail
06/28/11	5	19:03pm	19:12pm	9	70	sailboat "Symmetry"	up	cloudy 68	E-2	12.7	Sail
06/29/11	1	9:19am	9:29am	10	77	"clearwater" + 2 barges	down	cloudy 61	E-1	12.6	Barge
06/29/11	2	13:49pm	13:59pm	10	75	"Kathryn B" + 2 barges	down	cloudy 63	SW-4	12.4	Barge
06/30/11	1	00:29am	00:40am	11	70	"Daubi" + 1 barge	down	cloudy 58	SW-4	12.4	Barge
06/30/11	2	5:30am	5:39am	9	80	"Jenny's Joy" sail vessel	down	cloudy 55	N-1	12.53	Sail
06/30/11	3	9:30am	9:38am	8	70	"Wakadui" sailboat	down	cloudy 58	calm	12.4	Sail
06/30/11	4	12:52pm	13:02pm	10	80	"Cascades" + 2 barges	down	cloudy 61	E-3	12.3	Barge
06/30/11	5	13:43pm	13:51pm	8	65	"Bruce M" + 2 barges	down	cloudy 61	E-3	12.2	Barge
06/30/11	6	18:05pm	18:13pm	8	66	Maia Dokan, Do Drop In sailboats	down	cloudy 64	W-NW-7	12.1	Sail
06/30/11	7	23:50pm	00:08am	18	69	maintenance lift	-	cloudy 57	NW-6	12.2	N/A
06/30/11	1	23:23pm	23:33pm	10		East bridge R-barrier check for damage		cloudy 57	NW-8		N/A
07/01/11	1	9:01am	9:18am	17	136	Deschutes tug Portland	up	clear sun 56	2	12.5	Barge
07/01/11	2	10:10am	10:20am	10	95	Fuego	down	clear sun 59	7	12.6	Unknown
07/01/11	3	10:52am	11:05am	13	136	Deschutes spud barge	down	clear sun 59	5	12.6	Barge
07/01/11	4	11:35am	11:45am	10	84	Spirit sailboat	down	clear sun 62	5	12.6	Sail
07/01/11	5	12:56pm	13:06pm	10	90	"Adriatic Sea" (light boat)	down	clear 65	NW-11	12.5	Barge
07/02/11	1	1:20am	1:30am	10	80	"Dauby" + 2 barges	down	clear 64	NW-3	13	Barge
07/02/11	2	5:44am	5:59am	15	136	"Maverick" + crane barge	up	clear 57	NW-2	13.4	Barge
07/02/11	3	7:35am	7:43am	8	60	Anabelle sailboat	down	clear 58	N-NW-6	13.4	Sail
07/02/11	4	9:13am	9:21am	8	65	Legend + 4 barges	down	clear 60	N-NW-6	13.4	Barge
07/02/11	5	9:37am	9:45am	8	90	Maverick + 1 spud barge	down	clear 61	N-NW-6	13.4	Barge
07/02/11	6	11:30am	11:42am	12	65	Rebel - Galatea, Stella, Quarz, S.B.	down	clear 66	W-4	13.5	Barge
07/02/11	7	13:06pm	13:15pm	9	65	Cascades 4 barges	down	clear 71	W-SW-3	13.5	Barge
07/02/11	8	14:45pm	14:54pm	9	65	"Tango" sailboat	up	clear 77	W-4	13.5	Sail
07/02/11	9	16:25pm	16:37pm	12	75	"Willamette" + 3 barges	down	clear 79	W-5	13.4	Barge
07/02/11	10	16:57pm	17:05pm	8	65	"Invictus" sailboat	up	clear 81	NW-5	13.4	Sail
07/03/11	1	11:39am	11:49am	10	85	"Rebel" + 2 barges	down	cloudy 63	calm	13.7	Barge
07/04/11	1	8:22am	8:30am	8	65	Clearwater 2 barges	down	clear 58	NW-5	13.6	Barge
07/04/11	2	10:11am	10:19am	8	70	PT Thompson	up	clear 61	NW-3	13.6	Barge
07/04/11	3	12:02pm	12:10pm	8	70	Galatea + Spirit sailboats	up	clear 67	NW-1	13.6	Sail
07/04/11	4	12:24pm	12:32pm	8	70	PT Thompson	down	clear 68	6	13.6	Barge
07/04/11	5	14:43pm	14:52pm	9	70	Maverick Western Ranger	down	clear 74	W-4	13.6	Barge
07/05/11	1	9:19am	9:36am	17	80	Washougal + spud barge, Symmetry + Invictus S.B.	down	clear 63	4	12.8	Barge
07/05/11	2	12:47pm	12:57pm	10	70	Stella Polake, Ana Blue S.B.	up	clear 73	9	12.8	Sail
07/05/11	3	13:45pm	13:54pm	9	70	Rapscallion, Glori Jana S.B.	up	clear 77	W-10	12.3	Sail
07/05/11	4	20:57pm	21:06pm	9	75	"Challenger" + 3 barges	down	clear 78	NW-10	11.9	Barge
07/06/11	1	3:11am	3:20am	9	70	"Bruce M" + 1 barge	down	clear 64	NW-2	11.9	Barge
07/06/11	2	9:30am	9:40am	10	75	"Queen of the West"	down	clear 66	NW-6	11.7	Yacht
07/07/11	1	4:30am	4:39am	9	70	"Willamette" + 3 barges	down	clear 60	NW-3	11.8	Barge
07/07/11	2	10:57am	11:07am	10	90	"Bruce M" + 2 chip barges	down	cloudy 62	NW-5	11.8	Barge
07/07/11	3	12:05pm	12:20pm	15	80	"rebel" + 3 barges	down	cloudy 62	NW-6	11.8	Barge
07/07/11	4	18:35pm	18:48pm	13	65	"Kathryn B" + 3 barges	down	partly cloudy 64	E-9	11.4	Barge
07/09/11	1	9:21am	9:30am	9	70	sailboat "Great Shearwater"	down	clear 57	W-5	11.5	Sail
07/09/11	2	14:52pm	15:02pm	10	70	"Clearwater" + 3 barges	down	clear 72	NW-10	11.4	Barge
07/09/11	3	22:09pm	22:17pm	8	30	Test lift both bridges	-	clear 66	NW-5	11.3	N/A
07/09/11	4	23:20pm	23:28pm	8	100	test lift east bridge only	-	clear 63	NW-2	11.4	N/A

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
07/09/11	5	23:32pm	23:40pm	8	100	test lift west bridge only	-	clear 62	NW-2	11.4	N/A
07/09/11	6	23:46pm	23:53pm	7	44	test lift east bridge only	-	clear 62	NW-4	11.4	N/A
07/10/11	1	14:00pm	14:08pm	8	70	sailboat "Maia Doran"	up	partly cloudy 70	W-3	11	Sail
07/10/11	2	15:51pm	16:05pm	14	75	"Legend" + 4 barges	down	clear 75	W-2	11.2	Barge
07/10/11	3	15:07pm	15:14pm	7	60	"Rapscallion" sailboat	down	clear 75	NW-4	11.2	Sail
07/12/11	1	1:20am	1:46am	26	70	"Daubi" + 2 barges	-	raiun 60	0	10.7	Barge
07/12/11	2	10:52am	11:10am	18	136	East bridge maint "Sashey" sail vessel	up	cloudy 61	SE-2	10.4	Sail
07/12/11	3	13:25am	13:33am	8	80	"Wind Dancer" sail vessel	up	cloudy 63	SE-5	10	Sail
07/13/11	1	9:12am	9:46am	33	136	Lassen, PT Thompson, Deschutes, "Willamette" - oil Derrick barge	down	cloudy 62	S-1	9.5	Barge
07/14/11	1	1:49am	1:59am	10	70	"Daubi" + 1 barge	down	cloudy 59	NW-2	8.6	Barge
07/14/11	2	18:29pm	18:38pm	9	70	sailboat "Wind Dancing"	down	partly cloudy 68	NW-3	8.9	Sail
07/16/11	1	2:59am	3:09am	10	80	"Dauby" + 2 barges	down	rain 61	NE-4	10.5	Barge
07/16/11	2	3:55am	4:05am	10	85	"Challenger" + 3 barges	down	rain 60	calm	10.5	Barge
07/16/11	3	14:21pm				"Tidewater" + 3 barges	down	partly cloudy 69	SE-4	9	Barge
07/16/11	4	18:24pm	18:33pm	9	70	"rebel" + 3 barges	down	cloudy 71	S-2	8.8	Barge
07/16/11	5	23:54pm	00:03am	9	75	Dauby + crane barge	down	cloudy 62	NW-6	8.8	Barge
07/18/11	1	1:40am	1:49am	9	75	"Legend" + 4 barges	down	cloudy 58	W-4	8	Barge
07/18/11	2	20:57pm	21:07pm	10	70	"Spatlease" + Rapscallion sailboats	up	partly cloudy 67	NW-5	8.4	Sail
07/19/11	1	12:37pm	12:50pm	13	100	"Deschutes" "PT Thompson" "Willamette" crowly barge	down	cloudy 63	SE-1	8.6	Barge
07/20/11	1	10:53am	11:01am	8	70	"Wind Raven"	down	cloudy 63	W-5	8.1	Sail
07/20/11	2	11:45am	11:55am	10	86	"Crown of Camas" spud barge	down	partly cloudy 64	W-4	8.1	Barge
07/20/11	3	22:35pm	22:47pm	12	75	"Capt Bob" + 4 barges	down	partly cloudy 65	NW-4	8.2	Barge
07/21/11	1	18:00pm	18:07pm	7	30	test lift for D. Johnson	-	cloudy 67	W-11	6.8	N/A
07/21/11	1	10:18am	10:20am	2		traffic stop for Dave Johnson		cloudy 62	3		N/A
07/21/11	2	13:33pm	13:35pm	2		traffic stop to remove debris - SB		cloudy 65	S-4		N/A
07/22/11	1	11:05am	11:19am	14	100	Columbia + Derek barge, Willamette + spud barge	up	cloudy 61	NW-1	6.9	Barge
07/22/11	2	14:03pm	14:14pm	11	110	Columbia + Derek barge, Willamette + spud barge	down	sunny 65	W-5	6.8	Barge
07/24/11	1	21:11pm	21:21pm	10	75	"Chief" + 4 barges	down	clear 76	NW-9	5.8	Barge
07/25/11	1	19:20pm	19:28pm	8	75	"Ironwood"	up	clear 70	NW-9	5.8	Federal
07/27/11	1	2:00am	2:10am	10	70	"Willamette" + 4 barges	down	partly cloudy 58	NW-3	6.4	Barge
07/28/11	1	18:24pm	18:32pm	8	85	"Ironwood"	down	clear 79	W-7	5.9	Federal
07/29/11	1	20:17pm	20:27pm	10	110	"Daniel Foss" (Derrick)	down	clear 75	W-7	5.4	Barge
07/31/11	1	21:55pm	22:09pm	9	80	"Sam B" + 1 barge	up	clear 66	NW-9	7.1	Barge
08/01/11	1	4:38am	4:52am	14	136	Tug Maverick + 1 crane barge	up	clear 57	NW-5	5.7	Barge
08/05/11	1	5:50am	6:01am	11	90	"Sam B" + 1 barge	-	cloudy 61	NW-4	4.96	Barge
08/12/11	1	10:04am	10:12am	8	90	"Cristy T" + spud barge, crane	down	partly cloudy 60	3	5.5	Barge
08/12/11	2	11:18am	11:27am	9	90	Make It So	up	sunny 64	4	5	Sail
08/12/11	3					"Christy T" + Derrick	up	clear 77	3	5.4	Barge
08/17/11	1	6:00am	6:16am	16	86	maintenance lift	-	clear 59	NW-4	4.1	N/A
08/18/11	1	9:30am	9:50am	20	82	(Drawer) maint lift west bridge	-	cloudy 60	NW-4	4.7	N/A
08/19/11	1	12:09pm	12:29pm	22	86	maint lift east bridge only	-	clear 74	NW-10	4.4	N/A
08/20/11	1	6:02am	6:39am	32	136	maint east bridge lube slides	-				N/A
08/20/11	2	6:47am	7:13am	25	136	maint east bridge lube slides	-	61	2	4	N/A
08/20/11	3	21:38pm	21:52pm	14	125	"Betty Lou" + Derrick	down	clear 79	W-5	4.7	Barge
08/22/11	1	11:11am	11:21am	10	86	maint lift to retrieve greasing supplies	-	partly cloudy 767	SE-3	2.7	N/A
08/22/11	2	11:47am	11:56am	9	80	sailboat "Anum Cara"	up	partly cloudy 69	S-10	2.8	Sail
08/24/11	1	13:24pm	13:32pm	8	80	"Washougal" + Derrick	up	clear 81	W-2	2.8	Barge
08/25/11	1	9:00am	9:08am	8	65	"Ironwood" USCG	up	clear 67	NW-6	4.3	Federal
08/26/11	1	11:37am	11:45am	8	70	"Marine Assist" w/sailboat	down	clear 71	NW-6	3.5	Barge

Date	lift #	gates closed	gates open	total time (min)	life elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
08/30/11	1	10:01am	10:15am	14	136	maint	-	overcast 61	NW-4	4.8	N/A
09/04/11	1	20:24pm	20:31pm	7	75	"Walk-a-Doi" sailboat	up	clear 80	NW-3	2.2	Sail
09/10/11	1	23:33pm	23:42pm	9	76	east bridge only - test	-	clear 76	calm	2.4	N/A
09/10/11	2	23:45pm	23:54pm	9	76	west bridge only - test	-	clear 75	NW-2	2.4	N/A
09/11/11	1	00:02am	00:11am	9	73	east bridge only - test	-	clear 75	calm	2.3	N/A
09/11/11	2	00:15am	00:23am	8	67	west bridge only - test	-	clear 75	calm	2.1	N/A
09/12/11	1	18:05pm	18:13pm	8	75	sailing vessel "Autumn Wind"	up	clear 74	NW-3	4.5	Sail
09/12/11	2	13:40pm	13:43pm	3		maintenance - east bridge only		clear 68	SE-1		N/A
09/15/11	1	10:11am	10:29am	18	86	maintenance east bridge, "Jenny's Joy" sail vessel	up	cloudy 63	W-1	3	Sail
09/15/11	2	12:28pm	12:37pm	9	86	maintenance - east bridge only	-	cloudy 63	W-3	2	N/A
09/20/11	1	18:36pm	18:46pm	10	100	"Yaquina"	up	clear 78	NW-2	1.2	Federal
09/27/11	1	00:36am	1:07am	31	136	"Yaquina" Dredge	down	cloudy 59	SE-11	2.75	Federal
09/28/11	1	20:32pm	20:50pm	18		NB only - WDOT striping		clear 68	NE-5		N/A
10/02/11	1	12:08pm	12:17pm	9	80	sailboat "Bad Dog"	up	cloudy 60	E-7	2.8	Sail
10/04/11	1	12:23pm	12:30pm	7	50	test lift No. B. only	-	partly cloudy 62	11	3.3	N/A
10/08/11	1	15:08pm	15:16pm	8	80	"Haven" sailboat	down	partly cloudy 64	W-1	2.8	Sail
10/24/11	1	10:33am	10:45am	12	100	"Casey H" w/2 Derricks + 2 spuds	up	partly cloudy 49	W-2	0.9	Barge
10/27/11	1	12:53pm	13:00pm	7	80	"Ironwood"	down	clear 48	NW-3	1.8	Federal
10/29/11	1	14:02pm	14:13pm	11	70	"Rebel" w/4 barges	down	clear 51	W-3	2.9	Barge
10/30/11	1	14:48pm	15:03pm	15	75	"Rebel" + 4 barges	down	fog/rain 59	calm	2.3	Barge
11/03/11	1	12:29pm	12:45pm	16	100	"Olaf J" (Derrick)	down	cloudy 45	NW-1	3.8	Barge
11/03/11	2	18:00pm	18:12pm	12	90	"Daubi" + Derrick	up	partly cloudy 47	NW-5	2.5	Barge
11/07/11	1	9:20am	9:31am	11	90	"Washougal" + Derrick	down	cloudy 47	E-3	1.6	Barge
11/19/11	1	7:39am	8:02am	23	86	maint lift to remove weight from NB/East bridge counterweights	-	cloudy 38	0	2.7	N/A
11/19/11	2	8:20am	8:45am	25	86	maint lift to remove weight from NB/East bridge counterweights	-	cloudy 38	S-1	3.1	N/A
11/19/11	3	9:03am	9:22am	19	68/136	maint lift NB only to check ballance	-	cloudy 39	S-1	3.4	N/A
11/20/11	1	22:09pm	22:20pm	11	90	east bridge only - test	-	cloudy 37	SE-4	2.8	N/A
11/20/11	2	22:23pm	22:34pm	9	90	west bridge only - test	-	cloudy 37	SE-6	2.8	N/A
11/20/11	3	22:38pm	22:47pm	9	90	east bridge only - test	-	cloudy 37	SE-2	2.9	N/A
11/20/11	4	23:05pm	23:17pm	12	90	west bridge only - test	-	cloudy 37	SE-5	3.2	N/A
11/20/11	5	23:23pm	23:35pm	12	136	east bridge only - test	-	cloudy 37	SE-4	3.2	N/A
11/20/11	6	23:41pm	23:54pm	13	136	west bridge only - test	-	cloudy 38	SE-3	3.4	N/A
11/23/11	1	00:46am	00:58am	12	75	"Rebel" + 4 barges	down	rain 56	S-4	5.2	Barge
11/25/11	1	2:00am	2:10am	10	80	"Tidewater" + 4 barges	down	cloudy 43	W-4	6.5	Barge
11/26/11	1	7:35am	7:50am	15	6	maint adjustment lift	-	cloudy 47	SE-7	5.9	N/A
11/26/11	2	7:58am	8:13am	15	136	maint adjustment lift	-	cloudy 47	SE-7	5.9	N/A
11/30/11	1	00:13am	00:24am	11	75	"Rebel" + 4 barges	down	cloudy 45	S-3	4.5	Barge
12/01/11	1	11:26am	11:41am	15	80	"Daryl B" + 2 Derricks	down	clear 39	0	3.9	Barge
12/02/11	1	9:54am	9:55am	1		SE ped gate warning lights are out, full stop NB		cloudy 43	calm		N/A
12/03/11	1	5:11am	5:21am	10	90	"Daubi" + spud/Derek barge	up	clear 33	N-2	1.6	Barge
12/08/11	1	23:02pm	23:15pm	13	136	test lift east bridge	-	clear 35	NW-2	2.6	N/A
12/15/11	1	10:57am	11:05am	8	83	west bridge only, EMS battery delivery - CWTS	-	cloudy 37	E-5	3.9	N/A
12/17/11	1	12:13pm	12:26pm	13	85	"Stacy T" w/Derrick	down	clear 43	E-1	3.5	Barge

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Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
1/7/2012	1	12:22	12:31	9	85	Jonathan	Up	Cloudy 45	5	3.9	Sail
1/11/2012	2	14:11	14:25	14	75	Legend	Down	Sunny 46	9	3.6	Barge
1/14/2012	1	13:46	13:56	10	75	Legend		Rain 41	5	3.8	Barge
1/18/2012	1	3:11	3:25	14	85	Tidewater	Down	Snow/rain 33	3	3.7	Barge
1/20/2012	2	18:00	18:19	19	75	Deschutes	Down	Rain 36	14	11.2	Barge
1/20/2012	1	14:04	14:19	15	75	Lori B	Down	Rain 37	22	11	Barge
1/20/2012	2	18:00	18:19	19	75	Legend	Down	Rain 36	14	11.2	Barge
1/21/2012	2	19:30	19:42	12	85	Tidewater	Down	Cloudy 42	4	12.4	Barge
1/21/2012	3	22:41	22:52	16	85	Outlaw	Down	Cloudy 42	Calm	12.3	Barge
1/21/2012	1	12:18	12:27	9	80	Runaway	up	Rain 45	11	11.5	Sail
1/22/2012	1	15:14	15:27	13	80	Hurricane	Down	Rain 42	7	11.5	Barge
1/26/2012	1	23:53	0:06	13	80	Legend	Down	Cloudy 51	8	9.8	Barge
1/26/2012	2	9:37	9:51	14	90	Stacy T	Down	Clear 44	4	10	Barge
1/27/2012	2	13:00	13:12	12	80	Outlaw	Down	Clear 33	3	9.4	Barge
1/27/2012	1	0:42	0:53	11	80	Wallace E	Down	Clear 34	1	9.5	Barge
1/28/2012	2	12:00	12:10	10	85	Deschutes	Down	Cloudy 39	1	8.8	Barge
1/28/2012	1	5:23	5:37	14	75	Rebel	Down	Cloudy 32	2	8.7	Barge
1/28/2012	3	14:34	14:45	11	70	Legend	Down	Hazy 44	2	8.5	Barge
2/1/2012	1	22:32	22:42	10	85	Juno	Up	Cloudy 41	Calm	6	Other/unknown
2/2/2012	1	9:39	9:53	14	100	Nancy Ann	Up	Cloudy 38	2	5.4	Other/unknown
2/16/2012	1	18:01	18:13	12	100	Fishing vessel Jewel	Down	Cloudy 43	5	4.1	Sail
2/17/2012	1	13:15	13:25	10	110	Stacy T	Up	Rain 44	19	5	Barge
2/18/2012	1	22:41	22:52	11	85	Tidewater	Up	Cloudy 42	3	3.5	Barge
2/25/2012	1	20:45	20:58	13	80	Deschutes	Down	Cloudy 39	2	5.7	Barge
2/26/2012	1	14:20	14:34	14	90	Nancy Ann	Down	Cloudy 41	5	4.9	Other/unknown
2/27/2012	1	20:24	20:35	11	80	Tidewater	Down	Clear 40	6	5.2	Barge
2/28/2012	1	10:35	11:02	27	136/86	Norton Bay	Up	Cloudy 39	15	5.4	Barge
3/3/2012	1	2:41	2:52	11	60	Tidewater	Down	Cloudy 47	5	4.7	Barge
3/5/2012	1	19:41	19:53	12	130	Sundial	Up	Cloudy 41	6	5.2	Barge
3/6/2012	1	19:59	20:11	12	125	Sundial	Down	Clear 41	5	5.3	Barge
3/8/2012	1	19:02	19:20	18	100	Norton Bay	Down	Clear 58	11	5.9	Barge
3/18/2012	2	11:44	11:58	14	136	Juno	Up	Cloudy 40	2	10.7	Other/unknown
3/19/2012	1	21:47	21:59	12	110	Sundial	Up	Cloudy 41	13	9.8	Barge
3/20/2012	2	18:02	18:18	16	136	Sundial	Down	Cloudy 48	4	9.1	Barge
3/23/2012	2	23:10	23:19	9	65	Deschutes	Down	Clear 45	1	10	Barge
3/23/2012	1	12:43	12:53	10	80	Rebel	Down	Clear 41	3	10	Barge
3/24/2012	1	9:37	9:52	16	133	Free Bird	Down	Clear 54	9	10.3	Sail
3/25/2012	1	4:08	4:20	12	90	Deschutes	Down	Ovecast 44	3	10.3	Barge
3/25/2012	4	21:37	21:37	13	85	Tidewater	Down	Cloudy 44	5	10.5	Barge
3/25/2012	3	15:30	15:39	9	80	Free Bird	Up	Cloudy 53	3	10.4	Sail

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
3/25/2012	2	6:52	7:03	11	90	Pacific Avenger	Up	Overcast 44	2	10.6	Barge
3/26/2012	1	11:03	11:12	9	85	Rage	Up	Clear 47	2	10.1	Sail
3/26/2012	2	12:27	12:36	9	85	Rage	Down	Clear 50	7	10	Sail
3/28/2012	3	9:45	10:55	10	95	Dauby	Down	Cloudy 49	6	9.9	Barge
3/28/2012	1	2:00	2:10	10	80	Deschutes	Down	Cloudy 47	5	8.8	Barge
3/28/2012	2	9:00	9:09	9	90	Juno	Down	Cloudy 48	12	9.8	Other/unknown
3/31/2012	5	21:11	21:22	11	80	Chief	Down	Rain 48	4	15.4	Barge
3/31/2012	6	22:34	22:46	12	80	Defiance	Down	Rain 47	2	15.4	Barge
3/31/2012	7	23:56	0:08	12	80	Deschutes	Down	Rain 45	9	15.4	Barge
3/31/2012	2	12:05	12:17	12	75	Kathryn B	Down	Rain 44	12	15.3	Barge
3/31/2012	3	15:12	15:25	13	85	Tidewater	Down	Partly Cloudy 50	14	15.5	Barge
3/31/2012	4	18:10	18:21	11	80	Tidewater	Down	Partly Cloudy 51	12	15.4	Barge
3/31/2012	1	0:41	0:53	12	70	Willamette	Down	Rain 41	3	14.1	Barge
4/1/2012	2	19:54	20:05	11	80	Capt Bob	Down	Partly Cloudy 47	3	15.6	Barge
4/1/2012	1	19:06	19:19	13	80	Cascades	Down	Cloudy 49	6	15.6	Barge
4/2/2012	1	1:22	1:37	15	70	Rebel	Down	Cloudy 43	5	15.6	Barge
4/3/2012	1	1:19	1:29	10	70	Dauby	Down	Cloudy 51	12	15.5	Barge
4/3/2012	3	22:08	22:19	11	85	Lori B	Down	Cloudy 45	3	15.5	Barge
4/3/2012	2	10:24	10:38	14	70	Sundial	Down	Rain 48	5	15.4	Barge
4/4/2012	1	9:19	9:29	10	70	Defiance	Down	Cloudy 42	0	15.2	Barge
4/4/2012	2	10:30	10:39	9	70	Tidewater	Down	Rain 42	3	15.2	Barge
4/6/2012	3	12:12	12:23	11	70	Bruce M	Down	Partly Cloudy 48	1	12	Barge
4/6/2012	1	2:36	2:48	12	70	Chief	Down	Cloudy 39	2	12.3	Barge
4/6/2012	2	10:56	11:09	13	70	Legend	Down	Partly Cloidy 46	4	12.3	Barge
4/7/2012	1	23:18	23:27	9	65	Dauby	Down	Cloudy 42	0	12.3	Barge
4/7/2012	5	21:24	21:34	10	80	Hurricane	Down	Cloudy 56	Calm	12.9	Barge
4/7/2012	3	8:54	9:04	10	60	Tidewater	Down	Fog 36	2	12.7	Barge
4/7/2012	2	5:38	5:48	10	65	Wallace E	Down	Cloudy 34	0	12.5	Barge
4/7/2012	6	22:42	22:53	11	80	Willamette	Down	Cloudy 57	Calm	12.9	Barge
4/7/2012	4	11:47	11:55	8	65	Runaway	Down	Sunny 46	3	12.6	Sail
4/8/2012	4	15:48			75	Clearwater	Down	Clear 66	Calm	12.3	Barge
4/8/2012	1	3:32	3:42	10	80	Rebel	Down	Cloudy 54	Calm	12.5	Barge
4/8/2012	3	11:32	11:40	8	70	Runaway	Up	Clear 59	Calm	12.6	Sail
4/9/2012	3	4:03	4:13	10	65	Chief	Down	Cloudy 52	Calm	11.8	Barge
4/9/2012	1	1:54	2:03	9	60	Lori B	Down	Cloudy 55	6	12	Barge
4/9/2012	4	18:03	18:16	13	75	Legend	Down	Cloudy 66	2	10.9	Barge
4/9/2012	2	3:37	3:48	11	70	Wallace E	Down	Cloudy 55	Calm	11.8	Barge
4/10/2012	1	1:20	1:30	10	60	Capt Bob	Down	Cloudy 51	2	11	Barge
4/10/2012	2	9:20	9:29	9	90	Huski	Down	Cloudy 52	11	10.8	Barge
4/10/2012	3	21:33	21:44	11	75	Catherine	Down	Cloudy 54	2	9.3	Barge

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
4/11/2012	2	11:47	11:56	9	60	Bruce M	Down	Cloudy 52	2	10	Barge
4/11/2012	4	19:42	19:55	13	70	Chief	Down	Cloudy 49	4	9.4	Barge
4/11/2012	5	23:29	23:29	9	60	Deschutes	Down	Rain 46	3	10	Barge
4/11/2012	1	5:26	5:39	13	55	Hurricane	Down	Cloudy 51	2	9	Barge
4/11/2012	3	13:55	14:05	10	90	Huski	Down	Cloudy 53	3	9.8	Barge
4/12/2012	2	4:40	4:52	12	60	Dauby	Down	Cloudy 45	0	10.1	Barge
4/12/2012	1	2:59	3:10	11	60	Outlaw	Down	Cloudy 46	3	10.1	Barge
4/13/2012	3	10:16	10:28	12	65	Tidewater	Down	Partly Cloudy 46	3	9.8	Barge
4/13/2012	2	9:06	9:16	10	60	Wallace E	Down	Partly Cloudy 46	0	9.7	Barge
4/13/2012	1	0:20	0:30	10	65	Willamette	Down	Partly Cloudy 45	2	9.9	Barge
4/14/2012	2				75	Hurricane	Down	Clear 43	0	9.7	Barge
4/14/2012	3	11:33	11:45	12	75	Hurricane	Down	Partly Cloudy 57	Calm	9.7	Barge
4/14/2012	1	2:12	2:26	14	65	Rebel	Down	Cloudy 46	0	9.8	Barge
4/15/2012	10	21:40	21:56	16	65	Lori B	Down	Rain 55	0	8.9	Barge
4/15/2012	8	8:46	8:58	12	60	Legend	Down	Partly Cloudy 47	Calm	8.8	Barge
4/15/2012	9	15:49	15:58	9	80	Riva	Down	Partly Cloudy 63	0	9	Sail
4/16/2012	2	23:50	0:02	12	75	Dauby	Down	Cloudy 47	2	8.5	Barge
4/16/2012	1	20:52	21:04	12	80	Tidewater	Down	Cloudy 51	3	8.4	Barge
4/17/2012	1	9:30	9:37	7	70	Aquila	Down	Cloudy 47	2	9	Sail
4/19/2012	1	0:33	0:46	13	65	Dauby	Down	Cloudy 47	2	9.9	Barge
4/19/2012	2	0:43	0:58	15	65	Defiance	Down	Cloudy 46	0	9.9	Barge
4/19/2012	3	13:00	13:09	9	70	Aquila	Up	Rain 47	0	10.1	Sail
4/20/2012	1	12:44	12:57	13	70	Willamette	Down	Cloudy 53	3	10.6	Barge
4/21/2012	1	2:02	2:23	21	60	Hurricane	Down	Cloudy 48	0	10.8	Barge
4/21/2012	4	20:47	21:01	14	75	Rebel	Down	Clear 69	2	11.2	Barge
4/21/2012	2	12:35	12:47	12	80	Outlaw	Down	Sunny 56	1	11.07	Barge
4/21/2012	3	14:45	14:53	8	80	Riva	up	Clear 64	3	10.1	Sail
4/22/2012	2	23:33	23:47	14	75	Legend	Down	Clear 64	6	11.3	Barge
4/22/2012	1	12:27	12:34	7	70	Adventura	Down	Clear 65	4	11	Sail
4/23/2012	1	9:03	9:17	14	70	Clearwater	Down	Sunny 58	3	11.9	Barge
4/25/2012	2	20:12	20:23	11	70	Wila	Down	Drizzle 58	3	12.4	Sail
4/25/2012	1	9:27	9:36	9	75	Queen of the West	Down	Cloudy 56	5	12.4	Cruise/passenger
4/26/2012	1	4:10	4:30	20	65	Dauby	Down	Rain 50	9	13.7	Barge
4/26/2012	2	10:50	11:15	25	80	Tidewater	Down	Rain 47	10	14.4	Barge
4/26/2012	3	11:28	11:37	9	85	Whisper	Down	Rain 53	10	14.4	Sail
4/27/2012	2	9:26	9:36	10	60	Bruce M	Down	Cloudy 50	4	14.7	Barge
4/27/2012	6	19:28	19:42	14	65	Chief	Down	Cloudy 52	5	14.5	Barge
4/27/2012	1	0:58	1:13	15	60	Outlaw	Down	Cloudy 46	4	14.7	Barge
4/27/2012	4	12:43	12:51	8	75	Wind River	Down	Rain 51	1	14.6	Sail
4/27/2012	3	11:22	11:32	10	75	Luscious	Down	Cloudy 54	3	14.6	Sail

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
4/27/2012	5	13:39	13:49	10	75	Queen of the West	Up	Cloudy 53	1	14.6	Cruise/passenger
4/28/2012	3	14:47	17:59	12	80	Rebel	Down	Partly Cloudy 61	4	14.7	Barge
4/28/2012	4	23:20	23:30	10	75	Willamette	Down	Cloudy 58	2	14.6	Barge
4/28/2012	2	12:59	13:09	10	75	Queen of the West	Down	Partly Cloudy 55	3	14.6	Cruise/passenger
4/29/2012	3	13:04	13:16	12	75	Cascades	Down	Cloudy 57	5	14.7	Barge
4/29/2012	1	4:30	4:40	10	75	Deschutes	Down	Cloudy 53	5	14.6	Barge
4/29/2012	6	21:10	21:23	13	75	Sundial	Down	Cloudy 60	7	14.5	Barge
4/29/2012	5	19:15	19:28	13	75	Tidewater	Down	Cloudy 63	2	14.5	Barge
4/29/2012	2	9:22	9:31	9	75	Ecstasy	Up	Cloudy 53	Calm	14.5	Sail
4/29/2012	4	13:29	13:37	8	70	Wind Raven	Up	Cloudy 58	5	14.7	Sail
4/30/2012	1	19:59	20:13	14	65	Hurricane	Down	Cloudy 50	6	13.8	Barge
5/1/2012	2	3:38	3:50	12	60	Dauby	Down	Cloudy 44	3	13.5	Barge
5/1/2012	1	0:38	0:51	13	70	Legend	Down	Cloudy 46	1	13.5	Barge
5/1/2012	3	19:22	19:31	9	80	Seascape	Up	Cloudy 49	3	13.7	Sail
5/2/2012	1	9:45	9:56	11	65	Defiance	Down	Cloudy 47	4	13.8	Barge
5/2/2012	2	20:53	21:05	12	70	Tidewater	Down	Cloudy 51	5	13.9	Barge
5/3/2012	1	1:01	1:11	10	60	Chief	Down	Rain 47	5	14	Barge
5/3/2012	2	2:30	2:42	12	60	Dauby	Down	Rain 47	3	14	Barge
5/3/2012	3	4:34	4:46	12	60	Deschutes	Down	Rain 47	9	14.3	Barge
5/3/2012	4	12:54	13:07	11	65	Hurricane	Down	Rain 55	8	13.6	Barge
5/4/2012	1	9:01	9:15	14	60	Bruce M	Down	Cloudy 47	1	14.8	Barge
5/4/2012	2	18:00	18:16	16	65	Rebel	Down	Parly Cloudy 52	11	15	Barge
5/5/2012	6	22:40	22:57	11	75	Capt Bob	Down	Clear 50	3	14.4	Barge
5/5/2012	3	11:54	12:05	11	75	Deschutes	Down	Cloudy 51	Calm	14.7	Barge
5/5/2012	1	7:57	8:09	12	80	Sundial	Down	Cloudy 45	Calm	15	Barge
5/5/2012	2	8:41	8:50	9	70	Penelope	Down	Cloudy 46	Calm	15	Sail
5/5/2012	5	17:41	14:49	8	70	Penelope	Up	Cloudy 52	6	14.5	Sail
5/5/2012	4	12:25	12:32	7	70	Rya	Down	Cloudy 52	2	14.7	Sail
5/6/2012	3	8:14	8:24	10	65	Chief	Down	Cloudy 44	3	14.4	Barge
5/6/2012	7	21:21	21:23	13	75	Clearwater	Down	Clear 61	5	14.3	Barge
5/6/2012	8	22:24	22:35	11	70	Defiance	Down	Clear 58	3	14.3	Barge
5/6/2012	5	13:35	13:47	12	70	Hurricane	Down	Clear 57	6	14.3	Barge
5/6/2012	1	0:36	0:52	17	65	Tidewater	Down	Clear 48	5	14.2	Barge
5/6/2012	4	12:17	12:30	11	70	Willamette	Down	Clear 52	5	14.4	Barge
5/6/2012	2	6:23	6:30	7	60	Hardway	Down	Clear 42	Calm	14.2	Other/unknown
5/6/2012	6	17:05	17:12	7	70	Reva	Down	Clear 66	7	14.3	Sail
5/8/2012	3	14:15	14:25	10	60	Dauby	Down	Clear 66	7	12.6	Barge
5/8/2012	1	2:19	2:32	13	65	Rebel	Down	Clear 58	Calm	13.1	Barge
5/8/2012	4	18:02	18:11	9	110	Stacy T	Up	Clear 68	9	12.4	Barge
5/8/2012	2	11:35	11:43	8	85	Calif Girl	Down	Sunny63	5	12.8	Sail

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
5/9/2012	5	18:00	18:12	12	65	Chief	Down	Partly Cloudy 47	16	11.3	Barge
5/9/2012	2	1:34	10:47	13	65	Clearwater	Down	Cloudy 50	6	12	Barge
5/9/2012	1	1:31	1:44	13	70	Defiance	Down	Partly Cloudy 49	9	12.2	Barge
5/9/2012	4	12:30	12:43	13	65	Lori B	Down	Partly Clear 52	5	11.9	Barge
5/9/2012	3	11:56	12:07	11	100	Olaf J	Down	Partly Clear 53	7	11.9	Marine construction
5/10/2012	3	23:09	23:23	14	60	Cascades	Down	Clear 51	4	11.3	Barge
5/10/2012	1	0:47	0:58	11	70	Hurricane	Down	Cloudy 45	4	11.3	Barge
5/10/2012	2	9:51	10:04	13	75	Sargasso	Down	Clear 46	5	11.5	Barge
5/11/2012	1	3:07	3:20	13	60	Legend	Down	Clear 46	4	11	Barge
5/11/2012	3	11:47	11:56	9	70	Bonnevie	Down	Clear 56	6	10.9	Sail
5/11/2012	2	11:19	11:29	10	70	Maia Doran	Down	Clear 55	5	10.9	Sail
5/12/2012	1	10:44	10:57	13	70	Defiance	Down	Clear 62	4	10.4	Barge
5/12/2012	2	15:42	15:50	8	70	Bonnevie	Up	Clear 77	4	10.4	Sail
5/13/2012	1	11:19	11:30	11	70	Hurricane	Down	Clear 68	4	10.3	Barge
5/13/2012	2	12:14	12:23	9	70	Penelope	Up	Clear 72	5	10.3	Sail
5/14/2012	1	18:14	18:21	7	70	Affirmation	Down	Clear 81	7	8.9	Sail
5/15/2012	1	9:29	9:43	14	70	Defiance	Down	Clear 55	3	8.8	Barge
5/17/2012	2	23:20	23:36	16	90	Tidewater	Down	Clear	5	9.7	Barge
5/17/2012	1	18:44	18:54	10	70	Tango	Up	Clear 61	13	9.7	Sail
5/19/2012	3	15:16	12:28	12	75	Defiance	Down	Partly Cloudy 66	Calm	11.3	Barge
5/19/2012	1	2:30	2:44	14	70	Sundial	Down	Clear 48	0	10.6	Barge
5/19/2012	2	10:40	10:49	9	80	Runaway	Down	Clear 54	2	11.2	Sail
5/21/2012	1	9:50	10:02	12	59	Runaway	Up	Rain 55	5	11.2	Sail
5/23/2012	1	11:15	11:32	17	73	Lori B	Down	Cloudy 58	0	11.3	Barge
5/24/2012	4	13:58	14:09	11	75	Runaway	Down	Rain 52	6	11.5	Sail
5/25/2012	2	11:51	12:03	12	80	Always & Forever	Up	Partly Cloudy 61	2	11.7	Sail
5/25/2012	3	12:43	12:56	13	70	Wind Raven	Down	Partly Cloudy 61	1	11.6	Sail
5/25/2012	1	11:07	11:18	11	75	Passion Yacht	Down	Partly Cloudy 60	0	11.8	Other/unknown
5/26/2012	11	12:13	12:27	14	65	Cascades	Down	Cloudy 58	1	11.7	Barge
5/26/2012	9	10:19	10:35	16	70	Chief	Down	Cloudy 55	1	11.7	Barge
5/26/2012	7	4:47	5:15	18	50	Kathryn B		Cloudy 52	0	11.3	Barge
5/26/2012	10	11:37	11:55	18	75	Runaway	Up	Cloudy 52	1	11.7	Sail
5/26/2012	12	13:44	13:58	14	80	Liahana	Up	Cloudy 60	0	11.7	Sail
5/27/2012	2	13:12	13:29	17	55	Rebel	Down	Cloudy 57	1	10.7	Barge
5/27/2012	1	3:30	3:46	16	45	Sundial	Down	Cloudy 52	5	11.1	Barge
5/29/2012	1	9:58	10:17	19	56	Always & Forever	Down	Cloudy 57	Calm	8.8	Sail
5/29/2012	2	11:59	12:15	16	70	Liahana	Down	Sunny 60	Calm	8.8	Sail
5/31/2012	1	9:28	9:45	17	75	Desert Vision		58		8.3	Sail
6/1/2012	1	9:02	9:23	21	65	Rebel	Down	Cloudy 60	Calm	8	Barge
6/2/2012	1	4:10	4:28	18	41	Lori B	Down	Cloudy 55	4	8.9	Barge

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
6/2/2012	2	16:15	16:35	20	50	Legend	Down	Cloudy 62	6	7.9	Barge
6/3/2012	1	8:20	8:30	10	40	Tidewater	Down	Cloudy 50	0	8.4	Barge
6/3/2012	2	11:52	12:04	8	50	Liahana	Up	Cloudy 56	Calm	7.9	Sail
6/5/2012	2	23:51	0:03	12	50	Affirmation	Up	Clear 51	Calm	9.5	Sail
6/6/2012	1	19:02	19:16	14	65	Autumn Wind	Down	Cloudy 65	0	9.6	Sail
6/7/2012	1	11:00	11:11	11	60	Liahana	Down	Rain 52	12	11	Sail
6/8/2012	1	18:00	18:18	18	50	Kathryn B	Down	Rain 47	1	10.7	Barge
6/8/2012	2	21:52	22:09	17	55	Lori B	Down	Rain 47	0	11	Barge
6/9/2012	3	9:58	10:12	14	50	Defiance	Down	Cloudy 51	2	11.4	Barge
6/9/2012	2	9:38	9:51	13	50	Desert Vision	Up	Cloudy 51	1	11.4	Sail
6/9/2012	1	9:07	9:19	12	50	Yankee Rose	Down	Cloudy 52	1	11.4	Sail
6/13/2012	1	18:03	18:18	15	60	Sargasso	Up	Partly Cloudy 63	2	10.3	Barge
6/14/2012	1	0:21	0:36	15	65	Dauby	Down	Cloudy 52	10	10.1	Barge
6/14/2012	2	10:04	10:18	14	50	Tidewater	Down	Cloudy 52	0	10	Barge
6/15/2012	1	10:10	10:28	18	90	Stacy T	Down	Clear 58	Calm	9.7	Barge
6/15/2012	3	12:21	12:32	11	60	Maia Doran	Down	Clear 67	3	9.5	Sail
6/15/2012	2	11:08	11:23	15	90	Meduse	Up	Clear 65	3	9.5	Other/unknown
6/16/2012	1	0:20	0:33	13	40	Dauby	Down	Cloudy 66	0	9.9	Barge
6/16/2012	3	14:31	14:42	11	70	Legend	Down	Sunny 81	Calm	9.7	Barge
6/16/2012	2	10:59	11:07	8	50	Runaway	Down	Clear 69	6	10	Sail
6/17/2012	1	14:53	15:02	9	55	Mia Doran	Up	Cloudy 69	7	9	Other/unknown
6/18/2012	1	10:42	11:02	20	50	Runaway	Up	Cloudy 55	0	9.1	Sail
6/21/2012	1	9:01	9:27	26	60	Deschutes	Down	Clear 62	Calm	10.9	Barge
6/23/2012	1	0:45	0:57	12	65	Dauby	Down	Coudy 57	2	10.3	Barge
6/23/2012	2	15:43	15:54	11	75	Lori B	Down	Partly Cloudy 53	Calm	10.8	Barge
6/23/2012	3	16:41	16:54	13	95	Rebel	Down	Partly Cloudy 56	2	10.8	Barge
6/24/2012	1	6:58	7:08	10	95	Pacific Avenger	Down	Rain 50	0	10.6	Barge
6/27/2012	3	23:33	23:44	11	60	Dauby	Down	Clear 59	0	12.8	Barge
6/27/2012	2	21:37	21:50	13	70	Legend	Down	Clear 70	1	12.5	Barge
6/27/2012	1	12:06	12:15	9	80	Libby	Down	Clear 64	0	12.1	Sail
6/28/2012	1	9:15	9:31	16	70	Bruce M	Down	Clear 62	0	12.9	Barge
6/28/2012	1	9:15	9:31	16	70	Jenny's Joy	Down	Clear 62	0	12.9	Sail
6/29/2012	1	1:50	2:03	13	70	Chief	Down	Cloudy 63	4	12.3	Barge
6/29/2012	3	12:42	12:51	9	75	Affirmation	Down	Cloudy 71	1	11.7	Sail
6/29/2012	2	9:00	9:08	8	65	Fury	Down	Cloudy 64	4	11.9	Sail
6/29/2012	4	18:00	18:15	15	100	Olaf J	Down	Cloudy 74	1	11.8	Marine construction
6/30/2012	2	11:01	11:10	9	65	Clearwater	Down	Cloudy 67	Calm	11.9	Barge
6/30/2012	4	14:25	14:35	10	60	Lori B	Down	Rain 67	3	11.8	Barge
6/30/2012	5	14:44	14:54	10	80	Stacy T	Up	Rain 66	5	11.8	Barge
6/30/2012	6	16:04	16:12	8	70	Das Suenos	Up	Cloudy 68	3	12	Sail

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
6/30/2012	3	13:38	13:45	7	50	high Road	Down	Cloudy 68	4	11.8	Other/unknown
6/30/2012	1	10:01	10:16	9	65	Spay Lacy	Down	Cloudy 67	Calm	11.9	Other/unknown
7/1/2012	1	13:29	13:42	13	75	Tidewater	Down	Cloudy 63	4	12	Barge
7/2/2012	1	21:49	21:46	7	75	Autumn Cara	Up	Cloudy 62	Calm	11.9	Sail
7/2/2012	2	22:17	22:24	7	70	Semitry	Up	Cloudy 62	2	11.9	Sail
7/5/2012	2	9:15	9:28	13	115	Stacy T	Down	Clear 61	3	10.9	Barge
7/5/2012	3	11:09	11:16	7	70	Des Quenos	Down	Clear 61	0	10.8	Sail
7/5/2012	4	12:12	12:19	8	80	Meduse	Down	Clear 62	0	10.7	Other/unknown
7/5/2012	1	6:12	6:20	8	70	Minnow	Down	Clear 54	1	10.6	Sail
7/7/2012	1	15:42	15:50	8	70	Autumn Cara	Down	Clear 82	8	10	Sail
7/8/2012	1	10:12	10:20	8	50	Autumn Cara	Up	Sunny 70	0	9.6	Sail
7/10/2012	1	2:12	2:24	12	60	Dauby	Down	Partly Cloudy 55	0	9.3	Barge
7/10/2012	2	2:45	2:55	10	60	Lori B	Down	Partly Cloudy 55	1	9.3	Barge
7/10/2012	3	14:15	14:24	9	70	Sequoia	Up	Clear 71	0	8.2	Sail
7/12/2012	2	1:50	2:05	15	70	Legend	Down	Clear 65	1	9.3	Barge
7/12/2012	1	23:43	23:51	8	70	Affirmation	Up	Clear 70	0	9.2	Sail
7/13/2012	3	19:04	19:17	13	70	Tidewater	Down	Parlty Cloudy 77	2	8.4	Barge
7/13/2012	2	3:10	3:26	16	70	Legend	Down	Clear 58	0	9.3	Barge
7/13/2012	1	1:22	1:32	10	70	the Office	Down	Clear 59	2	9.2	Sail
7/14/2012	1	0:37	0:48	11	75	Dauby	Down	Clear 65	Calm	8.9	Barge
7/15/2012	2	12:35	12:46	11	70	Deschutes	Down	Cloudy 61	3	8.7	Barge
7/15/2012	1	6:32	6:41	9	60	Desert Vision	Down	Rain 59	Calm	9	Sail
7/20/2012	1	11:10	11:20	10	80	Sequoia	Down	Cloudy 64	1	7.9	Sail
7/22/2012	1	18:01	18;15	14	70	Deschutes	Down	Cloudy 66	2	9	Barge
7/23/2012	1	9:12	9:20	8	85	Runaway	Up	Partly Cloudy 59	3	9	Sail
7/24/2012	1	2:58	3:08	10	70	Dauby	Down	Clear 57	2	9	Barge
7/27/2012	1	5:17	5:29	12	65	Sundial	Down	59	0	7.8	Barge
7/28/2012	1	5:20	5:33	13	65	Defiance	Down	Cloudy 59	4	7.5	Barge
7/28/2012	2	14:43	14:51	8	70	Tanuki	Down	Clear 78	0	6.3	Other/unknown
7/31/2012	1	18:08	18:17	9	85	Stacy T	Up	Clear 78	0	6.4	Barge
8/3/2012	1	6:03	6:12	9	60	Defiance	Down	Cloudy 60	4	6.9	Barge
8/4/2012	1	9:34	9:45	11	75	Autumn Cara	Down	Clear 74	1	6.6	Sail
8/4/2012	2	22:02	22:09	7	70	Autumn Cara	Up	Clear 85	Calm	6.9	Sail
8/8/2012	1	19:01	19:14	13	70	Attair	Up	Clear 73	1	3.8	Barge
8/11/2012	1	11:55	12:04	9	65	Spirit	Down	Clear 71	4	2.8	Cruise/passenger
8/12/2012	1	11:06	11:22	16	90	Audratic Sea	Down	Sunny 75	0	3.6	Sail
8/15/2012	1	6:16	6:24	8	50	Sweet Dreams	Down	Cloudy 62	Calm	5.1	Sail
8/20/2012	1	9:13	9:23	10	55	Jenny's Joy	Up	Partly Cloudy 62	0	5.5	Sail
8/25/2012	1	15:30	15:37	7	65	Spirit	Up	Clear 81	0	3.7	Cruise/passenger
8/31/2012	1	18:40	18:50	10	80	Sweet Dreams	Up	Clear 73	7	5.4	Sail

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
9/5/2012	1	19:45	19:53	8	80	Autumn Wind	Up	Clear 79	1	3.9	Sail
9/6/2012	1	5:07	5:16	9	65	Wallace E	Down	Clear 58	0	2.6	Barge
9/10/2012	1	14:12	14:22	10	100	Yaquina	Up	Cloudy 67	2	2	Dredge
9/18/2012	3	5:30	5:42	12	95	Yaquina	Down	Clear 59	3	2.5	Dredge
9/18/2012	6	18:08	18:19	11	95	Yaquina	Up	Clear 82	6	4	Dredge
9/20/2012	1	3:43	4:04	21	95	Yaquina	Down	Overcast 54	6	3	Dredge
9/22/2012	1	14:16	14:26	10	75	Sweet Dreams	Down	Clear 65	3	1.9	Sail
9/24/2012	1	20:07	20:17	10	80	Too Dreamy	Up	Clear 76	4	1	Sail
10/15/2012	1	12:45	12:53	8	65	Free Bird	Down	Cloudy 64	5	1.3	Sail
10/23/2012	1	4:57	5:09	12	136	Clarkston	Up	Cloudy 44	2	2.9	Barge
10/23/2012	2	18:52	19:01	9	85	Clarkston	Down	Cloudy 47	12	2.7	Barge
10/25/2012	1	0:46	1:03	17	100	Bruce M	Up	Rain 47	4	2.6	Barge
11/15/2012	1	10:12	10:22	10	110	Stacy T	Down	Clear 43	0	4.7	Barge
11/16/2012	1	18:25	18:36	11	110	Stacy T	Up	Cloudy 49	0	6.2	Barge
11/24/2012	1	5:24	5:36	12	60	Kathryn B	Down	Cloudy 49	0	7.6	Barge
11/26/2012	1	12:20	12:33	13	100	Roxanna	Down	Clear 50	0	6.4	Sail
12/4/2012	1	4:15	4:30	15	80	Legend	Down	Rain 53	0	8	Barge
12/6/2012	1	9:44	9:50	11	110	Crown of Camas	Up	Cloudy 44	0	9.6	Barge
12/8/2012	1	12:06	12:22	16	70	Challenger	Down	Cloudy 45	0	9..4	Barge
12/9/2012	1	14:47	14:55	8	75	Sunuku	Up	Rain 43	0	9.3	Other/unknown
12/11/2012	1	11:30	11:40	10	85	Runaway	Down	Cloudy 47	0	7	Sail
12/13/2012	1	10:08	10:16	8	80	Runaway		Clear 42	2	9	Sail
12/14/2012	1	22:23	22:35	12	100	Nancy Ann	Down	Cloudy 38	8	8.8	Other/unknown
12/15/2012	1	9:50	10:03	13	60	Challenger	Down	Rain 38	10	7.9	Barge
12/17/2012	1	18:22	18:33	11	80	Lori B	Down	Dry 38	1	8	Barge
12/20/2012	1	23:22	23:36	14	65	Lori B	Down	Cloudy 37	3	8.2	Barge
12/22/2012	1	10:55	11:10	15	70	Lori B	Down	Rain	9	7.9	Barge
12/27/2012	1	21:04	21:13	9	65	Hurricane	Down	Cloudy 41	8	7.6	Barge
12/28/2012	1	13:32	13:42	10	80	Stacy T	Up	Cloudy 42	1	6.3	Barge
1/4/2013	1	0:01	0:11	10	65	Lori B	Down	Clear 33	10	5.3	Barge
1/12/2013	1	9:55	10:07	12	75	Renee	Up	Overcast 30	2	6	Barge
1/13/2013	1	9:18	9:30	12	90	Renee	Up	Cloudy 28	1	6.4	Barge
1/16/2013	1	13:22	13:30	8	70	Bonnevie	Up	Cloudy 34	3	5.5	Sail
1/21/2013	1	16:41	12:55	14	70	Rebel	Down	Clear 39	1	4.7	Barge
1/31/2013	1	18:00	18:08	8	85	Renee	Down	Cloudy 50	2	6.4	Barge
2/20/2013	1	18:00	18:17	17	100	Dutchess B	Down	Partly Cloudy 44	2	3.2	Sail
2/24/2013	1	16:38	16:50	12	95	Mary B	Up	partly Cloudy 51	4	5	Barge
3/2/2013	1	2:47	3:00	13	90	Mary B	Down	50	0	3.2	Barge
3/5/2013	1	18:28	18:42	14	100	norton Bay	Down	Rain 42	7	3.1	Barge
3/9/2013	1	16:08	16:16	8	70	Ocean Transport	Up	Clear 57	1	4.9	Barge

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
3/12/2013	2	14:17	14:29	12	100	Ramona III	Up	Cloudy 59	2	3.3	Barge
3/12/2013	1	13:48	13:57	9	70	Wakabui	Down	Cloudy 58	3	3.3	Sail
3/13/2013	1	13:42	14:03	21	100	Ramona III	Down	Cloudy 58	0	3.2	Barge
3/23/2013	1	18:11	18:19	8	75	Island Cat	Down	Clear 48	2	3.7	Sail
3/24/2013	1	5:19	5:35	16	60	Rebel	Down	Cloudy 37	Calm	3.8	Barge
3/27/2013	2	20:36	20:57	21	80	Nova	Down	Cloudy 56	3	4.8	Sail
3/27/2013	1	11:55	12:04	9	75	Wakadoui		Cloudy 54	1	3.4	Sail
3/30/2013	1	11:32	11:44	12	80	Rebel	Down	Clear 57	4	4.8	Barge
4/4/2013	1	3:17	3:30	13	65	Tidewater	Down	Cloudy 54	4	4.7	Barge
4/9/2013	1	18:28	18:37	8	80	Husky	Down	Cloudy 55	1	9.2	Barge
4/11/2013	1	9:02	9:16	14	70	Tidewater	Down	Cloudy 48	2	9.3	Barge
4/13/2013	1	3:34	3:45	11	70	Chief		Rain 43	6	9	Barge
4/14/2013	1	15:43	15:52	9	80	Autumn Cara	Down	Cloudy 47	4	7.1	Sail
4/16/2013	1	9:16	9:33	17	136	Lindy Marie	Up	Cloudy 40	1	8	Barge
4/16/2013	2	13:02	13:13	11	100	Lindy Marie	Down	Partly Cloudy 51	1	8	Barge
4/19/2013	1	0:30	0:45	15	95	Chief	Down	Cloudy 50	3	5.7	Barge
4/20/2013	2	17:36	17:49	13	85	Rebel	Down	Clear 57	3	5.5	Barge
4/20/2013	1	7:20	7:30	10	85	Seascape	Down	Cloudy	0	5.1	Sail
4/24/2013	1	12:46	12:56	10	80	Autumn Cara	Up	Clear 65	8	5.4	Sail
4/27/2013	1	10:25	10:36	11	90	Ocean Transport	Down	Partly Cloudy 56	2	6.4	Barge
5/4/2013	1	15:29	15:36	7	65	Autumn Cara	Down	Clear 81	12	6.5	Sail
5/9/2013	1	23:11	23:21	10	90	Stacy T	Down	Clear 66	4	7.3	Barge
5/10/2013	1	9:43	9:52	9	100	Stacy T	Up	Clear 60	1	7.9	Barge
5/12/2013	1	3:45	3:56	11	70	Hurricane	Down	Partly Cloudy 65	0	9.4	Barge
5/15/2013	1	11:42	11:52	10	65	Rebel	Down	Cloudy 53	2	9.7	Barge
5/17/2013	1	10:11	10:20	9	70	Maia Doran	Down	56	3	8.9	Sail
5/20/2013	1	2:18	2:26	8	60	Osprey	Up	Clear 50	5	8.8	Cruise/passenger
5/21/2013	1	13:46	13:54	8	60	Capt Bob	Down	Rain 51	2	7.9	Barge
5/23/2013	2	23:12	23:24	12	70	Rebel	Down	Rain 48	7	8.5	Barge
5/23/2013	1	13:55	14:04	9	70	Ecstasy	Down	Cloudy 53	7	8	Sail
5/24/2013	1	3:57	4:04	7	65	Capt Bob	Down	Rain 49	2	9.3	Barge
5/24/2013	2	10:47	10:55	8	80	Whisper	Down	Cloudy 53	3	9.4	Sail
5/25/2013	1	12:26	12:34	8	65	Gladiator	Down	Clear 59	1	9	Sail
5/26/2013	1	3:33	3:46	13	75	Hurricane	Down	Rain 54	9	8.8	Barge
5/27/2013	2	13:37	13:46	9	70	Whisper	Up	Cloudy 53	9	9.1	Sail
5/27/2013	1	11:53	12:01	8	70	Willow	Up	Rain 54	11	9.2	Sail
5/28/2013	2	13:38	13:51	13	65	Aquila	Down	Cloudy 60	2	9.6	Sail
5/28/2013	1	10:00	10:10	10	100	Lady Washington	Up	Cloudy 56	3	10	Sail
5/31/2013	1	18:00	18:08	8	75	Autumn Wind	Down	Partly Cloidy 66	7	7.9	Sail
6/1/2013	1	18:00	18:08	8	70	Manana	Up	Partly Cloudy 67	2	7.7	Sail

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
6/2/2013	1	9:56	10:04	8	50	Sargasso	Down	Partly cloudy 59	6	6.5	Barge
6/3/2013	1	10:29	10:37	8	80	Stacy T	Down	Cloudy 56	3	5.8	Barge
6/3/2013	2	18:18	18:27	9	90	Stacy T	Up	Clear 73	10	5.1	Barge
6/6/2013	1	2:57	3:08	11	75	PJ Brix	Down	Clear 59	7	6.7	Barge
6/8/2013	1	5:33	5:45	12	70	Kathryn B	Down	Clear 52	2	6.9	Barge
6/16/2013	1	8:13	8:21	8	80	Sargasso		Overcast 58	15	5.2	Barge
6/17/2013	1	5:38	5:46	8	60	Jenny's Joy	Down	Partly Cloudy 57	3	4.6	Sail
6/18/2013	1	11:29	11:37	8	100	Stacy T	Down	Cloudy 63	1	4	Barge
6/18/2013	2	18:47	18:58	9	100	Stacy T	Up	Clear 62	4	4.3	Barge
6/19/2013	1	5:31	5:39	8	60	Wakadui	Down	Cloudy 55	Calm	5.8	Sail
6/21/2013	1	10:37	10:47	10	85	Mariner	Up	Cloudy 60	0	5.1	Barge
6/21/2013	2	12:01	12:10	9	85	Mariner	Down	Partly Cloudy 62	1	4.8	Barge
6/24/2013	1	13:32	13:42	10	85	Lady Washington	Down	Cloudy 64	4	7.1	Sail
6/25/2013	1	22:35	22:44	9	75	Affirmation	Down	Cloudy 65	4	8.3	Sail
6/27/2013	1	18:45	18:56	11	75	Aquila	Up	Overcast 78	5	7.3	Sail
6/29/2013	1	4:39	4:47	8	70	Aquila	Down	Cloudy 66	0	7.4	Sail
6/29/2013	3	6:02	6:10	8	70	Madrone	Down	Cloudy 65	0	7.2	Sail
6/29/2013	2	5:34	5:42	8	70	Tasi	Down	Cloudy 69	3	7.2	Sail
8/20/2013	1	10:55	11:06	11	70	Jenny's Joy	Up	Partly Cloudy 64	9	3.6	Sail
8/21/2013	1	13:54	14:06	12	136	Yaquina	Up	Clear 80	3	2.7	Dredge
8/28/2013	1	12:18	12:27	9	85	Patricia	Down	73	3	2.7	Barge
8/31/2013	1	1:27	1:41	14	136	Yaquina	Down	Clear 64	3	3.9	Dredge
9/1/2013	1	13:58	14:07	9	70	Autumn Cara	Up	Sunny 78	Calm	1.7	Sail
9/5/2013	2	22:00	22:10	10	75	Osprey	Up	Rain 60	7	3	Cruise/passenger
9/10/2013	1	12:56	13:08	12	120	Christy T	Down	Clear 76	6	2.1	Barge
9/11/2013	3	18:20	18:30	10	100	Christy T	Up	Clear 92	6	2.3	Barge
9/11/2013	2	18:00	18:08	8	75	Autumn Wind	Up	Clear 92	9	2.1	Sail
9/18/2013	1	18:18	18:32	14	120	Daniel Foss	Down	Sunny 69	3	4.5	Barge
10/5/2013	1	21:57	22:07	10	80	Chief	Down	Clear 58	2	3.5	Barge
10/13/2013	1	20:56	7:10	14	90	Lori B	Up	Clear 54	3	1.7	Barge
10/16/2013	1	19:27	19:38	11	100	Daubi	Up	Clear 58	4	3	Barge
10/19/2013	1	11:07	11:18	11	100	patricia	Down	Light Fog 46	2	2.9	Barge
10/31/2013	1	11:37	11:50	13	100	norton Bay	Down	Cloudy 54	2	0.9	Barge
11/1/2013	1	11:54	12:10	16	100	Dutchess B	Down	Partly Cloudy 52	1	0.6	Sail
11/9/2013	1	9:03	9:17	14	110	Viking	Up	Fog 43	2	3.9	Barge
11/11/2013	1	15:15	15:31	16	100	Invader	Up	Clear 57	10	4	Barge
11/12/2013	1	14:18	14:27	9	80	Christy T	Down	Cloudy 54	3	4.7	Barge
11/19/2013	1	10:14	10:27	13	90	Viking	Down	Overcast 48	11	4.4	Barge
11/27/2013	1	11:10	11:27	17	100	Christy T	Up	Clear 43	1	3.3	Barge
11/27/2013	2	11:45	12:00	15	100	Invader	Down	Clear 44	1	3.6	Barge

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
11/27/2013	3	14:06	14:20	14	100	Invader	Up	Clear 49	2	3.9	Barge
1/25/2014	1	17:24	17:38	14	80	Rebel	Down	Clear 44	5	2.9	Barge
1/27/2014	1	10:57	11:09	12	120	Lindy Marie	Up	Cloudy 37	2	2.9	Barge
2/3/2014	1	9:00	9:10	10	90	Willamette Champ	Up	Cloudy 36	1	5.5	Marine construction
2/4/2014	1	9:01	9:11	10	80	Dutchess B	Up	Cloudy 30	2	4.4	Sail
2/4/2014	2	20:22	20:32	10	80	Atlantic Champion	Down	Cloudy 30	13	3.8	Other/unknown
2/19/2014	2	5:53	6:09	16	70	Defiance	Down	Cloudy 40	Calm	10	Barge
2/19/2014	1	0:54	1:05	11	70	Wallace E	Down	Cloudy 42	3	9.9	Barge
2/22/2014	2	17:42	17:53	11	80	Chief	Down	Clear 45	Calm	6.9	Barge
2/22/2014	1	4:01	4:13	12	110	Kathryn B	Up	Cloudy 36	Calm	6.8	Barge
2/24/2014	1	3:44	3:53	9	70	Tidewater	Down	Rain 44	7	6	Barge
2/26/2014	1	13:27	13:39	12	110	Klickitat	Down	Cloudy 48	15	5.7	Barge
2/27/2014	1	2:53	3:05	12	125	North Bay	Down	Clear 41	Calm	5.2	Marine construction
3/9/2014	1	8:04	8:21	7	70	Tasi	Down	Rain 52	1	11.7	Sail
3/13/2014	1	14:05	14:17	12	100	Patricia	Up	Cloudy 54	2	11.7	Barge
3/15/2014	1	9:19	9:07	13	120	Patricia	Down	Rain 55	3	9.1	Barge
3/15/2014	1	14:29	14:38	9	75	Carol Marie	Down	Cloudy 62	4	9.9	Sail
3/15/2014	1	9:19	9:07	12	120	Symmetry	Down	Rain 55	3	9.1	Sail
3/19/2014	1	19:46	20:00	14	60	Willamette	Down	Cloudy 46	8	9	Barge
3/20/2014	1	9:25	9:35	10	90	Bruce M	Up	Clear 40	1	9.4	Barge
3/20/2014	2	12:44	12:58	14	60	Wallace E	Down	Cloudy 46	1	8.9	Barge
3/22/2014	1	8:20	8:31	11	100	Bruce M	Down	Clear 38	1	7.7	Barge
3/23/2014	2	15:05	15:17	12	80	Capt. Bob	Down	Clear 56	2	6.9	Barge
3/23/2014	1	14:20	14:28	8	70	Somehow	Up	Clear 54	2	6.9	Sail
3/30/2014	1	10:20	10:27	7	60	Elizabeth	Down	Cloudy 49	Calm	10.1	Sail
4/1/2014	1	1:07	1:18	11	85	Lori B	Down	Rain 46	Calm	10.4	Barge
4/2/2014	2	19:34	19:49	15	70	Willamette	Down	Cloudy 55	1	9	Barge
4/2/2014	1	10:18	10:25	7	70	Wind Dancine	Down	Cloudy 47	1	9	Sail
4/3/2014	1	9:40	9:58	18	136	Lindy Marie	Up	Cloudy 48	7	9.2	Barge
4/6/2014	1	13:24	13:39	15	80	Defiance	Down	Cloudy 59	1	7.6	Barge
4/7/2014	1	9:42	9:54	12	100	Diane B	Down	Fog 48	Calm	6.8	Barge
4/7/2014	1	9:42	9:54	12	100	Lindy Marie	Down	Fog 49	Calm	7.8	Barge
4/11/2014	1	11:58	12:07	9	70	Minnow	Up	Clear 56	13	6.4	Sail
4/14/2014	1	9:10	9:18	8	80	Minnow	Down	Cloudy 48	1	8.5	Sail
4/14/2014	2	13:07	13:15	8	70	Riva	Up	Cloudy 54	4	8.1	Sail
4/24/2014	1	4:05	4:16	11	60	Lori B	Down	Rain 52	10	8.4	Barge
4/26/2014	3	6:48	6:58	10	65	Deschutes	Down	Cloudy 45	Calm	9.7	Barge
4/26/2014	2	4:48	4:59	11	60	Kathryn B	Down	45	Calm	9.7	Barge
4/26/2014	1	2:17	2:28	11	60	Lori B	Down	45	3	9.3	Barge
4/27/2014	2	17:09	17:17	8	65	Aquila	Up	Partly Cloudy 53	8	9.8	Sail

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
4/27/2014	1	16:29	16:36	7	75	Autumn Kara	Down	Partly Cloudy 54	10	9.8	Sail
4/28/2014	2	9:10	9:22	12	60	Deschutes	Down	Cloudy 48	Calm	10	Barge
4/28/2014	1	1:51	2:00	9	75	Sundial	Down	Cloudy 46	2	10.3	Barge
4/29/2014	2	10:58	11:07	9	70	Mystique	Down	Sunny 59	2	9.8	Sail
4/29/2014	1	9:35	9:45	10	108	Winddancer	Up	Sunny 54	2	10	Sail
5/2/2014	2	9:33	9:42	10	80	Autumn Kara	Up	Clear 58	2	8.8	Sail
5/2/2014	1	23:59	0:09	10	70	Juno	Up	Clear 70	3	8.8	Sail
5/3/2014	2	8:14	8:33	19	65	Cascade	Down	Cloudy 54	4	8.3	Barge
5/3/2014	1	0:10	0:22	12	70	Diane B	Down	Clear 57	6	8.1	Barge
5/3/2014	3	14:47	14:56	9	75	Autumn Cara	Down	Rain 58	17	7.8	Sail
5/3/2014	3	14:47	14:56	9	75	Reva	Down	Rain 58	17	7.8	Sail
5/7/2014	1	11:37	11:47	10	80	Taukni	Down	Clear 56	Calm	9.4	Sail
5/8/2014	1	21:16	21:29	13	65	Cascade	Down	Rain 55	9	8.4	Barge
5/8/2014	1	18:30	18:37	7	70	Bonnvie	Down	Cloudy 51	2	8.7	Sail
5/10/2014	1	10:10	10:19	9	80	Tug Washington	Down	Cloudy 51	Calm	8.9	Barge
5/11/2014	1	18:24	18:35	11	75	Defiance	Down	Clear 64	5	9.1	Barge
5/12/2014	1	9:48	9:56	8	80	Spatlese	Down	Sunny 56	3	9.7	Sail
5/14/2014	2	14:13	14:22	9	80	Dauby	Down	Clear 81	9	9.1	Barge
5/14/2014	1	5:00	5:10	10	80	Juneau	Down	Clear 58	Calm	10	Other/unknown
5/15/2014	1	0:52	1:02	10	70	Lori B	Down	Clear 68	2	8.6	Barge
5/15/2014	2	12:06	12:18	12	130	Mistral	Down	Clear 73	Calm	9	Sail
5/17/2014	1	0:15	0:23	8	65	Lori B	Down	Clear 56	Calm	8.5	Barge
5/17/2014	2	8:58	9:06	8	65	Carol Marie	Down	Cloudy 56	2	9.5	Sail
5/17/2014	4	21:11	21:20	9	65	Carol Marie	Up	Cloudy 62	4	9.2	Sail
5/17/2014	3	10:04	10:12	8	65	Madrone	Down	Cloudy 56	Calm	9.5	Sail
5/18/2014	2	16:04	16:14	10	80	Chief	Down	Cloudy 56	4	9.9	Barge
5/18/2014	1	12:18	12:27	9	75	Madrone	Up	Cloudy 59	5	10.3	Sail
5/19/2014	1	10:06	10:20	14	136	Dauby	Down	Cloudy 58	2	10.5	Barge
5/20/2014	1	13:18	13:28	10	70	Lori B	Down	Clear 67	3	10.9	Barge
5/22/2014	1	10:52	11:00	8	80	Whisper	Down	Clear 61	3	9.4	Sail
5/25/2014	2	22:05	22:17	12	132	Capt. Bob	Down	Rain 56	2	10.9	Barge
5/25/2014	1	18:18	18:30	12	134	Sanooki	Up	Rain 59	2	10.9	Sail
5/26/2014	3	19:25	19:33	8	70	Aiya	Up	Clear 64	13	10.7	Sail
5/26/2014	2	15:02	15:10	8	70	Bonnvie	Up	Partly Cloudy 66	2	10.5	Sail
5/26/2014	1	13:44	13:55	11	136	Whisper	Up	Partly Cloudy 65	6	10.5	Sail
5/27/2014	1	12:36	12:45	9	70	Spaet Lacy	Up	Cloudy 62	3	10.7	Sail
5/28/2014	1	12:46	12:55	9	80	Aequila	Down	Clear 57	5	11	Sail
5/29/2014	1	12:36	12:47	9	80	Spaplese	Down	Cloudy 58	2	10.9	Sail
5/30/2014	2	21:04	21:12	8	75	Madrone	Down	Clear 66	4	10.8	Sail
5/30/2014	1	10:50	10:58	8	75	Maridoran	Down	Clear 60	5	10.9	Sail

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
5/31/2014	1	4:56	5:04	8	80	Autumn Wind	Down	Clear 53	2	10.5	Sail
6/1/2014	1	16:57	17:54	7	60	Spatlese	Up	Clear 68	6	9	Sail
6/2/2014	2	6:12	6:22	10	90	Dauby	Up	Cloudy 55	10	9	Barge
6/2/2014	1	1:40	1:49	9	60	Tidewater	Down	Clear 58	4	9	Barge
6/4/2014	1	19:16	19:27	11	85	Chief	Down	Sunny 69	4	9	Barge
6/4/2014	2	22:57	23:09	12	70	Kathryn B	Down	Clear 57	4	9	Barge
6/6/2014	1	5:14	5:21	7	70	Endeavor	Down	Clear 51	6	8.7	Sail
6/7/2014	1	5:34	5:42	8	65	Lori B	Down	Clear 55	2	9	Barge
6/8/2014	1	7:27	7:35	8	65	Chief	Down	Cloudy 56	4	8.2	Barge
6/11/2014	1	11:00	11:10	10	65	Aquila	Up	Cloudy 59	4	7.4	Sail
6/14/2014	1	5:17	5:27	10	65	Aquila	Down	Cloudy 55	1	7.5	Sail
6/14/2014	2	13:46	13:56	10	75	Tango	Down	Cloudy 61	3	6.6	Sail
6/21/2014	1	15:21	15:30	9	65	Tango	Up	Clear 68	2	6.4	Sail
6/23/2014	1	9:53	10:05	12	85	Husky	Up	Sunny 63	Calm	7.2	Barge
6/24/2014	2	9:50	10:02	12	86	Husky	Down	Cloudy 61	2	7	Barge
6/24/2014	1	5:45	5:52	7	50	One World	Down	Cloudy 58	1	7.8	Sail
6/27/2014	1	23:45	23:53	8	70	One World	Up	Cloudy 62	3	6.9	Sail
6/27/2014	2	12:51	13:00	9	90	Whisper	Down	Cloudy 67	7	7.2	Sail
6/28/2014	1	17:57	18:07	10	70	Lori B	Down	Partly Cloudy 68	7	7.5	Barge
6/29/2014	1	5:13	5:20	7	70	Kalani	Down	Cloudy 60	Calm	7.5	Sail
7/1/2014	1	10:39	10:47	8	70	Gladiator	Down	Sunny 76	7	8.45	Sail
7/3/2014	1	11:33	11:45	12	136	Lindy Rose	Down	Cloudy 63	4	7.2	Sail
7/6/2014	1	15:43	15:51	8	70	Jenny's Joy	Down	Clear 81	7	5.5	Sail
7/7/2014	1	9:13	9:21	8	70	NRC Quest	Down	Cloudy 69	3	5	Barge
7/10/2014	1	5:18	5:29	11	90	Viking	Up	Clear 56	5	6.7	Barge
7/17/2014	1	14:15	14:30	15	136	Daubi	Down	Clear 76	3	4.8	Barge
7/19/2014	1	2:58	3:09	11	60	Lori B	Down	Cloudy 62	2	5.5	Barge
7/22/2014	1	13:31	13:40	9	75	One World	Down	Cloudy 69	1	3.4	Sail
7/23/2014	1	20:00	20:17	17	136	Laggen	Down	Cloudy 63	5	4	Barge
7/23/2014	1	12:55	13:05	10	100	Patricia	Down	Rainy 60	1	2.9	Barge
7/27/2014	1	19:30	19:37	7	65	Autumn Kara	Up	Clear 84	4	4.9	Sail
8/6/2014	1	19:20	19:31	11	70	Jenny's Joy	Up	Clear 78	4	2.3	Sail
8/8/2014	1	5:27	5:37	10	70	Wallace E	Down	Cloudy 58	1	5.3	Barge
8/16/2014	1	16:11	16:19	8	60	Whisper	Up	Clear 81	7	2.7	Sail
8/18/2014	1	10:06	10:15	9	70	Seascape	Down	Sunny 68	4	2.2	Sail
8/27/2014	1	6:11	6:18	7	50	Discovery	Up	Clear 65	3	4.6	Barge
8/31/2014	1	7:19	7:26	7	50	Discovery	Down	Cloudy 61	Calm	2.5	Barge
9/1/2014	1	7:15	7:27	12	80	Sea Spruce	Down	Sunny 58	Calm	1.7	Barge
9/1/2014	2	14:13	14:27	14	90	Sea Spruce	Up	Clear 75	2	1.8	Barge
9/1/2014	1	7:15	7:27	12	80	Sommers	Down	Sunny 58	Calm	1.7	Barge

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
9/1/2014	2	14:13	14:27	14	90	Sommers	Up	Clear 75	2	1.8	Barge
9/1/2014	1	7:15	7:27	12	80	Willamette	Down	Sunny 58	Calm	1.7	Barge
9/1/2014	2	14:13	14:27	14	90	Willamette	Up	Clear 75	2	1.8	Barge
9/3/2014	4	13:55	14:06	11	50	Daniel Foss	Down	Partly Cloudy 63	0	2	Barge
9/3/2014	2	10:40	10:55	15	125	Patricia	Down	Partly Cloudy 63	3	0.8	Barge
9/4/2014	1	12:30	12:43	13	136	Yaquina	Up	Clear 75	3	0.7	Dredge
9/9/2014	1	19:49	22:01	12	100	Yaquina	Down	Clear 66	4	3.3	Dredge
9/10/2014	1	9:31	9:39	8	75	Halsey	Down	Cloudy 58	2	3.2	Sail
9/12/2014	1	19:11	19:25	14	100	Laggen	Down	Clear 80	2	3.3	Barge
9/12/2014	1	19:11	19:25	14	100	Sommers	Down	Clear 80	2	3.3	Barge
9/21/2014	1	9:20	9:27	7	30	Pacific Escort	Up	Sunny 67	Calm	1.5	Barge
9/21/2014	2	10:12	10:17	5	20	Pacific Escort	Down	Sunny 70	Calm	1.3	Barge
9/24/2014	1	11:16	11:28	12	136	Yaquina	Up	Cloudy 63	6	3.1	Dredge
9/28/2014	1	11:35	11:50	15	111	Yaquina	Down	Clear 62	7	2.7	Dredge
9/29/2014	1	21:54	22:02	8	70	Nakolo	Up	Cloudy 58	4	4	Barge
10/1/2014	1	12:19	12:30	11	75	Nakolo	Down	Cloudy 60	2	2.2	Barge
10/6/2014	1	11:19	11:31	12	85	Lil Go	Down	Sunny 69	3	1.3	Sail
10/8/2014	1	11:48	11:57	9	80	Mamala	Up	Cloudy 62	1	2.3	Sail
10/17/2014	1	9:30	9:42	12	100	Stacey T	Down	Cloudy 56	5	1	Barge
10/18/2014	1	12:41	12:52	11	110	Patricia	Up	Cloudy 63	9	2.7	Barge
1/1/2015	1	13:51	14:00	9	70	Madrone	Down	Clear 38	Calm	7.4	Sail
1/6/2015	1	9:42	9:51	9	100	Make It So	Down	Fog 42	1	7.3	Sail
1/9/2015	2	10:49	11:08	19	136	Willamette Camp	Down	42	2	5.9	Barge
1/9/2015	1	10:21	10:31	10	75	Dutchess	Up	Clear 42	Calm	6.3	Sail
1/10/2015	1	9:13	9:26	13	70	Chief	Down	Rain 39	Calm	6.1	Barge
1/15/2015	1	9:33	9:42	9	70	Halsey	Down	Cloudy 40	7	4.3	Sail
1/17/2015	1	9:31	9:41	10	75	Halsey	Up	Rain 42	6	4.9	Sail
1/27/2015	1	11:12	11:23	11	95	Ross Island	Down	Fog 44	4	6	Dredge
1/28/2015	1	11:57	12:05	8	70	Montana	Down	Overcast 49	4	6.5	Barge
2/2/2015	1	3:47	4:01	14	90	Rebel	Down	Rain 43	2	5.7	Barge
2/4/2015	1	9:30	9:37	7	70	Delta Lindsey	Up	Cloudy 46	1	6.4	Barge
2/5/2015	1	12:03	12:11	8	65	Delta Lindsey	Down	Rain 46	10	6.5	Barge
2/27/2015	1	14:15	14:23	8	70	Moria	Down	Partly Cloudy 53	2	5.9	Other/unknown
3/10/2015	2	13:34	13:45	11	100	Stacey T	Down	Clear 57	1	4.3	Barge
3/10/2015	3	18:38	18:47	9	110	Stacey T	Up	Cloudy 61	4	3.8	Barge
3/10/2015	1	9:02	9:13	11	90	Argosy	Up	Clear 43	1	5.2	Sail
3/12/2015	1	12:07	12:18	11	100	Stacey T	Down	Partly Cloudy 54	2	4.4	Barge
3/17/2015	1	14:01	14:10	9	90	Maddy T	Down	Cloudy 55	5	6.1	Sail
3/18/2015	1	2:27	2:37	10	100	Christy T	Up	Clear 55	Calm	5.5	Barge
3/19/2015	1	0:03	0:14	11	70	Clearwater	Down	Clear 49	1	5	Barge

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
3/21/2015	1	11:35	11:44	9	70	Moments	Up	Rain 49	5	6.4	Sail
3/23/2015	1	9:36	9:44	8	70	Maddy T	Down	Cloudy 47	5	7.5	Sail
3/24/2015	1	10:56	11:03	7	50	Riva	Down	Partly Cloudy 51	2	7.6	Sail
3/25/2015	1	9:59	10:05	6	50	Delta Lindsey	Up	Cloudy 49	7	7.1	Barge
3/26/2015	1	12:52	13:00	8	60	Delta Lindsey	Down	Clear 55	2	6.8	Barge
3/28/2015	1	10:22	10:32	10	45	George W	Up	Cloudy 54	3	5.9	Sail
3/28/2015	2	15:21	15:29	8	70	George W	Down	Partly Cloudy 59	2	6.2	Sail
4/5/2015	1	12:20	12:29	8	70	Runaway	Up	Cloudy 48	2	6.4	Sail
4/7/2015	1	20:12	20:20	8	50	George W	Down	Cloudy 54	7	6.4	Sail
4/10/2015	1	10:00	10:08	8		Riva	Up	Clear 51	4	5.7	Sail
4/17/2015	1	11:18	11:27	9	65	George W	Up	Clear 60	8	3.8	Sail
4/19/2015	1	16:55	17:03	8	65	George W	Down	Clear 75	10	3.6	Sail
4/22/2015	1	10:01	10:11	10	80	Dutchess	Down	Clear 43	3	5.4	Sail
4/25/2015	1	14:14	14:24	10	90	Stacey T	Down	Partly Cloudy 56	3	3.5	Barge
4/26/2015	1	16:12	16:19	7	65	Autumn Cara	Down	Cloudy 59	5	3	Sail
5/4/2015	3	12:54	13:06	11	35	Delta Lindsey	Up	Partly Cloudy 58	Calm	4	Barge
5/6/2015	1	18:44	18:53	9	65	Delta Lindsey	Down	Partly Cloudy 58	3	4.1	Barge
5/17/2015	1	16:25	16:31	6	15	Delta Lindsey	Up	Clear 67	5	4	Barge
5/22/2015	1	13:05	13:23	18	136	Stacey T	Up	Cloudy 57	3	5.3	Barge
5/23/2015	1	10:45	11:06	10	100	Stacey T	Down	Cloudy 56	1	5.1	Barge
5/29/2015	1	14:11	14:22	11	100	Stacey T	Up	Clear 74	3	4.3	Barge
5/30/2015	1	5:59	6:14	15	136	Autumn Wind	Down	Clear 52	2	5.6	Sail
6/3/2015	1	18:21	18:31	10	100	Stacey T	Down	Cloudy 60	5	4.7	Barge
6/3/2015	2	20:14	20:26	12	100	Astoria	Down	Cloudy 60	3	5.3	CE
6/4/2015	1	21:38	21:49	11	100	Stacey T	Up	Clear 65	5	5.2	Barge
6/9/2015	1	18:33	18:42	9	70	Topaz	Up	Clear 82	4	3.3	Sail
6/11/2015	2	19:44	19:54	10	80	Argosy	Down	Clear 70	4	2.7	Sail
6/12/2015	1	11:18	11:27	9	90	Maddy T	Up	Clear 61	1	3	Sail
6/14/2015	1	15:54	16:01	7	70	Tanewshe	Down	Clear 82	4	3.5	Other/unknown
6/18/2015	1	21:14	21:23	9	70	Tanuki	Up	Partly Cloudy 66	6	4.4	Sail
6/28/2015	1	11:31	11:42	11	90	Stacey T	Down	Cloudy 80	Calm	2.3	Barge
7/1/2015	1	20:13	20:24	11	60	Whisper		Clear 88	6	3.8	Sail
7/2/2015	5	12:34	12:44	10	75	Stacey T	Up	Clear 84	3	3.3	Barge
7/4/2015	1	19:22	19:29	7	70	Whisper	Up	Clear 88	8	4.7	Sail
7/6/2015	2	22:09	22:20	11	75	Stacey T	Down	Clear 71	4	5.5	Barge
7/6/2015	1	12:25	12:34	9	70	MaMala	Up	Clear 79	1	4	Sail
7/8/2015	1	5:39	5:46	7	50	Jenny's Joy	Down	Cloudy 61	2	3.5	Sail
7/11/2015	3	18:28	18:37	9	80	Stacey T	Up	Cloudy 71	6	2.7	Barge
7/13/2015	1	12:21	12:32	11	90	Lady Washington	Up	Partly Cloudy 71	6	1.9	Sail
7/19/2015	1	14:03	14:13	10	90	Make It So		Clear 90	2	2.7	Sail

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
7/24/2015	1	12:01	12:10	9	80	Whisper	Down	Clear 70	Calm	2	Sail
7/25/2015	14	15:11	15:20	9	100	Willamette Camp	Down	Cloudy 66	4	2.3	Barge
7/27/2015	1	13:58	14:06	8	70	MaMala	Down	Partly Cloudy 69	3	1.9	Sail
8/1/2015	1	13:06	13:15	9	80	Whisper	Up	Clear 83	4	3.1	Sail
8/2/2015	1	13:55	14:04	9	95	Stacey T	Up	Cloudy 76	3	3.2	Barge
8/5/2015	1	9:44	9:53	9	80	MaMala		Cloudy 63	2	4.3	Sail
8/9/2015	1	13:09	13:16	7	60	Jenny's Joy	Up	Clear 74	2	2.4	Sail
8/10/2015	1	14:05	14:12	7	70	MaMala	Down	Clear 81	1	2.5	Sail
8/12/2015	1	12:45	12:55	10	100	Stacey T	Up	Clear 79	1	2	Barge
8/12/2015	2	18:34	18:44	10	80	MaMala	Up	Clear 89	1	3.8	Sail
8/13/2015	2	19:08	19:20	12	100	Stacey T	Down	Partly Cloudy 80	7	4.4	Barge
8/13/2015	1	12:58	13:08	10	80	MaMala	Down	Clear 71	3	2	Sail
8/14/2015	1	20:41	20:52	11	100	Stacey T	Up	Cloudy 67	2	4	Barge
8/18/2015	1	19:28	19:36	8	85	Yaquina	Up	Clear 89	9	3.5	Dredge
8/19/2015	1	9:05	9:14	9	100	Stacey T	Down	Clear 70	2	3.9	Barge
8/19/2015	2	11:08	11:21	13	136	Stacey T	Up	Clear 75	5	3.5	Barge
8/22/2015	1	9:08	9:18	10	100	Stacey T	Down	Hazy 59	3	2	Barge
8/24/2015	1	11:04	11:13	9	80	Lady Washington	Down	Clear 65	6	1.5	Sail
8/25/2015	1	4:30	4:41	11	136	Yaquina	Down	Clear 57	3	3.9	Dredge
9/10/2015	1	9:44	9:54	10	75	Roxanna	Down	Clear 63	4	2	Sail
9/25/2015	1	13:00	13:11	11	70	Sirius	Up	Cloudy 60	5	1.6	Other/unknown
9/27/2015	1	5:50	5:59	9	35	Sirius	Down	Clear 49	10	4.3	Other/unknown
10/9/2015	1	10:12	10:25	13	136	CG Henry Blake	Up	Cloudy 62	3	1	Federal
10/16/2015	1	10:38	10:49	11	136	CG Henry Blake	Down	Clear 59	3	3.5	Federal
10/20/2015	1	13:48	13:57	9	90	Stacey T	Up	Partly Cloudy 60	2	2.3	Barge
11/11/2015	1	11:54	12:07	13	85	Husky	Up	Clear 51	Calm	2.3	Barge
11/14/2015	1	10:33	10:49	16	90	Husky	Down	Cloudy 58	4	4	Barge
11/22/2015	1	13:38	13:46	8	65	Karol Marie	Up	Clear 43	1	5.4	Sail
11/24/2015	1	9:27	9:36	9	70	Stokers Delight	Down	Cloudy 39	2	4.4	Other/unknown
11/26/2015	1	12:09	12:20	11	80	Scorpius	Down	Clear 46	7	3	Other/unknown
11/26/2015	2	18:08	18:18	10	80	Scorpius	Up	Clear 45	11	5.9	Other/unknown
11/28/2015	1	11:16	11:27	11	100	Stacey T	Down	Clear 39	2	3.5	Barge
11/28/2015	2	19:16	19:25	9	100	Stacey T	Up	Clear 37	9	5.8	Barge
11/30/2015	1	13:12	13:22	10	90	Stacey T	Down	Cloudy 35	9	3.8	Barge
12/1/2015	2	13:48	13:59	11	100	Stacey T	Up	Cloudy 36	9	3.8	Barge
12/1/2015	1	2:03	2:12	9	60	Scorpius	Down	Cloudy 35	4	3.8	Other/unknown
12/6/2015	1	14:43	14:50	7	60	Riva	Down	Cloudy 56	13	6	Sail
12/8/2015	1	10:16	10:33	17	100	Stacey T	Down	Rain 59	5	8.7	Barge
12/13/2015	1	3:23	3:36	13	136	Clearwater	Down	Cloudy 45	5	11	Barge
12/16/2015	1	10:56	11:09	13	80	Nova	Up	Cloudy 42	Calm	8.5	Barge

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
12/17/2015	1	10:33	0:55	11	70	Rebel	Down	Rain 40	10	8.2	Barge
12/18/2015	1	10:03	10:12	9	100	Christy T	Up	Rain 47	6	9.4	Barge
12/19/2015	1	17:55	18:06	11	100	Stacey T	Up	Cloudy 45	5	9.8	Barge
12/22/2015	2	22:28	22:38	10	75	Capt. Bob	Down	Cloudy 41	1	9.2	Barge
12/22/2015	1	9:51	10:02	11	80	Husky	Up	Cloudy 42	2	9.5	Barge
1/4/2016	1	11:06	11:21	15	70	Husky	Down	Cloudy 32	Calm	4.3	Barge
1/4/2016	2	12:35	12:51	16	85	Husky	Down	Cloudy 33	Calm	5.1	Barge
1/19/2016	1	13:03	13:15	12	110	Christie	Down	Rain 42	1	7.7	Barge
1/20/2016	1	11:56	12:05	9	80	Runaway	Down	Cloudy 48	7	7.4	Sail
1/22/2016	1	3:15	3:30	15	75	Sundial	Down	Rain 45	5	8	Barge
1/23/2016	1	12:04	12:12	8	75	Runaway	Up	Cloudy 45	5	6.9	Sail
1/27/2016	2	20:26	20:42	16	65	Willamette	Down	Rain 48	13	7	Barge
1/27/2016	1	13:25	13:37	12	90	Dutchess	Up	Cloudy 51	10	6.8	Sail
2/9/2016	1	12:24	12:40	16	136	Stacey T	Down	Clear 55	7	4.5	Barge
2/9/2016	2	22:27	22:37	10	80	Stacey T	Up	Cloudy 50	2	5.5	Barge
2/11/2016	1	9:18	9:28	10	90	Dutchess	Down	Cloudy 51	1	6.3	Sail
2/15/2016	1	8:52	9:02	10	85	Ross Isle	Up	Cloudy 54	Calm	6.3	Dredge
2/19/2016	1	1:02	1:18	16	80	Crown Pt	Down	Cloudy 47	9	8	Barge
2/21/2016	2	20:07	20:19	12	105	Mary B	Up	Clear 45	Calm	8.6	Barge
2/21/2016	1	14:45	14:57	12	85	Rebel	Down	Cloudy 49	2	8	Barge
2/23/2016	1	2:28	2:42	14	105	Mary B	Down	Fog 38	Calm	7.2	Barge
2/24/2016	1	10:02	10:11	9	100	Stacey T	Down	Cloudy 50	6	6.7	Barge
2/27/2016	2	20:34	20:47	13	90	Crown Pt	Down	Clear 49	5	5.8	Barge
2/27/2016	1	10:24	10:32	8	70	Riva	Up	Cloudy 55	4	6.5	Sail
3/1/2016	1	20:04	20:12	8	75	Runaway	Up	Rain 48	13	6	Sail
3/4/2016	1	20:01	20:17	16	70	Kathryn B	Down	Cloudy 52	2	5.9	Barge
3/5/2016	1	9:35	9:45	10	70	Nevermore	Up	Cloudy 52	11	6.4	Sail
3/10/2016	2	18:50	19:03	13	120	Stacey T	Down	Cloudy 49	5	10.6	Barge
3/10/2016	1	10:30	10:39	9	75	Two Dream	Down	Cloudy 54	4	10	Other/unknown
3/11/2016	2	20:09	20:22	13	120	Stacey T	Up	Rain	14	10.5	Barge
3/11/2016	1	13:13	13:22	9	65	Honey	Down	Rain 51	Calm	10.4	Other/unknown
3/12/2016	4	12:40	12:48	8	65	Honey	Up	Cloudy 44	5	10.4	Barge
3/12/2016	1	23:34	23:44	10	95	Stacey T	Up	Rain 50	5	10	Barge
3/12/2016	3	11:52	12:00	8	65	Moon Dance	Up	Rain 45	4	4-Oct	Sail
3/12/2016	2	10:30	10:40	10	65	Wind Raven	Up	Cloudy 45	5	10.5	Sail
3/13/2016	1	11:26	11:34	8	65	Runaway	Down	Cloudy 51	11	10	Sail
3/15/2016	1	19:24	19:32	8	65	Runaway	Up	Coudy 45	4	9	Sail
3/18/2016	1	9:14	9:22	8	80	Ross Isle	Down	Overcast 52	19	8.3	Dredge
3/21/2016	1	11:54	12:03	9	75	Stokers Delight	Down	Overcast 53	6	7.2	Other/unknown
3/27/2016	1	9:55	10:05	10	90	American Pride	Up	Cloudy 48	4	7.8	Cruise/passenger

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
4/5/2016	1	10:32	10:45	13	120	Stacey T	Down	Cloudy 51	3	4.7	Barge
4/9/2016	1	12:07	12:16	9	75	First Light	Down	Partly Cloudy 56	3	8	Sail
4/10/2016	2	11:38	11:46	8	65	First Light	Up	Cloudy 49	2	8	Sail
4/10/2016	1	11:10	11:18	8	65	Runaway	Down	Cloudy 49	2	8	Sail
4/12/2016	1	11:16	11:26	10	70	Runaway	Up	Cloudy 54	6	7.8	Sail
4/14/2016	1	18:00	18:09	9	70	Emonja	Down	Cloudy 52	2	8	Sail
4/15/2016	1	10:35	10:42	7	70	Carolmarie	Down	Clear 52	Calm	8.3	Sail
4/17/2016	1	14:13	14:22	9	70	Carolmarie	Up	Clear 77	11	9.4	Sail
4/18/2016	1	12:57	13:05	8	70	Charlie		Clear 78	3	9	Sail
4/19/2016	1	20:20	20:29	9	70	Summer Wind	Up	Clear 79	3	9	Other/unknown
4/20/2016	2	21:47	22:00	13	70	Sundial	Down	Cloudy 65	Calm	9	Barge
4/24/2016	1	0:09	0:22	13	70	Granite Point	Down	Cloudy 54	4	10.2	Barge
4/26/2016	1	12:27	12:35	8	70	Canace	Down	Cloudy 56	Calm	10.5	Sail
4/27/2016	1	9:12	9:20	8	100	Husky	Up	Cloudy 48	3	9.5	Barge
4/28/2016	1	13:08	13:19	11	100	Husky	Down	Cloudy 60	1	8.6	Barge
4/28/2016	2	18:00	18:09	9	70	Cielo Blue	Down	Cloudy 61	5	8.2	Sail
4/29/2016	1	10:44	10:53	9	75	Nancy Riley	Down	Rain 49	Calm	8.1	Sail
4/30/2016	1	14:25	15:34	9	75	Autumn Cara	Down	Clear 61	7	7.8	Sail
5/3/2016	1	11:47	11:57	10	100	Sirius	Up	Clear 63	2	6.5	Other/unknown
5/5/2016	2	13:09	13:19	10	86	Imanji	Up	Partly Cloudy 61	Calm	6.3	Other/unknown
5/5/2016	1	9:28	9:44	16	100	Sirius	Down	Cloudy 55	5	6.8	Other/unknown
5/7/2016	2	9:06	9:15	9	75	Autumn Cara	Up	Clear 67	3	8.6	Sail
5/7/2016	1	6:15	6:23	8	70	Blue Martini	Down	Clear 60	1	8.8	Sail
5/10/2016	1	13:39	13:47	8	70	Autumn Cara	Down	Clear 69	9	8.4	Sail
5/14/2016	1	18:35	18:45	10	90	Stacey T	Up	Rain 55	9	6.4	Barge
5/15/2016	1	15:30	15:40	10	90	Stacey T	Down	Cloudy 56	1	6.5	Barge
5/20/2016	1	9:16	9:26	10	75	Sargaso	Down	Cloudy 51	5	6.3	Barge
5/20/2016	2	19:47	19:56	9	70	Riva	Down	Cloudy 59	4	6.8	Sail
5/24/2016	1	18:07	18:14	7	65	Nancy Riley	Up	Cloudy 67	6	5.3	Sail
5/25/2016	1	12:43	12:51	8	70	Tow Boat	Up	Cloudy 59	6	5.8	Barge
5/28/2016	1	9:40	9:48	8	75	Whisper	Down	Clear 55	3	5.4	Sail
5/30/2016	1	12:29	12:36	7	70	Whisper	Up	Clear 64	5	4.3	Sail
6/1/2016	1	18:15	18:28	13	136	Nancy Riley	Down	Cloudy 74	8	4.7	Sail
6/4/2016	1	6:28	6:37	9	70	Autumn Wind	Up	Clear 66	5	7.2	Sail
6/27/2016	5	11:36	11:46	11	40	South Creek	Down	Clear 72	3	4.7	Barge
7/10/2016	1	10:17	10:25	8	75	Make It So	Down	Cloudy 60	3	4	Sail
7/14/2016	1	18:13	18:25	12	75	PS Brix	Down	Clear 74	15	2.1	Barge
7/23/2016	1	6:13	6:29	16	120	Willamette	Down	Cloudy 60	3	3.4	Barge
7/29/2016	1	18:35	18:44	9	80	Denise Foss	Up	Clear 72	2	2.5	Barge
7/30/2016	1	14:33	14:52	19	136	Denise Foss	Down	Clear 74	7	2.9	Barge

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
8/1/2016	2	18:40	18:48	8	80	Make It So	Up	Clear 75	4	4.5	Sail
8/1/2016	1	12:01	12:12	11	80	Umitilla	Down	Clear 62	4	3.3	Barge
8/4/2016	1	18:08	18:20	12	80	Tranquility	Down	Clear 85	8	3.1	Sail
8/5/2016	1	20:48	20:58	10	90	Tranquility	Up	Clear 64	5	4.9	Sail
8/21/2016	1	7:52	7:59	7	65	Jabez	Up	Partly Cloudy 60	6	5.6	Sail
8/24/2016	1	5:10	5:24	14	136	Yaquina	Up	Clear 63	Calm	2.2	Dredge
8/30/2016	1	4:19	4:33	14	120	Yaquina	Down	Clear 50	3	5.2	Dredge
9/7/2016	1	9:18	9:28	10	120	Christie	Up	Cloudy 61	1	2.4	Barge
9/7/2016	2	12:11	12:23	12	120	Christie	Down	Cloudy 64	1	1.8	Barge
9/11/2016	1	14:56	15:06	10	75	Autumn Wind	Up	Partly Cloudy 68	7	1.9	Sail
9/16/2016	2	19:22	19:31	9	75	Bagabundo	Up	Cloudy 75	3	4.1	Sail
9/17/2016	2	10:30	10:38	8	50	Bumble Bee	Up	Rain 56	8	2.6	Sail
9/18/2016	1	6:16	6:25	9	75	Orsinius	Up	Cloudy 60	Calm	3.6	Sail
9/18/2016	2	19:35	19:43	8	75	Orsinius	Down	Cloudy 67	2	4.6	Sail
9/21/2016	1	20:38	20:49	11	100	Tranquility	Down	Partly Cloudy 62	2	4.4	Sail
9/23/2016	1	13:03	13:13	10	80	Anas	Up	Cloudy 59	6	2.4	Sail
9/25/2016	1	14:14	14:26	12	130	Dauby	Up	Clear 75	5	2.4	Barge
9/26/2016	1	2:30	2:38	8	70	Tranquility	Up	Clar 63	2	3.7	Sail
10/1/2016	1	0:53	1:04	11	70	Dauby	Down	Cloudy 57	5	1	Barge
10/17/2016	1	9:28	9:37	9	95	Southcreek	Down	Cloudy 54	3	6.4	Barge
10/23/2016	1	9:06	9:17	11	90	Delta Lindsey	Down	Cloudy 53	6	3.4	Barge
10/23/2016	2	11:30	19:19	10	95	Delta Lindsey	Up	Cloudy 58	1	3.9	Barge
10/25/2016	1	4:54	5:04	10	90	Delta Lindsey	Down	Cloudy 53	6	4.4	Barge
10/25/2016	2	10:28	10:39	11	90	Delta Lindsey	Up	Cloudy 54	5	3	Barge
11/1/2016	1	3:52	4:01	9	70	Celestial	Up	Cloudy 52	5	4.8	Sail
11/3/2016	1	12:37	12:55	18	136	Deschutes	Down	Partly Cloudy 58	2	5.1	Barge
11/6/2016	1	13:00	13:09	9	100	Summer S		Cloudy 60	5	5	Other/unknown
11/9/2016	1	12:04	12:14	10	95	Orsinius	Up	Cloudy 56	5	4.6	Sail
11/9/2016	2	13:48	13:57	9	95	Orsinius	Down	Clear 62	Calm	4.8	Sail
11/11/2016	1	10:49	11:00	11	100	Southcreek	Up	Cloudy 56	2	5.2	Barge
11/27/2016	1	10:37	10:44	7	75	Riva	Down	Cloudy 46	4	7	Sail
11/28/2016	1	10:52	10:52	10	95	Stacey T	Down	Cloudy 47	2	6.9	Barge
12/5/2016	1	13:12	13:22	10	100	Stacey T		Cloudy 38	4	4.8	Barge
12/6/2016	1	12:10	12:19	9	70	Irmongina	Down	Cloudy 41	4	5.2	Other/unknown
12/11/2016	1	21:43	21:54	11	120	Maverick	Up	Rain 42	3	6	Sail
12/13/2016	1	22:08	22:17	9	100	Maverick	Down	Cloudy 35	6	6.6	Sail
12/17/2016	1	7:48	7:58	10	100	Stacey T	Down	Cloudy 29	5	6.5	Barge
12/18/2016	1	13:34	13:42	8	68	Riva	Up	Fog 38	2	5.3	Sail
12/21/2016	1	12:36	12:45	9	100	Stacey T		Fog	Calm	6.5	Barge
12/29/2016	1	13:44	13:54	10	75	Star Castle	Up	Cloudy 40	2	4.8	Other/unknown

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
1/2/2017	1	18:08	18:18	10	100	Stacey T	Up	Cloudy 31	9	5.1	Barge
2/7/2017	1	23:09	23:19	10	80	Defiance	Up	Cloudy 37	3	8	Barge
2/7/2017	2	18:37	18:46	9	80	Defiance	Down	Cloudy 37	8	8.9	Barge
2/13/2017	1	11:50	11:58	8	70	In Your Dreams	Up	Clear 47	10	10.6	Sail
2/14/2017	2	12:31	12:45	14	100	Nova	Up	Cloudy 45	5	9.2	Barge
2/14/2017	1	11:45	12:02	13	100	Lindy Marie	Up	Cloudy 45	7	9.2	Barge
2/17/2017	1	11:33	11:46	13	100	Lindy Marie	Down	Partly Cloudy 48	3	10.4	Barge
2/18/2017	1	11:04	11:13	9	85	Runaway	Down	Cloudy 45	2	8.5	Sail
2/23/2017	1	10:47	11:00	13	85	Nova	Down	Partly Cloudy 39	1	11.2	Barge
2/24/2017	1	18:01	18:13	12	70	Chaos	Up	Cloudy 39	2	11.2	Sail
2/26/2017	1	9:25	9:34	9	70	Anais	Down	Rain 37	2	10.2	Sail
2/27/2017	1	13:57	14:05	8	80	Anais	Up	Rain 42	4	9.1	Sail
3/2/2017	1	10:07	10:17	9	80	Runaway	Up	Cloudy 43	9	8.2	Sail
3/4/2017	1	11:46	11:59	13	85	South Creek	Down	Rain 46	3	8.7	Barge
3/11/2017	1	1:26	1:37	11	70	Crown Point	Down	Cloudy 44	2	12.7	Barge
3/16/2017	1	2:31	2:40	9	60	Daubi	Down	Clear 44	2	15.4	Barge
3/17/2017	1	10:10	10:18	8	60	Columbia River Marine Assistance	Down	Rain 42	2	15.8	Federal
3/17/2017	2	13:13	13:23	10	60	Columbia River Marine Assistance	Up	Rain 43	3	15.9	Federal
3/18/2017	2	11:08	11:20	8	75	Moonshadow	Down	Cloudy 46	4	16.5	Sail
3/18/2017	1	10:48	10:56	8	75	Runaway	Down	Cloudy 46	2	16.4	Sail
3/19/2017	1	13:33	13:42	9	75	Moonshadow	Up	Clear 47	4	16.6	Sail
3/21/2017	2	5:15	5:26	11	70	Cap't Bob	Down	Rain 44	1	16.4	Barge
3/21/2017	1	2:01	2:09	8	70	Sundial	Down	Rain 44	3	16.4	Barge
3/21/2017	4	11:35	11:45	10	80	Runaway	Up	Cloudy 46	10	16.4	Sail
3/21/2017	3	9:38	9:46	8	60	Columbia River Marine Assistance	Up	Cloudy 45	12	16.4	Federal
3/23/2017	3	14:01	14:15	14	75	Kathryn B	Down	Cloudy 53	2	16.7	Barge
3/23/2017	1	2:32	2:42	11	60	Crown Point	Down	Cloudy 45	3	16.6	Barge
3/23/2017	4	21:00	21:13	13	70	Crown Point	Down	Rain 47	4	16.7	Barge
3/23/2017	5	22:00	22:12	12	70	American Empress		Rain 47	1	16.7	Cruise/passenger
3/23/2017	3	14:01	14:15	14	75	Cha Cha	Up	Cloudy 53	2	16.7	Sail
3/23/2017	2	10:02	10:10	8	60	Julia Max	Up	Cloudy 45	6	16.7	Sail
3/24/2017	1	5:35	5:46	11	60	Willamette	Down	Rain 46	5	16.7	Barge
3/25/2017	1	2:14	2:24	10	80	Cap't Bob	Down	Cloudy 46	Calm	17	Barge
3/25/2017	2	9:48	10:00	12	70	Hurricane	Down	Cloudy 47	Calm	17.2	Barge
3/26/2017	1	1:41	1:57	16	70	Cascade	Down	Cloudy 46	5	17.2	Barge
3/26/2017	3	6:02	6:12	10	70	Clearwater	Down	Cloudy 45	11	17.3	Barge
3/26/2017	2	3:31	3:39	8	70	American Empress	Down	Cloudy 45	7	17.2	Cruise/passenger
3/27/2017	1	2:00	2:12	12	70	Deschutes	Down	Rain 47	1	17.2	Barge

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
3/27/2017	2	4:01	4:10	9	70	Diane B	Down	Rain 47	3	17.2	Barge
3/28/2017	1	23:40	23:49	9	60	Deschutes	Up	Cloudy 47	5	17.3	Barge
3/28/2017	2	11:21	11:37	16	136	Hurricane	Down	Cloudy 51	4	17.3	Barge
3/28/2017	3	12:33	12:42	10	70	Lori B	Down	Cloudy 53	6	17.6	Barge
3/29/2017	1	1:03	1:14	11	70	Granite Point	Down	Rain 47	Calm	17.2	Barge
3/29/2017	2	21:32	21:45	13	70	Willamette	Down	Cloudy 48	6	17.3	Barge
3/30/2017	1	4:51	5:04	13	60	Clearwater	Down	Cloudy 45	Calm	17.3	Barge
3/30/2017	3	9:47	9:55	8	70	Rowena	Down	Cloudy 46	4	17.5	Sail
3/30/2017	2	6:04	6:12	8	60	American Empress	Up	Cloudy 45	2	17.3	Cruise/passenger
3/31/2017	1	19:18	19:30	12	65	Cascade	Down	Partly Cloudy 55	Calm	17.4	Barge
4/1/2017	1	8:52	9:05	13	65	Granite Point	Down	Cloudy 49	4	16.7	Barge
4/1/2017	1	19:51	20:00	9	70	Lori B	Down	Cloudy 55	6	16.7	Barge
4/2/2017	1	2:15	2:27	12	70	Deschutes	Down	Cloudy 47	6	16.7	Barge
4/2/2017	3	11:21	11:30	9	75	Runaway	Down	Cloudy 49	1	16.7	Sail
4/2/2017	2	3:51	4:00	9	70	American Empress	Down	Cloudy 47	3	16.6	Cruise/passenger
4/5/2017	1	0:27	0:38	11	70	Cascade	Down	Clear 51	7	15.2	Barge
4/5/2017	2	2:10	2:19	9	70	Daubi	Down	Clear 50	7	15.2	Barge
4/5/2017	3	13:01	13:13	12	72	American Empress	Up	Cloudy 58	12	15.1	Cruise/passenger
4/6/2017	1	10:18	10:36	18	72	Clearwater	Down	Rain 48	5	14.5	Barge
4/6/2017	2	21:57	22:04	12	65	Defiance	Down	Cloudy 53	2	14.4	Barge
4/8/2017	2	11:08	11:20	12	65	Diane B	Down	Cloudy 47	1	13.1	Barge
4/8/2017	1	9:40	9:48	8	70	Autumn Cara	Up	Cloudy 45	3	13.3	Sail
4/9/2017	1	10:32	10:47	15	60	Deschutes	Down	Cloudy 45	4	13.3	Barge
4/9/2017	2	15:23	15:31	8	70	Riva	Down	Cloudy 55	3	13.4	Sail
4/11/2017	1	22:47	22:55	8	60	Crown Point	Down	Rain 48	3	12.8	Barge
4/13/2017	4	18:26	18:40	14	100	Cascade	Down	Cloudy 48	Calm	13.3	Barge
4/13/2017	1	10:33	0:57	13	60	Granite Point	Down	Cloudy 46	2	12.6	Barge
4/13/2017	3	13:33	13:41	8	75	Starry Night	Down	Cloudy 50	5	13.3	Sail
4/13/2017	2	12:28	12:37	9	80	Columbia River Marine Assistance	Down	Cloudy 52	10	13.2	Barge
4/14/2017	1	10:13	10:26	13	100	Defiance	Down	Cloudy 47	Calm	13.6	Barge
4/14/2017	2	20:15	20:27	12	100	Willamette	Down	Partly Cloudy 48	2	13.3	Barge
4/15/2017	3	19:42	19:51	9	75	Deschutes	Down	Clear 58	5	12.9	Barge
4/15/2017	2	13:51	14:08	17	75	Kathryn B	Down	Partly Cloudy 52	Calm	13.2	Barge
4/15/2017	1	3:40	3:52	12	136	Lori B	Down	Cloudy 42	1	13.2	Barge
4/16/2017	1	9:46	9:55	9	50	Cap't Bob	Down	Partly Cloudy 50	Calm	12.9	Barge
4/16/2017	2	17:24	17:34	10	60	Granite Point	Down	Cloudy 63	6	12.4	Barge
4/17/2017	2	13:11	13:22	11	70	Clearwater	Down	Cloudy 54	1	11.9	Barge
4/17/2017	1	3:41	3:50	9	70	Julia Max	Up	Cloudy 50	6	12.2	Sail
4/18/2017	1	13:31	13:40	9	65	Lori B	Down	Cloudy 59	4	11.8	Barge

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
4/19/2017	1	11:30	11:39	9	100	Runaway	Down	Cloudy 49	Calm	11.7	Sail
4/20/2017	2	9:00	9:14	14	100	Cap't Bob	Down	Cloudy 48	Calm	11	Barge
4/20/2017	1	5:58	6:09	11	100	In Your Dreams	Down	Cloudy 47	4	11.1	Sail
4/20/2017	3	12:12	12:22	10	100	Symmetry	Down	Cloudy 53	3	11	Sail
4/22/2017	4	21:49	21:59	10	65	Clearwater	Down	Cloudy 55	Calm	11.7	Barge
4/22/2017	3	18:57	19:06	9	65	Diane B	Down	Clear 58	7	11.8	Barge
4/22/2017	1	13:03	13:13	10	70	Granite Point		Rain 57	18	11	Barge
4/22/2017	2	16:04	16:15	11	70	Willamette	Down	Cloudy 58	5	11.7	Barge
4/23/2017	1	7:31	7:43	12	65	Cap't Bob	Down	Cloudy 51	9	12	Barge
4/24/2017	1	11:15	11:23	8	65	Symmetry	Up	Rain 45	12	12.1	Sail
4/25/2017	1	1:43	1:56	12	60	Sundial	Down	Cloudy 47	Calm	12.2	Barge
4/26/2017	1	18:48	19:04	16	80	Capt	Down	Cloudy 52	7	13.6	Barge
4/26/2017	2	20:40	20:58	18	100	Outlaw	Down	Cloudy 50	9	13.7	Sail
4/27/2017	1	9:48	9:58	10	100	Riva	Up	Cloudy 46	2	13.9	Sail
4/28/2017	1	23:00	23:13	13	136	Cascade	Down	Cloudy 47	2	14.3	Barge
4/28/2017	2	12:08	12:20	12	100	Wind Raven	Down	Partly Cloudy 53	4	14.4	Sail
4/28/2017	3	13:43	14:03	10	100	Iris	Down	Partly Cloudy 54	6	14.4	Sail
4/29/2017	3	16:20	16:30	10	70	Clearwater	Down	Cloudy 63	1	14.3	Barge
4/29/2017	1	10:04	10:18	14	70	Willamette	Down	Cloudy 50	Calm	14.5	Barge
4/29/2017	2	10:49	10:57	8	70	Panama Red	Down	Cldouy 52	Calm	14.5	Sail
4/30/2017	6	18:08	18:09	11	70	Deschutes	Down	Partly Cloudy 51	5	13.6	Barge
4/30/2017	1	3:47	3:59	12	60	Ryan Point	Down	Rain 51	Calm	14	Barge
4/30/2017	4	10:51	11:01	10	70	Sundial	Down	Cloudy 50	4	14	Barge
4/30/2017	2	9:04	9:15	11	70	Outlaw	Down	Cloudy 51	10	14	Sail
4/30/2017	5	11:44	12:05	10	70	Wind Raven	Up	Cloudy 52	5	13.9	Sail
4/30/2017	3	9:49	9:56	7	50	Mariner	Down	Cloudy 51	10	14	Barge
5/1/2017	1	13:48	13:56	8	70	Leni Cona	Up	Cloudy 51	Calm	12.9	Sail
5/2/2017	1	13:47	13:57	10	70	Crown Point	Down	Cloudy 57	2	11.9	Barge
5/3/2017	5	14:08	14:17	9	70	Cascade	Down	Clear 70	4	11.7	Barge
5/3/2017	3	11:56	12:05	9	70	Lindy Rose	Down	Clear 64	4	11.8	Barge
5/3/2017	4	12:56	13:05	9	70	Starry Night	Up	Clear 68	4	11.8	Sail
5/3/2017	1	10:00	10:09	9	100	Point Thomason	Down	Cloudy 59	2	11.7	Barge
5/3/2017	2	11:26	11:35	9	100	Vessel Type	Down	Clear 63	3	11.8	Other/unknown
5/4/2017	1	5:55	6:08	10	70	Diane B	Down	Clear 61	Calm	11.2	Barge
5/4/2017	3	13:42	13:52	10	70	Granite Point	Down	Clear 77	3	11.1	Barge
5/4/2017	2	10:09	10:18	9	75	Runaway	Up	Clear 67	3	11.1	Sail
5/5/2017	3	21:16	21:30	14	65	Kathryn B	Down	Cloudy 60	4	11.3	Barge
5/5/2017	2	11:33	11:41	8	74	Mary Biz	Down	Rain 55	5	11.1	Barge
5/5/2017	1	4:28	4:36	8	75	Julia Max	Down	Cloudy 56	Calm	11.1	Sail
5/6/2017	4	19:22	19:32	10	75	Clearwater	Down	Clear 58	6	12.2	Barge

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
5/6/2017	1	2:28	2:40	12	70	Sundial	Down	Cloudy 57	3	11.5	Barge
5/6/2017	3	15:27	15:36	9	75	Riva	Down	Cloudy 58	5	12.1	Sail
5/6/2017	2	6:59	7:09	10	80	Tanuki	Down	Clear 45	Calm	11.7	Sail
5/7/2017	3	10:02	10:15	13	60	Cap't Bob	Down	Clear 51	4	13.1	Barge
5/7/2017	2	5:38	5:48	10	60	Deschutes	Down	Clear 46	Calm	12.7	Barge
5/7/2017	1	1:15	1:24	10	60	Hurricane	Down	Clear 48	4	12.3	Barge
5/7/2017	4	19:28	19:38	10	65	Willamette	Down	Clear 62	6	13.6	Barge
5/8/2017	1	1:13	1:24	11	60	Crown Point	Down	Clear 62	1	13.8	Barge
5/9/2017	1	9:10	9:29	19	75	South Creek	Down	Clear 54	2	14.9	Barge
5/9/2017	2	13:31	13:38	7	50	Sundial	Down	Clear 66	2	14.8	Barge
5/10/2017	4	22:26	22:40	14	70	Granite Point	Down	Cloudy 65	2	14.6	Barge
5/10/2017	1	9:40	9:50	10	70	Hurricane	Down	Clear 54	Calm	14.8	Barge
5/10/2017	3	12:06	12:19	13	70	Ryan Point	Down	Clear 63	Calm	14.8	Barge
5/10/2017	2	10:32	10:42	10	70	Swift	Up	Clear 57	Calm	14.8	Sail
5/11/2017	1	2:12	2:24	12	136	Clearwater	Down	Cloudy 59	3	14.5	Barge
5/12/2017	1	18:03	18:18	15	70	Cascade	Down	Cloudy 52	1	14.4	Barge
5/13/2017	4	19:49	19:57	8	70	Cap't Bob	Down	Rain 49	6	14.5	Barge
5/13/2017	6	23:07	23:17	10	70	Clearwater	Down	Rain 47	3	14.6	Barge
5/13/2017	3	18:50	18:59	9	70	Deschutes	Down	Rain 49	1	14.5	Barge
5/13/2017	1	1:15	1:25	10		Diane B	Down	Rain 47	4	14.7	Barge
5/13/2017	5	21:02	21:11	9	70	Crown Point	Down	Rain 46	5	14.6	Barge
5/13/2017	2	13:39	13:47	8	70	Seaquel	Up	Cloudy 51	3	14.5	Other/unknown
5/14/2017	1	0:47	0:57	10	60	Ryan Point	Down	Cloudy 47	4	14.7	Barge
5/14/2017	3	19:42	19:50	8	60	Willamette	Down	Partly Cloudy 57	1	14.5	Barge
5/14/2017	2	14:17	14:24	7	60	Starry Night	Down	Partly Cloudy 56	1	14.6	Sail
5/15/2017	1	0:08	0:17	9	60	Sundial	Down	Cloudy 50	2	14.5	Barge
5/16/2017	1	10:41	10:55	14	136	Bumblebee	Down	Partly Cloudy 51	9	14.6	Sail
5/17/2017	2	13:54	14:04	10	60	Kathryn B	Down	Cloudy 55	Calm	14.9	Barge
5/17/2017	1	10:46	10:56	10	75	Runaway	Down	Cloudy 54	2	14.7	Sail
5/18/2017	2	18:21	18:37	16	75	Cascade	Down	Cloudy 67	2	14.9	Barge
5/18/2017	1	2:38	2:52	14	75	Granite Point	Down	Cloudy 49	Calm	14.7	Barge
5/19/2017	4	20:26	20:41	15	100	Clearwater	Down	Partly Cloudy 67	10	14.4	Barge
5/19/2017	1	4:15	4:26	11	70	Mary Biz	Down	Cloudy 55	1	14.8	Barge
5/19/2017	2	10:28	10:36	8	75	Runaway	Up	Clear 61	Calm	14.8	Sail
5/19/2017	3	14:07	14:17	10	100	Zia	Down	Partly Cloudy 69	2	14.9	Sail
5/20/2017	1	15:33	15:42	9	75	Anais	Down	Clear 66	3	14.2	Sail
5/21/2017	1	0:14	0:23	9	70	Sundial	Down	Clear 62	4	13.7	Barge
5/22/2017	1	13:41	13:54	13	75	Willamette	Down	Clear 83	4	12.9	Barge
5/22/2017	2	14:16	14:25	9	75	Lindy Rose	Up	Clear 84	9	12.9	Barge
5/24/2017	1	1:50	2:01	11	65	Granite Point	Down	Cloudy 52	2	12.6	Barge

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
5/24/2017	3	20:07	20:18	11	100	Anais	Up	Partly Cloudy 57	10	13	Sail
5/24/2017	2	18:40	18:51	11	100	Sans Saver	Down	Partly Cloudy 60	6	13	Other/unknown
5/25/2017	1	23:36	23:49	13	100	Cascade	Down	Cloudy 53	Calm	13	Barge
5/26/2017	1	4:59	5:12	13	100	Cap't Bob	Down	Clear 56	Calm	14.2	Barge
5/26/2017	2	9:06	9:17	11	100	Cascade	Down	Clear 56	1	14.3	Barge
5/26/2017	4	18:11	18:20	9	70	Renegade	Up	Clear 82	3	14.6	Sail
5/26/2017	3	13:09	13:26	17	100	Mach IV & Spotlace	Up	Clear 72	3	14.5	Other/unknown
5/26/2017	3	13:09	13:26	17	100	Spirit & Honey	Down	Clear 72	3	14.5	Other/unknown
5/27/2017	2	10:54	11:06	12	100	Clearwater	Down	Clear 66	Calm	14.6	Barge
5/27/2017	3	12:23	12:32	11	70	Defiance	Down	Clear 72	2	14.9	Barge
5/27/2017	1	6:30	6:40	10	100	Carol Marie	Down	Clear 57	Calm	14.2	Sail
5/29/2017	1	4:20	4:31	11	70	Deschutes	Down	Cloudy 55	Calm	13.8	Barge
5/29/2017	5	18:29	18:37	8	75	Runaway	Down	Clear 71	Calm	13.5	Sail
5/29/2017	2	8:00	8:07	7	50	Wind Raven	Down	Cloudy 54	6	13.8	Sail
5/29/2017	4	13:20	13:27	7	55	Mach IV	Down	Overcast 63	3	13.9	Other/unknown
5/29/2017	3	12:50	12:58	8	55	Spirit & Honey	Up	Cloudy 60	Calm	13.9	Other/unknown
5/31/2017	2	20:58	21:12	14	70	Diane B	Down	Cloudy 66	2	14.3	Barge
5/31/2017	1	19:05	19:18	13	100	Stacey T	Down	Cloudy 68	5	14.2	Barge
6/1/2017	1	9:42	9:56	14	100	Clearwater	Down	Cloudy 60	1	14.6	Barge
6/2/2017	1	23:35	23:48	13	100	Hurricane	Down	Cloudy 60	Calm	14.6	Barge
6/2/2017	3	12:20	12:33	13	100	Ryan Point	Down	Partly Cloudy 64	Calm	14.6	Barge
6/2/2017	2	5:17	5:26	9	100	Autumn Wind	Down	Cloudy 67	2	14.6	Sail
6/2/2017	4	13:52	14:01	9	75	Madrone	Down	Partly Cloudy 66	4	14.6	Sail
6/3/2017	3	17:52	18:04	12	60	Defiance	Down	Cloudy 63	5	14.4	Barge
6/3/2017	5	21:29	21:38	9	60	Deschutes	Down	Cloudy 61	10	14.5	Barge
6/3/2017	2	6:45	6:55	10	100	South Creek	Up	Overcast 56	3	14.7	Barge
6/3/2017	4	19:31	19:41	10	55	Sundial	Down	Partly Cloudy 64	2	14.4	Barge
6/3/2017	1	4:33	4:42	9	100	Aquilla	Down	Overcast 57	3	14.7	Sail
6/4/2017	1	1:03	1:14	11	65	Diane B	Down	Partly Cloudy 55	3	14.3	Barge
6/4/2017	2	15:03	15:11	8	75	Cha Cha	Down	Partly Cloudy 62	1	14.5	Sail
6/4/2017	3	15:58	16:05	7	50	Selkie	Up	Partly Cloudy 63	5	14.4	Sail
6/5/2017	2	19:01	19:13	12	60	Bruce M	Down	Clear 76	2	14	Barge
6/5/2017	1	12:39	12:46	7	45	Nahoma	Up	Clear 56	3	13.8	Other/unknown
6/6/2017	2	21:48	22:01	13	136	Sundial	Down	Clear 66	5	13.6	Barge
6/6/2017	1	18:03	18:19	16	80	Iia	Down	Clear 83	4	13.6	Other/unknown
6/6/2017	1	18:03	18:19	16	80	Iris	Up	Clear 83	4	13.6	Sail
6/7/2017	1	4:20	4:28	8	60	Diane B	Down	Cloudy 58	Calm	13.6	Barge
6/7/2017	2	18:06	18:18	12	60	Willamette	Down	Clear 74	1	13.4	Barge
6/8/2017	3	20:12	20:22	10	60	Clearwater	Down	Cloudy 57	6	13.5	Barge
6/8/2017	2	18:08	18:19	11	100	Stacey T	Up	Cloudy 61	6	13.4	Barge

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
6/8/2017	1	1:13	1:25	12	100	Scorpius	Up	Rain 60	2	13.5	Other/unknown
6/9/2017	1	13:08	13:18	10	65	Defiance	Down	Cloudy 57	1	13.5	Barge
6/9/2017	2	20:18	20:30	12	70	Deschutes	Down	Cloudy 53	2	13.5	Barge
6/10/2017	1	23:46	23:56	10	70	Willamette	Down	Cloudy 53	Calm	13.5	Barge
6/11/2017	1	8:02	8:12	10	70	Deschutes	Down	Cloudy 54	Calm	13.9	Barge
6/11/2017	2	11:14	11:23	9	50	Crown Point	Down	Cloudy 58	2	14	Barge
6/11/2017	3	15:30	15:37	7	45	Fantasy	Up	Partly Cloudy 66	5	14	Sail
6/12/2017	1	18:56	19:04	8	60	Defiance	Down	Cloudy 58	3	12.4	Barge
6/13/2017	2	10:10	10:19	9	95	Stacey T	Down	Cloudy 53	2	11.7	Barge
6/13/2017	3	22:20	22:30	10	75	Stacey T	Up	Cloudy 57	5	11.5	Barge
6/13/2017	1	1:37	1:47	10	65	Sundial	Down	Cloudy 53	Calm	12.2	Barge
6/14/2017	1	1:43	1:52	9	60	Cascade	Down	Cloudy 54	Calm	11	Barge
6/14/2017	2	5:41	5:51	10	60	Hurricane	Down	Cloudy 53	Calm	11	Barge
6/14/2017	3	10:43	10:52	9	100	South Creek	Down	57	Calm	11.6	Barge
6/15/2017	2	21:09	21:18	9	60	Clearwater	Down	Rain 62	2	11.7	Barge
6/15/2017	1	1:30	1:42	12	100	Crown Point	Down	Rain 57	4	11.5	Barge
6/16/2017	1	5:02	5:12	10	100	Chief	Down	Rain 59	Calm	12	Barge
6/16/2017	2	5:23	5:32	9	100	Mischief	Down	Rain 58	Calm	12	Sail
6/16/2017	3	9:50	9:58	8	75	Melekai	Down	Cloudy 60	1	12	Sail
6/17/2017	3	18:11	18:19	8	60	Cascade	Down	Cloudy 68	Calm	10.4	Barge
6/17/2017	1	2:43	2:54	11	100	Chief	Down	Cloudy 56	2	11.4	Barge
6/17/2017	2	6:04	6:14	10	100	Willamette	Down	Cloudy 55	1	11.1	Barge
6/18/2017	2	18:18	18:26	8	70	Clarkston	Down	Clear 75	7	9.9	Barge
6/18/2017	1	5:56	6:04	8	50	Lindy Rose	Down	Cloudy 59	Calm	10	Barge
6/21/2017	4	18:06	18:18	12	65	Clearwater	Down	Clear 72	7	9.3	Barge
6/21/2017	1	5:01	5:09	8	45	Minjana	Down	Clear 53	4	9.5	Other/unknown
6/23/2017	1	1:26	1:39	13	100	Lori B	Down	Clear 66	Calm	8.8	Barge
6/23/2017	2	20:37	20:47	10	100	Stacey T	Up	Clear 82	2	8.8	Barge
6/24/2017	1	9:20	9:36	16	100	Hurricane	Down	Clear 71	1	9.8	Barge
6/27/2017	2	12:49	12:59	10	70	Daubi	Down	Cloudy 62	4	7.3	Barge
6/27/2017	1	4:18	4:26	8	60	Sea Fever	Down	Cloudy 57	7	7.7	Sail
6/28/2017	2	18:58	19:10	12	100	Stacey T	Down	Partly Cloudy 69	2	6.4	Barge
6/28/2017	1	10:21	10:28	7	80	Mari Biz	Down	Cloudy 59	1	7.8	Other/unknown
6/29/2017	1	21:02	21:14	12	125	Stacey T	Up	Clear 74	5	6.4	Barge
6/30/2017	1	12:10	12:19	9	70	Bliss	Down	Clear 71	3	6.9	Sail
7/2/2017	1	9:58	10:06	8	80	Make It So	Down	Clear 59	4	5.5	Sail
7/5/2017	1	11:28	11:37	9	70	Bliss	Up	Clear 70	4	5	Sail
7/6/2017	1	18:31	18:39	8	43	Plansea	Up	Clear 87	2	5	Sail
7/7/2017	1	18:03	18:11	8	47	Plansea	Down	Cloudy 69	3	5	Sail
7/11/2017	1	9:48	9:55	12	100	Stacey T	Down	Clear 58	2	4.8	Barge

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
7/11/2017	2	10:45	10:55	10	70	Stacey T	Down	Clear 60	1	4.4	Barge
7/11/2017	3	18:34	18:45	11	100	Stacey T	Up	Clear 76	9	3.8	Barge
7/13/2017	1	9:07	9:15	8	65	Whisper	Down	Cloudy 61	Calm	5	Sail
7/22/2017	1	5:28	5:38	10	70	Stacey T	Down	Clear 63	Calm	6.4	Barge
7/22/2017	2	19:15	19:25	9	70	Tanuki	Up	Clear 86	10	5	Sail
7/23/2017	1	11:15	11:23	8	70	First Lite	Down	Partly Cloudy 68	6	4	Sail
7/27/2017	1	9:37	9:47	10	80	Stacey T	Down	Overcast 60	5	5	Barge
7/27/2017	2	18:41	18:51	10	100	Make It So	Up	Clar 77	4	3.2	Sail
7/28/2017	1	18:33	18:43	10	75	Sea Faver	Up	Clar 78	9	1.8	Sail
7/29/2017	1	9:49	9:59	10	80	Anais	Down	Clear 63	1	3.9	Sail
8/8/2017	6	20:21	20:30	9	95	Stacey T	Up	Smokey 82	6	4.5	Barge
8/10/2017	10	12:47	12:57	10	80	Whisper	Up	Hazy 74	1	3.5	Sail
8/14/2017	1	11:29	11:39	10	80	Stacey T	Down	Cloudy 61	1	3.5	Barge
8/15/2017	1	21:46	21:55	9	136	Yaquina	Up	Cloudy 76	4	3.2	Dredge
8/16/2017	1	14:16	14:24	8	80	Stacey T	Up	Clear 75	1	2.9	Barge
8/19/2017	2	16:03	16:14	11	75	Anais	Up	Clear 75	10	3	Sail
8/19/2017	1	10:05	10:14	9	75	Vagabundo	Down	Clear 60	4	2	Sail
8/22/2017	2	5:41	5:52	11	90	Make It So	Down	Overcast 65	Calm	5.2	Sail
8/22/2017	1	4:32	4:46	14	136	Yaquina	Down	Overcast 68	Calm	4.1	Dredge
8/24/2017	1	9:19	9:29	10	70	Saragosso	Down	Cloudy 61	13	4.7	Barge
8/29/2017	1	22:56	23:07	11	75	Daubi	Down	Hazy 65	Calm	4	Barge
9/2/2017	1	17:30	17:37	7	75	Anais	Down	Clear 95	3	3	Sail
9/6/2017	1	10:00	10:12	12	75	South Creek	Down	Hazy 69	Calm	3	Barge
9/6/2017	3	18:00	18:07	7	75	Autumn Wind	Up	Hazy 76	Calm	4.1	Sail
9/6/2017	2	12:09	12:18	9	95	Make It So	Up	Hazy 73	2	2.3	Sail
9/7/2017	1	18:00	18:09	9	80	USCG Ironwood	Up	Hazy 69	1	4.3	Federal
9/11/2017	1	20:38	20:47	9	90	Stacey T	Down	78	3	4.2	Barge
9/20/2017	1	12:49	12:57	8	90	Stacey T	Down	Rain 57	Calm	2.3	Barge
9/21/2017	1	13:10	13:27	17	65	Wallace E	Down	Cloudy 54	Calm	2.4	Barge
9/27/2017	1	10:11	10:23	12	90	Scorpius	Down	Clear 65	2	1.7	Other/unknown
10/10/2017	1	19:30	19:39	9	70	Wallace E	Up	Cloudy 52	Calm	3.8	Barge
10/11/2017	1	10:03	10:15	12	70	Sarkasso	Up	Rain 46	Calm	2.5	Barge
10/16/2017	1	18:03	18:16	13	95	Triston	Up	Clear 64	Calm	3	Other/unknown
10/23/2017	1	13:42	13:51	9	90	Christy	Up	Clear 56	Calm	5	Barge
10/25/2017	1	12:42	12:51	9	115	Christy	Down	Overcast 56		3.1	Barge
11/6/2017	1	9:20	9:28	8	40	Washington	Up	Cloudy 42	Calm	4.3	Sail
11/8/2017	1	9:54	10:08	14	85	Ross Isle	Up	Overcast 48	12	4.5	Dredge
11/11/2017	1	7:38	7:47	9	65	Washington	Down	Cloudy 47	9	2.4	Sail
11/14/2017	1	9:03	9:20	16	136	Clarkston	Up	Cloudy 50	7	3	Barge
11/17/2017	1	18:29	18:46	17	100	Maverick	Down	Cloudy 48	Calm	6	Sail

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
12/6/2017	1	10:25	10:36	11	85	USCG Ironwood	Down	Cloudy 51	19	5	Federal
12/14/2017	1	11:13	11:26	13	136	South Creek	Down	Overcast 42	7	2.9	Barge
12/15/2017	1	14:03	14:13	10	90	Phoenix	Up	Cloudy 38	Calm	4.8	Sail
12/22/2017	1	9:43	9:54	11	90	Ross Isle	Down	Overcast 35	Calm	4	Dredge
1/13/2018	1	14:56	15:04	8	75	Anais	Down	Clear 56	2	8.5	Sail
1/17/2018	1	18:12	18:23	11	105	Stacey T		Rain 45	16	8	Barge
1/21/2018	1	14:29	14:37	8	75	Mosaic	Down	Clear 48	4	7	Sail
1/21/2018	2	14:59	15:07	8	75	Polar Express	Up	Clear 48	5	7.1	Sail
1/27/2018	1	14:18	14:29	11	95	Stacey T	Up	Cloudy 53	2	9	Barge
1/29/2018	2	18:08	18:18	10	95	Daubi	Down	Rain 51	5	9.3	Barge
1/29/2018	1	12:31	12:41	10	95	Polar Express	Down	Cloudy 48	11	8.5	Sail
1/30/2018	1	2:56	3:07	11	80	Sarah B	Down	Rain 46	2	8.5	Barge
1/31/2018	1	9:23	9:33	10	100	Stacey T	Down	Cloudy	3	8	Barge
1/31/2018	2	19:19	19:29	10	95	Stacey T	Up	Cloudy 45	1	9.5	Barge
2/6/2018	2	13:03	13:19	14	100	Stacey T	Down	Cloudy 47	Calm	8.4	Barge
2/6/2018	1	10:44	10:59	16	105	James T	Up	Cloudy 43	Calm	9.5	Barge
2/10/2018	1	9:02	9:13	11	80	South Creek		Clear 41	Calm	6.5	Barge
2/10/2018	2	15:34	15:45	11	80	James T	Down	Partly Cloudy 50	Calm	7	Barge
2/12/2018	1	18:39	18:56	17	80	Clarkston	Up	Clear 43	4	7.8	Barge
2/17/2018	2	21:25	21:37	12	100	Clarkston	Down	Rain 43	Calm	7.5	Barge
2/17/2018	1	7:10	7:18	8	80	James T	Up	Rain 46	Calm	6.8	Barge
2/18/2018	1	2:20	2:31	11	75	James T	Down	Rain 40	Calm	6.6	Barge
3/9/2018	1	12:29	12:39	10	80	Tanuki	Down	Cloudy 50	Calm	5.4	Sail
3/20/2018	1	13:05	13:14	9	70	Tanuki	Up	Clear 49	Calm	5.9	Sail
3/23/2018	1	9:47	9:56	9	70	Sargassa	Down	Cloudy 40	Calm	6.7	Barge
3/23/2018	2	3:32:00	13:42	10	80	Sargassa	Up	Cloudy 48	10	6.4	Barge
4/4/2018	1	9:27	9:38	11	85	South Creek	Down	Cloudy 46	1	5.5	Barge
4/4/2018	2	18:21	18:34	13	80	Phoenix	Down	Cloudy 53	2	4.7	Sail
4/5/2018	1	9:36	9:46	10	70	Bliss	Down	Cloudy 49	Calm	6.5	Sail
4/8/2018	2	16:56	17:04	8	80	Auam Craka	Down	Cloudy 53	3	8.9	Sail
4/8/2018	1	10:56	11:07	10	80	My Horse	Down	Rain 50	Calm	8.6	Sail
4/11/2018	1	9:03	9:12	9	70	Yankee Rose	Down	Cloudy 49	10	9.8	Sail
4/15/2018	1	2:22	2:36	14	60	Chief	Down	Rain 48	2	9.8	Barge
4/17/2018	1	18:13	18:25	12	80	Bruce M	Down	Cloudy 50	Calm	10.5	Barge
4/18/2018	2	21:18	21:35	12	70	Captain Bob	Down	Partly Cloudy 53	1	11	Barge
4/18/2018	1	13:22	13:29	7	70	Biiss	Up	Cloudy 53	5	10.7	Sail
4/19/2018	1	12:42	12:54	12	65	Yankee Rose	Up	Clear 57	5	11	Sail
4/20/2018	1	0:20	0:30	10	75	PJ Brix	Up	Clear 51	Calm	10.6	Barge
4/20/2018	3	10:02	9:52	10	70	Riva	Up	Clear 50	Calm	10.3	Sail
4/20/2018	4	10:30	10:40	10	70	Somehow	Down	Clear 53	Calm	10.3	Sail

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
4/20/2018	2	0:51	1:06	15	65	The Lincoln	Down	Clear 50	2	10.6	Barge
4/21/2018	1	8:22	8:33	11	85	Autumn Carra	Up	Partly Cloudy 49	1	9.6	Sail
4/22/2018	2	21:54	22:06	12	136	Rebel	Up	Clear 55	1	8	Barge
4/22/2018	1	13:35	13:48	14	80	First Light	Up	Clear 56	4	8.9	Sail
4/22/2018	1	13:34	13:48	14	80	Somehow	Down	Clear 56	4	8.9	Sail
4/23/2018	1	18:16	18:25	9	80	Rebel	Down	Clear 70	19	7.5	Barge
4/29/2018	2	11:24	11:32	8	75	Sargassa	Down	Cloudy 56	Calm	9.6	Barge
4/29/2018	1	1:02	1:16	14	60	Captain Bob	Down	Rain 51	Calm	8	Barge
4/29/2018	2	21:29	21:38	9	65	Granite	Down	Cloudy 51	Calm	9.9	Barge
5/1/2018	1	9:02	9:08	6	70	Celestial	Down	Cloudy 51	Calm	10.8	Sail
5/3/2018	1	5:54	6:06	12	70	Mischief	Down	Clear 52	Calm	9.7	Sail
5/4/2018	1	22:57	23:08	11	60	The Lincoln	Down	Clear 53	Calm	9.8	Barge
5/5/2018	1	10:43	11:06	12	65	My Horse	Down	Hazy 57	1	9.4	Sail
5/5/2018	2	16:22	16:30	8	70	Riva	Down	Clear 72	Calm	9.4	Sail
5/7/2018	1	10:39	10:49	10	70	Diane B	Down	Clear 58	Calm	10.3	Barge
5/8/2018	1	9:06	9:15	9	80	Anamcara	Down	Clear 56	1	11.2	Sail
5/10/2018	1	18:01	18:13	12	70	Raven	Up	Partly Cloudy 64	Calm	12.2	Sail
5/11/2018	1	5:17	5:28	11	60	Captain Bob	Down	Overcast 49	Calm	12.7	Barge
5/11/2018	3	14:14	14:26	12	70	Clearwater	Down	Partly Cloudy 63	6	13	Barge
5/11/2018	4	18:56	19:08	12	70	Defiance	Down	Clear 67	5	13	Barge
5/11/2018	2	14:14	14:26	12	70	Memets	Up	Partly Cloudy 63	6	13	Other/unknown
5/12/2018	1	3:37	3:48	11	65	Granite Point	Down	Cloudy 52	Calm	13.5	Barge
5/12/2018	6	17:52	18:02	10	70	Ryan Point	Down	Clear 70	2	14.3	Barge
5/12/2018	3	12:51	13:00	9	70	First Light	Up	Clear 63	Calm	13.9	Sail
5/12/2018	5	15:07	15:14	7	70	Zila	Up	Clear 77	5	14	Sail
5/12/2018	4	13:25	13:33	8	70	Sea Fever	Down	Clear 64	Calm	13.9	Sail
5/12/2018	2	4:36	4:48	12	65	Swipt	Up	Cloudy 51	Calm	13.7	Sail
5/13/2018	2	21:48	21:56	8	70	Rebel	Down	Clera 78	11	15	Barge
5/13/2018	1	10:44	10:53	9	70	Sundial	Down	Clear 64	Calm	14.7	Barge
5/14/2018	2	20:00	20:11	11	60	Defiance	Down	Clear 79	4	14.9	Barge
5/14/2018	1	18:27	18:35	8	80	Ironwood	Up	Clear 86	2	14.9	Federal
5/15/2018	1	5:54	6:07	13	65	Ryan Point	Down	Cloudy 56	Calm	15.3	Barge
5/16/2018	3	18:06	18:17	11	60	Willamette	Down	Cloudy 62	Calm	15.6	Barge
5/16/2018	4	22:26	22:39	13	60	Outlaw	Down	Cloudy 58	1	15.7	Sail
5/16/2018	1	2:51	3:01	10	70	American Empress	Up	Cloudy 57	Calm	15.1	Cruise/passenger
5/16/2018	2	13:45	13:53	8	60	Lena Kona	Down	Cloudy 60	Calm	15.5	Other/unknown
5/17/2018	1	9:02	9:20	18	136	Bruce M	Down	Overcast 54	Calm	16	Barge
5/17/2018	2	11:49	12:00	11	60	Willamette	Down	Cloudy 58	Calm	15.9	Barge
5/17/2018	4	13:34	13:44	10	70	Ironwood	Down	Cloudy 60	Calm	15.7	Federal
5/17/2018	3	12:23	12:35	12	60	UBI	Up	Cloudy 58	Calm	16	Other/unknown

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
5/18/2018	1	10:37	10:49	10	65	Lena Kona	Up	Cloudy 56	Calm	15.8	Other/unknown
5/18/2018	2	19:19	19:28	9	60	Robins Nest	Down	Partly Cloudy 64	3	15.8	Other/unknown
5/19/2018	2	11:15	11:31	13	75	Cascades	Down	Overcast 59	Calm	15.9	Barge
5/19/2018	1	9:25	9:37	12	74	The Lincoln	Down	Overcast 57	Calm	15.9	Barge
5/20/2018	1	0:17	0:26	9	65	Deschutes	Down	Cloudy 56	Calm	15.8	Barge
5/20/2018	2	15:45	15:53	8	65	Robins Nest	Up	Clear 67	Calm	15.5	Other/unknown
5/21/2018	1	9:40	9:54	14	65	Diane B	Down	Cloudy 55	Calm	15.5	Barge
5/22/2018	1	2:45	2:56	11	65	Captain Bob		Cloudy 58	Calm	15.5	Barge
5/22/2018	2	19:08	19:16	8	60	Iris	Up	Clear 81	2	15.5	Sail
5/23/2018	3	19:44	19:54	10	80	PJ Brix	Down	Cloudy 72	5	15	Barge
5/23/2018	2	11:27	11:37	10	80	South Creek	Down	Clear 67	Calm	14.9	Barge
5/23/2018	1	3:16	3:28	12	65	Willamette	Down	Clera 61	Calm	15.3	Barge
5/24/2018	1	9:45	9:57	12	85	South Creek	Up	Overcast 59	Calm	15.1	Barge
5/24/2018	2	13:03	13:17	14	71	Forever More	Down	Partly Cloudy 64	Calm	15.2	Sail
5/24/2018	2	13:03	13:17	14	71	The Lincoln	Down	Partly Cloudy 64	Calm	15.2	Barge
5/25/2018	4	23:24	23:38	14	70	Deschutes	Down	Partly Cloudy 54	Calm	15	Barge
5/25/2018	1	4:40	4:50	10	65	Moments	Down	Overcast 54	1	15.3	Sail
5/25/2018	2	9:15	9:24	9	60	Coyote	Down	Cloudy 55	Calm	15.3	Sail
5/25/2018	3	11:04	11:13	9	60	Coyote	Up	Cloudy 60	1	15.3	Sail
5/26/2018	1	7:08	7:20	8	65	Cascades	Down	Cloudy 53	1	15	Barge
5/26/2018	2	12:08	12:18	9	60	Eagle	Down	Cloudy 58	Calm	14.9	Sail
5/26/2018	3	20:30	20:38	8	75	American Empress	Down	Partly Cloudy 60	Calm	14.9	Cruise/passenger
5/28/2018	1	4:20	4:31	11	65	Sundial	Down	Clear 55	Calm	15	Barge
5/28/2018	2	14:09	14:16	7	65	Eagle	Up	Clear 65	1	15	Sail
5/29/2018	1	11:55	12:03	8	70	Forever More	Up	Cloudy 74	1	14.3	Sail
5/30/2018	2	21:15	21:27	12	70	Willamette	Down	Partly Cloudy 57	Calm	13.7	Barge
5/30/2018	1	14:00	14:08	8	61	Cielow Blue	Down	Clear 61	3	13.7	Sail
6/1/2018	3	1:57	13:07	8	60	Cielow Blue	Up	Cloudy 61	Calm	11.8	Sail
6/1/2018	2	3:20	3:35	15	60	The Lincoln	Down	Cloudy 53	Calm	12.3	Barge
6/1/2018	1	23:41	23:51	10	65	Tidewater	Down	Cloudy 54	Calm	12.3	Barge
6/2/2018	1	7:45	7:56	12	65	Granite Point	Down	Clear 57	Calm	12	Barge
6/2/2018	2	8:06	8:13	7	65	Matsayo	Up	Clear 57	Calm	12	Other/unknown
6/3/2018	1	4:25	4:35	10	65	Aquila	Down	Clear 54	Calm	11.6	Sail
6/3/2018	2	6:38	6:48	10	75	Autumn Wind	Down	Clear 53	Calm	11.6	Sail
6/4/2018	1	2:00	2:12	12	65	Cascades	Down	Partly Cloudy 54	Calm	11	Barge
6/4/2018	1	19:23	19:31	8	65	Crown Point	Down	Clear 70	Calm	9.5	Barge
6/8/2018	1	18:02	18:13	11	65	East Going	Up	Rain 58	Calm	7.6	Sail
6/10/2018	1	11:51	12:00	9	100	Tristan	Down	Cloudy 55	1	7.4	Other/unknown
6/11/2018	1	18:39	18:47	8	90	Stacy T	Down	Clear 80	Calm	7.9	Barge
6/12/2018	1	10:35	10:55	15	136	Stacy T	Down	Clear 60	Calm	8	Barge

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
6/12/2018	2	12:31	12:40	9	80	Vagabondo	Down	Clear 67	Calm	7.6	Sail
6/14/2018	3	18:27	18:39	12	126	Stacy T	Up	Cloudy 62	Calm	6.4	Barge
6/18/2018	1	9:34	9:44	10	85	South Creek	Down	Clear 64	Calm	6.1	Barge
6/24/2018	2	10:05	10:15	10	82	Stacy T	Down	Clear 63	1	5	Barge
6/24/2018	1	9:18	9:28	10	79	Dove	Down	Clear 62	Calm	5.2	Sail
6/27/2018	1	11:04	11:14	10	70	Aquila	Up	Clear 64	Calm	6.4	Sail
6/30/2018	9	20:33	20:45	12	80	Stacy T	Down	Cloudy 66	10	6	Barge
7/4/2018	1	9:15	9:25	10	75	Whisper	Down	Cloudy 69	Calm	4	Sail
7/12/2018	1	9:16	9:26	10	95	Make It So	Down	Clear 70	Calm	5.2	Sail
7/19/2018	1	9:35	9:45	10	85	Rowdy	Down	Cloudy 61	Calm	3.4	Sail
7/23/2018	1	11:10	11:27	17	81	Stacy T	Down	Clear 73	Calm	2	Barge
7/25/2018	1	10:25	10:35	10	99	Stacy T	Up	Clear 69	Calm	4.3	Barge
7/30/2018	1	13:56	14:06	10	65	Go Team	Up	Clear 85	Calm	3.2	Sail
8/11/2018	1	18:57	19:05	8	90	Make It So	Up	Cloudy 73	1	5	Sail
8/12/2018	1	20:50	21:00	10	100	Y Quena	Up	Cloudy 69	Calm	4.8	Dredge
8/13/2018	1	9:30	9:40	10	75	Whisper	Up	Clear 64	Calm	4.5	Sail
8/20/2018	1	10:33	10:43	10	68	Whisper		Overcast 63	Calm	0.5	Sail
8/21/2018	1	4:40	5:00	20	136	Y Quena	Down	Clear 68	Calm	3.4	Dredge
8/23/2018	1	9:41	9:51	10	100	Stacy T	Down	Smokey 60	Calm	2.8	Barge
8/23/2018	2	18:27	18:38:00	11	90	Stacy T	Up	Partly Cloudy 71	Calm	3.7	Barge
8/26/2018	2	9:21	9:35	14	90	Stacy T	Down	Cloudy 61	Calm	4	Barge
8/26/2018	4	17:36	17:34	8	80	Stacy T	Up	Cloudy 59	Calm	3.5	Barge
8/26/2018	1	9:00	9:09	9	75	Autumn Wind	Up	Cloudy 61	Calm	4	Sail
8/26/2018	3	12:30	12:40	10	85	Corker	Up	Cloudy 65	Calm	2.9	Sail
9/20/2018	1	3:12	3:23	11	100	Vixan	Down	Clear 55	Calm	2.7	Sail
9/25/2018	1	13:32	13:42	10	95	Stacy T	Down	Clear 72	2	0.7	Barge
9/26/2018	1	14:22	14:33	11	95	Stacy T	Up	Clear 75	Calm	1.1	Barge
9/27/2018	1	12:24	12:36	12	100	Stacy T	Down	Clear 67	Calm	1.5	Barge
9/27/2018	2	17:59	18:11	12	100	Stacy T	Up	Clear 80	Calm	3.2	Barge
9/28/2018	3	9:33	9:47	14	136	Huski	Up	Clear 60	Calm	3.1	Barge
10/4/2018	1	9:20	9:33	13	100	Huski	Down	Clear 53	Calm	1.5	Barge
10/21/2018	1	15:26	15:34	8	90	Corker	Up	Clear 63	Calm	2.5	Sail
10/29/2018	1	10:25	10:40	15	136	Make It So		Cloudy 52	Calm	3.7	Sail
10/31/2018	1	10:10	10:17	7	36	Andrew Foss	Up	Overcast 53	Calm	1.1	Barge
10/31/2018	2	12:43	12:50	7	36	Andrew Foss	Down	Overcast 55	Calm	3	Barge
11/6/2018	1	20:14	20:22	8	60	Make It So		Cloudy 50	Calm	3.7	Sail
12/21/2018	1	13:40	13:52	12	95	Make It So	Up	Clear 43	Calm	5.6	Sail
1/4/2019	1	19:05	19:17	12	100	Stacy T	Down	Cloudy 48	1	5.4	Barge
1/8/2019	1	9:19	9:31	12	100	Stacy T	Up	Rain 44	9	4.5	Barge
1/12/2019	2	21:29	21:37	9	80	Pacific Walk	Up	Cloudy 43	2	4.3	Barge

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
1/12/2019	1	16:55	17:08	13	70	Stuck		Partly Cloudy 46	3	3.5	Other/unknown
1/15/2019	1	10:32	10:43	11	85	Pheonix	Up	Cloudy 38	2	4.4	Sail
2/12/2019	1	18:22	18:43	21	136	James P	Up	Rain 48	6	4	Barge
2/18/2019	1	18:28	18:47	19	100	Daubi	Down	Rain 42	1	6.4	Barge
2/21/2019	1	13:22	13:38	16	100	Ross Isle	Up	Clear 41	4	3.7	Dredge
2/28/2019	1	18:00	18:14	14	100	Daubi	Down	Cloudy 37	9	3.3	Barge
3/11/2019	1	15:25	13:23	9	100	Stacy T	Down	Clear 46	6	3.5	Barge
3/14/2019	1	13:27	13:35	8	75	Go Team	Down	Partly Cloudy 51	1	3.4	Sail
3/15/2019	1	23:38	23:49	11	100	Stacy T	Up	Clear 46	4	2.2	Barge
3/17/2019	1	13:52	14:00	8	80	Go Team	Up	Clear 58	2	4	Sail
3/20/2019	2	18:34	18:47	13	85	Stacy T	Down	Partly Cloudy 67	15	5.9	Barge
3/20/2019	1	12:46	12:56	10	85	Moon Dance	Down	Clear 65	9	2.8	Sail
3/21/2019	1	19:52	20:03	11	85	Stacy T	Up	Cloudy 54	1	6	Barge
3/31/2019	1	12:24	12:32	8	85	Go Team	Down	Clear 59	1	4	Sail
3/31/2019	2	20:30	20:38	8	75	Darma	Down	Clear 64	1	4	Sail
4/1/2019	2	9:05	9:13	8	90	Clearwater	Down	Overcast 52	2	4.5	Barge
4/1/2019	1	3:05	3:18	13	136	Pacific Walk	Down	Overcast 51	2	4.7	Barge
4/3/2019	1	9:32	9:45	13	100	Ross Isle	Down	Cloudy 55	3	4.3	Dredge
4/5/2019	1	2:34	2:44	10	70	Darma	Up	Rain 50	2	5.9	Sail
4/6/2019	1	12:55	13:11	16	136	Willamette	Down	Cloudy 56	5	5.8	Barge
4/10/2019	1	11:45	11:59	15	90	Go Team	Up	Cloudy 51	4	12.7	Sail
4/11/2019	4	22:14	22:29	15	75	Defiance	Down	Cloudy 51	1	15	Barge
4/11/2019	1	1:22	1:35	13	75	Crown Point	Down	50	2	13.7	Barge
4/12/2019	1	4:44	4:56	12	65	Sundial	Down	Cloudy 48	1	15.1	Barge
4/12/2019	3	11:02	11:01	11	75	Madonna	Down	Cloudy 52	2	15.3	Sail
4/13/2019	3	18:20	18:31	11	65	Cascades	Down	Cloudy 49	4	13.8	Barge
4/13/2019	2	13:30	13:41	11	65	Ryan Point	Down	Rain 47	7	14.2	Barge
4/13/2019	1	10:30	10:38	8	70	Aquilla	Up	Rain 48	Calm	14.3	Sail
4/14/2019	1	7:08	7:21	13	65	Willamette		Cloudy 42	1	12.7	Barge
4/14/2019	3	10:46	10:56	10	65	Crown Point	Down	Cloudy 47	2	12.4	Barge
4/14/2019	4	13:14	13:22	8	65	Daumer	Up	Rain 45	2	12.3	Other/unknown
4/14/2019	2	9:23	9:30	7	65	Summer Wind		Cloudy 45	4	12.5	Other/unknown
4/15/2019	1	1:35	1:47	12	65	Defiance		Cloudy 43	6	12	Barge
4/15/2019	3	11:51	12:01	10	65	Riva	Down	Cloudy 47	6	10.9	Sail
4/19/2019	1	12:54	13:09	15	136	Riva	Up	Cloudy 57	4	7.9	Sail
4/22/2019	2	18:13	18:30	17	136	Clearwater	Up	Rain 59	3	8	Barge
4/22/2019	1	10:20	10:34	14	137	Stacy T	Down	Clear 51	4	8.6	Barge
4/26/2019	2	13:24	13:34	10	76	Iris	Down	Clear 60	2	9.5	Sail
4/26/2019	3	20:26	20:46	20	136	Lincoln	Down	Clear 54	7	8.8	Barge
4/27/2019	1	23:47	23:58	11	70	Sundial	Down	Clear 49	6	8.5	Barge

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
4/30/2019	1	11:29	11:39	10	70	Descutes	Down	Clear 57	4	6.6	Barge
5/1/2019	1	6:00	6:07	7	70	Inimahahn	Down	Clear 44	3	7.1	Other/unknown
5/4/2019	1	19:39	19:48	9	70	Crown Point	Down	Clear 71	5	6.8	Barge
5/5/2019	1	19:48	19:55	7	70	Daumer	Down	Clear 69	7	6.8	Other/unknown
5/6/2019	1	10:34	10:42	8	70	Easy Going	Down	Clear 59	3	6.5	Sail
5/7/2019	1	23:05	23:13	8	90	Willamette	Up	Clear 64	5	6.2	Barge
5/7/2019	2	23:22	23:29	7	66	First Light	Up	Clear 64	4	6.2	Sail
5/9/2019	1	11:56	12:10	14	136	Lincoln	Up	Clear 76	2	6.4	Barge
5/10/2019	1	19:45	20:01	16	136	Lincoln	Down	Clear 84	Calm	5.6	Barge
5/16/2019	2	14:05	14:20	15	75	Daubi	Down	Cloduy 59	3	8.9	Barge
5/18/2019	1	22:18	22:28	10	75	Willamette	Down	Rain 55	5	9.5	Barge
5/19/2019	1	15:05	15:13	8	75	Somehow	Down	Cloudy 60	5	10	Sail
5/25/2019	1	3:58	4:07	9	70	Aquilla	Down	Cloudy 51	2	6.6	Sail
5/28/2019	1	21:46	21:57	11	95	Stacy T	Up	Clear 62	5	6.5	Barge
6/1/2019	1	4:26	4:33	7	70	Naughty Boy	Down	Clear 55	7	8.8	Other/unknown
6/2/2019	1	9:25	9:32	7	65	Kimberly C	Up	Cloudy 56	2	8.8	Barge
6/2/2019	2	12:26	12:33	7	65	Kimberly C	Down	Clear 62	8	8.9	Barge
6/7/2019	1	12:03	12:12	9	70	First Light	Down	Cloudy 54	1	7.9	Sail
6/16/2019	1	21:53	22:03	10	75	Juno	Up	Cloudy 66	2	4.9	Other/unknown
6/20/2019	1	1:08	1:18	10	100	Stacy T	Down	Cloudy 55	5	3.6	Barge
6/22/2019	1	7:00	7:15	15	70	Willamette	Down	Cloudy 56	4	4.5	Barge
6/23/2019	2	15:00	15:12	12	136	Stacy T	Up	Cloudy 64	2	2.8	Barge
6/23/2019	1	10:23	10:31	8	70	Rama	Down	Cloudy 58	2	4	Sail
6/30/2019	2	19:22	19:36	14	120	Invader	Up	Partly Cloudy 80	6	3.4	Barge
6/30/2019	1	5:01	5:09	8	71	Pheonix	Down	Clear 59	1	5.2	Sail
7/1/2019	2	9:50	10:03	13	120	South Creek	Down	Clear 64	2	3.8	Barge
7/1/2019	1	9:50	10:03	13	120	Juno	Down	Clear 64	2	3.8	Other/unknown
7/3/2019	1	13:10	13:24	14	136	Invader	Down	Partly Cloudy 65	Calm	2.7	Barge
7/5/2019	1	10:31	10:41	10	100	Make It So	Down	Overcast 61	3	4.3	Sail
7/21/2019	1	11:37	11:45	8	80	Sweet Dreams	Up	Clear 71	3	3.5	Sail
7/25/2019	1	3:20	3:35	15	100	Dauby	Up	Clear 63	5	2.7	Barge
7/25/2019	3	12:58	13:09	11	100	Stacy T	Down	Clear 77	12	2	Barge
7/27/2019	12	10:09	10:20	11	100	Stacy T	Up	Cloudy 65	2	2.9	Barge
7/29/2019	1	6:38	6:50	12	90	Duaby	Up	Clear 61	3	4.2	Barge
8/2/2019	1	12:52	13:06	14	110	Husky	Up	Cloudy	5	3.9	Barge
8/10/2019	1	10:06	10:18	12		Yaquina	Up	Rain 65	3	2.5	Dredge
8/13/2019	1	4:02	4:15	13	110	Yaquina	Down	Clear 64	3	4.5	Dredge
8/13/2019	2	13:57	14:14	17	100	Yaquina	Up	Clear 81	3	1	Dredge
8/17/2019	1	9:45	9:54	9	70	Riversong	Down	Cloudy 63	4	3.2	Sail
8/17/2019	2	19:27	19:38	11	100	Yaquina	Down	Cloudy 68	3	3.5	Dredge

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
8/19/2019	1	11:08	11:22	14	136	Clarkston	Down	Cloudy 65	2	3	Barge
8/24/2019	1	23:42	23:51	9	75	First Light	Up	Cloudy 66	4.5		Sail
8/29/2019	1	9:33	9:44	11	90	Bruce M	Down	Cloudy 63	Calm	3.1	Barge
8/30/2019	2	19:56	20:12	16	100	Daubi	Down	Clear 74	7	4.6	Barge
8/30/2019	1	13:09	13:18	9	100	Shadow Fax	Up	Cloudy 72	1	2.2	Other/unknown
9/5/2019	1	20:35	20:46	11	100	Defiance	Up	Cloudy 79	1	2.7	Barge
9/27/2019	1	19:35	19:48	13	110	Defiance	Down	Cloudy 57	4	2.7	Barge
10/2/2019	1	9:43	9:57	13	90	Husky	Up	Clear 46	3	3.8	Barge
10/5/2019	1	9:41	10:02	21	100	Husky	Down	Overcast 50	Calm	1	Barge
10/6/2019	1	12:05	12:12	7	75	Make It So	Up	Clear 62	5	1.2	Sail
10/18/2019	1	11:51	12:06	15	100	Stacy T	Down	Cloudy 56	4	2.5	Barge
10/22/2019	1	11:30	11:43	13	100	Stacy T	Up	Partly Cloudy 59	4	1.7	Barge
10/26/2019	1	20:59	21:11	12	100	Doubi	Up	Rain 58	Calm	4.5	Barge
10/26/2019	1	12:59	13:12	13	100	Stacy T	Down	Partly Cloudy 53	2	0.3	Barge
10/29/2019	1	18:04	18:14	10	70	Stacy T	Up	Clear 43	9	3.6	Barge
10/30/2019	1	23:19	23:31	12	120	Rebel	Up	Clear 38	5	2.9	Barge
11/2/2019	1	8:40	9:04	24	85	Husky		Clear 42	Calm	1.5	Barge
11/3/2019	1	7:15	7:26	11	100	Stacy T	Down	Clear 42	1	0.7	Barge
11/5/2019	1	13:46	13:56	10	70	Stacy T	Up	Overcast 46	2	3	Barge
11/6/2019	1	9:14	9:22	8	90	Stacy T	Down	Fog 45	1	0.5	Barge
11/6/2019	2	18:10	18:23	13	100	Stacy T	Up	Clear 52	4	2.3	Barge
11/12/2019	1	18:43	18:52	9	75	Stacy T	Up	Cloudy 49	2	4.5	Barge
11/26/2019	1	12:52	13:12	20	100	Stacy T	Down	Cloudy 42	2	2	Barge
12/1/2019	1	16:44	16:53	9	80	Stacy T	Up	Cloudy 39	4	2.1	Barge
12/5/2019	2	11:27	11:39	12	90	Sara B	Up	Clear	10	3.7	Barge
12/5/2019	3	18:08	18:20	12	90	Sara B	Down	Clear 47	Calm	2.6	Barge
1/8/2020	1	12:49:00 PM	1:03:00 PM	00:14	100	Bruce M.	Up	Overcast	4	5.3	Barge
1/14/2020	1	10:39:00 AM	10:49:00 AM	00:10	80	Richard O.	Down	Clouds	5	7.3	Barge
1/14/2020	2	2:15:00 PM	2:24:00 PM	00:09	80	Richard O.	Up	Clouds	9	6.8	Barge
1/19/2020	1	12:02:00 PM	12:09:00 PM	00:07	70	Pama	Up	Clear	2	6.5	Other/unknown
1/23/2020	1	11:20:00 AM	11:30:00 AM	00:10	70	Richard O.	Down	Rain	13	5.4	Barge
1/26/2020	1	5:27:00 PM	5:38:00 PM	00:11	78	Stacy T.	Down	Clouds	0	8.5	Barge
1/27/2020	2	10:29:00 AM	10:38:00 AM	00:09	85	Stacy T.	Up	Clouds	10	7.4	Barge
1/27/2020	1	9:50:00 AM	9:58:00 AM	00:08	70	Reba	Down	Clouds	7	7.5	Sail
1/28/2020	1	12:45:00 PM	12:55:00 PM	00:10	100	Stacy T.	Down	Clouds	4	8.0	Barge
1/29/2020	1	2:55:00 AM	3:08:00 AM	00:13	70	Captain Bob	Down	Clouds	10	9.0	Barge
1/29/2020	2	1:47:00 PM	1:58:00 PM	00:11	90	Stacy T.	Up	Rain	12	8.9	Barge
2/1/2020	1	14:22	14:31	00:09	65	Shadowfox	Down	Clouds	2	7.9	Other/unknown
2/5/2020	1	18:51	19:02	00:11	70	Darma	Down	Clouds	0	6.9	Sail
2/7/2020	1	02:39	02:53	00:14	80	Christy	Up	Clouds	4	7.6	Barge

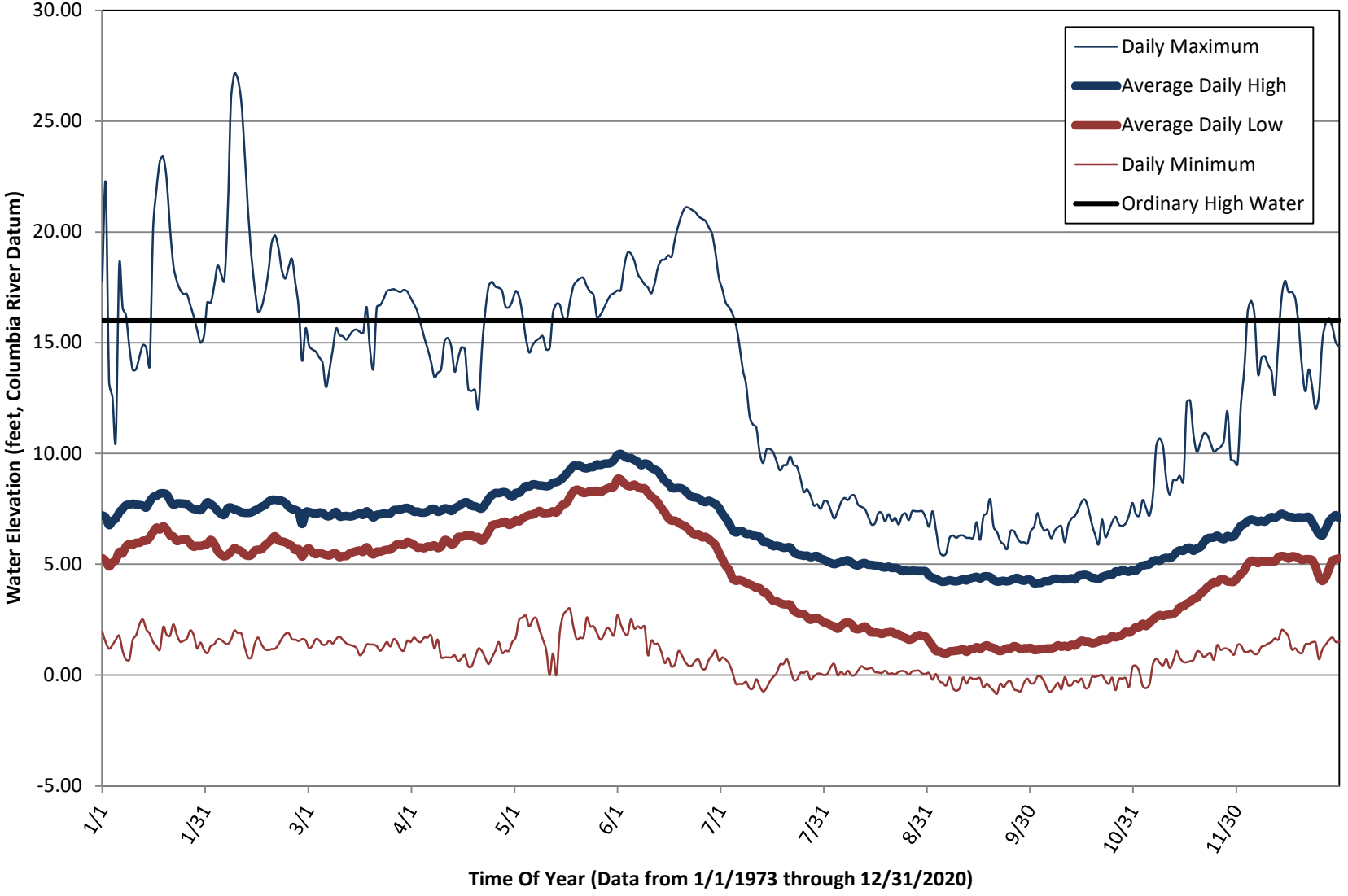
Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
2/7/2020	2	10:01	10:11	00:10	80	Easy Going	Down	Clouds	7	7.8	Sail
2/9/2020	1	08:45	09:09	00:24	85	Christy/Richard O	Down	Clouds	3	9.5	Barge
2/17/2020	1	10:23	10:31	00:08	90	Pied Piper	Down	Clear	2	5.5	Sail
2/29/2020	1	12:12	12:21	00:09	70	Shadowfox	Up	Clouds	0	4.4	Other/unknown
3/5/2020	1	20:29	20:41	00:12	100	Stacy T.	Down	Clouds	3	3.0	Barge
3/6/2020	1	18:05	18:16	00:11	100	Stacy T.	Up	Rain	2	4.3	Barge
3/12/2020	1	13:22	13:31	00:09	75	Go Team	Down	Clear	5	3.2	Sail
3/23/2020	1	10:25	10:35	00:10	72	Norman O.	Up	Clouds	5	3.0	Barge
3/23/2020	2	11:45	12:00	00:15	72	Norman O.	Down	Clouds	4	2.5	Barge
3/25/2020	1	21:55	22:06	00:11	100	Maverick	Up	Clouds	2	3.6	Sail
3/26/2020	1	12:02	12:17	00:15	136	Stacy T.	UP	Clouds	2	2.9	Barge
3/26/2020	2	22:24	22:36	00:12	110	Maverick	Down	Clouds	1	3.5	Sail
4/4/2020	1	22:07	22:17	00:10	90	Richard O.	Up	Clouds	2	2.5	Barge
4/15/2020	1	10:19	10:32	00:13	90	Windellero	Up	Clouds	2	3.2	Other/unknown
4/17/2020	1	18:12	18:21	00:09	80	Stacy T.	Up	Clouds	5	2.9	Barge
4/23/2020	1	02:18	02:36	00:18	136	Maverick	Up	Clouds	2	3.3	Sail
4/23/2020	2	18:17	18:32	00:15	105	Maverick	Down	Hazy	2	4.8	Sail
5/7/2020	1	18:36	18:52	00:16	90	Korker	Down	Clear	9	7.4	Other/unknown
5/8/2020	1	10:54	11:03	00:09	70	Willamette	Down	Clear	22	8.0	Barge
5/8/2020	3	19:48	19:56	00:08	75	Go Team	Up	Clear	10	7.9	Sail
5/8/2020	2	12:54	13:02	00:08	80	Riversong	Down	Clear	12	7.4	Sail
5/10/2020	1	11:05	11:18	00:13	76	First Light	Down	Clear	1	8.4	Sail
5/10/2020	2	13:06	13:18	00:12	70	Korker	Up	Clear	11	7.7	Other/unknown
5/13/2020	1	10:41	10:55	00:14	95	Stacy T.	Down	Clouds	1	8.3	Barge
5/15/2020	1	03:34	03:46	00:12	75	Captain Bob	Down	Clouds	0	9.6	Barge
5/16/2020	1	11:23	11:33	00:10	95	Stacy T.	Up	Clouds	1	8.6	Barge
5/16/2020	2	23:45	23:55	00:10	70	Willamette	Down	Rain	5	8.1	Barge
5/17/2020	1	07:45	08:00	00:15	136	Stacy T.	Down	Fog	2	8.6	Barge
5/20/2020	1	21:12	21:26	00:14	75	Captain Bob	Down	Clouds	4	9.5	Barge
5/22/2020	1	13:09	13:18	00:09	78	Uphoria	Down	Rain	2	9.9	Other/unknown
5/23/2020	1	12:53	13:08	00:15	55	Amy	Down	Clouds	5	9.9	Sail
5/24/2020	1	19:08	19:16	00:08	75	Uphoria	Up	Clouds	2	9.6	Other/unknown
5/25/2020	2	15:00	15:08	00:08	61	Amy	Up	Clouds	6	9.4	Sail
5/25/2020	1	13:34	13:42	00:08	65	Riva	Down	Overcast	1	9.5	Sail
5/28/2020		12:37	12:52	00:15	95	Ross Isle		Clouds	4	8.7	
	1						Up				Dredge
5/29/2020	1	23:16	23:27	00:11	80	Captain Bob	Down	Clear	3	9.6	Barge
5/30/2020	3	11:58	12:12	00:14	60	First Light	Up	Clouds	2	10.1	Sail

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level	Type1
5/30/2020	2	05:59	06:10	00:11	70	Riva	Up	Clear	1	9.9	Sail
5/30/2020	1	04:24	04:33	00:09	75	Shadow Fax	Down	Clear	6	9.9	Other/unknown
6/1/2020	1	05:55	06:04	00:09	70	Riva	Down	Clear	4	10.9	Sail
6/3/2020	1	20:25	20:37	00:12	70	Willamette	Down	Clouds	10	11.5	Barge
6/4/2020	1	01:39	01:50	00:11	65	Defiance	Down	Clouds	5	11.3	Barge
6/4/2020	2	13:43	13:52	00:09	65	Riva	Up	Clouds	2	10.6	Sail
6/5/2020	1	10:30	10:41	00:11	60	Deschutes	Down	Clouds	2	10.8	Barge
6/5/2020	2	18:23	18:34	00:11	80	PJ Brix	Up	Rain	3	10.5	Barge
6/5/2020	3	19:47	20:01	00:14	80	PJ Brix	Down	Clouds	1	10.7	Barge
6/6/2020	1	21:35	21:45	00:10	75	Willamette	Down	Clouds	6	10.8	Barge
6/7/2020	1	00:05	00:17	00:12	75	Granite Point	Down	Rain	3	10.8	Barge
6/9/2020	1	09:02	09:23	00:21	86	Lori B.	Down	Clouds	5	10.1	Barge
6/21/2020	1	07:45	07:55	00:10	90	Christy T.	Down	Clouds	2	8.6	Barge
6/22/2020	2	13:14	13:24	00:10	75	Christy T.	Up	Clear	2	7.5	Barge
6/22/2020	1	10:15	10:23	00:08	68	Hole in Water	Down	Clear	2	8.0	Sail
6/26/2020	1	11:16	11:26	00:10	70	Ever After	Down	Clear	2	8.2	Sail
6/26/2020	2	13:29	13:43	00:14	65	Randy S.	Down	Clear	2	8.0	Marine construction
6/30/2020	1	18:14	18:24	00:10	90	Corker	Down	Clear	11	7.7	Sail
7/1/2020	1	09:11	09:23	00:12	86	Ross Isle	Down	Clouds	2	7.9	Dredge
7/3/2020	1	13:10	13:20	00:10	65	Amy	Down	Clouds	0	8.1	Sail
7/31/2020	1	04:17	04:36	00:19	136	Maverick	Up	Clear	0	6.1	Sail
7/31/2020	3	19:44	20:00	00:16	136	Maverick	Down	Clouds	7	4.0	Sail
7/31/2020	2	18:22	18:32	00:10	90	Pied Piper	UP	Clouds	3	4.3	Sail
8/1/2020	1	04:32	04:42	00:10	70	Richard O.	Up	Clear	1	5.8	Barge
8/4/2020	1	11:19	11:37	00:18	136	Lassen	Up	Clear	1	3.7	Sail
8/5/2020	1	11:13	11:26	00:13	125	Christy T.	Down	Clear	2	4.6	Barge
8/5/2020	2	18:19	18:31	00:12	125	Christy T.	Up	Clouds	7	4.0	Barge
8/14/2020	1	09:31	09:41	00:10	96	Christy T.	Down	Clear	3	1.1	Barge
8/14/2020	2	13:10	13:21	00:11	95	Christy T.	Up	Clear	11	1.2	Barge
8/15/2020	1	17:59	18:15	00:16	136	Yaquina	Up	Clear	4	2.5	Dredge
8/18/2020	1	05:55	06:04	00:09	110	Pied Piper	Down	Clouds	7	5.7	Sail
8/23/2020	1	14:45	15:00	00:15	115	Yaquina	Down	Clear	4	3.2	Dredge
8/23/2020	2	19:11	19:20	00:09	85	Pied Piper	Up	Clear	6	3.5	Sail
8/27/2020	1	10:20	10:34	00:14	100	Ruth	Down	Clear	4	1.5	Barge
8/28/2020	1	13:13	13:25	00:12	55	Windafelo	Down	Clear	6	1.9	Other/unknown
9/1/2020	1	18:59	19:08	00:09	86	Pied Piper	Down	Clear	10	3.7	Sail
10/3/2020	1	14:01	14:10	00:09	70	Runaway	Up	Clear	1	1.0	Sail
10/4/2020	1	08:15	08:31	00:16	136	Christy T.		Fog	3	3.5	Barge
10/12/2020	1	11:06	11:20	00:14	136	Deschutes	Down	Clouds	4	0.8	Barge
10/12/2020	2	11:47	11:59	00:12	100	Olaf J.	Down	Clouds	5	1.2	Marine construction

Date	lift #	gates closed	gates open	total time (min)	lift elevation (feet)	vessel name	up or down	weather temp (degrees)	wind (mph)	water level
10/23/2020	1	18:11	18:33	00:22	136	Daubi	Down	Clouds	3	1.3
10/24/2020	1	09:59	10:12	00:13	90	Daubi	Down	Clouds	2	1.0
10/29/2020	1	13:55	14:09	00:14	90	Terilyn	Up	Clear	2	1.5
11/2/2020	2	09:44	09:55	00:11	95	Christy T.	Down	Clear	6	2.8
11/2/2020	3	22:08	22:18	00:10	95	Christy T.	Up	Clear	4	3.3
11/2/2020	1	03:38	03:55	00:17	136	Hurricane	Up	Clear	2	1.9
11/3/2020	1	10:50	11:10	00:20	100	Teri lynn		Rain	8	2.9
11/4/2020	1	20:29	20:45	00:16	136	Chief	Down	Clouds	5	4.5
11/18/2020	1	13:26	13:40	00:14	125	Christy T.	Up	Clouds	4	5.3
11/22/2020	1	01:27	01:37	00:10	75	Bella	Up	Fog	0	4.7
11/23/2020	1	09:02	09:15	00:13	75	Teri lynn	Up	Rain	3	3.5
11/23/2020	2	12:14	12:35	00:21	110	Teri lynn	Down	Clear	1	4.8
12/13/2020	1	15:31	15:39	00:08	70	Bella	Down	Rain	2	6.1
12/14/2020	1	10:23	10:33	00:10	85	Christy T.	Down	Clouds	2	3.6
12/14/2020	2	12:46	12:54	00:08	80	Christy T.	Up	Clouds	2	3.4
12/17/2020	1	02:56	03:06	00:10	70	Gloria	Up	Clear	3	4.5
12/18/2020	1	10:08	10:18	00:10	90	Sara B.		Clouds	7	5.4
12/22/2020	1	10:36	10:48	00:12	100	South Creek	Up	Clouds	4	7.4
12/23/2020	1	05:30	05:45	00:15	110	Terry Linn	Up	Fog	1	7.3
12/23/2020	2	12:26	12:54	00:28	100	Terry Linn	Down	Clear	5	6.9
12/27/2020	1	18:19	18:29	00:10	100	Christy T.	Up	Clouds	6	6.0
12/29/2020	1	18:33	18:42	00:09	110	Sara B.	Down	Clouds	5	5.9
12/30/2020	1	03:06	03:20	00:14	80	Richard O.	Up	Clouds	3	5.6
5/24/2020	2	20:47	20:55	00:08	60	Willamette	Down	Clouds	8	9.8

APPENDIX F COLUMBIA WATER LEVEL

Columbia River Water Elevation at the Interstate Bridges



Note: The water level went above the ordinary high water mark (16' above CRD) less than 1.2% of the time (189 days / 17,113 days) between 1973 and 2020.

Columbia River Water Elevation at the Interstate Bridges, Daily Statistics (feet, Columbia River Datum)

	Daily Maximum	Daily Minimum	Average Daily High	Average Daily Low	Average Monthly Max	Average Montly Min	Ordinary High Water
1-Jan	17.77	1.97	7.21	5.28	16.98	1.62	16
2-Jan	22.20	1.48	7.12	5.14	16.98	1.62	16
3-Jan	13.27	1.19	6.78	4.91	16.98	1.62	16
4-Jan	12.58	1.36	6.96	5.08	16.98	1.62	16
5-Jan	10.65	1.60	7.06	5.20	16.98	1.62	16
6-Jan	18.48	1.78	7.34	5.57	16.98	1.62	16
7-Jan	16.59	1.10	7.51	5.49	16.98	1.62	16
8-Jan	16.25	0.70	7.67	5.81	16.98	1.62	16
9-Jan	14.80	0.70	7.69	5.91	16.98	1.62	16
10-Jan	13.78	1.60	7.74	5.90	16.98	1.62	16
11-Jan	13.82	1.80	7.70	5.98	16.98	1.62	16
12-Jan	14.38	2.30	7.67	5.97	16.98	1.62	16
13-Jan	14.90	2.51	7.64	6.07	16.98	1.62	16
14-Jan	14.78	2.07	7.57	6.07	16.98	1.62	16
15-Jan	13.97	1.87	7.83	6.21	16.98	1.62	16
16-Jan	20.10	1.50	8.03	6.45	16.98	1.62	16
17-Jan	21.90	1.31	8.09	6.66	16.98	1.62	16
18-Jan	23.20	1.14	8.19	6.57	16.98	1.62	16
19-Jan	23.40	2.18	8.21	6.71	16.98	1.62	16
20-Jan	22.40	1.83	8.16	6.58	16.98	1.62	16
21-Jan	20.20	1.78	7.89	6.32	16.98	1.62	16
22-Jan	18.50	2.30	7.69	6.25	16.98	1.62	16
23-Jan	17.80	1.83	7.75	6.06	16.98	1.62	16
24-Jan	17.40	1.51	7.75	6.10	16.98	1.62	16
25-Jan	17.20	1.55	7.74	6.13	16.98	1.62	16
26-Jan	17.20	1.65	7.71	6.12	16.98	1.62	16
27-Jan	16.70	2.02	7.59	5.94	16.98	1.62	16
28-Jan	16.20	1.81	7.50	5.80	16.98	1.62	16
29-Jan	15.60	1.20	7.49	5.84	16.98	1.62	16
30-Jan	15.00	1.47	7.44	5.83	16.98	1.62	16
31-Jan	15.29	1.14	7.61	5.87	16.98	1.62	16
1-Feb	16.82	0.99	7.80	5.91	19.39	1.46	16
2-Feb	16.80	1.31	7.72	6.10	19.39	1.46	16
3-Feb	17.53	1.39	7.60	5.94	19.39	1.46	16
4-Feb	18.47	1.61	7.42	5.62	19.39	1.46	16
5-Feb	18.15	1.60	7.29	5.44	19.39	1.46	16
6-Feb	17.79	1.47	7.23	5.37	19.39	1.46	16
7-Feb	20.73	1.40	7.53	5.43	19.39	1.46	16
8-Feb	25.98	1.60	7.57	5.58	19.39	1.46	16
9-Feb	27.15	2.01	7.47	5.73	19.39	1.46	16
10-Feb	26.92	1.90	7.43	5.65	19.39	1.46	16
11-Feb	25.96	1.90	7.35	5.60	19.39	1.46	16
12-Feb	23.68	1.30	7.33	5.45	19.39	1.46	16
13-Feb	21.05	0.80	7.33	5.39	19.39	1.46	16
14-Feb	18.97	0.80	7.35	5.42	19.39	1.46	16
15-Feb	17.48	1.40	7.43	5.62	19.39	1.46	16
16-Feb	16.41	1.70	7.50	5.66	19.39	1.46	16
17-Feb	16.60	1.39	7.60	5.68	19.39	1.46	16
18-Feb	17.24	1.17	7.67	5.85	19.39	1.46	16
19-Feb	18.17	1.13	7.82	5.98	19.39	1.46	16
20-Feb	19.50	1.18	7.91	6.13	19.39	1.46	16
21-Feb	19.85	1.19	7.91	6.27	19.39	1.46	16
22-Feb	19.30	1.38	7.90	6.08	19.39	1.46	16
23-Feb	18.30	1.65	7.87	6.04	19.39	1.46	16
24-Feb	17.90	1.85	7.78	6.00	19.39	1.46	16
25-Feb	18.40	1.90	7.61	5.91	19.39	1.46	16
26-Feb	18.79	1.63	7.50	5.83	19.39	1.46	16
27-Feb	17.71	1.60	7.45	5.64	19.39	1.46	16
28-Feb	16.55	1.54	7.35	5.68	19.39	1.46	16
29-Feb	14.19	1.63	6.82	5.35	19.39	1.46	16
1-Mar	15.66	1.57	7.36	5.64	15.66	1.38	16
2-Mar	14.87	1.22	7.36	5.71	15.66	1.38	16

Columbia River Water Elevation at the Interstate Bridges, Daily Statistics (feet, Columbia River Datum), cont'd.

	Daily Maximum	Daily Minimum	Average Daily High	Average Daily Low	Average Monthly Max	Average Montly Min	Ordinary High Water
3-Mar	14.70	1.33	7.32	5.55	15.66	1.38	16
4-Mar	14.60	1.63	7.26	5.46	15.66	1.38	16
5-Mar	14.35	1.57	7.34	5.51	15.66	1.38	16
6-Mar	14.10	1.38	7.32	5.47	15.66	1.38	16
7-Mar	13.00	1.39	7.19	5.43	15.66	1.38	16
8-Mar	13.75	1.56	7.17	5.40	15.66	1.38	16
9-Mar	14.70	1.42	7.27	5.48	15.66	1.38	16
10-Mar	15.65	1.63	7.36	5.48	15.66	1.38	16
11-Mar	15.35	1.74	7.16	5.33	15.66	1.38	16
12-Mar	15.30	1.59	7.17	5.38	15.66	1.38	16
13-Mar	15.15	1.44	7.19	5.38	15.66	1.38	16
14-Mar	15.35	1.37	7.16	5.50	15.66	1.38	16
15-Mar	15.55	1.32	7.18	5.55	15.66	1.38	16
16-Mar	15.60	1.22	7.25	5.59	15.66	1.38	16
17-Mar	15.50	0.90	7.29	5.62	15.66	1.38	16
18-Mar	15.45	1.04	7.23	5.56	15.66	1.38	16
19-Mar	16.62	1.38	7.39	5.77	15.66	1.38	16
20-Mar	14.70	1.38	7.27	5.57	15.66	1.38	16
21-Mar	13.85	1.38	7.12	5.44	15.66	1.38	16
22-Mar	16.62	1.31	7.24	5.58	15.66	1.38	16
23-Mar	16.70	1.10	7.25	5.57	15.66	1.38	16
24-Mar	16.98	1.27	7.30	5.62	15.66	1.38	16
25-Mar	17.33	1.50	7.26	5.66	15.66	1.38	16
26-Mar	17.39	1.30	7.30	5.67	15.66	1.38	16
27-Mar	17.42	1.63	7.44	5.79	15.66	1.38	16
28-Mar	17.35	1.50	7.46	5.91	15.66	1.38	16
29-Mar	17.30	1.19	7.48	5.92	15.66	1.38	16
30-Mar	17.39	1.11	7.53	5.89	15.66	1.38	16
31-Mar	17.32	1.55	7.55	6.01	15.66	1.38	16
1-Apr	17.02	1.49	7.48	5.96	15.21	1.08	16
2-Apr	16.74	1.70	7.37	5.88	15.21	1.08	16
3-Apr	16.40	1.54	7.38	5.75	15.21	1.08	16
4-Apr	15.84	1.50	7.34	5.77	15.21	1.08	16
5-Apr	15.25	1.70	7.34	5.73	15.21	1.08	16
6-Apr	14.73	1.70	7.39	5.82	15.21	1.08	16
7-Apr	14.16	1.80	7.49	5.79	15.21	1.08	16
8-Apr	13.45	1.20	7.50	5.85	15.21	1.08	16
9-Apr	13.65	1.60	7.38	5.74	15.21	1.08	16
10-Apr	13.80	0.80	7.42	5.81	15.21	1.08	16
11-Apr	15.07	0.80	7.53	6.09	15.21	1.08	16
12-Apr	15.22	0.80	7.51	6.05	15.21	1.08	16
13-Apr	14.83	0.80	7.40	5.91	15.21	1.08	16
14-Apr	13.70	0.90	7.53	5.96	15.21	1.08	16
15-Apr	14.30	0.62	7.61	6.23	15.21	1.08	16
16-Apr	14.80	0.76	7.72	6.24	15.21	1.08	16
17-Apr	14.70	0.90	7.80	6.29	15.21	1.08	16
18-Apr	12.92	0.40	7.78	6.31	15.21	1.08	16
19-Apr	12.83	0.40	7.64	6.30	15.21	1.08	16
20-Apr	12.87	0.80	7.62	6.23	15.21	1.08	16
21-Apr	12.03	1.20	7.56	6.23	15.21	1.08	16
22-Apr	14.64	1.10	7.52	6.06	15.21	1.08	16
23-Apr	16.38	0.78	7.72	6.23	15.21	1.08	16
24-Apr	17.54	0.50	7.95	6.47	15.21	1.08	16
25-Apr	17.75	0.80	8.12	6.75	15.21	1.08	16
26-Apr	17.54	1.10	8.22	6.81	15.21	1.08	16
27-Apr	17.48	1.50	8.21	6.83	15.21	1.08	16
28-Apr	17.36	1.00	8.25	6.89	15.21	1.08	16
29-Apr	16.64	1.10	8.25	6.92	15.21	1.08	16
30-Apr	16.60	1.10	8.15	6.79	15.21	1.08	16
1-May	16.88	1.50	8.04	6.85	16.44	1.94	16
2-May	17.34	1.70	8.23	6.99	16.44	1.94	16
3-May	17.08	2.50	8.22	6.94	16.44	1.94	16

Columbia River Water Elevation at the Interstate Bridges, Daily Statistics (feet, Columbia River Datum), cont'd.

	Daily Maximum	Daily Minimum	Average Daily High	Average Daily Low	Average Monthly Max	Average Montly Min	Ordinary High Water
4-May	16.28	2.60	8.39	7.08	16.44	1.94	16
5-May	15.21	2.68	8.54	7.16	16.44	1.94	16
6-May	14.56	2.20	8.51	7.23	16.44	1.94	16
7-May	14.90	2.50	8.61	7.24	16.44	1.94	16
8-May	15.10	2.58	8.60	7.32	16.44	1.94	16
9-May	15.20	2.06	8.56	7.41	16.44	1.94	16
10-May	15.30	1.62	8.55	7.32	16.44	1.94	16
11-May	14.70	1.14	8.53	7.32	16.44	1.94	16
12-May	14.74	0.00	8.56	7.33	16.44	1.94	16
13-May	16.36	0.98	8.68	7.40	16.44	1.94	16
14-May	16.76	0.00	8.72	7.34	16.44	1.94	16
15-May	16.73	1.90	8.78	7.54	16.44	1.94	16
16-May	16.14	2.70	8.92	7.70	16.44	1.94	16
17-May	16.01	2.90	9.10	7.78	16.44	1.94	16
18-May	16.85	3.00	9.26	8.05	16.44	1.94	16
19-May	17.55	2.20	9.44	8.28	16.44	1.94	16
20-May	17.78	1.62	9.44	8.37	16.44	1.94	16
21-May	17.91	1.70	9.45	8.32	16.44	1.94	16
22-May	17.93	1.70	9.35	8.22	16.44	1.94	16
23-May	17.55	2.60	9.33	8.24	16.44	1.94	16
24-May	17.31	2.20	9.39	8.30	16.44	1.94	16
25-May	17.15	2.20	9.40	8.28	16.44	1.94	16
26-May	16.16	1.90	9.51	8.32	16.44	1.94	16
27-May	16.26	1.60	9.49	8.25	16.44	1.94	16
28-May	16.56	1.80	9.54	8.35	16.44	1.94	16
29-May	16.88	2.14	9.55	8.42	16.44	1.94	16
30-May	17.15	2.00	9.58	8.48	16.44	1.94	16
31-May	17.24	1.80	9.71	8.50	16.44	1.94	16
1-Jun	17.37	2.70	9.92	8.85	19.19	1.22	16
2-Jun	17.37	2.30	9.99	8.83	19.19	1.22	16
3-Jun	18.46	1.92	9.88	8.66	19.19	1.22	16
4-Jun	19.07	1.82	9.79	8.55	19.19	1.22	16
5-Jun	19.02	2.52	9.80	8.53	19.19	1.22	16
6-Jun	18.69	2.10	9.71	8.60	19.19	1.22	16
7-Jun	18.12	2.20	9.63	8.49	19.19	1.22	16
8-Jun	17.87	2.11	9.48	8.42	19.19	1.22	16
9-Jun	17.64	2.20	9.55	8.43	19.19	1.22	16
10-Jun	17.50	0.90	9.51	8.24	19.19	1.22	16
11-Jun	17.24	1.56	9.36	8.06	19.19	1.22	16
12-Jun	17.70	1.40	9.28	7.95	19.19	1.22	16
13-Jun	18.42	1.40	9.19	7.78	19.19	1.22	16
14-Jun	18.73	1.02	8.97	7.53	19.19	1.22	16
15-Jun	18.77	0.54	8.77	7.33	19.19	1.22	16
16-Jun	18.95	0.78	8.66	7.09	19.19	1.22	16
17-Jun	18.89	0.38	8.46	6.97	19.19	1.22	16
18-Jun	19.70	0.50	8.43	6.97	19.19	1.22	16
19-Jun	20.30	1.08	8.45	6.88	19.19	1.22	16
20-Jun	20.80	0.90	8.42	6.78	19.19	1.22	16
21-Jun	21.10	0.60	8.32	6.73	19.19	1.22	16
22-Jun	21.10	0.43	8.16	6.58	19.19	1.22	16
23-Jun	21.00	0.44	8.05	6.42	19.19	1.22	16
24-Jun	20.90	0.65	8.02	6.35	19.19	1.22	16
25-Jun	20.70	0.70	7.98	6.36	19.19	1.22	16
26-Jun	20.60	0.30	7.86	6.22	19.19	1.22	16
27-Jun	20.50	0.30	7.81	6.24	19.19	1.22	16
28-Jun	20.20	0.70	7.87	6.13	19.19	1.22	16
29-Jun	19.90	0.90	7.80	6.01	19.19	1.22	16
30-Jun	19.00	1.12	7.71	5.86	19.19	1.22	16
1-Jul	17.90	0.66	7.55	5.52	11.29	-0.01	16
2-Jul	17.40	0.80	7.29	5.23	11.29	-0.01	16
3-Jul	16.80	0.70	7.08	4.93	11.29	-0.01	16
4-Jul	16.60	0.50	6.84	4.73	11.29	-0.01	16

Columbia River Water Elevation at the Interstate Bridges, Daily Statistics (feet, Columbia River Datum), cont'd.

	Daily Maximum	Daily Minimum	Average Daily High	Average Daily Low	Average Monthly Max	Average Montly Min	Ordinary High Water
5-Jul	16.30	0.10	6.55	4.36	11.29	-0.01	16
6-Jul	15.80	-0.40	6.44	4.25	11.29	-0.01	16
7-Jul	14.90	-0.40	6.50	4.29	11.29	-0.01	16
8-Jul	13.80	-0.40	6.48	4.24	11.29	-0.01	16
9-Jul	13.10	-0.30	6.37	4.17	11.29	-0.01	16
10-Jul	11.70	-0.60	6.38	4.09	11.29	-0.01	16
11-Jul	11.31	-0.60	6.32	4.03	11.29	-0.01	16
12-Jul	11.18	-0.18	6.27	3.93	11.29	-0.01	16
13-Jul	10.02	-0.52	6.24	3.92	11.29	-0.01	16
14-Jul	9.57	-0.74	6.03	3.76	11.29	-0.01	16
15-Jul	10.18	-0.58	6.01	3.70	11.29	-0.01	16
16-Jul	10.21	-0.28	5.93	3.51	11.29	-0.01	16
17-Jul	10.05	-0.08	5.82	3.35	11.29	-0.01	16
18-Jul	9.64	0.10	5.84	3.32	11.29	-0.01	16
19-Jul	9.24	0.48	5.81	3.26	11.29	-0.01	16
20-Jul	9.47	0.50	5.75	3.20	11.29	-0.01	16
21-Jul	9.49	0.73	5.76	3.19	11.29	-0.01	16
22-Jul	9.88	0.30	5.77	3.17	11.29	-0.01	16
23-Jul	9.49	-0.20	5.57	2.92	11.29	-0.01	16
24-Jul	9.41	-0.20	5.46	2.82	11.29	-0.01	16
25-Jul	8.89	0.10	5.43	2.76	11.29	-0.01	16
26-Jul	8.27	0.10	5.39	2.75	11.29	-0.01	16
27-Jul	8.39	0.18	5.39	2.62	11.29	-0.01	16
28-Jul	8.10	-0.20	5.33	2.50	11.29	-0.01	16
29-Jul	7.66	-0.06	5.36	2.56	11.29	-0.01	16
30-Jul	7.71	0.06	5.37	2.56	11.29	-0.01	16
31-Jul	7.50	0.06	5.26	2.48	11.29	-0.01	16
1-Aug	7.85	0.00	5.21	2.37	7.39	0.15	16
2-Aug	7.82	0.06	5.12	2.33	7.39	0.15	16
3-Aug	7.43	0.37	5.06	2.25	7.39	0.15	16
4-Aug	7.07	0.50	5.01	2.20	7.39	0.15	16
5-Aug	7.40	-0.01	5.05	2.10	7.39	0.15	16
6-Aug	7.80	0.15	5.11	2.22	7.39	0.15	16
7-Aug	8.00	0.01	5.15	2.34	7.39	0.15	16
8-Aug	7.90	0.20	5.19	2.37	7.39	0.15	16
9-Aug	8.10	0.00	5.08	2.31	7.39	0.15	16
10-Aug	8.10	0.00	4.99	2.11	7.39	0.15	16
11-Aug	7.70	0.20	4.95	2.07	7.39	0.15	16
12-Aug	7.60	0.40	5.03	2.12	7.39	0.15	16
13-Aug	7.50	0.31	5.06	2.20	7.39	0.15	16
14-Aug	7.16	0.28	4.98	2.07	7.39	0.15	16
15-Aug	6.80	0.33	4.98	1.93	7.39	0.15	16
16-Aug	6.84	0.14	4.95	1.92	7.39	0.15	16
17-Aug	7.32	0.12	4.95	1.91	7.39	0.15	16
18-Aug	7.31	0.10	4.88	1.86	7.39	0.15	16
19-Aug	6.94	0.20	4.86	1.91	7.39	0.15	16
20-Aug	7.27	0.06	4.89	1.93	7.39	0.15	16
21-Aug	6.96	0.08	4.84	1.95	7.39	0.15	16
22-Aug	7.10	0.04	4.84	1.87	7.39	0.15	16
23-Aug	6.80	0.14	4.80	1.85	7.39	0.15	16
24-Aug	7.20	0.19	4.70	1.74	7.39	0.15	16
25-Aug	7.30	0.15	4.72	1.68	7.39	0.15	16
26-Aug	7.00	0.02	4.70	1.60	7.39	0.15	16
27-Aug	7.40	0.17	4.71	1.63	7.39	0.15	16
28-Aug	7.40	0.20	4.71	1.74	7.39	0.15	16
29-Aug	7.40	0.20	4.70	1.81	7.39	0.15	16
30-Aug	7.40	0.07	4.70	1.77	7.39	0.15	16
31-Aug	7.10	0.06	4.68	1.73	7.39	0.15	16
1-Sep	6.70	0.10	4.49	1.53	6.35	-0.38	16
2-Sep	7.40	-0.21	4.40	1.32	6.35	-0.38	16
3-Sep	6.60	0.05	4.36	1.10	6.35	-0.38	16
4-Sep	5.60	-0.27	4.26	1.07	6.35	-0.38	16

Columbia River Water Elevation at the Interstate Bridges, Daily Statistics (feet, Columbia River Datum), cont'd.

	Daily Maximum	Daily Minimum	Average Daily High	Average Daily Low	Average Monthly Max	Average Montly Min	Ordinary High Water
5-Sep	5.40	-0.35	4.22	1.00	6.35	-0.38	16
6-Sep	5.50	-0.47	4.23	0.98	6.35	-0.38	16
7-Sep	6.20	-0.10	4.28	1.07	6.35	-0.38	16
8-Sep	6.30	-0.59	4.25	1.08	6.35	-0.38	16
9-Sep	6.20	-0.70	4.23	1.10	6.35	-0.38	16
10-Sep	6.30	-0.59	4.27	1.13	6.35	-0.38	16
11-Sep	6.30	-0.10	4.33	1.18	6.35	-0.38	16
12-Sep	6.20	-0.38	4.27	1.05	6.35	-0.38	16
13-Sep	6.20	-0.13	4.36	1.16	6.35	-0.38	16
14-Sep	6.20	-0.17	4.40	1.17	6.35	-0.38	16
15-Sep	6.90	-0.16	4.44	1.26	6.35	-0.38	16
16-Sep	6.10	-0.14	4.36	1.19	6.35	-0.38	16
17-Sep	7.17	-0.56	4.44	1.28	6.35	-0.38	16
18-Sep	7.31	-0.38	4.46	1.34	6.35	-0.38	16
19-Sep	7.94	-0.55	4.43	1.26	6.35	-0.38	16
20-Sep	6.69	-0.70	4.29	1.23	6.35	-0.38	16
21-Sep	6.47	-0.84	4.22	1.13	6.35	-0.38	16
22-Sep	6.04	-0.39	4.24	1.09	6.35	-0.38	16
23-Sep	5.90	-0.55	4.25	1.14	6.35	-0.38	16
24-Sep	5.70	-0.33	4.23	1.21	6.35	-0.38	16
25-Sep	6.50	-0.28	4.27	1.20	6.35	-0.38	16
26-Sep	6.50	-0.63	4.34	1.31	6.35	-0.38	16
27-Sep	6.20	-0.69	4.39	1.26	6.35	-0.38	16
28-Sep	6.00	-0.73	4.30	1.18	6.35	-0.38	16
29-Sep	6.00	-0.34	4.26	1.21	6.35	-0.38	16
30-Sep	5.94	-0.16	4.31	1.21	6.35	-0.38	16
1-Oct	6.50	-0.37	4.29	1.23	6.86	-0.30	16
2-Oct	6.72	-0.35	4.15	1.14	6.86	-0.30	16
3-Oct	7.32	-0.06	4.16	1.14	6.86	-0.30	16
4-Oct	6.80	-0.08	4.16	1.16	6.86	-0.30	16
5-Oct	6.53	-0.31	4.24	1.19	6.86	-0.30	16
6-Oct	6.56	-0.68	4.24	1.21	6.86	-0.30	16
7-Oct	6.18	-0.74	4.28	1.20	6.86	-0.30	16
8-Oct	6.51	-0.55	4.35	1.25	6.86	-0.30	16
9-Oct	6.68	-0.35	4.36	1.34	6.86	-0.30	16
10-Oct	6.71	-0.64	4.32	1.28	6.86	-0.30	16
11-Oct	6.00	-0.09	4.33	1.32	6.86	-0.30	16
12-Oct	6.76	-0.46	4.33	1.28	6.86	-0.30	16
13-Oct	7.07	-0.44	4.37	1.37	6.86	-0.30	16
14-Oct	7.19	-0.24	4.32	1.34	6.86	-0.30	16
15-Oct	7.48	-0.32	4.47	1.45	6.86	-0.30	16
16-Oct	7.82	-0.16	4.51	1.56	6.86	-0.30	16
17-Oct	7.92	-0.57	4.52	1.50	6.86	-0.30	16
18-Oct	7.49	-0.55	4.48	1.51	6.86	-0.30	16
19-Oct	6.82	-0.09	4.40	1.44	6.86	-0.30	16
20-Oct	6.33	-0.08	4.37	1.46	6.86	-0.30	16
21-Oct	5.90	-0.03	4.33	1.52	6.86	-0.30	16
22-Oct	7.02	0.00	4.43	1.62	6.86	-0.30	16
23-Oct	6.23	-0.24	4.48	1.61	6.86	-0.30	16
24-Oct	6.53	-0.40	4.52	1.65	6.86	-0.30	16
25-Oct	6.90	-0.11	4.53	1.76	6.86	-0.30	16
26-Oct	7.15	-0.68	4.68	1.71	6.86	-0.30	16
27-Oct	6.80	-0.17	4.66	1.75	6.86	-0.30	16
28-Oct	6.74	-0.16	4.74	1.83	6.86	-0.30	16
29-Oct	6.85	-0.14	4.69	1.95	6.86	-0.30	16
30-Oct	7.23	-0.54	4.67	1.92	6.86	-0.30	16
31-Oct	7.77	0.37	4.74	2.02	6.86	-0.30	16
1-Nov	7.27	0.43	4.72	2.17	9.66	0.66	16
2-Nov	7.20	0.16	4.85	2.16	9.66	0.66	16
3-Nov	7.90	-0.49	4.94	2.32	9.66	0.66	16
4-Nov	7.55	-0.59	4.98	2.22	9.66	0.66	16
5-Nov	7.20	-0.42	5.00	2.36	9.66	0.66	16

Columbia River Water Elevation at the Interstate Bridges, Daily Statistics (feet, Columbia River Datum), cont'd.

	Daily Maximum	Daily Minimum	Average Daily High	Average Daily Low	Average Monthly Max	Average Montly Min	Ordinary High Water
6-Nov	8.04	0.48	5.14	2.49	9.66	0.66	16
7-Nov	10.33	0.75	5.19	2.62	9.66	0.66	16
8-Nov	10.69	0.56	5.16	2.71	9.66	0.66	16
9-Nov	10.34	0.44	5.26	2.67	9.66	0.66	16
10-Nov	8.80	0.72	5.29	2.72	9.66	0.66	16
11-Nov	8.15	0.32	5.28	2.72	9.66	0.66	16
12-Nov	8.80	0.64	5.38	2.76	9.66	0.66	16
13-Nov	8.80	1.08	5.55	2.87	9.66	0.66	16
14-Nov	9.00	0.77	5.63	3.06	9.66	0.66	16
15-Nov	8.70	0.59	5.61	3.11	9.66	0.66	16
16-Nov	12.30	0.58	5.72	3.23	9.66	0.66	16
17-Nov	12.40	0.63	5.75	3.31	9.66	0.66	16
18-Nov	10.85	0.68	5.61	3.45	9.66	0.66	16
19-Nov	10.08	1.06	5.73	3.48	9.66	0.66	16
20-Nov	10.48	1.03	5.78	3.67	9.66	0.66	16
21-Nov	10.90	0.82	5.98	3.79	9.66	0.66	16
22-Nov	10.86	0.91	6.16	3.95	9.66	0.66	16
23-Nov	10.49	1.00	6.20	4.07	9.66	0.66	16
24-Nov	10.09	0.70	6.21	4.21	9.66	0.66	16
25-Nov	10.19	1.35	6.29	4.19	9.66	0.66	16
26-Nov	10.30	1.14	6.18	4.33	9.66	0.66	16
27-Nov	10.60	1.20	6.14	4.32	9.66	0.66	16
28-Nov	11.91	1.19	6.28	4.23	9.66	0.66	16
29-Nov	9.76	1.07	6.22	4.21	9.66	0.66	16
30-Nov	9.68	0.92	6.28	4.23	9.66	0.66	16
1-Dec	9.50	1.36	6.52	4.40	14.70	1.36	16
2-Dec	12.20	1.34	6.74	4.56	14.70	1.36	16
3-Dec	13.80	1.06	6.82	4.73	14.70	1.36	16
4-Dec	16.40	1.05	6.95	5.02	14.70	1.36	16
5-Dec	16.90	1.10	7.02	5.15	14.70	1.36	16
6-Dec	16.30	0.95	6.99	5.15	14.70	1.36	16
7-Dec	13.60	0.99	6.93	5.06	14.70	1.36	16
8-Dec	14.30	1.27	6.97	5.14	14.70	1.36	16
9-Dec	14.40	1.33	6.92	5.12	14.70	1.36	16
10-Dec	14.00	1.42	7.05	5.12	14.70	1.36	16
11-Dec	13.70	1.50	7.13	5.14	14.70	1.36	16
12-Dec	12.67	1.66	7.11	5.13	14.70	1.36	16
13-Dec	15.00	1.60	7.19	5.32	14.70	1.36	16
14-Dec	17.10	2.04	7.28	5.37	14.70	1.36	16
15-Dec	17.80	1.94	7.22	5.36	14.70	1.36	16
16-Dec	17.30	1.73	7.15	5.26	14.70	1.36	16
17-Dec	17.30	1.15	7.14	5.36	14.70	1.36	16
18-Dec	17.00	1.21	7.10	5.35	14.70	1.36	16
19-Dec	15.80	1.04	7.13	5.28	14.70	1.36	16
20-Dec	13.90	1.00	7.12	5.20	14.70	1.36	16
21-Dec	12.80	1.39	7.13	5.23	14.70	1.36	16
22-Dec	13.80	1.40	7.14	5.23	14.70	1.36	16
23-Dec	13.00	1.48	6.92	5.19	14.70	1.36	16
24-Dec	12.00	1.47	6.63	4.89	14.70	1.36	16
25-Dec	12.60	0.72	6.39	4.43	14.70	1.36	16
26-Dec	15.10	1.16	6.30	4.25	14.70	1.36	16
27-Dec	15.90	1.38	6.60	4.42	14.70	1.36	16
28-Dec	16.10	1.58	6.94	4.80	14.70	1.36	16
29-Dec	15.70	1.70	7.11	5.17	14.70	1.36	16
30-Dec	15.00	1.49	7.22	5.23	14.70	1.36	16
31-Dec	14.83	1.51	7.08	5.27	14.70	1.36	16

Columbia River Water Elevation at the Interstate Bridges, Daily Maximum (feet, Columbia River Datum)

Date	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
January																
1		5.50	10.60	6.20	10.10	5.60	6.10	5.40	6.70	13.20	7.40	7.15	7.00	5.30	5.60	8.29
2		6.40	9.00	6.30	8.90	4.80	5.40	5.80	7.30	12.10	7.25	7.00	7.20	6.40	4.90	7.67
3		6.80	9.70	6.50	8.80	5.70	5.50	6.80	6.70	11.40	6.70	6.60	7.80	6.70	5.60	7.54
4		6.90	8.70	7.10	8.10	5.70	7.30	6.80	6.60	10.80	7.85	7.85	8.80	6.40	5.50	7.01
5		6.80	8.40	7.40	9.10	5.80	8.50	6.40	6.70	9.60	8.45	10.60	9.60	6.70	6.30	6.82
6		6.10	6.80	7.80	9.10	5.70	8.60	6.10	6.70	9.50	8.40	14.30	9.30	6.40	6.30	6.58
7		5.00	7.50	8.50	10.40	5.80	9.10	5.20	6.90	8.90	8.32	16.25	8.95	7.20	6.70	6.62
8		5.80	7.20	9.60	12.60	5.70	9.20	3.90	6.90	8.90	8.24	16.25	8.40	7.40	7.40	6.74
9		6.00	7.20	9.70	12.80	5.10	9.30	3.50	7.70	8.20	8.16	14.80	8.00	7.40	7.40	6.31
10		5.40	7.40	9.90	12.80	4.30	9.50	3.72	8.80	8.10	8.10	13.60	8.00	7.00	8.00	6.37
11		5.60	7.58	8.90	11.90	4.50	9.50	4.58	8.80	7.80	7.55	12.00	8.15	6.40	7.40	5.98
12		6.60	7.76	7.60	11.40	5.40	9.20	5.44	9.50	7.10	6.95	11.20	7.40	6.30	7.00	6.56
13		6.90	7.94	9.40	11.30	5.40	9.00	6.30	10.30	6.80	6.70	11.10	7.10	5.90	6.90	6.34
14		8.30	8.10	10.90	11.60	5.30	8.30	5.60	11.20	6.90	6.60	10.60	7.15	6.20	6.20	6.53
15		9.10	13.50	11.30	12.40	5.30	8.40	6.60	12.10	6.90	6.20	9.90	7.20	6.50	6.40	6.49
16		9.40	20.10	10.90	12.20	5.40	8.20	6.00	12.90	7.00	6.90	8.90	7.90	6.30	6.40	6.52
17		9.40	21.90	9.50	12.80	5.80	8.00	6.00	12.80	7.30	8.50	8.00	8.30	6.70	6.40	5.78
18		9.80	23.20	8.20	12.80	5.90	8.20	6.00	11.60	7.40	9.00	8.40	8.20	7.10	6.80	5.50
19		9.70	23.40	7.40	12.80	5.90	8.80	5.40	9.80	6.70	8.90	8.60	8.15	7.20	7.50	5.42
20		8.80	22.40	7.80	11.80	6.10	8.90	5.20	8.60	7.50	8.65	8.55	8.40	7.20	7.70	5.33
21		7.80	20.20	6.40	9.80	5.80	8.20	4.80	8.00	7.40	8.30	8.00	8.05	7.00	7.20	5.38
22		7.30	18.50	6.80	9.40	5.80	7.70	4.60	7.20	7.50	7.80	7.80	6.85	7.40	7.40	5.21
23		7.50	17.80	7.30	9.30	5.20	7.80	5.90	7.30	7.90	10.00	7.20	7.10	7.40	8.10	5.66
24		6.60	17.40	7.30	8.60	5.40	8.20	6.70	7.30	7.40	11.75	7.75	8.10	6.90	8.20	6.73
25		6.40	17.20	7.30	7.90	5.50	8.20	7.20	6.70	6.60	11.60	8.30	8.70	6.90	8.00	6.30
26		5.40	17.20	11.00	7.80	5.50	7.50	7.30	6.10	5.70	11.70	9.40	9.55	6.80	7.40	7.08
27		5.10	16.70	11.10	7.90	5.30	7.40	6.60	6.20	6.80	11.50	10.25	9.05	5.30	7.50	8.14
28		4.90	16.20	9.70	7.80	4.70	7.40	5.80	6.60	6.80	11.25	10.05	8.50	5.60	6.90	8.60
29		5.60	15.60	9.40	8.00	4.60	7.10	4.30	7.20	6.70	10.90	9.80	7.45	5.60	6.60	8.79
30		5.80	15.00	9.10	8.10	4.30	6.80	6.20	7.30	6.50	10.00	8.60	7.25	4.90	7.00	8.70
31		5.70	14.50	8.80	8.10	5.40	6.60	6.30	7.30	6.20	9.10	8.20	7.60	5.00	7.30	8.21
February																
1		5.60	14.20	8.40	8.10	5.40	6.50	6.60	6.70	6.00	8.25	8.60	7.40	6.60	7.60	10.79
2		6.40	14.05	7.30	7.80	5.40	7.10	6.60	6.70	6.00	7.80	8.20	7.75	6.00	7.50	11.19
3		6.20	13.90	6.90	7.80	5.40	7.60	6.40	6.70	6.80	7.55	8.65	7.60	5.70	7.70	11.01
4		5.30	13.90	6.90	7.60	5.30	7.60	5.30	6.30	7.20	7.25	7.75	6.80	6.90	7.80	9.86
5		5.20	13.70	6.50	7.50	5.20	8.00	4.60	5.80	7.60	7.20	8.50	5.60	7.60	7.40	8.27
6		5.10	13.00	6.00	7.60	4.80	8.40	5.20	5.60	7.50	7.20	6.60	6.10	7.30	7.40	6.99
7		5.20	12.30	6.10	6.70	4.90	9.50	8.20	5.60	7.30	7.40	7.25	6.50	7.10	7.80	6.28
8		5.80	10.90	6.50	6.40	5.40	9.50	8.80	5.20	6.40	7.50	8.00	6.55	7.30	7.25	5.30
9		5.90	10.00	6.40	6.40	5.40	9.80	8.90	5.40	5.00	7.30	8.80	6.90	7.50	7.18	5.28
10		6.00	9.50	7.00	6.00	5.40	9.80	8.30	5.40	5.90	7.10	9.90	7.15	7.50	7.25	5.67
11		5.90	9.20	8.00	6.10	5.40	8.80	8.30	4.50	6.80	7.10	10.25	7.20	7.40	6.95	5.88
12		5.40	9.30	8.70	7.00	4.60	8.80	9.70	5.30	6.70	7.00	9.80	7.35	7.30	6.78	6.10
13		5.20	9.20	8.90	7.10	4.60	8.20	10.20	6.40	6.80	7.10	10.50	8.85	6.90	6.57	6.87
14		5.60	7.80	10.10	7.50	4.20	6.20	11.10	6.80	6.60	8.50	10.85	11.10	7.40	7.10	6.69
15		6.30	7.20	9.70	8.10	4.80	6.40	10.20	7.70	6.50	9.50	11.10	12.90	7.90	7.79	6.82
16		6.20	7.30	8.90	8.60	5.20	6.40	10.00	7.70	8.30	10.50	11.10	13.05	7.60	7.29	6.78
17		6.00	6.90	7.40	10.50	5.20	6.20	9.30	6.80	9.60	11.55	10.80	11.30	7.00	8.57	6.25
18		4.90	8.00	6.80	11.20	4.70	6.10	8.80	7.40	10.50	13.10	11.90	10.71	6.40	9.71	6.46
19		5.30	9.20	6.90	11.20	4.80	5.30	7.00	8.10	13.00	15.70	12.60	10.25	6.90	10.46	5.97
20		5.20	10.20	8.50	10.30	4.80	5.60	6.40	7.10	13.30	19.50	13.15	9.80	7.10	10.48	6.46
21		4.70	10.40	8.20	10.00	5.40	6.10	7.20	7.00	13.50	19.85	13.60	9.40	6.80	10.35	5.66
22		5.10	10.60	9.10	8.90	5.60	6.30	7.20	7.10	13.00	19.30	14.15	8.80	6.60	10.76	5.43
23		4.90	10.80	7.70	8.30	5.60	6.40	7.80	7.10	12.00	18.30	14.60	8.70	6.50	15.15	5.21
24		4.90	10.50	8.20	7.90	5.00	6.30	7.80	5.90	10.00	17.90	14.80	9.20	5.90	17.73	5.40
25		4.50	8.90	7.80	9.20	4.40	6.50	7.60	5.20	9.00	17.60	14.60	9.10	5.10	18.40	5.84
26		4.60	9.50	8.30	9.40	3.90	6.30	8.10	5.70	8.40	17.30	14.10	9.00	5.90	18.79	6.17
27		4.60	10.20	8.40	11.30	3.50	6.40	8.60	6.80	7.60	16.50	13.70	8.10	5.40	17.71	6.17
28		4.60	9.60	8.50	11.30	4.20	6.90	8.90	7.10	6.55	15.10	13.70	7.30	5.40	16.55	5.93
29					11.60				7.10				7.70			
March																
1		5.80	9.90	8.80	11.60	4.70	6.90	8.90	6.70	5.65	15.00	13.80	7.85	5.40	15.66	5.90
2		5.50	11.20	8.80	11.40	4.80	6.90	9.00	6.50	5.40	14.70	13.75	7.45	5.70	14.87	6.10
3		6.00	10.50	8.60	11.40	5.10	6.50	9.00	6.30	6.30	14.70	13.80	7.40	5.40	13.95	7.07
4		5.80	10.20	9.30	10.10	5.00	6.90	7.30	6.30	7.10	14.60	13.50	7.35	6.10	13.19	7.87
5		6.20	10.60	9.30	9.30	5.00	5.80	7.00	7.10	6.70	14.35	13.60	7.65	6.60	12.47	7.43
6		6.60	10.70	9.00	7.30	5.60	6.80	7.30	7.10	6.65	14.10	13.00	7.40	6.30	10.71	6.60
7		6.60	10.60	8.80	6.80	6.40	6.90	7.30	7.10	6.40	13.00	12.40	6.60	6.40	10.37	5.10
8		6.80	10.30	8.10	6.80	6.80	6.90	7.30	6.60	5.90	11.50	13.75	6.40	6.10	12.25	4.69
9		6.60	10.20	7.70	6.50	7.50	6.80	8.10	5.90	5.90	11.50	14.70	6.70	6.80	13.66	4.87
10		6.32	10.10	7.90	6.80	7.50	6.80	8.10	4.60	6.00	12.20	15.65	6.60	5.90	13.78	5.31
11		6.04	8.00	8.50	6.80	6.40	6.80	6.40	4.80	5.90	13.10	15.35	5.95	6.80	13.46	5.81
12		5.76	8.70	7.90	6.90	6.40	6.40	6.90	5.50	5.70	13.20	15.30	5.80	6.30	12.59	6.21
13		5.48	9.30	8.00	6.40	5.80	6.20	5.90	7.90	5.40	13.20	15.15	7.10	4.80	12.04	6.78
14		5.20	9.00	7.80	7.00	5.30	6.20	6.00	8.10	5.00	13.40	15.35	8.40	4.30	12.78	7.28
15		4.90	10.00	8.30	7.30	5.10	5.30	6.40	8.00	4.80	13.15	15.55	9.40	4.30	12.77	7.77
16		6.10	9.70	8.00	7.50	5.30	5.20	6.60	7.80	4.80	13.13	15.60	10.25	4.50	12.47	7.67
17		5.90	11.00	7.60	8.20	5.50	4.90	6.60	7.10	5.20	13.12	15.50	10.80	4.60	11.06	7.23
18		5.20	10.70	8.80	8.20	5.20	4.60	6.50	7.50	5.40	13.15	15.45	10.70	4.70	9.69	7.39
19		6.20	10.10	9.20	8.80	5.00	4.30	6.50	7.50	6.10	12.75	15.25	10.55	4.80	8.77	7.78
20		6.50	10.10	10.10	8.80	5.30	4.40	6.30	7.00	6.10	11.10	14.70	10.70	5.90	8.73	7.40
21		6.30	9.20	10.40	8.60	5.40	5.00	6.30	6.50	5.50	9.55	13.85	9.70	6.00	8.79	6.25
22		5.90	9.00	8.90	8.40	4.70	5.30	5.70	6.20	5.40	9.60	12.95	10.20	6.10	8.43	5.33
23		5.30	8.80	9.40	8.00	5.00	6.50	5.70	5.30	5.40	9.45	12.20	10.80	6.80	7.45	5.21
24		4.60	8.80	9.80	9.00	5.30	6.90	5.50	4.70	5.35	9.60	11.90	10.80	7.20	8.13	4.47
25		4.00	8.50	10.20	9.50	4.80	7.40	5.50	4.20	5.70	9.70	11.80	10.30	6.80	8.46	4.46
26		3.60	9.40	10.20	10.10	4.10	7.20	6.30	4.20	5.40	9.85	11.50	9.80	7.50	9.56	4.78
27		4.10	9.20	10.40	10.80	4.10	7.20	7.60	4.10	5.00	9.70	10.70	9.10	7.50	9.92	5.78
28		4.30	9.60	10.90	10.80	3.90	7.20	7.90	4.00	4.65	9.75	11.20	9.90	6.60	9.83	5.20
29		4.60	10.50	9.60	10.70	2.90	7.30	8.00	4.60	4.80	9.90	13.40	10.15	5.90	9.29	4.96
30		5.70	11.60	7.90	8.00	3.20	7.40	7.70	4.60	4.30	9.50	15.60	9.65	5.30	8.69	5.25
31		4.80	11.90	7.20	8.30	3.70	7.50	7.60	4.50	5.80	9.40	15.80	10.00	5.00	10.28	5.50

Date	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
January																			
1	5.29	5.46	4.65	7.67	5.08			5.61		17.77	7.44	14.13	5.84	3.82		7.99	6.64	4.78	13.53
2	4.94	4.87	4.44	6.87	5.78	4.92		4.69	8.81	22.20	6.68	13.00	5.82	3.64	6.72	8.52	5.73	4.56	13.49
3	5.05	5.91	4.49	4.99	6.47	5.19	5.49	3.84	9.46		6.35	11.34	6.30	3.85	5.62	8.39	5.72	4.49	13.27
4	5.69	5.84	5.68	5.38	6.56	5.74	6.24	3.88	9.67		6.61	10.84	7.35	4.40	5.02	8.13	6.13	4.84	12.58
5	5.62	6.67	5.78	6.23	6.32	5.83	6.81	4.15	9.54		7.14	10.00	7.29	5.11	5.12	7.30	5.71	5.08	10.65
6	5.45	6.98	6.12	5.83	6.20	6.47	6.61	4.68	9.90	18.48	7.82	9.11	7.49	5.32	5.52	6.49	5.76	5.82	9.63
7	5.54	7.59	7.52	6.48	6.15	6.95	6.24	4.42	10.43	16.59	8.20	8.54		5.60	7.42	5.91	7.02	6.66	8.78
8	5.53	8.11	9.38	6.00	6.23	7.38	6.80	4.75	11.10	15.15	7.10	7.91	7.55	6.37	8.42	5.26	6.80	7.28	8.70
9	5.21	9.12	11.32	5.95	5.60	7.19	6.72	4.87	11.12	14.19	7.48	7.90	8.24	6.41	8.12	5.35	7.08	6.86	8.93
10	5.43	10.43	12.20	6.14	5.44	7.19	6.55	5.07	10.55	13.78	8.00	7.73	8.85	6.72	8.52	4.66	6.51	6.89	12.09
11	7.28	10.34	11.90	6.70	5.85	6.80	6.65	5.92	10.57	13.76	7.89	7.48	8.93	6.50	7.72	4.59	6.22	7.03	13.82
12	7.16	10.03	11.48	7.84	5.27	6.18	6.52	6.95	11.10	13.27	8.06	6.87	8.90	6.05	7.02	5.12	5.77	6.39	14.38
13	7.91	10.56	9.62	8.14	4.80	6.16	6.08	6.30	11.21	12.78	9.00	7.12	8.94	5.47	6.62	5.13	5.83	6.00	14.90
14	9.24	9.31	8.35	8.35	4.90	6.35	5.92	6.19	10.45	12.37	10.39	8.54	9.29	4.85	6.02	5.28	5.71	5.91	14.78
15	10.83	8.07	6.63	9.30	5.25	5.96	5.34	8.90	10.77	12.34	10.36	8.93	9.42	4.54	5.32	5.17	5.86		13.97
16	10.41	8.54	6.47	9.67	6.00	5.70	4.67	9.12	11.83	11.82	10.32	10.53	9.69	4.30	6.52	5.27	6.31	4.90	12.21
17	9.75	7.99	6.32	10.15	5.99	5.21	4.19	8.87	12.21	11.03	10.23	11.20	9.68	4.03	6.22	5.43	6.18	4.83	12.26
18	9.07	7.66	6.18	9.41	6.07	4.93	4.81	8.11	12.51	11.37	9.99	12.87	9.29	4.18	5.42	5.85	6.33	5.87	12.97
19	8.75	7.71	5.82	8.58	5.96	6.28	4.46	7.60	13.08	11.39	9.58	13.31	9.05	4.76	5.02	5.80	6.70	5.62	12.66
20	8.29	7.26	5.21	8.63	6.20	7.44	4.55	6.93	13.85	10.90	8.92	13.19	8.96	4.64	4.92	5.66	6.78	5.53	13.43
21	7.83	7.23	4.71	8.28	6.46	6.44	3.60	6.47	14.60	11.17	8.82	13.39	9.18	5.10	5.62	5.52	6.81	5.48	13.42
22	7.31	6.81	5.39	7.90	6.68	6.41	3.10	6.52	14.95	10.75	8.64	13.44	8.96	4.73	5.92	5.46	6.35	5.63	12.02
23	6.53	6.75	6.17	7.42	6.39	6.65	5.08	7.11	14.84	9.95	9.37	13.75	8.23	4.98	6.52	5.54	6.91	5.49	11.05
24	5.59	6.84	5.60	7.59	6.59	6.06	5.78	7.25	14.65	9.12	9.63	13.74	7.96	5.07	7.22	5.51	7.64	5.77	9.65
25	5.42	6.55	6.92	7.73	6.82	5.89	6.12	7.32	14.19	9.58	9.24	13.25	8.15	5.03	7.22	5.58	6.93	5.53	9.31
26	5.56	5.95	7.37	7.23	5.99	5.65	5.98	7.49	13.23	9.71	9.47	11.75	8.18	4.98	8.72	6.36	6.65	6.01	9.07
27	5.13	5.68	7.80	7.24	5.60	5.99	6.05	8.07	12.55	9.75	9.27	10.31	7.70	4.51	8.42	6.33	6.69	6.10	8.91
28	5.26	4.37	8.47	7.55	6.24	5.86	5.80	8.17	11.10	9.89	9.86	10.80	8.01	4.18	8.62	6.55	7.04	5.46	9.68
29	5.44	3.93	8.83	7.94	6.44	4.90	5.63	8.37	10.43	9.61	9.94	11.23	7.64	4.83	8.52	7.28	9.30	5.29	9.14
30	5.30	4.38	9.51	8.24	6.30	4.23	4.87	8.40	10.46	10.19	9.75	11.36	6.73	3.85	8.22	7.94	10.23	4.82	11.57
31	5.80	5.12	9.04	7.60	7.03	4.06	4.71	10.06	10.17	15.29	9.15	10.80		3.81	7.72	11.78	10.07	4.80	11.80
February																			
1	6.03	6.78	9.62	7.68	6.94	4.27	5.19	14.33	9.55	16.82	8.50	10.08	7.30	3.77	7.22	13.77	9.70	4.49	12.48
2	6.18	7.03	8.95	7.94	6.89	4.76	5.45	16.24	9.12	16.80	8.31	10.19	8.88	4.53	6.52	13.53	8.43	4.45	12.13
3	5.78	6.39	8.22	7.46	6.28	5.06	5.63	17.53	8.68	16.07	8.25	10.09	9.01	4.29	6.12	12.52	8.03	4.73	11.80
4	5.36	5.73	7.40	7.06	5.88	5.49	5.31	18.47	8.25	14.45	8.09	10.94	9.32	4.76	5.12	10.70	7.24	5.46	11.54
5	5.02	5.23	7.17	7.15	5.84	6.04	5.15	18.15	8.22	14.10	7.71	10.62	8.81	5.13	6.02	9.19	6.83	5.46	10.43
6	4.51	6.31	7.43	7.38	5.93	5.90	5.63	17.79	12.57	13.32	7.80	10.21	7.41	5.47	5.82	6.89	6.98	6.17	10.08
7	4.63	6.57	7.69	6.98	5.63	5.88	5.95	17.44	20.73	12.54	8.32	11.19	7.12	5.47	6.22	5.83	6.63	6.38	9.66
8	4.75	5.74	8.12	6.57	5.60	6.35	5.56	16.34	25.98	11.69	8.68	11.56	7.61	5.45	6.92	5.39	6.08	6.26	8.93
9	4.59	5.66	7.79	6.25	5.52	6.16	6.41	13.61	27.15	10.80	7.59	11.70	7.29	5.72	7.12	4.64	5.23	6.25	7.99
10	4.80	5.84	9.84	6.09	5.87	5.80	5.07	12.08	26.92	10.67	8.62	11.32	7.01	5.35	6.42	4.09	5.15	6.07	6.75
11	5.61	4.24	9.63	6.72	5.79	6.16	5.16	11.22	25.96	10.29	8.32	10.44	7.09	5.11	5.62	4.19	5.19	6.00	6.49
12	4.75	4.91	9.28	6.78	5.76	5.81	5.14	10.97	23.68	9.09	8.91	9.50	7.50	4.95	6.02	4.36	5.08	5.88	6.02
13	4.41	4.73	9.24	7.49	5.96	5.08	5.43	11.26	21.05	9.14	9.19	8.58	7.93	4.67	5.62	5.10	5.29	5.48	6.41
14	4.87	4.84	8.64	8.19	6.10	4.56	5.16	12.01	18.97	9.02	8.87	8.56	8.28	4.48	5.72	5.38	5.51	4.97	6.26
15	5.36	5.00	8.32	8.63	6.29	4.37	5.31	13.91	17.48	8.64	8.32	8.24	7.72	4.43	5.22	5.99	5.63	4.66	5.63
16	5.60	4.92	8.20	8.63	6.13	4.30	5.43	15.79	16.41	8.46	7.30	8.59	8.41	4.42	4.52	6.17	5.65	4.18	5.63
17	6.32	6.18	8.07	8.02	6.32	4.61	5.46	16.55	16.60	9.34	7.46	8.81	8.87	3.63	4.72	6.23	6.01	4.02	5.79
18	5.76	5.62	6.95	7.84	6.75	5.41	4.83	16.56	17.24	8.62	7.38	9.18	8.20	4.11	4.52	6.18	7.13	4.37	5.39
19	5.29	5.75	5.83	7.60	7.38	5.76	4.46	16.12	18.17	9.05	7.17	10.12	8.11	4.41	5.32	6.27	7.29	4.64	5.16
20	4.90	5.88	6.14	8.23	8.07	5.71	4.44	15.28	19.00	9.66	7.47	10.41	6.91	4.51	4.62	6.34	7.55	4.55	4.89
21	4.95	5.55	6.84	8.59	9.27	5.45	3.86	14.38	18.95	10.43	8.19	9.91	6.56	4.73	5.02	6.19	6.35	4.71	4.67
22	4.72	5.79	7.03	8.12	10.01	5.51	4.99	13.11	18.53	10.98	8.71	9.35	6.52	5.12	5.12	6.21	6.01	4.75	4.24
23	4.94	5.78	7.61	7.75	9.24	5.27	5.75	11.77	17.73	11.36	8.68	10.03	6.60	4.98	5.52	5.54	5.79	4.83	4.64
24	4.50	5.73	7.11	6.95	7.77	5.42	6.70	11.59	17.68	10.62	8.80	12.02	6.32	5.08	5.62	5.05	5.70	5.17	5.32
25	3.91	5.51	7.00	6.91	7.15	5.15	8.24	11.09	17.43	9.50	8.98	12.31	6.99	4.51	5.62	4.63	5.96	5.00	5.86
26	3.47	4.60	7.38	7.22	6.33	4.91	7.98	11.11	16.96	8.86	8.50	12.62	6.31	4.11	6.22	5.06	6.09	4.87	6.04
27	3.49	4.12	7.19	7.64	5.16	3.96	7.64	10.68	15.92	9.18	8.51	13.23	6.76	4.06	6.22	5.11	5.42	4.89	6.92
28	3.69	4.59	6.87	7.78	5.31	4.05	7.00	9.95	15.15	8.95	8.02	14.60	6.65	4.32	6.02	5.18	5.13	5.18	7.12
29	3.79				5.78				14.19				6.55				4.35		
March																			
1	4.13	4.24	6.97	8.05	5.79	4.07	7.00	9.10	13.96	8.39	8.21	14.56	6.95	4.44	5.92	5.30	4.62	5.35	7.55
2	4.43	5.04	7.08	8.87	5.71	3.85	6.62	7.95	12.82	9.42	8.09	13.79	7.34	4.81	5.42	5.27	4.33	5.44	7.93
3	4.28	5.15	7.04	8.41	5.71	4.27	6.91	7.59	11.47	9.95	7.91	14.37	7.45	4.47	5.32	5.31	4.86	4.96	7.18
4	4.85	4.62	6.38	9.65	6.29	4.39	6.24	7.94	10.74	8.98	7.45	14.38	7.22	4.63	5.12	5.26	5.38	4.88	6.55
5	4.45	5.29	6.24	9.58	6.53	5.02	5.38	7.64	13.29	8.99	7.49	13.79	6.87	4.71	5.22	5.67	6.33	4.63	5.80
6	5.03	6.91	6.30	9.72	6.59	5.13	4.82		13.57	9.67	7.28	13.63	7.11	4.85	5.02	5.75	5.78	4.50	6.11
7	4.55	7.03	6.84	9.55	6.21	5.09	4.40		12.38	10.07	6.66	12.54	7.38	5.38	4.62	5.86	5.42	4.86	5.88
8	5.12	7.30	7.24	9.22	6.30	5.65	5.00		12.16	10.17	5.59	11.23	7.51	5.44	4.32	7.15	5.19	4.98	5.23
9	4.74	7.00	6.87	8.78	6.08	5.68	5.39		11.78	9.79	6.19	9.35	7.45	5.31	4.32	7.91	5.33	5.29	5.90
10	4.16	7.39	8.26	7.71	5.74	5.88	5.39		11.55	10.67	5.84	8.63	6.94	5.07	5.12	7.58	5.11	5.17	6.21
11	4.25	7.83	8.18	6.66	5.45	5.24	4.79		10.94	11.75	6.20	9.22	6.96	4.71	6.02	6.61	5.22	5.54	6.33
12	3.84	8.76	7.51	7.03	5.77	4.91	4.45		11.62	12.11	6.58	8.64	6.66	4.62	6.92	5.95	5.50	5.38	6.04
13	3.40	9.03	7.79	7.74	5.13	5.00	4.47		11.88	11.87	6.40	8.35	6.48	4.66	7.82	6.79	4.97	4.95	5.66
14	3.89	8.03	7.60	7.84	5.03	4.87	4.47		12.23	11.85	6.43	8.51	6.31	4.58	7.62	7.10	4.52	5.00	5.72
15	4.42	8.01	7.00	7.97	5.41	4.78	5.12		12.33	11.56	6.26	8.28	6.07	4.26	6.72	7.55	4.06	4.86	6.24
16	3.72	7.79	6.49	8.12	5.95	4.69	5.26		12.26	11.12	5.60	8.76	6.80	3.75	6.82	7.51	4.59	4.58	6.20
17	5.53	7.20	5.53	8.55	6.00	5.71	5.28		11.66	11.37	5.99	8.79	7.12	3.34	5.92	7.57	4.76	4.01	6.15
18	5.43	7.67	5.68	7.95	6.02	6.43	5.57		11.66	12.07	5.96	9.00	7.05	3.36	4.92	7.53	5.95	3.51	5.62
19	5.43	6.80	5.14	7.93	6.58	6.76	5.18		10.92	13.33	5.92	8.65	7.17	3.39	5.32	7.60	5.67	3.52	5.06
20	5.63	6.95	5.30	8.10	6.63	7.46	4.68		10.79	13.71	5.47	8.88	6.68	3.76	5.22	7.72	5.44	4.14	5.48
21	5.63	7.39	5.42	7.97	6.52	8.23	4.86		10.66	13.66	5.20	8.88	6.37	3.66	4.42	7.39	5.10	4.06	5.20
22	5.73	7.41	6.41	6.51	5.87	8.76	5.16		10.62	13.81	5.04	8.94	6.64	4.03	4.42	8.30	5.46	4.47	4.97
23	6.13	7.58	7.63	6.28	5.29	10.36	4.75		9.72	13.36	6.14	8.60	6.50	4.64	4.32	8.29	5.53	4.88	5.25
24	5.43	7.43	7.34	6.96	5.17	11.06	5.65		9.68	13.26	7.40	8.94	6.80	4.55	4.42	7.50	6.18	4.75	4.67
25	6.13	7.43	6.46	7.60	4.68	11.15	5.56		8.89	12.46	8.52	9.04	6.47	4.54	4.72	6.89	5.32	4.68	5.36
26	5.83	7.32	7.88	7.28	4.18	10.48	5.22		8.74	11.72	9.12	9.10	5.45	4.41	5.22	7.27	5.66	5.24	5.06
27	5.73	6.96	8.67	7.13	4.04	9.62	5.41		8.59	12.69	10.60	9.47	4.68	4.45	5.52	8.07	5.57	6.21	6.10
28	5.53	7.72	7.79	7.11	3.28	8.28	5.66		7.82	13.82	10.56	10.20	4.55	5.15	5.62	8.87	4.30	7.26	7.01
29	6.13	7.28	7.10	7.19	3.47	7.28	5.84		7.56	14.25	9.59	11.00	4.34	4.95	5.42	8.79	3.78	7.55	6.99
30	6.53	6.95	7.78	6.60	3.98	6.30	6.23		7.44	14.38	7.95	11.18	4.97	4.61	5.52	8.02	4.39	7.39	6.80
31	5.43	7.19	7.08	6.23	4.17	5.46	6.19		6.94	14.05	7.66	11.07	4.84	4.70	5.62	7.70	3.98	6.60	7.60

Date	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
January															
1	6.62	4.71	8.11	8.06	7.95	7.59	6.52	5.93	7.60	4.82	6.07	7.53	5.08	4.91	
2	7.52	5.19	10.29	7.82	7.11	6.85	6.49	5.96	7.53	4.67	5.85	7.54	5.20	4.39	
3	8.80	5.84	10.15	7.41	7.71	5.59	6.27	5.95	7.33	4.78	5.20	7.78	5.98	4.63	
4	9.89	6.53	9.96	6.97	7.47	6.10	6.05	5.18	7.66	5.14	5.33	7.53	6.38	4.77	
5	9.49	7.38	9.39	6.93	6.64	6.12	5.76	4.60	7.85	5.61	5.48	7.33	6.86	5.01	
6	9.98	7.46	9.56	7.26	5.92	5.81	6.01	4.79	7.45	6.27	5.93	6.71	6.39	5.57	
7	9.33	7.05	11.81	7.43	5.64	5.56	6.67	5.05	7.06	6.32	5.86	5.93	5.79	5.99	
8	8.75	7.77	13.63	7.14	4.95	5.60	7.08	5.42	6.66	6.60	6.11	6.23	5.80	6.44	
9	8.19	8.20	12.90	6.74	4.85	6.03	8.36	5.40	6.18	6.43	7.15	7.02	5.96	6.30	
10	7.88	8.35	11.55	6.41	4.90	5.56	8.09	5.60	6.09	6.35	7.81	6.27	5.62	7.46	
11	7.40	8.44	9.83	6.58	4.37	5.57	7.85	6.18	6.14	6.65	8.00	6.83	5.29	7.74	
12	7.04	8.28	8.86	7.12	5.85	5.20	7.59	6.35	6.08	6.55	8.33	8.07	4.86	8.42	
13	6.87	8.04	8.49	7.06	6.68	4.98	7.10	6.22	5.53	7.39	7.74	8.55	4.52	7.83	
14	6.63	6.90	8.06	6.92	6.67	5.28	6.38	5.66	5.17	6.76	6.85	7.98	4.71	7.54	
15	6.70	7.16	8.43	7.29	7.45	5.50	6.07	5.27	5.70	6.93	6.59	7.61	4.93	6.97	
16	7.11	6.41	8.30	6.85	10.59	5.24	6.12	5.38	6.30	7.14	6.31	7.66	5.50	7.36	
17	7.08	6.67	7.30	7.19	12.50	5.92	5.96	5.13	7.09	7.43	6.08	7.98	6.28	6.91	
18	6.91	6.07	6.40	7.29	13.44	6.30	5.26	5.21	8.91	7.22	7.63	8.45	6.42	6.73	
19	7.24	6.13	5.93	7.12	13.48	8.97	4.84	4.86	9.73	7.90	8.05	8.39	7.01	6.45	
20	6.94	6.12	5.68	7.26	13.24	11.25	4.96	4.36	9.62	8.16	8.15	7.94	7.35	6.27	
21	6.09	6.23	5.59	6.77	12.00	12.40	5.00	4.41	9.72	8.70	7.53	8.08	6.98	6.88	
22	6.00	6.28	5.68	6.96	11.18	12.24	5.33	4.54	9.04	8.78	6.96	7.74	7.14	6.89	
23	6.00	6.27	5.53	5.91	11.10	11.36	5.78	4.44	8.18	8.52	6.84	7.28	6.96	7.69	
24	5.95	6.39	5.51	5.65	10.90	10.55	5.59	4.03	7.48	8.42	6.56	8.44	6.30	8.78	
25	6.00	5.72	5.71	6.84	10.92	10.27	6.33	4.45	7.09	8.44	6.63	8.70	5.93	8.91	
26	6.20	5.80	5.46	6.48	10.04	10.04	6.39	4.82	7.00	8.00	6.24	8.89	5.51	8.63	
27	5.79	5.72	6.19	6.36	9.34	9.65	6.19	5.20	7.04	7.49	6.00	9.21	5.10	8.07	
28	5.46	5.60	5.50	6.59	9.23	9.10	6.25	5.55	6.53	7.65	5.93	9.17	4.78	9.02	
29	5.11	6.36	4.64	7.01	8.70	8.35	6.03	6.69	6.47	7.94	5.88	9.46	4.97	9.45	
30	5.56	5.56	4.95	6.99	7.75	7.60	6.09	6.69	6.57	7.86	5.71	9.62	5.16	9.28	
31	5.57	5.49	4.54	6.76	7.69	7.54	6.67	6.51	6.23	7.81	5.66	9.63	5.39	8.95	
February															
1	5.88	5.33	4.43	6.35	7.43	7.07	6.77	6.07	6.85	7.54	5.65	9.60	5.73	8.32	
2	5.69	5.41	4.37	6.38	6.70	5.99	5.79	5.74	7.65	6.49	4.89	9.50	6.10	7.70	
3	5.42	6.17	4.47	6.59	6.44	5.56	5.76	5.68	6.88	6.21	5.27	9.14	5.99	7.23	
4	5.03	6.19	4.75	6.49	6.39	5.49	5.66	5.36	7.49	6.35	6.60	8.76	6.25	6.95	
5	4.74	6.67	5.27	6.52	6.08	5.63	6.05	4.49	8.02	6.33	7.29	8.52	5.99	7.37	
6	4.91	6.03	5.49	6.18	5.22	5.70	6.01	3.91	8.57	6.04	8.80	8.55	5.33	8.13	
7	4.97	6.93	5.37	5.55	5.26	6.23	6.41	4.50	9.77	5.96	9.24	8.11	4.76	9.26	
8	4.88	6.24	5.93	5.09	5.47	6.35	6.50	4.02	10.55	6.33	9.14	7.46	4.75	10.09	
9	4.67	6.48	5.88	5.01	5.85	6.04	6.32	4.37	10.75	6.69	10.69	7.58	4.96	9.87	
10	4.44	6.47	5.80	5.22	5.66	6.20	6.14	4.64	10.49	6.58	12.12	7.33	4.75	9.30	
11	4.83	5.72	5.84	5.75	5.47	6.52	5.79	5.01	10.81	6.51	11.81	8.08	5.11	8.75	
12	4.50	5.74	5.97	6.06	6.08	6.18	5.50	6.38	10.58	7.06	11.88	8.13	5.71	7.84	
13	4.65	6.30	5.76	5.73	5.77	6.28	5.55	6.75	10.08	6.83	11.49	7.47	6.07	7.48	
14	4.83	6.31	5.56	5.90	6.15	6.27	5.21	7.83	9.10	6.83	9.85	7.59	6.01	7.38	
15	6.04	5.95	5.11	5.37	7.43	5.32	5.09	9.11	8.60	6.97	9.03	7.23	6.45	7.03	
16	7.04	5.06	4.88	5.43	8.69	5.29	5.00	9.18	8.43	7.25	9.70	7.19	6.36	6.82	
17	7.60	4.71	4.60	5.16	8.57	5.17	4.53	9.94	8.69	8.44	10.40	7.97	6.51	6.18	
18	7.04	5.19	3.75	5.17	8.61	5.97	4.42	10.11	8.69	8.91	10.50	8.14	6.74	6.28	
19	7.03	6.03	3.71	5.29	8.45	5.43	4.49	10.24	8.45	8.61	10.73	7.89	6.68	5.79	
20	7.37	6.11	3.82	5.19	7.99	5.99	4.18	9.38	8.22	8.41	11.08	7.19	6.73	5.58	
21	7.39	6.09	4.09	5.10	7.47	6.00	4.38	8.67	8.21	8.79	11.41	7.33	6.07	5.90	
22	7.26	6.17	4.75	4.74	7.54	6.84	5.35	7.43	7.58	8.64	11.48	6.83	5.85	5.77	
23	6.46	5.95	5.06	5.00	7.27	7.64	5.11	7.02	7.11	7.89	11.73	6.58	5.66	6.31	
24	5.84	5.46	5.68	5.62	7.51	7.15	5.06	6.56	7.20	7.04	11.75	6.84	6.00	5.11	
25	6.23	5.11	6.08	5.73	5.90	7.31	5.53	6.14	6.34	6.86	11.26	6.82	5.78	4.91	
26	6.02	4.65	5.82	6.53	5.55	5.94	5.15	6.11	5.91	6.78	10.42	6.92	5.18	4.81	
27	5.68	4.74	5.99	6.97	5.77	5.71	5.32	6.63	5.87	6.68	10.21	7.18	5.01	4.85	
28	6.19	4.45	6.00	6.69	6.75	5.59	5.42	7.17	5.83	5.94	9.10	7.41	4.27	4.88	
29		4.17				5.82				5.63				5.16	
March															
1	6.52	3.72	5.72	6.50	8.15	4.89	5.70	7.08	5.61	6.49	8.39	8.32	4.37	4.44	
2	6.50	3.09	5.89	6.71	9.23	4.44	5.78	7.35	5.72	6.77	8.16	8.58	4.75	4.24	
3	6.34	3.74	5.93	6.74	8.97	4.81	5.42	8.09	5.40	6.66	8.13	8.23	4.27	3.77	
4	6.06	4.66	5.79	6.47	8.40	4.99	4.99	8.78	5.41	6.48	8.74	7.69	4.59	4.09	
5	5.91	4.89	5.51	6.08	7.99	6.19	5.29	9.22	5.47	7.72	9.04	7.21	5.02	4.68	
6	5.76	4.89	5.14	5.62	7.53	5.86	5.37	10.82	5.90	8.26	8.52	6.59	5.47	5.41	
7	5.79	5.09	5.31	5.30	7.46	6.18	5.08	11.38	5.97	8.94	8.14	6.32	5.63	5.92	
8	5.84	5.14	5.36	4.53	7.41	6.03	5.29	11.82	5.97	8.65	8.97	5.62	5.41	6.14	
9	6.23	5.18	5.65	3.65	7.38	6.35	5.02	12.66	5.49	9.23	10.69	5.73	5.50	6.24	
10	6.12	5.56	5.11	4.09	8.77	6.63	5.05	13.02	5.26	10.51	12.89	5.83	5.01	6.20	
11	5.37	5.69	5.08	5.06	8.85	7.45	5.03	12.91	5.22	10.48		5.82	4.55	5.69	
12	5.14	5.45	4.99	5.70	8.94	7.24	5.26	13.19	5.16	10.74		5.81	5.07	5.36	
13	6.08	5.88	5.07	5.09	8.86	8.22	5.52	12.66	5.25	10.12		6.13	4.42	5.40	
14	6.42	5.73	5.40	4.84	8.20	8.11	5.54	11.57	5.17	9.72		6.50	3.94	5.73	
15	6.85	5.46	5.73	4.80	8.62	8.85	5.38	10.38	5.19	9.34		6.73	3.98	5.16	
16	7.20	4.57	5.73	5.22	9.43	10.16	5.15	9.91	6.17	9.60		6.98	4.06	4.60	
17	7.30	5.10	5.21	5.16	9.81	10.80	4.74	10.30	6.78	9.29		7.12	4.58	4.19	
18	7.26	5.33	4.63	4.81	10.46	10.58	4.11	10.06	6.46	8.65		6.82	4.78	4.03	
19	7.43	5.60	4.19	4.66	10.25	9.97	3.42	9.82	7.10	8.29	16.62	6.72	5.22	4.17	
20	8.16	6.23	3.92	4.83	9.99	9.73	4.95	9.47	7.32	7.79		6.72	5.82	4.30	
21	8.89	6.53	3.89	5.22	9.32	9.74	3.97	8.90	7.58	8.06		6.74	6.20	4.30	
22	9.38	6.07	4.22	4.64	8.33	10.44	3.82	8.09	7.57	8.33	16.62	7.15	6.30	4.56	
23	8.66	5.53	4.32	3.93	8.66	10.48	3.99	7.29	7.66	8.19	16.70	6.95	6.89	4.96	
24	7.37	5.14	5.16	3.91	8.85	10.58	4.34	6.57	7.78	8.40	16.98	6.97	6.75	4.84	
25	8.13	5.22	5.25	4.40	8.59	10.87	4.81	6.36	7.15	8.01	17.33	6.69	6.51	4.86	
26	8.66	5.52	5.51	4.67	8.27	10.37	5.14	6.90	6.87	8.01	17.39	6.05	6.38	4.78	
27	8.94	4.89	6.20	4.94	7.98	9.88	5.49	7.51	6.95	7.74	17.42	6.36	6.05	4.78	
28	7.86	5.19	5.82	5.84	7.89	9.94	5.82	8.38	6.70	7.10	17.35	6.27	5.35	4.81	
29	7.58	5.08	6.56	7.19	7.36	10.62	5.87	9.71	6.00	6.87	17.30	6.42	4.97	5.05	
30	8.31	3.33	6.59	8.33	8.54	14.01	5.79	10.55	6.52	6.27	17.39	6.34	4.94	5.50	
31	8.60	2.83	6.42	8.53	9.92	15.40	6.46	10.82	6.71	5.61	17.32	6.26	4.81	5.18	

Columbia River Water Elevation at the Interstate Bridges, Daily Maximum (feet, Columbia River Datum), cont'd

Date	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
April																
1		4.10	12.20	8.10	8.40	4.20	7.60	6.70	4.50	6.15	9.40	15.90	9.75	5.20	9.77	5.63
2		4.60	13.20	8.60	8.70	4.20	7.40	5.70	4.50	6.60	9.40	15.90	8.80	6.80	8.80	5.32
3		5.80	14.10	8.10	8.60	4.40	8.50	5.40	4.70	6.95	9.35	15.80	8.15	7.10	8.75	5.18
4		6.50	14.40	6.60	7.90	4.40	8.80	5.90	4.80	6.80	9.30	14.50	8.60	7.40	8.93	4.44
5		6.00	14.20	6.30	7.80	4.80	8.50	5.90	5.10	6.35	8.90	13.10	8.40	7.30	8.88	3.89
6		5.90	13.00	4.90	7.90	5.00	8.50	5.70	5.10	6.20	8.90	12.10	7.35	7.20	8.31	3.50
7		5.00	12.30	5.80	7.90	5.60	8.90	5.30	5.10	6.30	9.90	12.00	8.35	7.00	7.86	3.46
8		4.30	12.30	6.50	9.40	5.10	8.90	5.30	4.30	6.75	9.60	10.90	8.75	6.70	7.80	3.87
9		4.30	12.00	6.40	9.60	5.10	7.90	5.80	5.50	6.60	8.60	8.90	8.40	6.70	7.52	4.44
10		4.50	11.80	7.10	9.55	4.50	7.50	7.30	5.60	6.35	7.65	8.30	9.50	6.90	7.11	4.91
11		4.30	11.60	6.70	9.50	3.60	7.70	7.80	6.20	6.00	8.10	8.90	10.40	7.40	7.41	4.84
12		4.00	11.80	6.50	8.60	3.30	7.70	7.80	6.20	5.30	9.60	8.90	10.70	7.20	7.98	4.88
13		4.50	11.90	5.30	8.90	3.50	7.10	8.00	5.50	5.10	11.00	9.30	10.15	6.20	7.46	5.73
14		4.70	11.80	6.00	11.40	3.60	7.30	7.50	5.90	5.60	13.70	9.50	9.60	6.30	8.07	6.21
15		4.40	10.90	7.30	12.40	4.20	7.30	7.70	6.40	5.50	14.30	9.00	10.20	7.00	8.28	6.54
16		4.80	9.60	7.40	12.20	4.40	7.40	7.70	6.40	5.65	14.80	8.40	10.70	7.40	7.92	6.18
17		6.00	10.30	6.90	12.30	3.70	6.70	7.00	7.30	5.90	14.70	8.20	11.30	8.20	7.62	6.22
18		6.20	10.80	5.90	11.60	3.50	6.30	6.70	7.30	5.50	12.70	8.10	11.10	8.90	7.78	6.47
19		6.60	10.90	5.10	10.80	3.60	6.40	6.30	6.80	5.65	11.35	8.00	11.45	8.60	7.78	5.14
20		5.40	11.20	4.90	10.10	3.80	7.40	6.40	6.80	5.35	11.10	7.60	12.15	8.70	6.58	4.78
21		4.50	11.20	5.70	9.90	4.20	7.90	6.40	5.80	5.05	11.35	6.80	11.75	8.80	6.39	4.30
22		3.90	10.70	6.10	9.90	4.40	8.20	6.20	5.80	5.35	11.45	6.00	11.60	8.10	7.27	4.07
23		3.60	11.00	7.20	10.40	4.30	7.60	5.40	6.40	6.30	10.90	7.80	11.75	6.40	7.67	4.20
24		3.20	10.90	8.40	10.40	4.50	7.80	5.80	7.00	5.40	9.60	8.70	11.40	6.80	8.40	4.57
25		2.70	10.40	9.40	9.00	3.90	8.40	6.60	7.60	5.70	10.30	10.00	11.08	7.90	9.73	4.99
26		2.90	9.80	9.60	8.60	3.00	8.50	7.20	7.50	5.65	9.90	11.40	10.75	7.20	9.46	5.14
27		3.20	12.30	9.20	8.50	3.20	8.50	7.00	6.00	4.50	9.40	11.90	10.80	6.10	9.84	5.40
28		3.40	12.90	9.30	8.30	3.70	8.70	6.80	5.80	5.70	9.30	12.00	10.60	6.00	9.18	5.49
29		3.90	13.30	9.10	8.66	3.90	8.70	6.40	6.70	6.20	9.40	11.40	9.65	6.40	8.95	5.55
30		4.00	13.70	7.60	9.02	4.00	8.70	6.80	8.40	6.70	9.35	10.60	8.80	7.10	9.01	6.77
May																
1		4.90	14.10	6.90	9.40	4.60	8.50	6.80	8.60	6.90	8.60	10.00	9.95	7.10	8.15	7.78
2		5.50	14.10	6.40	9.60	5.10	8.30	6.50	8.60	7.40	8.55	9.60	10.00	8.00	8.13	7.50
3		5.70	14.50	7.60	9.60	6.40	8.20	6.60	8.80	7.90	9.20	9.30	9.95	8.70	8.13	6.97
4		6.30	14.50	8.60	9.90	7.00	8.70	5.50	8.80	8.80	9.80	9.40	10.80	7.80	7.62	7.29
5		6.30	14.50	9.20	10.20	7.10	8.70	6.20	7.80	9.40	10.55	9.20	10.80	8.60	9.13	6.86
6		5.40	14.50	9.60	10.30	6.60	9.10	7.10	7.20	9.30	10.80	9.00	10.40	9.50	8.34	6.40
7		5.10	14.90	9.90	10.70	6.70	9.10	8.80	8.00	7.80	10.90	9.40	9.50	8.80	8.53	6.77
8		5.50	15.10	8.70	11.10	6.00	8.10	9.70	8.50	8.80	10.15	10.10	9.40	8.10	8.34	7.00
9		4.60	15.20	8.50	11.90	5.40	8.50	10.20	8.80	7.80	9.75	10.30	9.35	6.90	8.47	7.49
10		5.10	15.30	8.30	13.10	4.80	8.50	10.10	8.80	6.10	9.95	10.60	9.30	7.00	8.43	7.67
11		4.90	14.70	8.30	13.75	4.40	8.40	10.40	8.70	5.30	9.90	11.60	10.38	7.00	8.29	8.07
12		4.80	13.90	8.30	14.40	4.50	7.80	10.50	8.80	5.60	9.90	12.00	11.45	6.60	8.51	8.37
13		4.80	12.40	9.90	14.50	4.90	7.80	10.40	8.80	6.20	10.50	10.60	11.15	6.70	8.88	8.76
14		5.10	11.10	11.00	14.70	4.90	7.77	9.40	8.20	6.20	11.00	10.50	10.80	6.80	8.06	8.99
15		5.40	10.60	11.70	14.48	5.00	7.70	8.30	8.20	6.45	10.90	10.90	10.45	6.40	7.96	9.14
16		5.40	10.40	12.30	14.26	5.00	8.70	8.10	7.50	6.45	10.70	9.90	12.20	6.50	8.00	8.77
17		5.60	9.70	13.80	14.04	5.90	9.70	7.90	8.00	6.50	10.55	9.10	12.90	6.50	7.99	8.26
18		5.60	10.70	14.30	13.82	5.00	9.60	7.30	7.60	6.00	11.50	8.40	13.20	6.60	7.24	7.98
19		5.90	11.10	13.90	13.60	4.60	9.90	7.40	7.50	7.10	12.50	8.50	12.85	6.80	6.69	7.47
20		5.40	11.20	13.00	12.30	4.70	9.80	7.60	6.40	7.20	12.60	8.10	12.15	7.00	7.97	6.64
21		4.90	11.10	12.30	12.90	4.80	8.20	7.60	6.20	6.60	13.40	8.30	11.85	7.10	8.67	6.11
22		3.90	11.00	12.10	11.80	4.80	8.20	7.80	6.40	6.90	13.30	7.80	11.10	6.70	9.46	5.76
23		4.10	10.80	12.10	11.90	4.60	8.80	7.80	7.10	7.10	12.50	8.70	11.10	7.10	9.83	5.56
24		3.90	10.80	11.30	11.90	4.40	9.80	8.50	8.30	7.10	12.50	9.60	11.95	6.70	9.69	5.54
25		4.20	11.20	11.30	11.20	3.90	10.20	9.20	8.30	7.35	12.80	10.40	12.45	7.25	8.33	5.99
26		4.50	11.40	11.50	11.20	5.10	10.10	9.90	8.20	6.90	13.40	11.20	12.80	7.45	7.70	6.29
27		4.20	11.30	11.50	11.20	5.40	9.70	9.90	7.90	8.50	13.60	12.40	13.05	7.20	7.59	5.86
28		4.40	12.00	11.10	11.30	5.90	9.40	8.40	8.30	9.60	13.85	13.10	12.60	7.05	8.73	6.02
29		4.70	12.70	10.80	11.30	5.30	8.10	8.40	8.70	10.20	13.55	13.40	10.80	6.55	9.62	6.46
30		5.50	13.60	10.50	11.80	5.30	6.90	7.70	9.30	11.20	12.75	13.40	11.30	7.20	10.53	6.47
31		5.70	13.60	10.50	11.40	5.30	7.70	7.70	9.90	11.80	12.30	13.60	11.90	7.80	11.27	6.25
June																
1		5.90	13.10	10.50	11.50	6.50	7.20	6.80	9.70	12.50	10.50	13.60	12.65	8.30	11.72	5.09
2		6.00	12.90	11.40	11.40	6.70	7.90	6.80	9.70	12.90	9.90	13.60	12.95	8.20	11.94	5.01
3		5.70	12.80	11.80	11.20	6.60	7.50	6.00	9.40	12.90	10.15	13.50	12.95	8.35	12.48	4.67
4		5.40	12.80	12.30	10.90	6.70	6.30	5.30	9.40	12.80	10.25	12.90	12.80	8.50	12.27	4.87
5		5.30	14.60	12.20	10.30	6.50	6.80	4.90	9.20	12.70	10.55	12.00	12.10	9.30	12.79	4.63
6		4.50	15.30	11.90	9.40	5.50	7.30	5.90	8.90	13.20	10.40	11.30	12.40	8.40	11.76	4.77
7		3.80	15.50	12.00	8.90	5.20	6.90	6.40	8.70	13.20	10.70	11.20	12.30	7.05	11.37	5.78
8		4.70	15.60	12.20	9.50	5.00	7.60	5.80	9.30	14.30	10.20	11.30	11.95	8.35	10.97	5.73
9		5.50	15.30	12.20	9.50	5.00	8.30	5.50	9.70	15.80	10.05	10.90	12.15	8.55	10.50	6.01
10		4.40	15.00	11.90	9.90	4.80	9.00	5.70	10.30	16.60	9.50	11.40	12.60	8.60	9.51	5.99
11		4.00	14.60	11.80	10.10	4.80	9.40	6.20	9.90	16.85	9.15	11.00	12.75	8.10	8.47	6.68
12		4.80	14.40	11.70	10.00	4.40	9.40	6.40	9.90	16.40	9.10	11.20	12.35	7.80	8.47	6.56
13		5.10	14.80	11.00	9.90	4.40	8.70	6.40	9.90	15.60	9.00	11.20	12.25	7.90	7.73	5.95
14		5.10	15.30	10.60	8.70	4.90	8.00	6.10	10.20	15.00	9.30	10.80	12.05	6.75	7.04	5.58
15		5.10	16.20	9.80	8.50	4.70	7.50	5.60	10.20	14.45	11.10	9.90	11.80	6.10	6.28	5.22
16		5.10	17.30	9.60	8.50	4.90	7.80	6.10	10.00	13.70	12.30	8.60	12.60	5.85	6.50	4.55
17		4.90	18.40	9.50	8.30	5.10	7.70	4.70	9.50	12.70	13.20	8.20	12.30	5.75	6.90	3.81
18		4.40	19.70	9.30	7.80	5.10	7.60	4.70	10.30	11.80	13.65	8.50	12.30	5.90	7.17	4.29
19		4.50	20.30	9.90	8.10	4.90	6.90	5.20	10.70	12.00	13.85	7.70	12.55	5.65	7.42	4.49
20		4.10	20.80	10.40	8.40	4.10	8.10	5.40	10.70	12.55	13.80	7.40	12.50	6.50	7.78	4.88
21		4.60	21.10	10.20	8.60	3.80	8.00	5.80	9.90	12.70	14.25	7.50	12.50	6.45	6.87	5.46
22		4.30	21.10	10.80	8.90	3.60	8.00	5.70	8.60	12.60	14.40	8.00	12.80	5.60	6.73	4.80
23		4.00	21.00	11.40	9.10	3.80	7.80	5.20	8.30	12.60	14.40	7.80	12.95	4.75	6.59	4.97
24		2.10	20.90	11.20	9.80	3.80	7.50	5.20	9.00	12.35	14.50	8.00	12.90	4.40	6.61	4.12
25		4.40	20.70	10.70	10.00	3.90	6.10	5.10	9.10	11.50	14.45	7.30	12.50	4.45	6.03	4.53
26		5.30	20.60	10.20	9.30	4.20	6.10	4.90	9.40	10.95	14.20	6.60	13.00	4.40	5.50	4.74
27		5.50	20.50	10.10	9.10	4.00	6.90	4.90	9.30	10.40	13.60	6.60	11.95	5.00	5.57	4.53
28		5.60	20.20	10.20	8.80	4.60	6.60	5.20	9.40	9.75	13.55	6.70	12.50	5.10	5.29	4.39
29		5.70	19.90	9.70	8.90	4.70	7.10	5.20	8.40	9.40	13.30	6.10	12.95	5.50	4.63	3.97
30		5.90	19.00	8.70	8.90	5.10	6.80	4.20	6.80	8.90	13.35	5.90	13.10	5.60	4.49	4.43

Date	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
April																	
1	5.33	7.14	6.23	6.42	4.44	5.22	5.68		6.79	12.03	7.20	11.28	5.15	3.91	5.42	7.23	4.67
2	5.43	6.83	5.71	6.92	4.87	5.24	4.81		7.18	11.23	6.35	10.31	4.72	3.97	5.72	7.46	4.39
3	6.63	6.94	5.51	6.47	5.27	6.36	4.03		7.47	11.32	5.72	9.58	5.65	3.97	5.02	7.66	5.10
4	7.03	7.01	6.19	6.77	5.65	7.27	3.70		8.09	10.18	4.63	9.10	5.90	4.14	4.12	7.02	5.12
5	6.63	7.64	6.36	7.83	5.72	8.08	4.10		8.77	10.07	4.27	8.84	6.52	4.66	3.92	6.46	5.06
6	7.43	7.55	6.84	9.02	4.97	8.63	5.20		8.91	9.76	4.66	8.46	7.28	5.28	3.72	6.98	5.51
7	7.13	7.51	6.54	9.35	5.71	8.64	5.12		9.23	8.96	5.03	7.83	8.35	5.23	3.82	6.37	5.74
8	6.03	7.90	5.91	9.10	5.00	8.88	5.49		8.70	8.90	4.91	7.52	8.73	5.28	4.22	6.58	6.39
9	4.83	7.39	6.64	9.08	4.98	8.95	5.98		7.51	9.14	5.19	6.84	8.13	5.03	4.92	6.26	6.14
10	4.23	7.71	7.78	9.20	5.13	8.64	5.54		8.10	8.73	5.23	6.67	6.19	5.26	5.82	6.22	5.38
11	4.33	7.31	7.60	8.74	4.63	8.11	5.56		9.36	8.69	5.83	6.52	6.89	5.47	6.72	6.27	5.05
12	4.83	6.58	6.46	8.46	4.54	8.12	5.96		10.77	8.32	5.84	5.83	7.48		6.82	6.29	4.71
13	5.43	5.44	6.58	8.77	4.75	7.54	5.62		11.23	7.81	5.76	5.95	7.56	4.37	7.62	6.86	4.78
14	5.93	5.47	5.55	8.61	5.46	6.72	5.40		11.31	6.15	5.93	7.06	9.19	3.26	9.62	7.18	5.05
15	6.53	5.55	5.04	8.36	5.15	6.16	4.70		11.41	7.01	5.68	7.40	10.12	2.74	10.32	7.70	5.58
16	6.93	5.53	5.35	8.46	6.47	4.90	4.48		11.71	7.60	4.79	7.42	10.01	2.52	12.42	8.23	6.11
17	7.13	6.71	5.47	8.43	7.63	5.66	3.94		11.87	8.33	4.39	7.25	8.65	3.13	12.92	8.43	5.99
18	6.93	7.25	5.48	8.39	6.71	6.06	3.43		12.28	8.54	4.55	7.71	9.43	3.43	12.92	9.13	6.08
19	5.00	7.55	5.94	7.72	6.96	5.76	3.75		12.83	9.28	4.03	7.44	10.07	3.94	12.02	8.87	5.71
20	5.03	8.13	6.12	7.15	6.45	6.13	4.12		12.87	10.75	3.73	8.04	10.35	4.20	10.82	8.43	6.34
21	5.01	8.24	6.48	6.43	6.12	6.35	4.71		12.03	11.91	4.16		10.98	4.29	9.42	7.47	6.62
22	5.36	8.24	6.52	6.26	5.40	6.48	4.96		11.63	14.64	4.35		10.13	3.96	8.82	6.78	6.76
23	4.82	7.97	7.51	6.35	5.29	6.49	6.01		14.18	16.38	5.29		11.40	3.81	7.92	7.03	5.66
24	4.30	7.75	7.89	7.12	5.40	6.66	6.45		16.71	17.54	6.27		11.53	4.30	7.92	7.59	4.89
25	3.78	8.28	8.74	8.03	4.58	6.13	7.05		17.19	17.75	6.97		10.93	4.72	8.12	7.21	4.36
26	4.16	8.35	9.21	8.99	4.62	6.59	6.90		17.54	17.44	7.10		10.11	5.24	7.82	7.78	3.99
27	4.56	7.82	9.88	8.60	4.75	6.71	6.39		17.48	16.54	7.12		9.83	4.93	7.62	8.39	3.80
28	5.00	7.86	10.52	8.76	4.62	6.30	6.81		17.36	15.61	7.34	9.89	9.39	4.98	7.82	7.38	3.48
29	5.42	8.27	10.55	8.58	5.67	6.05	6.68		16.64	15.90	7.24	10.55	8.91	4.45	6.82	7.73	3.64
30	5.57	7.87	10.00	8.88	6.23	6.07	6.22		14.47	16.60	7.04	9.97	8.89	4.81	7.12	7.81	3.93
May																	
1	5.52	6.83	9.05	8.07	6.50	6.70	6.03		12.89	16.88	7.50	10.08	8.67	4.89	6.82	7.75	4.53
2	5.51	8.00	8.29	7.92	7.06	7.63	5.71		13.00	17.34	7.35	9.54	9.36		6.42	7.66	5.21
3	6.03	8.58	8.50	7.37	6.89	7.36	5.25		12.26	17.08	7.16	10.12	9.49	4.82	6.12	7.09	5.45
4	6.92	9.87	8.32	7.05	6.97	8.19	5.54		11.61	16.28	7.73	10.49	9.48	5.48	6.02	7.17	6.36
5	7.07	10.24	8.20	6.90	7.02	8.66	6.01		11.23	15.21	8.31	10.56	9.81	5.44	6.02	6.67	7.21
6	6.35	9.73	7.51	6.36	6.92	8.60	6.31		11.13	14.56	8.92	10.20	10.14	5.40	5.72	6.71	7.86
7	5.67	9.06	7.84	6.19	6.71	9.51	6.63		10.56	14.52	9.80	9.77	9.81	5.60	5.82	7.34	7.74
8	5.47	8.43	7.84	6.77	6.58	10.14	6.56		9.54	14.48	10.67	9.31	8.84	5.60	6.62	7.15	7.06
9	5.16	9.23	7.99	7.62	6.04	10.06	6.40		9.10	14.28	11.01	8.48	9.12	5.06	6.62	6.05	6.87
10	5.61	9.07	8.20	8.51	5.89	10.15	6.32		9.29	14.07	11.43	8.31	8.94	4.58	5.82	6.23	5.87
11	6.59	9.28	8.00	9.74	5.20		6.91		8.38	13.68	11.24	8.89	8.44	4.18	5.32	5.82	5.64
12	7.57	9.40	7.84	9.04	6.00		6.84		7.70	14.10	10.15	8.39	8.76	4.32	6.02	5.51	5.99
13	7.74	9.42	6.68	8.07	6.28		6.54		7.74	16.36	9.92	7.94	9.24	3.58	5.52	5.96	6.21
14	7.92	8.43	6.04	8.46	6.64		6.35		8.13	16.76	10.35	8.38	8.48	3.78	6.02	6.88	5.77
15	8.14	6.83	6.17	8.24	7.05		6.08		10.19	16.73	10.96	8.97	8.91	4.58	6.12	8.07	5.94
16	8.12	7.40	6.12	8.88	7.26		5.44		11.12	16.14	10.67	8.87	9.53	4.58	6.12	8.17	5.87
17	7.93	7.90	6.18	10.03	7.04	12.36	5.53		11.87	16.01	10.42	9.27	8.24	4.92	5.72	8.27	6.10
18	7.95	8.23	5.87	9.36	6.92	13.36	5.63		13.82	16.85	10.19	9.63	8.05	4.94	6.32	7.67	6.28
19	7.74	8.03	4.96	11.18	6.68	13.11	5.64		15.17	17.55	10.51	9.51	8.43	4.40	5.62	7.36	5.98
20	7.14	8.34	5.85	12.40	6.24	12.95	5.75		15.78	17.78	10.16	9.61	7.70	4.56	5.72	6.83	6.55
21	7.08	7.91	5.70	12.68	5.83	13.19	5.96		15.90	17.91	10.85	9.68	7.77	5.06	6.32	6.11	6.68
22	6.65	7.64	6.56	12.57	5.92	13.02	4.98		15.79	17.93	11.47	9.32	7.39	5.94	7.42	6.25	6.27
23	4.84	8.09	7.27	12.08	5.64	13.00	6.58		15.15	17.55	10.84	8.65	7.76	6.14	8.42	6.57	6.38
24	5.12	7.83	7.84	11.77	4.90	12.91	7.16		15.26	17.31	10.74	8.44	7.92	6.14	8.32	6.95	6.25
25	5.96	6.92	8.12	11.83	4.41	12.48	7.06		15.03	17.15	11.65	8.80	7.88	5.98		7.34	5.85
26	6.54	7.27	8.53	11.80	4.70	11.67	6.79		14.66	16.16	11.58	10.18	7.76	5.76	8.22	7.05	5.41
27	6.59	7.40	7.63	11.46	5.41	10.80	7.29		13.67	15.54	12.56	11.73	6.62	5.70	7.72	7.19	6.45
28	6.84	6.69	7.07	10.64	5.75	10.36	6.96		12.93	15.39	13.62	12.57	6.59	4.70	8.42	9.17	7.40
29	6.38	6.67	6.71	10.03	5.99	10.19	6.66		13.35	15.47	14.23	12.72	6.77	4.34	9.52	9.18	8.10
30	6.18	7.03	7.23	10.18	6.14	10.32	5.77		13.83	15.56	14.53	12.16	6.04	4.72	9.42	9.43	8.45
31	6.45	7.21	8.04	9.94	6.10	10.05	5.66		13.98	15.19	14.83	11.88	6.93	5.64	9.42	10.02	8.28
June																	
1	7.45	7.64	8.95	9.63	6.34	9.91	5.69		13.38	16.31	14.90	11.41	7.80		10.22	10.46	8.64
2	8.40	8.23	9.68	9.51	6.27	10.10	5.68		13.82	17.22	14.84	11.85	8.13	5.28	10.42	9.88	8.83
3	8.80	8.78	10.60	9.53	6.18	10.71	5.43		13.58	18.46	14.27	12.19	7.13	5.30	9.42	8.99	8.74
4	8.58	7.52	10.84	9.36	6.02	11.15	5.68		13.07	19.07	14.02	12.20	7.29	5.06	9.22	8.64	7.90
5	7.91	7.61	10.05	9.27	5.64	11.23	5.97		13.47	19.02	13.44	11.98	7.00	5.50	10.42	8.38	8.67
6	7.32	8.18	10.20	9.28	5.19	10.20	6.25		13.79	18.69	12.39	11.98	7.41	5.68	11.32	7.81	8.29
7	7.03	7.31	11.29	9.19	5.07	8.90	6.08		13.76	18.12	12.35	11.89	7.64	5.42	11.42	7.83	8.13
8	6.54	7.47	11.71	9.11	4.71	9.53	6.15		13.47	17.87	11.33		7.02	5.12	10.72	7.67	7.48
9	6.32	7.84	12.68	9.59	5.32	9.88	6.46		13.83	17.64	10.77	11.08	6.29	5.32	10.62	7.91	7.25
10	7.00	7.80	12.80	9.52	5.71	9.85	6.17		14.08	17.50	11.13	10.92	6.09	4.24	9.82	7.63	6.93
11	6.61	5.57	12.76	9.59	5.98	8.75	6.64		14.63	17.24	10.48	11.11	5.97	3.94	9.62	8.26	6.82
12	5.84	6.04	11.53	9.72	6.04		5.79		14.82	17.70	10.31	10.42	6.00	3.94	9.92	9.05	7.35
13	5.75	6.90	11.91	10.20	6.07		6.25		14.85	18.42		10.80	6.81	3.96	9.12	9.41	7.50
14	5.59	6.53	12.24	10.35	6.06		6.43		14.50	18.73	9.46	10.39	8.01	3.86	9.32	8.63	7.12
15	5.59	6.36	12.19	10.06	5.93	7.39	6.35		13.70	18.77	9.11	11.17	7.97	3.50	8.42	8.99	7.02
16	5.75	5.87	11.29	9.50	5.85	6.48	6.78		13.27	18.95	8.63	10.45	7.86	3.66	8.22	7.66	6.90
17	5.45	5.95	10.28	8.67	5.60	6.55	6.12		13.38	18.89	7.08	11.93	7.33	3.74	8.22	7.43	6.79
18	5.15	5.99	10.29	8.43	5.67	6.67	6.14		13.55	18.59	6.85	12.16	6.58	3.60	8.62	7.50	6.10
19	4.42	5.59	10.06	7.81	5.32	7.31	6.18		13.70	18.33	7.18	11.55	5.85	4.36	9.32	7.18	6.38
20	4.16	5.72	9.01	7.19	5.03	7.12	6.08		13.02	18.11	7.49	11.02	5.93	5.34	10.32	6.74	5.76
21	4.02	6.00	9.16	6.92	4.65	7.03	6.43		11.86	17.32	8.42	10.91	5.92	5.20	10.82	5.09	5.66
22	4.07	5.68	9.02	7.09	4.31	6.80	6.78		10.46	16.61	7.84	10.71	5.69	5.46	10.82	4.62	5.56
23	4.33	5.11	9.13	6.32	4.87	6.59	6.88		8.84	16.04	7.60	10.29	5.41	5.36	9.82	4.79	5.14
24	4.62	4.70	9.25	6.25	5.48	6.39	6.52		8.06	15.28	7.71	10.98	5.28	5.20	9.62	4.70	4.86
25	4.96	4.70	8.35	6.66	5.63	6.27	6.50		8.23	14.80	8.83	11.21	4.80	4.62	9.62	4.32	4.49
26	4.93	4.52	8.20	6.64	5.95	6.19	5.83		8.51	14.02	8.41	10.30	5.24	4.34	8.82	5.10	4.74
27	4.56	4.76	7.86	7.28	6.21	5.86	5.21		9.47	12.39	8.57	10.40	5.55	4.50	8.62	6.02	5.21
28	5.36	5.19	8.23	7.75	6.32	5.83	4.57		9.42	12.40	8.24	10.30	5.89	4.80	9.22	5.93	5.42
29	5.00	5.61	8.38	8.00	6.56	6.03	4.42		9.54	11.79	7.67	9.45	6.99	4.66	10.42	5.88	6.01
30	5.05	5.73	8.49	7.70	6.81	6.47	4.76		9.95	11.32	7.11	9.65	7.22	4.72	10.42	5.95	6.05

Date	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
April																	
1	6.76	7.49	8.60	3.75	5.38	8.10	10.68	15.64	6.57	10.94	6.87	5.65	17.02	6.66	5.34	4.55	
2	5.74	7.33	8.37	4.03	6.08	7.06	11.95	15.68	5.49	9.84	6.21	6.07	16.74	6.53	5.31	4.38	
3	5.43	6.93	7.78	4.18	5.19	7.02	12.95	15.58	4.97	9.29	6.48	5.32	16.40	6.36	5.49	4.08	
4	5.11	6.70	7.92	4.74	5.01	6.39	13.18	15.40	5.61	8.57	6.70	5.80	15.84	6.29	5.53	4.78	
5	5.19	6.61	8.02	5.04	4.83	5.84	14.07	14.38	6.42	7.86	7.10	6.00	15.25	6.38	6.37	5.34	
6	6.09	7.03	8.09	5.58	5.13	5.39	14.43	12.59	7.21	7.73	7.25	6.92	14.73	6.61	7.31	5.42	
7	6.56	8.76	7.11	5.90	5.57	4.00	13.83	12.95	8.46	7.26	7.20	7.74	14.16	7.60	8.30	5.33	
8	5.99	9.24	6.59	6.05	6.00	4.37	12.70	12.91	8.84	6.77	6.86	8.51	13.45	9.02	9.88	5.52	
9	6.23	8.75	6.43	6.21	6.12	3.79	11.42	12.20	9.29	6.39	6.13	8.67	13.65	9.58	11.27	5.78	
10	5.66	9.34	6.06	5.67	6.91	4.10	11.16	10.92	9.86	6.92	5.69	8.26	13.80	10.10	13.66	6.03	
11	6.15	10.57	6.45	4.78	7.65	5.04	11.04	10.15	9.36	7.22	5.65	7.94	13.15	9.95	15.07	6.11	
12	5.54	10.94	6.30	4.22	7.55	5.30	10.57	10.62	9.77	7.21	4.78	7.72	12.78	9.74	15.22	5.56	
13	5.56	10.29	6.79	4.36	7.84	5.45	10.19	9.98	9.50	7.14	5.01	7.49	13.43	9.65	14.83	4.77	
14	4.70	10.31	7.11	3.81	7.39	5.59	9.81	10.06	8.16	7.45	5.37	8.35	13.51	10.12	13.15	4.00	
15	4.19	10.88	7.21	4.02	7.69	5.74	9.52	9.56	8.09	7.17	5.20	8.54	13.27	10.57	11.76	3.49	
16	4.38	11.63	7.56	4.66	7.29	5.92	10.23	9.17	8.25	7.66	5.17	9.25	12.94	10.78	10.64	3.28	
17	3.71	11.93	7.71	5.27	6.26	6.02	10.16	9.47	7.87	8.35	5.77	9.56	12.38	10.73	9.46	3.56	
18	3.58	12.08	8.24	5.12	6.28	6.03	10.99	10.00	6.81	8.04	5.77	9.28	11.83	10.95	8.93	4.43	
19	3.75	12.04	7.58	4.82	5.91	5.94	11.21	10.64	6.08	8.04	5.99	9.42	11.80	11.02	8.91	4.54	
20	4.20	11.63	7.92	4.83	5.77	5.76	11.08	11.00	5.74	8.08	6.46	9.16	11.25	10.50	9.04	4.80	
21	4.26	11.68	7.53	5.19	6.42	5.64	10.72	11.29	6.36	7.79	6.81	8.98	11.46	9.81	8.39	5.00	
22	4.88	10.36	7.34	5.53	7.33	4.93	10.19	11.45	6.89	7.67	5.68	9.56	11.82	9.22	8.70	5.19	
23	5.56	9.62	6.77	5.62	7.81	5.26	9.84	12.23	7.24	7.61	5.19	10.21	12.12	8.10	9.05	5.75	
24	6.09	9.45	6.46	5.50	9.22	6.26	8.80	12.53	6.84	8.81	4.89	10.42	12.38	8.06	9.21	5.74	
25	5.91	10.00	5.44	5.35	10.02	6.00	8.28	13.05	6.98	9.56	4.17	10.52	12.73	8.10	9.84	6.07	
26	6.24	9.99	5.69	5.48	9.39	6.73	8.16	14.77	6.94	9.90	4.04	10.47	13.61	8.27	9.86	5.94	
27	6.73	10.53	5.95	5.03	9.33	7.78	8.26	14.78	7.32	10.32	3.77	9.74	14.25	8.85	8.69	6.19	
28	6.75	10.83	6.14	4.42	8.96	7.87	8.89	14.72	7.50	10.32	5.00	8.71	14.58	9.03	7.92	5.94	
29	6.21	10.52	6.37	4.69	8.40	7.74	8.82	14.65	7.58	10.29	4.47	8.18	14.55	9.65	7.61	6.88	
30	5.34	9.62	6.36	4.68	7.72	7.23	8.12	14.30	7.02	9.74	4.44	7.93	14.20	10.26	7.35	6.70	
May																	
1	4.83	9.65	6.94	5.05	7.03	6.80	7.83	13.67	6.58	9.65	4.49	7.46	13.35	10.70	7.18	5.70	
2	4.96	10.76	7.85	5.99	6.28	6.70	8.37	13.98	6.49	9.13	4.89	7.37	12.34	10.25	7.07	6.68	
3	5.36	11.16	7.78	6.48	6.60	6.31	7.95	14.32	6.05	8.56	5.51	7.56	11.82	9.85	6.74	7.05	
4	5.76	10.80	8.10	6.09	5.89	6.11	8.15	15.04	6.41	9.09	5.80	7.44	11.30	9.87	6.89	7.24	
5	5.94	10.32	8.40	6.00	6.83	5.83	8.51	15.03	6.40	9.08	6.00	7.68	11.29	9.71	7.21	7.94	
6	6.54	8.84	8.27	6.88	8.04	5.42	7.77	14.51	6.57	9.51	5.70	8.11	12.30	10.18	7.07	8.32	
7	6.88	8.07	7.48	6.80	9.92	4.75	8.28	14.20	7.15	9.62	5.40	8.92	13.89	10.68	6.99	8.22	
8	7.09	8.47	6.80	7.51	10.21	5.31	7.69	13.26	7.44	9.12	5.13	8.88	14.66	11.39	6.83	8.53	
9	7.53	8.64	7.24	8.14	9.23	5.13	8.49	12.32	7.88	9.14	4.63	8.94	14.94	11.92	6.73	8.98	
10	7.80	8.74	7.17	8.80	8.76	5.50	8.87	11.59	8.33	9.29	4.21	8.91	14.83	12.42	6.78	8.64	
11	8.01	8.83	7.14	8.32	7.72	5.76	9.09	11.28	9.76	9.17	4.04	8.67	14.66	13.23	7.07	8.07	
12	8.93	7.82	7.53	6.69	7.83	5.26	8.59	10.90	10.28	9.81	4.24	8.33	14.74	14.18	7.08	8.64	
13	8.90	8.17	7.53	7.63	8.01	6.23	9.61	10.65	10.05	10.33	5.13	7.91	14.65	14.93	7.23	8.70	
14	7.65	8.50	7.74	7.87	8.46	6.94	11.10	9.74	9.72	10.08	5.81	7.45	14.74	14.96	7.72	9.51	
15	7.17	8.07	8.56	7.00	7.79	6.35	12.23	9.40	9.83	9.60	6.34	6.88	14.55	15.18	8.80	9.65	
16	7.11	8.18	8.90	8.21	7.59	6.29	14.13	9.98	9.66	9.12	6.50	6.65	14.70	15.69	9.75	9.19	
17	6.83	8.36	8.46	8.75	7.33	6.43	15.17	9.82	9.53	9.65	6.27	7.05	14.89	15.87	9.87	8.98	
18	8.29	9.41	8.37	10.54	7.33	6.82	15.66	10.77	8.41	10.44	6.65	7.32	14.91	15.87	9.88	8.68	
19	9.23	10.35	8.20	12.54	7.66	7.21	15.91	11.41	8.66	10.74	7.10	6.55	14.93	15.86	10.64	9.11	
20	9.41	10.82	8.13	13.41	8.61	7.24	15.82	11.41	8.80	10.95	6.71	6.76	14.54	15.61	10.51	9.73	
21	9.33	11.23	7.56	13.89	9.32	7.46	15.89	11.31	8.67	10.98	6.53	7.53	13.74	15.39	10.18	10.36	
22	9.72	11.31	7.26	14.25	9.88	8.03	15.73	11.12	8.26	10.24	6.11	7.14	13.29	15.34	9.38	10.47	
23	9.59	11.72	6.87	14.24	10.18	7.63	15.80	11.48	8.78	9.78	5.39	6.14	12.95	15.23	8.49	10.40	
24	9.28	12.01	6.67	13.98	9.12	7.19	15.91	11.80	9.89	10.19	5.31	6.45	13.06	15.22	8.09	10.14	
25	9.03	12.44	6.89	13.20	9.68	8.23	15.96	11.96	9.82	10.93	5.40	6.38		15.29	7.10	10.04	
26	7.97	12.51	6.90	12.63	10.44	7.94	16.09	11.83	9.87	11.26	5.22	6.22	14.73	15.02	6.98	9.55	
27	7.98	12.35	6.75	12.05	10.64	7.55	16.26	11.44	9.76	11.17	5.30	5.78	14.98	14.83	7.07	8.98	
28	8.08	12.61	5.93	12.11	10.34	7.82	16.56	10.24	10.10	11.48	5.52	5.56	14.58	14.89	6.86	8.77	
29	8.09	12.57	6.88	12.70	10.35	6.79	16.88	9.57	9.88	11.35	5.80	5.25	14.20	14.49	7.39	9.92	
30	7.01	12.85	6.71	12.98	10.19	6.65	17.15	8.90	9.48	11.11	5.96	5.00	13.94	13.87	7.74	10.16	
31	5.82	12.74	6.77	13.02	10.11	7.50	17.24	9.24	8.69	10.90	5.47	5.50	14.56	13.67	8.27	10.39	
June																	
1	5.86	11.51	6.98	13.07	10.24	6.69	17.37	8.69	8.49	9.94	6.29		14.72	12.48	8.96	10.93	
2	6.63	10.31	6.79	13.22	10.31	7.82	17.37	9.01	7.74	10.13	6.92		14.70	12.18	9.22	11.63	
3	6.99	9.50	6.59	13.41	10.20	9.90	17.11	8.86	6.55	10.15	6.55	6.85	14.72	12.17	8.70	12.08	
4	6.52	9.53	6.25	13.67	10.29	11.88	17.31	9.42	7.33	9.76	6.19	7.19	14.60	10.81	8.68	11.71	
5	6.93	9.75	6.55	13.83		12.79	17.27	9.96	6.99	9.23	6.12	7.44	14.19	10.22	8.82	11.08	
6	6.24	10.18	6.20	14.02	10.48	13.60	17.31	10.14	7.39	9.06	5.70	7.80	14.37	9.41	8.38	11.27	
7	6.63	10.62	6.23	13.80	10.41	13.57	17.18	11.37	7.46	9.13	5.15	7.61	13.94	9.34	8.24	11.27	
8	6.33	10.89	6.06	13.07	10.34	13.85	17.01	11.41	7.16	8.54	5.36	7.42	13.77	8.75	6.64	10.86	
9	6.02	10.93	6.79	12.42	10.78	14.11	16.88	11.73	7.00	8.35	5.63	6.31	13.84	8.02	6.20	10.23	
10	6.17	11.26	7.65	11.24	10.49	14.14	16.76	11.74	6.94	8.12	5.91	6.12	14.14	8.19	6.16	9.69	
11	5.54	11.39	7.17	11.58	9.89	14.42	16.68	11.32	6.59	8.57	5.51	5.72	14.32	8.18	6.34	8.78	
12	5.16	11.00	7.88	12.09	8.40	14.63	16.57	10.66	6.21	8.61	5.58	5.47	13.44	8.48	6.42	8.96	
13	4.34	10.77	7.60	12.27	7.20	14.48	16.52	10.63	6.58	7.95	5.28	5.04	12.57	8.75	6.93	8.99	
14	4.29	10.91	7.38	11.77	6.89	12.62	16.57	10.45	6.46	8.10	5.59	4.66	11.82	8.04	6.74	7.82	
15	4.45	11.00	7.57	11.00	6.68	10.69	16.61	10.20	6.30	7.83	5.83	4.82	12.25	7.72	6.54	7.86	
16	4.63	11.21	7.50	9.38	6.38	11.07	16.64	10.45	6.33	7.08	6.22	5.33	12.26	7.31	6.32	8.30	
17	5.52	10.82	6.46	9.68	6.80	11.27	16.70	9.40	5.52	6.60	6.08	5.73	11.57	6.90	6.12	7.99	
18	6.07	10.37	5.66	10.67	6.29	11.27	16.56	9.65	5.79	7.46	5.67	5.83	10.57	5.97	6.00	8.10	
19	6.20	9.48	6.02	11.06	7.27	11.18	15.95	10.19	6.52	7.50	5.02	5.48	10.37	6.18	5.47	8.43	
20	6.15	8.91	5.75	10.72	7.88	10.03	15.19	10.92	6.52	7.33	4.40	5.47	10.70	6.35	5.06	8.90	
21	7.12	9.03	5.21	10.34	8.09	8.79	14.44	11.05	6.97	7.05	3.96	5.80	9.86	6.41	4.88	8.78	
22	7.00	7.98	4.98	9.68	7.71	9.62	14.19	11.00	7.56	7.42	3.66	5.87	9.96	5.98	5.13	8.34	
23	7.02	7.81	5.11	9.21	7.79	10.43	14.19	11.05	8.40	8.03	3.71	5.57	9.97	5.86	4.26	8.61	
24	7.19	8.56	5.04	8.82	8.60	10.47	15.03	11.01	8.74	8.01	3.72	5.49	9.97	6.33	4.15	8.57	
25	6.66	7.77	4.55	9.73	8.29	10.39	15.40	12.30	8.79	8.13	4.03	5.05	9.97	6.68	4.34	8.15	
26	6.27	6.87	4.39	9.78	7.72	10.07	15.11	12.34	8.58	8.38	4.17	5.24	9.81	6.71	4.56	8.30	
27	5.98	7.68	5.05	9.93	6.76	9.47	13.58	12.87	8.36	8.17	4.41	5.39	8.65	7.19	4.91	8.27	
28	6.00	7.13	5.12	10.22	6.88	9.63	13.18	13.10	8.30	8.16	5.07	5.50	8.18	7.17	5.04	8.50	
29	5.59	6.65	5.53	9.87	6.90	8.83	12.75	12.36	8.13	8.40	5.43	5.68	7.70	6.85	5.47	8.56	
30	5.71	6.76	5.87	9.77	6.14	9.03	12.56	12.16	8.11	8.40	5.74	5.67	7.52	6.70	5.56	8.27	

Columbia River Water Elevation at the Interstate Bridges, Daily Maximum (feet, Columbia River Datum), cont'd

Date	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
July																																																		
1		5.10	17.90	8.00	8.90	5.00	6.80	4.00	7.00	8.30	13.20	5.80	12.70	5.80	4.64	4.10	5.10	6.15	7.95	7.35	6.30	6.48	4.84		9.71	9.91	6.70	9.96	7.21	4.20	9.22	5.62	6.67	6.09	5.94	6.08	9.75	6.15	8.97	12.96	12.40	7.85	8.54	5.75	5.74	7.45	6.32	5.80	8.64	
2		5.30	17.40	6.40	8.70	4.60	6.50	4.00	7.10	8.00	13.20	5.90	12.30	5.80	4.50	3.97	5.14	5.85	7.01	7.71	5.78	6.42	4.83		8.49	9.11	6.96	9.17	6.54	4.16	9.02	5.49	7.00	6.07	4.97	5.26	9.60	5.73	7.64	13.62	12.58	7.78	8.11	6.00	6.42	6.66	4.85	6.13	8.63	
3		5.20	16.80	6.20	8.30	4.50	5.80	3.80	5.90	7.60	12.90	5.80	12.25	6.50	4.68	3.01	4.75	5.85	7.09	7.95	5.30	6.45	4.22		7.85	9.35	6.54	8.73	6.45	4.58	8.92	4.94	6.82	5.79	4.94	5.02	10.11	5.24	6.86	13.76	12.02	7.62	7.88	6.14	6.23	6.33	4.83	5.79	9.04	
4		4.20	16.60	7.00	6.70	4.80	5.70	4.30	5.30	7.60	12.85	6.20	11.05	6.20	4.61	4.13	4.43	5.39	6.84	7.39	4.75	6.02	4.22		8.06	9.36	5.50	8.30	6.02	5.00	8.22	4.03	6.05	5.62	4.76	5.08	10.09	5.34	6.32	13.68	11.36	7.33	7.37	5.95	5.97	6.26	4.50	5.77	9.12	
5		4.40	16.30	7.20	6.60	3.90	5.50	4.40	5.30	7.10	12.35	6.50	9.00	5.40	4.19	3.84	4.16	5.08	6.38	6.91	4.56	5.60	4.27		8.03	9.28	6.48	7.87	5.85	4.30	8.32	3.98	5.55	5.04	4.58	4.82	9.18	5.35	5.00	13.54	10.97	7.11	7.34	5.73	5.89	6.36	4.25	5.60	8.30	
6		3.20	15.80	7.20	6.60	3.40	6.60	4.80	5.70	7.00	11.75	7.10	8.30	4.85	4.25	4.04	4.62	5.00	6.67	7.18	4.44	5.21	4.67		7.81	8.88	5.58	7.37	5.69	4.06	7.52	4.20	5.28	6.00	4.73	5.18	8.26	5.55	5.41	11.99	11.10	7.51	7.08	5.65	5.68	6.30	4.86	5.15	7.39	
7		4.50	14.90	8.30	7.40	3.00	6.60	5.10	6.20	8.00	11.15	7.80	8.60	4.20	4.36	4.26	4.79	4.63	6.88	7.40	4.45	5.36	5.29		7.82	8.92	6.04	7.11	6.43	3.76	7.22	4.26		5.25	4.95	5.16	7.11	5.53	5.21	11.87	10.86	7.47	6.39	5.77	5.75	6.29	4.86	4.73	6.91	
8		4.20	13.80	9.40	7.00	3.30	6.30	5.20	6.30	8.65	11.15	8.00	8.40	4.15	4.36	4.57	5.09	3.89	6.72	7.94	4.36	5.31	5.30		7.92	8.43	6.17	7.05	6.56	3.54	7.12	4.56	4.98	5.70	5.95	4.99	7.11	5.65	5.88	11.88	10.00	6.87	6.84	5.66	5.46	6.45	4.95	4.79	6.62	
9		3.90	13.10	10.00	8.00	3.60	4.70	5.20	6.30	8.80	10.30	7.00	8.10	3.85	5.02	5.01	4.81	3.47	6.49	7.73	4.21	4.93	5.40		7.57	7.80	6.79	7.57	5.56	3.28	6.62	4.64	4.99	5.66	6.52	5.13	6.89	5.71	6.50	11.90	9.49	7.03	7.05	5.45	4.87	6.18	5.39	4.86	5.96	
10		4.40	11.70	9.40	7.70	3.00	6.20	5.90	6.40	8.80	9.50	7.40	8.15	3.95	4.36	5.69	4.73	3.52	6.68	7.28	4.24		5.40		7.25	7.54	6.80	7.86	5.24	3.26		5.82	4.95	5.12	6.54	5.69	6.76	5.51	6.77	11.63	9.51	6.14	7.10	5.44	4.70	6.24	5.56	4.86	6.20	
11		4.40	10.60	8.90	7.80	3.00	6.20	5.60	6.60	8.60	9.20	7.00	7.10	4.00	5.02	5.95	4.87	3.43	6.27	7.51	4.10		4.94		7.86	7.84	6.47	7.65	5.39	3.32	6.99	6.13	4.89	4.83	6.81	5.91	5.93		6.77	11.31	9.53	5.59	7.82	5.03	4.43	5.56	6.06	5.03	6.11	
12		4.30	10.10	7.80	7.90	3.50	5.90	6.10	6.60	6.80	9.20	7.60	6.80	3.95	5.07	5.57	4.82	3.67	6.49	7.51	5.18	4.26	5.22		7.40	7.99	5.98	8.61	5.54	3.26	7.28	6.33	4.63	4.82	6.97	6.48	5.40		6.91	11.18	9.46	5.31	7.82	5.03	4.38	5.70	6.78	5.07	5.77	
13		4.90	9.00	7.00	7.90	3.80	6.70	6.10	6.40	5.75	9.25	8.10	6.50	3.85	4.89	4.72	5.45	3.93	6.24	7.45	4.69	4.64	5.17		7.81	8.11	6.26	8.72		3.00	7.79	6.44	5.19	4.77	6.39	6.67	5.41		6.45	10.02	9.43	5.62	8.37	5.11	4.21	5.17	6.92	5.47	5.13	
14		4.80	8.00	6.90	7.70	3.80	6.90	5.30	5.10	6.10	8.60	7.90	6.20	3.90	4.17	5.04	5.24	4.15	6.03	7.22	5.11	4.56	5.00		7.94	7.05	6.36	8.05		2.78	7.07	5.72	4.80	4.90	6.21	6.58	5.19		6.32	9.57	9.26	5.50	7.37	5.53	4.35	5.73	6.57	5.51	5.15	
15		4.20	7.20	6.20	8.00	4.10	6.70	4.30	5.10	6.85	8.50	7.50	5.95	3.80	5.14	4.64	5.07	4.40	5.51	7.27	5.28	4.85	5.19		7.91	7.40	6.32	8.81	5.75	2.70	6.98	6.26	5.31	5.18	5.57	6.74	4.68		5.88	10.18	9.33	5.95	6.81	5.94	4.20	5.46	6.87	5.26	5.44	
16		4.60	7.30	7.10	8.00	4.00	5.70	4.20	5.20	7.30	8.00	7.70	5.75	4.15	5.48	3.79	4.60	4.57	5.44	6.25	4.95	5.22	4.92		7.45	7.92	6.46	9.00	5.53	2.96	6.98	5.59	4.98	5.51	5.35	6.55	5.19	4.86	6.04	10.21	9.37	5.95	6.82	5.46	4.35	5.16	6.10	5.48	5.42	
17		5.10	7.50	6.40	7.60	3.70	5.40	4.80	5.20	7.80	7.90	7.80	5.45	4.20	6.03	3.32	3.58	4.59	5.27	6.47	4.97	5.29	4.96		7.51		6.60	7.89	5.39	3.42	6.27	5.26	5.06	5.65	5.73	6.39	4.87	4.88	5.82	9.10	10.05	5.94	6.62	5.05	4.89	5.54	5.92	5.37	5.38	
18		5.40	7.80	6.70	7.40	3.50	6.50	4.90	4.10	7.15	7.70	7.20	5.65	4.55	6.08	4.73	3.29	4.63	5.74	5.62	4.77	5.84	4.83		7.07	8.88	6.23	7.33	5.21	3.78	6.73	4.59	5.02	5.89	5.75	5.44	4.96	5.34	5.58	8.71	9.64	5.94	6.50	4.87	5.15	5.57	5.37	5.35	5.61	
19		5.10	8.40	6.60	7.10	4.30	6.80	5.20	4.40	5.70	7.45	7.20	5.60	4.95	5.96	4.03	3.76	4.64	5.78	5.04	4.62	5.91	5.15		6.38	9.24	6.31	7.33	5.22	4.70	7.03	3.95	4.65	6.21	5.34	4.85	4.77	5.38	5.10	8.91	8.82	6.13	6.50	4.92	5.57	5.89	5.16	4.86	5.97	
20		4.70	8.40	6.20	7.40	4.30	6.50	5.60	3.80	5.80	7.80	7.00	5.45	5.00	5.86	3.90	3.95	5.27	6.16	4.76	4.38	5.94	4.65		6.19	9.47	6.16	6.73	4.99	4.42	6.61	4.06	4.85	6.32	5.10	4.84	5.10	5.60	5.51	8.52	8.65	6.33	5.92	4.66	5.59	6.33	5.08	4.47	6.03	
21		4.10	8.40	5.60	7.70	4.10	6.60	4.90	4.00	6.30	7.80	7.10	5.15	4.70	6.17	4.29	3.94	5.16	6.24	4.34	4.45	6.05	6.16		5.93	8.96	6.56	6.39	5.22	4.54	6.70	4.17	4.34	6.20	5.42	4.74	4.52	6.07	5.00	8.36	9.49	6.84	5.71	4.50	5.56	6.53	4.72	4.26	6.82	
22		4.00	8.20	6.30	7.80	4.00	6.50	4.30	4.90	6.00	7.70	7.20	4.50	4.25	6.37	4.76	3.88	4.70	6.36	4.50	4.56	6.43	6.33		6.03	8.64	6.52	6.20	5.12	4.54	6.70	4.38	3.85	6.97	5.96	4.74	4.35	6.04	4.98	7.61	9.88	6.73	6.10	4.40	5.41	6.58	4.90	4.06	6.74	
23		2.00	7.70	6.10	8.10	3.70	6.50	4.20	4.90	5.85	7.70	7.10	4.75	3.30	6.27	4.32	3.90	3.75	6.13	4.55	4.52	6.07	6.03		6.02	8.47	6.90	6.43	4.17	4.22	7.03	4.16	4.27	6.55	5.63	4.82	4.39	5.83	4.90	7.50	9.49	6.99	5.78	4.25	4.68	6.60	4.69	3.95	6.40	
24		4.30	7.50	5.20	7.70	3.40	6.40	4.40	4.60	6.15	6.80	6.60	4.40	3.25	5.65	4.66	3.60	3.67	5.72	5.41	3.88	5.87	5.90		6.20	8.42	6.26	6.06	4.79	4.14	6.53	4.47	4.32	5.90	5.86	4.85	4.82	5.41	5.24	6.96	9.41	6.39	5.84	4.03	4.59	6.04	5.44	3.79	5.73	
25		4.60	8.40	5.30	6.30	3.80	6.40	4.80	4.80	6.15	6.10	6.30	4.60	3.00	5.13	4.59	3.68	4.36	5.24	5.42	4.57	5.44	5.13		6.66	8.18	6.04	6.08	4.98	3.78	6.47	4.47	4.32	5.33	5.96	4.39	4.96	5.53	5.47	6.99	8.89	5.78	6.13	4.14	4.70	6.32	5.71	4.17	5.44	
26		4.70	7.90	5.00	6.50	4.00	5.90	4.90	4.90	5.95	6.40	6.40	5.10	3.20	4.43	4.67	4.56	4.43	4.68	5.23	4.19	5.55	4.90		6.77	7.83	5.79	6.97	4.94	3.78	5.89	4.51	4.19	5.60	5.67	4.49	5.02	5.12	5.51	6.75	8.27	6.01	6.37	4.39	4.83	5.87	5.26	4.41	5.65	
27		5.30	6.90	4.10	7.30	4.10	5.70	4.90	5.10	5.50	6.45	6.60	5.40	3.30	4.94	3.76	5.00	4.79	4.52	5.13	4.15	5.60			7.20	7.50	5.46	6.59	5.53	3.78	5.14	4.61	5.02	5.52	5.42	4.99	5.22	5.29	5.07	6.69	8.39	5.50	5.93	4.59	4.83	5.22	5.40	4.59	6.05	
28		5.70	5.90	4.20	7.20	4.30	5.20	4.70	5.10	6.60	6.30	6.80	5.80	3.40	4.19	4.35	4.27	4.57	4.02	4.75	5.08	5.71	4.70		6.77	6.69	5.86	6.46	6.19	3.78	4.41	4.53	5.34	5.31	4.72	5.67	5.08	5.62	4.87	6.74	8.10	4.89	5.87	4.75	5.05	5.18	5.25	4.35	5.96	
29		5.50	5.80	4.30	7.58	4.50	4.60	3.60	5.00	6.95	6.15	6.40	6.40	3.70	4.61	4.36	4.60	4.36	3.97	4.65	5.38	5.67	4.38		6.34	7.66	5.73	6.73	6.32	3.48	4.10	5.39	5.62	5.27	4.64	5.86	5.43	5.58	4.83	6.99	7.61	4.94	5.90	4.99	5.14	5.20	5.19	4.82	5.88	
30		4.90	6.50	4.00	7.40	4.60	4.00	3.80	5.20	6.90	6.15	5.90	6.55	4.10	4.29	3.91	4.72	4.21	3.76	4.90	5.54	5.67	4.12		6.97	6.97	5.37	7.12	6.58	3.46	4.81	5.56	5.98	5.21	4.49	5.68	5.62	5.53	4.40	7.06	7.71	4.94	5.45	5.51	5.49	4.92	5.30	5.26	6.06	
31		5.40	6.80	2.10	7.10	4.50	3.90	3.80	5.20	7.15	5.80	5.70	6.14	4.30	4.21	3.78	4.46	4.29	4.11	5.22	5.57	5.95	3.95		6.27	6.36	4.92	5.89	6.05	3.54	4.75	5.21	6.19	5.08	4.42	5.75	6.05	5.13	4.16	6.76	7.50	4.85	5.45	6.15	5.33	4.63	5.02	5.87	6.34	
August																																																		
1		5.40	6.80	4.30	7.00	4.50	4.70	2.20	4.90	7.15	4.65	4.80	5.73	4.50	4.20	3.77	4.26	5.16	3.93	5.46	5.03	5.55	3.85		6.71	5.99	4.60	5.71	6.27	3.54	4.24	4.72	6.29	5.32	4.19	5.57	6.42	4.75	4.14	7.34	7.85	5.00	5.26	5.96	5.64	4.72	4.61	6.07	6.04	
2		5.40	6.90	4.20	5.90	4.70	5.30	3.70	4.40	5.80	4.50	4.60	5.31	4.50	4.57	2.40	4.40	5.28	4.42	5.61	4.91	4.76	3.64		6.51	6.30	4.08	5.64	5.85	3.78	4.30	4.99	5.65	5.04	4.23	5.78	5.90	5.10	3.96	7.20	7.82	5.14	5.05	5.87	5.86	4.59	4.16	6.42	6.09	
3		5.60	6.50	4.70	6.60	4.60	5.30	3.90	4.40	5.30	5.25	5.70	4.90	4.70	4.76	3.65	4.20	4.39	4.42	5.00	4.86	5.12	3.82		6.01	5.94	4.21	5.80	5.98	4.00	4.27	4.46	5.11	5.00	4.33	5.34	5.42	4.85	3.88	6.54	7.43	5.01	4.90	5.52	5.31	4.97	3.90	5.96	5.97	
4		4.60	5.80	4.70	6.80	4.60	5.30	4.10	4.30	5.10	5.20	4.75	3.20	4.90	4.85	3.96	4.76	3.77	4.94	5.17	5.08	5.59	4.13		5.47	5.86	4.55	6.55	5.91	4.16	4.42	4.98	4.98	4.67	4.62	4.99	4.59	4.86	4.42	6.72	7.07	5.20	5.11	5.38	5.02	4.99	4.35	5.50	5.66	
5		1.90	6.30	5.10	7.40	4.60	5.30	4.50	4.70	5.30	5.60	6.00	4.60	4.20	4.63	4.13	4.46	3.47	5.36	4.92	4.55	5.40	4.45		5.50	5.64	5.13	6.56	5.66	3.92	4.28	4.92	4.75	4.88	4.37	5.07	4.84	4.96	4.78	6.49	6.94	5.29	5.19	5.15	4.83	5.24	4.97	5.30	5.97	
6		3.80	6.00	5.20	7.80	4.50	4.30	4.40	4.80	5.30	6.30	6.15	4.00	3.70	4.72	4.23	3.87	3.56	5.45	5.45	4.68	5.36	4.59		5.67	6.31	5.53	6.41	5.11	4.06	5.36	4.67	4.42	5.02	4.77	5.03	5.00	5.14	4.99	6.32	6.81	5.40	4.94	5.08	4.49	5.56	4.97	5.32	5.45	
7		4.30	6.00	5.50	8.00	3.50	3.90	5.20	4.90	5.90	6.65	6.60	4.30	3.70	4.92	5.17	3.50	3.97	5.67	5.82	4.34	4.55	4.30		5.87	6.25	6.01	6.76	4.75	3.94	5.35	4.88	4.21	4.76	5.27	4.94	5.09	4.99	4.84	5.81	6.57	5.50	5.22	5.16	4.53	5.53	5.16	5.14	4.94	
8		4.30	5.90	5.80	7.90	3.40	4.80	5.30	5.20	6.00	6.55	6.95	5.60	3.80	4.89	5.78	3.70	3.78	5.20	6.80	4.08	4.35	4.14		5.46	5.88	6.00	6.48	5.05	4.00	5.39	5.03	3.87	4.52	5.61	4.82	4.81	4.20	5.15	5.80	6.48	5.37	5.86	5.35	4.33	5.44	5.31	4.96	4.46	
9		4.50	5.60	5.10	8.10	3.40	4.80	5.40	4.90	5.25	6.40	6.75	4.60	3.10	4.93	5.47	3.67	3.34	5.11	6.78	3.79	4.47	4.49		5.26	5.84	6.10	6.59	4.96	4.06	5.92	5.08	3.53	4.55	5.69	5.31	4.17	4.31	5.40	5.99	5.77	5.09	6.12	5.23	3.90	5.53	5.62	4.96	4.05	
10		4.30	4.60	4.40	8.10	3.60	4.60	5.40	4.60	4.10	6.00	6.70	4.00	3.00	4.96	4.99	3.83	3.09	5.48	6.85	3.76	4.05	4.27		5.51	5.81	5.56	6.76	4.62	3.90	5.81	5.61	3.75	4.44	6.13	5.50	3.73	4.51	5.49	5.61	5.53	5.15	6.34	5.09	3.92	5.61	6.21	4.55	4.50	
11		4.30	5.50	5.30	7.70	3.70	4.40	5.20	4.80	3.60	5.30	6.25	5.00	3.17	4.80	4.95	3.47	3.17	5.54	6.56	4.11	4.00	4.02		5.51	5.50	5.59	7.37	4.67	3.88	5.40	5.12	3.97	4.51	5.69	5.80	3.38	4.19	5.44	6.08	5.03	4.65	6.32	5.19	3.92	5.32	6.51	4.47	4.42	
12		4.10	5.10	5.00	7.60	4.00	4.70	4.50	5.00	5.00	5.85	6.20	5.20	3.34	5.17	5.24	4.31	3.72	5.02	6.38	4.58	4.32	4.02			5.20	5.63	6.78	4.83	3.88	5.25	5.62		4.52	4.85	5.91	3.86	4.22	5.43	6.41	5.09	4.88	6.57	5.11	3.85	5.24	5.96	4.47	4.25	
13		4.20	6.10	5.10	7.50	4.30	4.10	4.50	5.10	5.20	6.05	6.20	4.60	3.50	4.27	4.69	4.46	3.80	4.12	6.30	4.95	4.39	4.14		5.78	5.49	5.94	6.98	5.11	4.02	5.69	5.85		4.40	4.82	5.33	3.99	4.34	5.18	6.56	5.73	5.29	6.30	5.15	4.09	5.06	5.47	4.51	3.99	
14		4.30	6.30	3.10	7.10	3.90	4.20	4.20	4.90	5.40	5.50	6.10	4.00	3.70	5.24	4.47	3.58	3.87	5.01	6.20	5.01	4.11	4.10		6.01	5.76	5.89	7.16	4.79	3.88	5.78	5.16		4.38	4.84	5.19	4.07	4.22	5.32	5.79	5.92	5.39	6.09	5.55	4.39	4.94	5.41	5.14	3.94	
15		4.00	5.70	5.30	6.80	4.00	4.90	3.80	4.00	5.85	5.35	5.70	4.60	3.90	5.03	4.18	3.52	4.55	5.14	6.64	4.50	4.51	3.94			6.39	5.63	6.59	5.30	4.26	5.67	4.64		4.30	4.56	5.42	4.24	3.98	5.28	5.40	5.54	5.39	5.93	4.99	4.40	5.02	5.70	4.98	4.46	
16		4.10	6.10	4.80	6.30	4.50	5.50	4.50	3.60	6.25	5.30	5.25	4.80	4.80	5.11	2.78	3.82	4.28	4.96	6.10	3.61	4.73	4.32		5.71	6.84	5.31	6.09		4.54	5.66	4.03		4.80	4.43	4.95	4.86	3.80	4.93	5.76	6.19	5.16	5.45	4.77	4.40	4.97	5.18	4.52	4.91	
17		4.90	6.40	4.00	6.30	5.00	5.70	4.00	3.80	6.00	5.60	4.80	4.80	5.00	5.17	3.49	3.97	4.08	5.02	5.37	3.89	4.86	4.32		4.62	7.32	4.95	5.82	5.08	4.78	5.33	4.42		4.85	4.36	4.79	4.77	3.95	4.84	5.73	6.10	5.44	5.21	4.55	4.58	5.01	4.42	4.28	5.82	
18		4.30	5.50	4.30	6.30	5.00	5.60	3.90	3.80	5.75	6.25	5.00	4.10	4.00	5.09	3.06	3.40	4.06	5.50	4.89	4.58	5.49	4.33		4.37	7.31	5.02	5.74	5.05	4.92	4.66	4.26		5.91	4.30	4.35	4.56	4.07	4.74	5.56	6.51	5.66	4.99	4.39	4.87	4.84	4.13	4.22	6.07	
19		4.10	5.70	4.70	5.80	4.80	5.60	3.70	3.60	5.20	6.50	5.10	4.30	4.20	5.41	3.47	3.48	4.00	5.25	4.18	4.84	5.52	4.44		4.11	6.94	4.99	5.77	4.59	4.56	4.83	4.24		5.96	4.68	4.04	4.66	4.46	4.44	5.75	6.08	5.70	5.04	4.87	5.11	4.92	4.03	3.83	6.00	
20		4.40	5.90	4.40	6.40	4.80	4.90	4.00	3.90	5.00	6.60	5.45	2.50	3.40	5.35	3.77	3.38	4.04	5.02	4.29	4.67	5.40	4.56		5.00	7.27	5.36	5.81	4.05	4.76	5.03	4.15	4.77	5.81	4.71	3.78	5.25	5.71	4.03	5.52	6.44	5.85	4.88	4.54	5.58	5.17	3.86	4.28	6.14	
21		2.00	5.60	4.40	6.70	4.10	5.30	4.40	3.80	5.15	6.40	6.10	3.90	3.60	5.29	3.74	3.14	4.53	5.39	4.52	4.42	4.75	4.30		4.90	6.96	5.59	5.33	4.23	4.44	5.23	4.07	4.96	5.46	4.73	3.69	5.04	5.64	4.08	4.75	6.39	5.85	4.66	4.28	5.39	5.22	4.29	4.60	6.04	
22		4.00	5.50	4.40	7.10	3.70	5.80	4.20	3.90	5.00	5.30	5.70	4.10	3.40	4.90	4.13	3.18	5.21	4.87	4.43	4.47	4.84	4.27		3.79	7.08	5.52	5.27	4.24	4.86	5.22	4.31	4.69	5.19	4.70	3.70	5.23	5.20	4.15	4.57	6.57	5.78	4.89	4.15	5.00	5.65	4.57	4.62	6.16	
23		4.50	5.00	4.30	6.80	4.40	5.10	4.70	3.80	5.00	4.95	5.60	4.80	3.30	4.89	4.27	3.44	4.66	5.12	4.62	3.73	4.45	3.94		5.46	6.76	5.35	4.76	4.44	4.66	5.00	4.03	4.56	5.28	4.83	3.95	4.90	5.01	3.96	4.52	6.23	5.66	5.02	4.15	4.74	5.66	5.05	4.21	5.88	
24		4.50	2.90	3.90	7.20	4.70	5.10	4.70	4.20	5.05	5.15	5.10	5.40	3.30	4.15	3.65	4.32	4.18	5.27	5.28	3.88	4.18	3.08		5.23	6.42	5.00	5.36	4.62	4.00	4.90	4.14	4.56	5.08	4.59	3.96	5.16	4.82	3.95	4.81	6.08	5.45	4.93	4.36	4.48	5.33	4.87	3.89	5.63	
25		5.00	4.40	4.00	7.30	4.60	5.20	4.40	4.20	5.00	5.00	5.00	5.80	4.20	3.74	4.05	4.90	4.00	5.11	5.29	3.83	3.97	3.21		5.23	6.06	4.32	5.48	3.97	4.50	4.61	4.63	4.88	4.50	4.53	4.29	5.17	4.33	4.03	5.47	6.06	4.92	4.96	4.60	4.37	4.89	4.79	3.79	5.20	
26		4.60	3.80	4.40	7.00	4.80	4.30	4.30	4.80	5.00	4.80	4.75	5.90	3.40	4.27	3.94	5.19	4.15	4.91	4.90	4.00	4.23	3.52		5.78	6.14	4.13	5.92	4.24	4.50	3.87	5.07	4.96	4.15	4.85	4.27	4.68	4.22	4.18	5.65	5.91	4.69	5.09	4.89	4.46	4.46	5.06	3.60	5.08	
27		4.90	4.00	5.20	7.40	4.40	3.70	4.20	4.90	5.20	4.10	4.80	5.90	3.40	3.07	4.06	5.00	4.03	4.69	4.80	4.17	4.08	4.05		5.86	5.88	3.67	6.16	4.71	4.30	4.08	5.56	5.72	4.11	4.60	4.45	4.68	4.05	4.12	5.85	5.69	4.57	5.15	5.26	4.70	4.00	5.12	4.07	5.03	
28		4.30	4.50	5.50	7.40	4.40	3.80	4.40	4.50	5.30	3.70	4.80	5.00	3.00	3.79	4.37	4.49	3.76	4.52	5.16	4.28		2.75		5.67	5.84	3.71	6.67	4.64	4.00	4.39	5.61	6.16	4.17	4.54	4.52	4.61	4.02	4.32	6.15	6.03	4.36	5.05	5.58	4.49	4.20	4.64	4.72	4.75	
29		5.00	5.30	4.30	7.40	4.50	3.90	4.40	4.90	5.35	3.60	4.95	4.30	3.10	3.53	4.06	4.57	4.32	4.36	5.46	4.51		2.05		5.11	5.69	3.82	6.28	4.76	4.30	3.99	4.84	5.88	3.85	4.60	4.87	5.19	3.51	4.11	6.00	5.85	4.31	4.91	5.94	4.70	4.56	4.91	5.43	4.86	
30		5.10	5.20	4.90	7.40	4.90	4.90	3.20	4.80	5.15	3.60	5.15	3.50	3.40	3.03	3.78	5.20	4.38	3.81	5.49	4.75		1.80		5.89	5.98	3.76	5.34	5.59	4.16	3.97	4.78	5.70	3.68	4.15	5.55	5.35	3.58	3.90	5.89	6.11	4.24	4.89	5.62	5.22	4.41	4.73	5.68	4.53	
31		5.20	4.70	4.20	7.10	4.90	4.60	4.20	4.80	4.70	4.20	5.00	5.20	3.20	3.12	4.31	5.13	3.85	3.85	5.41	4.55		2.20		5.82	6.35	3.62	5.58	5.57	4.22	3.87	4.87	5.92	4.24	3.79	5.22	4.89	3.83	3.61	6.04	5.95	4.12	4.69	5.42	4.96	3.98	4.44	5.49	4.47	
September																																																		
1		4.00	4.50	4.20	6.70	4.40	5.50	3.68	4.80	4.85	4.80	5.50	5.00	2.90	3.23	2.76	4.94	4.32	3.99	4.93	4.32	3.35	2.56		5.37	5.93	3.84	5.91	4.68	3.92	3.90	4.73	5.80	4.01	3.40	5.07	4.11	3.87	3.42	5.88	5.50	4.56	4.26	5.37	4.58	4.20	4.04	5.32	4.32	
2		3.70	4.30	4.00	7.40	4.10	5.20	4.20	4.70	4.70	4.80	5.85	3.90	3.10	3.59	1.93	5.11	4.18	4.14	4.65	4.28	4.74	3.04		4.50	5.27	4.28	5.51	5.02	4.06	3.52	4.16	5.61	4.12	3.15	4.57	4.23	3.62	3.73	5.00	5.01	4.17	4.18	5.24	4.38	4.47	3.91	4.94	4.46	
3		3.50	5.00	4.40	6.60	4.00	4.30	4.29	4.30	4.25	5.20	5.15	4.60	2.90	3.99	4.04	4.56	3.95	4.12	4.11	4.20	4.64	3.50		4.69	5.14	4.76	5.20	4.21	4.00	3.50	4.37	4.83	3.84	3.65	4.58	4.00	3.87	3.79	4.64	4.66	4.29	4.18	5.04	4.14	4.31	3.93	4.97	4.63	
4		3.40	5.20	4.60	5.60	4.00	4.30	4.73	4.00	3.90	4.80	5.55	4.10	3.20	4.73	4.02	3.70	3.83	4.22	4.33	4.07	4.27	3.42		4.32	4.91	4.69	5.12	3.76	3.70	4.06	4.37	4.04	3.85	3.98	4.33	4.04	3.73	3.59	4.47	4.70	4.34	3.91	4.75	4.01	4.21	4.00	4.78	4.52	
5		1.80	5.30	4.90	4.80	3.70	4.70	4.81	4.30	3.65	4.30	5.40	4.10	3.20	4.89	4.46	3.57	3.86	4.93	4.85	3.52	4.16	3.61		3.76	5.07	4.66	5.40	3.49	3.62	4.87	4.29	3.56	3.68	4.02	4.15	3.83	3.88	3.51	4.56	5.08	4.45	3.89	4.43	3.71	4.78	4.13	4.40	4.13	
6		3.30	5.20	5.20	4.90	3.20	5.50	5.08	4.40	3.45	4.30	5.10	4.50	3.40	5.05	4.12	3.42	3.93	5.15	5.06	3.45	3.87	3.72		3.70	4.99	4.87	4.92	3.25	3.28	4.93	4.06	3.23	3.75	4.15	3.94	3.25	4.10	3.40	4.67	5.12	4.71	4.55	3.74	3.63	5.04	4.45	3.91	4.06	
7		3.00	4.90	5.20	5.00	3.30	6.20	5.78	4.40	3.50	5.05	5.70	4.70	3.50	5.29	3.86	4.02	3.98	4.84	5.40	3.11	4.01	4.10		3.65	4.71	5.15	4.16	3.24	3.14	4.99	4.34	3.19	3.67	4.51	3.87	2.80	3.86	3.65	4.31	4.65	4.68	5.14	3.46	3.47	5.41	4.70	3.75	3.72	
8		2.70	4.30	5.30	5.90	3.30	6.20	5.43	4.20	3.65	5.50	6.30	5.00	2.90	5.37	4.49	3.61	3.72	5.08	4.70	3.20	4.07	4.20		3.54	4.17	4.67	4.81	3.51	2.96	4.51	4.13	3.11	3.95	4.44	3.32	3.11	3.71	4.50	4.44	4.42	4.22	4.81	3.46	2.86	5.31	5.13	3.83	3.49	
9		2.50	4.80	5.30	6.20	3.20	6.10	4.99	4.20	3.85	5.65	5.25	4.90	2.60	4.90	4.98	3.92	3.47	4.66	4.95	3.49	3.83	4.20		4.01	4.39	4.81	5.83	3.56	3.20	4.32	3.94	2.99	4.13	4.43	3.29	3.18	3.60	4.70	4.57	4.41	4.17	4.63	3.87	2.60	4.86	4.63	3.59	3.38	
10		3.10	3.00	5.30	6.30	3.60	6.10	5.00	4.40	4.00	5.60	6.05	4.40	3.50	4.49	4.98	3.74	3.37	4.96	5.50	3.55	4.06	4.14		4.28	4.52	4.47	4.90	3.55	3.26	5.02	4.48	3.40	3.53	4.33	3.28	2.73	3.93	4.35	4.61	3.65	4.92	4.78	4.16	2.76	4.68	4.53	3.59	3.85	
11		3.90	4.50	4.80	6.30	3.60	5.10	5.10	4.40	4.00	5.05	5.65	4.60	3.94	3.13	4.96	3.63	3.74	4.69	5.28	3.67	4.26	3.93		4.33	4.59	4.76	5.02	3.69	3.26	4.93	3.90	4.77	3.20	4.73	3.91	3.24	3.90	4.07	4.64	3.59	5.45	4.38	4.35	3.07	5.08	4.76	3.96	3.58	
12		4.00	4.70	4.80	6.20	3.60	5.30	4.60	4.10	3.85	4.75	4.70	4.90	4.21	4.14	4.86	3.36	3.60	4.36	5.24	3.76	3.92	3.63		4.33	4.50	4.67	4.39	4.16	3.46	4.08	3.53	4.59	3.55	4.35	4.10	3.24	4.41	3.90	4.75	3.78	4.96	4.69	4.38	2.94	4.94	4.75	4.10	3.68	
13		4.60	5.50	4.10	6.20	4.40	5.30	4.20	4.10	4.20	4.70	4.15	4.60	4.89	4.07	4.76	3.69	3.84	4.27	5.49	3.42	3.67	3.16		5.23	5.10	4.52	4.61	4.65	4.16	3.67	3.41	4.57	3.75	3.95	3.92	3.37	4.41	4.10	4.57	4.21	4.90	4.92	4.55	3.58	4.72	4.20	4.45	4.10	
14		4.60	5.70	4.10	6.20	4.90	6.00	3.60	3.80	4.70	4.95	4.10	4.20	5.12	4.13	4.19	4.15	4.35	4.51	4.72	3.85	4.11	3.27		5.52	5.35	4.36	4.57	5.05	4.20	4.03	3.33	4.63	3.99	4.11	3.87	3.29	3.77	3.96	4.60	4.32	4.89	4.48	4.16	3.43	4.51	4.57	3.95	4.67	
15		4.10	5.20	3.70	5.30	5.10	6.90	3.90	3.50	5.20	5.35	3.90	4.90	4.67	4.44	3.08	4.50	5.08	4.78	3.96	4.55	4.36	3.15		5.26	5.80	4.21	4.06	4.89	4.40	4.22	3.40	5.26	3.75	4.08	3.63	3.38	3.62	3.78	4.61	5.00	4.62	4.48	4.35	4.32	4.55	4.26	4.33	4.70	
16		4.10	5.10	4.30	4.50	5.30	6.10	3.50	3.50	5.30	5.80	3.70	3.70	4.67	4.72	3.25	3.98	4.99	4.59	3.30	2.66	4.82	3.24		5.19	5.86	4.76	3.91	5.13	4.14	3.42	3.87	5.00	4.01	3.39	3.39	4.46	4.40	3.78	4.61	5.14	4.31	4.32	4.77	4.65	4.61	3.70	4.09	4.86	
17		4.30	5.40	3.90	4.10	5.40	5.60	3.60	3.80	5.40	5.60	3.50	4.50	5.08	5.30	3.20	3.58	5.37	4.55	3.46	4.26	5.03	3.51		4.87	7.17	5.00	3.65	4.56	4.06	3.55	3.21	5.47	4.17	2.85	3.34	4.95	4.20	3.71	4.17	5.17	4.70	4.06	4.35	4.69	5.13	3.64	4.79	4.88	
18		4.20	5.70	3.70	4.20	5.00	5.70	4.00	3.80	5.30	5.55	4.35	4.00	5.46	5.01	3.23	3.30	5.52	4.90	3.57	4.08	4.71	3.61		4.50	7.31	5.03	3.51	4.53	3.94	4.17	2.94	5.72	4.39	2.94	3.07	4.46	4.29	3.60	4.01	5.81	5.08	3.86	4.22	4.50	4.99	3.55	5.04	5.37	
19		4.50	5.70	4.20	3.90	5.20	6.10	4.10	3.70	4.75	5.40	4.00	2.50	5.69	7.94	3.20	3.35	5.13	4.98	3.91	4.34	4.53	3.55		4.64	6.84	5.19	3.44	4.45	3.94	4.03	2.81	5.38	4.06	3.51	2.84	4.32	4.35	3.46	3.79	5.93	4.77	3.46	4.13	4.88	5.13	2.92	4.06	5.12	
20		3.10	5.60	4.20	4.70	5.20	6.10	4.30	4.10	4.50	5.60	3.95	3.90	5.14	4.93	3.27	3.11	4.56	4.76	4.03	3.55	4.11	3.67		4.36	6.69	4.67	3.11	4.79	4.10	4.07	2.55	5.27	4.17	3.65	2.74	3.78	3.93	3.59	3.71	5.36	5.49	3.80	3.59	5.05	5.33	3.00	3.55	4.89	
21		4.40	4.50	4.00	5.00	4.50	5.80	4.30	4.10	4.40	5.30	4.20	4.30	4.63	4.54	3.76	3.48	4.43	4.60	3.63	3.50	4.31	3.62		4.19	6.47	4.26	3.59	4.79	3.94	4.16	2.43	4.75	4.64	3.84	2.70	3.53	3.92	3.80	3.89	4.92	4.86	3.85	3.51	4.86	5.34	3.04	3.31	4.63	
22		4.20	3.90	4.70	6.00	4.20	5.60	4.00	4.20	4.20	4.75	5.00	4.70	3.90	4.40	3.91	3.75	4.16	4.72	3.44	3.84	4.03	4.00		4.11	6.04	4.03	4.48	4.84	4.26	3.93	2.84	4.27	4.16	4.16	3.00	3.11	4.13	4.06	4.03	4.62	4.74	4.13	3.51	4.11	5.24	3.64	3.80	4.44	
23		4.40	2.80	4.70	5.90	4.20	4.90	4.00	4.30	4.10	4.50	5.30	4.90	3.56	5.14	4.76	4.08	3.99	4.28	3.50	4.03	4.09	4.36		4.23	5.69	4.12	5.00	4.07	3.68	4.77	3.69	4.35	4.16	3.94	3.28	3.10	4.37	3.79	3.87	4.50	5.29	4.68	3.67	3.72	4.40	3.43	3.60	4.72	
24		4.50	3.80	4.50	5.70	4.90	4.00	4.20	4.50	4.35	4.25	4.95	4.50	3.98	4.87	4.81	4.59	3.82	2.79	4.20	4.87	3.59	3.95		4.55	5.37	3.93	4.74	4.28	3.62	4.55	4.22	4.44	3.43	3.38	3.23	3.69	3.79	3.88	4.42	4.41	4.77	5.42	4.13	3.72	3.93	3.68	3.43	4.21	
25		4.50	3.70	4.50	6.50	4.80	3.50	4.20	4.40	4.50	4.00	4.80	5.00	3.93	4.49	4.76	4.64	4.28	3.92	4.58	5.04	3.23	3.24		5.02	5.73	4.12	5.31	4.27	3.66	4.34	4.08	4.56	3.13	3.54	3.22	4.08	3.50	4.19	4.82	4.13	4.30	5.04	4.83	3.28	3.52	4.08	3.39	4.19	
26		4.70	4.00	4.20	6.50	5.00	4.10	4.10	4.70	4.60	3.40	4.90	5.60	4.69	3.52	4.59	5.20	3.92	3.75	5.44	5.12	2.84	3.05		5.23	5.44	4.26	4.93	4.89	3.48	4.65	4.52	4.92	2.49	3.70	3.90	3.74	3.22	3.90	5.47	4.01	3.80	4.90	4.82	3.66	3.94	4.25	3.84	4.27	
27		4.70	3.90	3.80	6.20	5.10	4.10	4.40	5.70	4.60	3.40	4.80	5.50	4.92	3.70	4.24	5.27	4.18	3.28	5.80	5.39	3.47	3.11		5.62	5.47	3.71	4.77	5.08	3.36	4.42	5.21	4.71	2.52	4.22	4.30	3.88	2.43	4.42	5.84	4.38	3.57	4.81	4.31	4.19	3.45	4.48	3.81	3.65	
28		4.70	4.00	3.80	6.00	5.30	4.00	4.40	5.60	4.70	4.00	4.70	5.10	4.72	3.17	4.18	4.87	4.26	3.06	5.50	4.48	3.82	3.06		5.13	5.03	3.26	3.99	4.65	3.48	3.73	5.15	5.12	2.51	4.17	4.49	3.62	2.29	4.29	5.64	4.63	3.67	4.53	4.80	4.09	3.53	4.73	4.56	3.51	
29		4.30	3.70	3.30	6.00	5.30	4.10	3.50	5.50	4.85	3.75	4.40	5.40	4.13	3.18	4.29	3.72	4.92	3.32	4.68	4.62	4.20	2.96		4.74	5.31	3.19		4.89	3.30	3.38	4.66	5.00	2.84	3.36	4.23	4.23	3.07	3.99	5.64	4.90	4.40	4.25	5.84	4.04	3.40	4.37	4.55	4.28	
30		3.70	4.60	3.50	5.40	5.30	4.70	3.30	5.40	4.60	4.05	4.40	4.70	4.36	3.76	4.36	3.58	4.79	2.95	4.35	4.06	4.39	2.88		5.06	5.33	3.28	4.93	5.00	3.34	3.25	4.70	5.23	3.86	3.04	4.49	4.20	3.15	3.91	5.72	4.42	5.94	3.77	5.77	3.90	3.22	4.51	4.91	4.59	

Columbia River Water Elevation at the Interstate Bridges, Daily Maximum (feet, Columbia River Datum), cont'd

Date	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
October																
1		4.10	5.00	4.00	4.80	5.00	4.70	3.10	5.00	5.10	4.30	4.20	3.80	4.47	4.19	4.29
2		3.50	5.00	4.00	4.90	4.50	4.40	3.90	4.40	4.60	4.40	4.40	2.90	4.85	4.35	3.17
3		2.70	5.10	4.40	4.00	3.80	4.90	4.20	4.32	3.70	4.25	4.40	4.30	4.85	4.76	4.01
4		1.90	5.00	5.40	4.30	3.60	5.50	5.10	4.92	3.45	4.65	5.00	4.40	4.27	4.46	3.94
5		2.70	4.60	5.80	5.20	3.60	5.50	5.20	4.44	4.10	5.15	5.60	4.15	4.21	4.73	4.09
6		2.70	4.20	6.10	5.40	3.20	5.70	5.60	5.04	4.75	6.00	5.50	4.10	3.94	4.94	5.14
7		2.70	4.20	5.80	5.40	3.40	5.70	5.60	3.99	4.75	5.70	5.40	4.25	3.67	5.70	5.70
8		3.30	4.40	6.10	5.30	3.50	5.00	5.50	3.99	4.50	5.00	5.30	4.80	3.64	5.41	5.73
9		4.00	3.30	5.40	5.30	3.40	4.90	5.50	3.80	4.70	4.70	5.15	5.00	3.23	4.57	5.45
10		4.10	4.10	5.20	5.10	3.40	4.50	4.90	4.18	4.70	4.10	5.00	5.55	3.64	3.88	4.91
11		4.60	4.00	5.30	6.00	3.95	4.50	4.80	4.20	4.90	3.60	4.75	5.75	4.46	3.19	4.43
12		5.00	3.90	3.00	4.90	4.60	4.50	4.30	4.20	5.45	4.25	5.00	6.35	4.61	3.35	4.24
13		5.30	4.00	3.20	4.80	5.00	4.90	3.10	4.50	5.70	4.25	4.95	5.70	4.64	3.76	3.83
14		4.70	4.50	3.00	4.80	4.80	4.40	3.10	4.10	5.70	5.05	3.40	5.30	4.36	4.28	3.59
15		5.20	5.00	3.70	4.80	4.90	4.70	3.30	4.20	5.80	5.45	2.80	4.55	4.74	4.97	3.60
16		4.60	5.60	4.00	4.60	4.70	5.10	3.70	3.80	6.00	5.45	3.10	4.55	5.29	5.28	3.38
17		4.70	5.60	4.80	4.20	4.50	5.20	3.70	3.40	5.10	5.55	3.50	4.30	5.72	5.38	3.10
18		3.90	5.40	4.70	4.20	4.50	5.20	4.60	3.00	4.55	5.50	3.90	3.30	5.53	5.08	2.92
19		3.20	4.40	4.30	4.50	4.50	5.20	5.30	2.90	4.30	5.45	4.30	3.35	5.43	4.75	3.22
20		3.70	3.80	4.80	5.30	3.80	5.20	5.60	3.57	4.20	5.45	4.70	4.05	4.77	5.30	4.55
21		3.80	3.50	5.30	5.80	3.50	5.10	5.60	4.08	3.70	5.05	5.10	4.30	4.81	5.08	5.03
22		3.80	2.60	5.30	6.10	3.50	4.50	5.90	3.91	3.80	5.15	5.10	5.30	4.45	4.33	5.00
23		5.20	3.20	5.30	6.10	4.00	3.40	5.70	4.25	4.30	4.60	4.85	5.35	4.72	4.09	5.77
24		5.70	3.50	5.50	6.00	4.70	3.40	5.70	5.00	4.90	3.90	4.85	5.85	4.96	3.65	5.02
25		5.50	4.00	5.80	6.10	4.80	3.20	5.90	5.09	4.80	3.70	5.30	5.90	5.05	3.16	3.18
26		5.10	3.80	5.80	6.10	4.90	3.30	5.90	4.91	4.70	4.60	4.80	7.15	5.32	3.17	4.40
27		4.60	3.90	5.50	5.70	5.40	3.80	4.80	4.73	5.30	4.20	4.40	6.80	5.75	3.60	4.88
28		4.50	5.20	5.00	5.40	5.70	4.30	4.80	4.40	6.10	4.60	4.20	6.00	5.90	3.54	4.59
29		4.40	5.50	5.40	4.90	5.70	4.60	4.10	4.40	5.80	6.85	4.15	5.30	5.10	4.14	3.96
30		4.20	5.50	6.30	4.60	5.30	4.70	4.10	3.40	5.60	6.95	4.20	4.50	5.23	5.36	3.74
31		4.70	5.70	6.30	4.70	5.00	4.90	4.40	3.60	5.00	6.95	4.40	4.45	5.24	5.72	3.98
November																
1		4.20	5.70	6.10	4.60	5.70	5.20	4.70	3.80	4.35	6.75	5.10	4.40	5.32	5.59	3.79
2		3.60	5.00	6.50	4.60	5.70	5.50	5.50	4.00	4.15	7.20	5.70	6.60	5.51	5.73	3.60
3		3.60	4.40	6.80	4.60	4.60	5.60	6.40	4.20	3.60	7.05	6.80	7.90	4.59	5.88	4.15
4		4.00	4.90	6.90	4.90	4.10	5.60	6.60	4.40	3.05	6.85	7.20	7.50	3.99	5.87	4.71
5		4.30	4.70	7.20	5.10	4.20	5.60	6.70	4.50	3.40	6.90	6.80	6.50	3.50	5.90	4.82
6		4.50	4.50	7.60	5.10	4.20	4.80	6.50	4.80	3.60	6.40	7.40	7.00	3.83	5.79	5.47
7		4.80	4.70	8.70	5.00	4.30	4.30	6.20	6.10	3.90	5.70	6.60	6.80	5.10	5.05	4.90
8		5.00	4.40	7.00	5.00	4.60	4.20	5.80	6.30	4.10	5.55	6.00	6.90	6.57	3.86	4.37
9		6.90	4.90	6.40	5.00	5.50	4.30	5.40	6.30	4.50	5.70	5.70	7.10	6.56	3.66	4.43
10		7.20	4.70	5.60	5.00	6.00	4.20	4.70	5.50	5.60	5.55	5.95	8.30	7.06	4.05	3.75
11		8.00	5.10	5.60	4.90	6.10	4.80	4.10	5.50	6.75	5.45	5.60	8.10	7.25	4.41	3.34
12		8.80	5.40	5.30	4.20	6.10	4.80	3.80	5.10	6.80	5.80	5.10	8.00	7.23	4.44	3.32
13		8.80	5.30	5.30	4.20	5.80	5.10	3.60	4.90	7.00	5.90	5.65	8.10	7.44	4.91	4.44
14		9.00	5.70	5.60	4.00	6.20	5.80	3.60	5.90	8.15	5.70	5.75	7.80	7.12	5.59	3.20
15		8.70	5.70	6.60	4.10	6.30	6.40	3.90	4.70	7.90	6.30	6.10	7.60	6.88	5.29	3.27
16		12.30	5.70	6.70	4.60	6.20	6.40	4.90	3.40	6.30	7.05	6.75	8.20	7.16	5.57	3.49
17		12.40	5.70	7.40	5.20	5.70	6.00	5.60	4.00	5.80	7.45	7.80	7.90	5.79	6.01	4.02
18		10.85	5.40	7.40	5.20	5.60	5.40	5.60	4.40	5.60	7.35	8.85	7.50	5.04	6.99	4.47
19		9.30	4.40	7.90	5.40	6.00	4.40	5.50	5.10	5.55	6.90	9.70	7.40	4.77	6.30	4.84
20		8.40	4.80	7.20	5.50	5.60	4.50	5.20	5.70	5.95	6.40	9.85	7.60	5.77	6.42	5.33
21		8.20	4.80	7.10	6.10	5.90	5.30	5.10	7.20	6.45	5.50	9.80	7.70	6.08	6.76	5.56
22		7.70	4.30	6.70	6.30	6.10	5.80	6.60	7.40	6.00	4.95	9.60	7.20	6.11	6.58	6.04
23		8.10	5.10	8.20	6.30	6.20	5.00	6.60	7.30	6.40	4.80	9.30	7.70	5.82	7.16	5.78
24		7.90	5.60	5.70	6.20	6.90	4.20	5.90	7.00	6.50	4.80	9.60	7.80	6.00	8.14	5.72
25		7.70	5.20	5.70	6.00	9.30	3.90	5.60	6.10	6.50	4.50	9.20	7.60	6.62	8.27	4.87
26		8.10	5.20	5.50	5.80	10.30	3.90	5.50	5.70	6.60	4.70	8.80	6.80	6.88	7.85	4.37
27		8.00	5.60	5.80	4.40	10.60	4.50	5.20	5.60	6.40	5.75	8.30	7.30	5.85	7.70	3.98
28		8.50	5.70	6.40	3.90	9.50	5.90	5.10	4.80	6.10	6.90	7.40	8.50	5.67	8.95	3.99
29		8.60	5.70	6.60	3.90	8.90	6.10	5.10	5.70	5.50	7.45	7.80	8.50	5.09	8.64	3.83
30		8.30	6.30	7.20	4.70	8.70	7.20	5.70	5.70	4.70	8.70	8.30	9.30	5.85	8.06	4.23
December																
1		8.10	6.00	9.10	4.80	8.00	7.80	5.90	5.20	5.40	8.50	8.70	9.50	5.25	8.48	6.81
2		7.50	6.20	12.20	4.90	10.80	7.70	7.30	6.00	7.00	9.25	8.90	9.10	4.65	8.52	6.71
3		7.00	6.30	13.10	5.10	13.80	7.20	7.30	9.10	6.90	9.75	8.60	8.50	5.12	8.04	7.16
4		6.70	5.90	16.40	5.10	14.50	7.70	8.00	10.30	7.00	9.55	7.60	8.00	5.79	7.89	7.68
5		6.90	5.30	16.90	4.50	12.50	8.20	8.10	10.40	8.60	9.75	8.55	7.40	5.87	7.60	7.12
6		7.30	5.60	16.30	4.70	11.00	8.20	8.40	10.40	10.20	8.60	9.15	6.80	6.15	6.80	7.21
7		8.20	4.80	13.60	5.00	10.70	7.30	8.40	10.20	11.10	8.45	8.40	7.20	6.85	5.70	7.16
8		8.70	4.70	14.30	5.60	10.10	7.60	7.50	8.22	11.60	8.70	8.50	6.90	6.67	4.90	7.27
9		8.10	5.30	14.40	5.60	10.10	6.50	6.20	7.70	11.45	8.10	8.80	6.80	7.45	5.33	8.56
10		8.80	5.80	14.00	4.90	9.80	5.50	5.50	7.70	10.55	7.90	8.70	7.50	8.17	5.31	10.53
11		9.50	6.60	13.70	4.10	9.50	6.50	5.10	6.90	11.00	7.05	8.00	7.40	8.36	5.34	9.96
12		9.30	7.10	11.70	4.10	9.60	6.80	5.20	6.90	11.60	6.95	7.45	7.60	8.12	5.60	8.51
13		9.30	6.90	10.60	4.10	15.00	7.20	5.70	6.60	12.10	7.10	8.00	7.20	7.87	5.89	6.11
14		10.00	6.40	9.80	4.60	17.10	7.20	5.80	5.90	12.30	7.35	8.40	7.00	7.63	6.43	6.22
15		10.40	6.00	8.80	5.00	17.80	6.50	6.00	5.50	12.20	8.20	8.50	7.00	7.38	6.76	6.24
16		9.80	6.80	8.30	5.30	17.30	6.50	6.00	5.70	10.10	10.10	8.80	6.80	7.14	6.30	6.24
17		10.90	6.30	7.70	5.90	17.30	6.30	6.40	6.00	10.80	11.20	9.00	6.70	5.63	5.70	6.55
18		11.30	6.45	8.30	5.90	17.00	6.20	7.10	6.70	10.70	10.55	8.70	7.10	5.69	5.97	6.63
19		11.60	6.60	8.40	5.90	15.80	5.90	7.80	6.80	10.65	11.00	9.50	6.80	5.46	5.53	6.49
20		12.00	7.90	8.40	5.80	13.90	5.10	7.80	6.90	10.60	10.50	8.80	6.90	4.86	4.90	6.21
21		12.80	8.90	7.10	6.10	12.20	4.80	7.90	7.40	10.00	10.70	9.50	7.40	4.57	4.60	6.81
22		13.80	8.60	6.90	6.40	10.00	4.80	7.90	8.30	9.20	10.75	9.30	7.30	4.68	4.95	6.90
23		13.00	8.00	7.40	6.40	8.70	4.80	6.90	8.50	8.90	10.20	8.70	6.80	4.72	4.82	6.28
24		12.00	8.30	7.40	6.10	8.70	4.30	7.00	9.60	9.00	8.60	8.00	6.10	4.52	5.16	5.64
25		12.60	7.70	7.00	4.90	8.00	4.50	6.70	11.80	8.90	7.60	6.70	5.50	4.06	4.71	4.94
26		12.40	6.50	8.20	5.00	6.70	5.20	6.70	15.10	8.95	7.00	5.30	5.60	4.58	5.50	4.35
27		11.90	9.10	8.80	5.00	6.70	6.20	6.20	15.90	8.85	6.65	6.10	5.70	4.45	5.84	4.33
28		13.70	8.90	9.30	4.80	7.20	7.60	5.90	16.10	9.00	7.30	5.85	5.40	5.16	6.12	4.98
29		13.60	7.70	9.40	4.70	7.20	7.60	5.90	15.70	8.90	7.50	6.20	5.70	5.16	7.58	5.20
30		13.40	8.10	9.30	4.90	7.20	7.40	6.00	13.30	8.50	7.60	7.30	6.40	5.02	7.42	5.70
31		11.90	7.10	10.10	5.00	6.90	7.40	6.70	13.60	7.55	7.45	7.40	6.00	3.87	7.62	5.50

Date	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
October																	
1	3.44	4.42	3.90	4.56	5.18	4.64	3.32		4.85	6.50	3.76	4.44	4.89	3.30	3.03	3.93	4.37
2	3.30	4.52	3.87	4.06	4.29	4.56	3.24		4.55	6.72	3.94	3.90	4.34	3.68	2.93	4.27	4.07
3	2.88	4.41	4.42	4.00	3.57	4.25	3.75		4.08	7.32	4.51	3.45	3.74	3.72	3.28	4.12	3.89
4	2.89	4.08	4.88	4.33	3.19	4.35	3.82		3.91	6.80	4.34	3.55	3.28	3.24	4.11	3.65	3.82
5	2.62	4.03	5.33	4.41	2.96	4.27	4.17		3.85	6.53	4.81	3.94	3.14	3.78	4.56	3.14	3.40
6	2.71	3.62	5.31	4.19	2.55	4.04	4.30		2.99	6.56	5.26	4.43	2.65	3.64	3.83	3.15	3.06
7	3.34	2.98	5.43	4.47	2.75	4.07	3.51		2.93	6.18	5.89	4.59	2.85	3.32	4.47	3.89	2.84
8	3.24	2.95	5.24	4.65	3.69	3.78			3.60	6.51	5.62	4.72	3.15	3.28	4.47	4.65	3.50
9	3.26	2.87	4.88	5.10	3.79	3.66	4.19		4.09	6.68	5.28		3.80	2.88	5.19	4.72	4.06
10	4.12	3.05	4.63	5.14	3.87	3.32	4.02		4.23	6.71	4.91		3.95	3.44	5.06	4.50	3.26
11	4.44	3.77	4.34	5.30	3.83	3.24	3.83		5.15	5.92	4.26	4.52	4.39	3.48	4.30	4.58	3.50
12	4.93	4.54	3.62	5.43	4.28	3.87	3.45		5.22	6.76	4.15	4.45	4.49	2.98	3.67	4.52	3.79
13	4.67	5.31	3.71	4.31	4.56	4.40	3.63		5.63	7.07	4.15	4.30	4.72	3.28	2.83	4.10	4.16
14	4.40	5.28	3.71	3.66	4.58	4.08	3.75		6.05	6.72	3.79	3.89	4.56	3.28	2.76	3.99	4.32
15	4.46	5.32	4.87	3.11	4.28		4.12		5.91	7.48	4.04	3.25	4.83	3.96	2.85	4.41	5.27
16	3.90	5.47	4.63	3.23	3.97		4.12		5.15	7.60	3.69	2.75	5.15	4.40	3.07	4.22	5.04
17	3.42	5.78	4.76	2.81	3.95		3.81		5.32	7.76	4.19	2.32	5.09	4.60	3.66	3.92	5.38
18	3.71	5.26	5.17	3.32	3.92	5.10	3.81		5.32	7.22	3.96	2.19	4.69	4.76	3.54	3.53	5.71
19	3.62	5.11	5.21	3.20	3.97	5.10	3.96		4.97	6.26	3.61	2.45	4.15	4.42	3.42	3.10	6.04
20	3.31	4.70	4.56	3.83	4.00	4.47	4.49		4.38	5.59	3.60	3.03	4.53	3.84	3.40	3.42	5.46
21	4.06	3.90	4.27	4.70	4.11	3.87	1.86		4.23	4.86	4.25	3.56	4.53	3.52	4.18	3.86	5.40
22	4.32	3.61	4.97	4.76	4.18	3.58			4.63	4.36	4.50	4.43	3.85	3.80	4.01	4.32	4.85
23	4.73	4.26	4.84	5.03	4.51	3.20			5.12	4.00	4.46	4.81	3.53	3.40	4.39	4.41	4.82
24	5.30	4.34	4.31	5.03	4.61	3.19			6.53	3.99	3.94	5.10	3.96	2.28	4.12	5.05	4.77
25	5.63	5.07	4.11	5.62	4.64	3.30	3.83		6.90	3.96	3.94	5.52	4.73	2.48	4.12		5.12
26	5.66	5.30	4.03	5.99	4.94	3.28	4.15		6.19	3.79	3.66	5.76	5.43	2.44	4.12	5.59	5.88
27	5.71	4.86	2.87	6.08	5.32	3.93	4.19		5.46	4.50	3.37	5.47	5.89	3.04	3.31	5.78	6.05
28	5.65	4.31	3.38	5.23	5.28	4.19	4.58		6.34	5.16	2.68	6.74		2.92	3.20	5.83	5.65
29	4.57	4.37	3.63	4.91	5.66	4.40	4.00		5.95	6.15	2.77	5.07	5.66	3.44	2.71	5.36	5.35
30	4.25	4.80	5.14	4.00	5.44	4.81	3.96		5.34	7.23	3.20		5.10	4.12	2.62	4.60	5.45
31	4.01	4.75	5.68	3.73	4.69	4.77	5.69		4.28	7.77	3.95		4.55	4.44	2.75	3.63	4.90
November																	
1	3.70	4.64	5.82	4.14	3.95	4.41	7.27		3.68	7.27	4.39	3.40	3.79	4.60	3.14	3.22	4.58
2	3.89	4.73	5.92	3.72	3.35	4.30	7.11		3.30	6.44	4.87		3.28	4.72	4.34	3.19	4.58
3	4.31	5.21	6.16	4.22	3.15	4.38	7.00		2.99	6.69	5.20		2.90	4.44	4.70	3.87	3.78
4	4.05	3.90	6.00	5.31	3.54	4.15	7.55		3.17	6.13	5.87	4.63	3.50	4.04	5.24	3.83	3.35
5	4.44	3.24	6.69	5.66	3.54	3.68	6.91		3.66	6.13	6.24	4.68	3.09	3.88	5.57	4.17	3.16
6	4.88	3.20	6.59	5.96	3.86	2.98	6.66		4.32	6.13	6.36	5.43	3.33	4.04	5.92	4.09	3.13
7	5.14	3.43	5.96	5.78	4.51	2.49	5.86		4.10	5.82	6.22	5.60	3.52	3.32	6.23	4.50	3.75
8	5.67	4.22	5.57	5.76	4.71	3.00	5.05		4.73	5.73	5.40	5.76	4.50	3.24	6.33	4.90	4.33
9	5.43	5.00	5.20	5.81	5.19	4.45	5.47		4.83	4.78		6.00	4.75	3.22	5.60	5.02	4.75
10	6.31	5.51	4.90	5.13	5.07	4.70	4.87		5.34	5.90		5.95	5.05	3.68	4.58	5.01	5.27
11	5.98	5.98	4.80	4.41	4.92	4.45	4.33		5.66	6.40	4.07	5.71	5.13	3.68	3.87	4.88	5.63
12	6.23	6.18	5.44	4.28	4.74	4.90	4.44		6.05	6.71	4.04	5.37	5.31	4.36	4.33	4.48	5.90
13	5.80	6.91	6.11	4.16	4.81	4.77	4.10		5.98	6.96	4.66	4.88	5.53	4.82	4.10	4.34	6.15
14	5.68	6.76	5.95	3.56	4.99	4.35	4.78		6.03	7.33	4.96	4.29	5.77	6.42	4.21	4.28	6.05
15	5.08	6.27	6.59	3.31	4.56	5.18	5.40		5.62	6.63	5.73	3.96	5.35	6.52	4.27	3.91	6.27
16	5.12	6.23	6.58	4.45	3.89	5.04	5.67		5.32	6.60	5.35	4.44	4.85	6.02	5.00	4.54	5.75
17	5.15	5.95	6.37	5.88	4.02	4.72	4.42		5.54	7.04	5.53	4.32	3.93	5.42	4.95	4.10	4.98
18	5.08	5.27	6.58	5.51	4.20	3.51	5.28		6.27	6.35	5.20	4.51	3.50	4.92	4.99	4.60	4.46
19	5.60	4.00	6.32	5.95	5.15	3.23	5.06		10.08	6.59	5.25		3.60	4.92	5.23	5.18	4.20
20	6.01	4.07	6.14	7.36	4.58	2.68	4.04		10.48	6.07	6.25	6.13	3.87	5.02	5.23	5.25	3.70
21	7.00	4.23	6.13	7.38	6.23	3.15	4.58		10.90	6.00	7.48	6.50	4.30	4.52	5.32	5.51	4.05
22	8.88	4.30	6.19	7.45	7.28	3.89	4.49		10.86	5.99	7.24	6.85	4.64	5.12	5.21	5.55	4.41
23	9.36	4.69	5.87	7.15	7.19	3.64	4.61		10.49	6.48	7.05	7.06	5.09	4.72	4.98	5.99	4.80
24	8.92	4.36	6.29	7.31	7.11	2.52			10.09	6.76	7.51	7.83	5.15	5.02	4.44	6.23	5.53
25	8.80	5.17	8.14	6.67	6.25	3.80	4.03		9.70	6.67	8.58	10.19	5.40	4.82	3.74	6.58	5.58
26	8.04	5.67	9.43	6.98	5.68	3.84	4.21		9.26	7.48	9.57		5.63	4.42	3.33	5.94	5.27
27	7.75	5.37	9.51	7.62	5.67	4.21	4.94		8.21	6.93	9.53		5.48	4.62	3.33	5.05	5.32
28	8.14	5.66	9.99	7.19	4.79	4.27	5.18		8.48	7.10	8.72	11.91	4.98	6.72	3.75	5.59	4.58
29	8.14	5.56	9.76	6.12	3.96	5.17	6.37		7.97	7.33	8.20	9.63	5.41	7.22	4.22	4.82	4.23
30	6.88	6.18	9.68	5.65	3.88	5.19	7.69		7.57	6.87	8.23	8.58	4.57	7.22	4.81	4.56	4.27
December																	
1	6.96	5.52	9.04	5.37	4.36	6.37	9.43		8.46	6.92	8.48	8.01	4.01	8.32	5.12	4.52	4.12
2	7.03	4.29	9.03	5.55	4.63	5.13	9.34		8.78	6.54	10.35	8.80	3.90	8.22	5.63	4.55	3.10
3	5.68	4.50	8.54	5.95	4.82	4.83	8.68		8.88	6.97	10.85	8.63	3.53	8.32	5.80	4.81	3.28
4	4.86	5.84	9.20	6.26	5.40	4.32	7.66		9.75	6.59	10.55	8.09	3.22	7.22	5.71	4.73	4.05
5	5.43	6.19	9.46	6.53	5.04	3.65	7.72		12.07	6.17	10.00	8.67	3.59	6.92	5.77	5.81	4.71
6	6.27	5.52	8.42	7.38	5.46	3.92	7.63		12.28	5.85	9.28	8.74	3.88	6.82	5.62	6.25	5.27
7	6.04	6.04	8.24	7.94	6.16	5.36	7.13		11.84	6.03	8.56	8.85	4.64	6.72	5.24	6.35	5.39
8	6.29	6.99	7.88	8.27	7.43	5.53	6.19		12.72	6.37	8.30	8.71	5.27	6.02	4.44	5.91	7.26
9	6.18	6.77	6.93	7.78	7.16	6.32	5.41		12.94	6.00	7.95	9.34	5.72	5.92	4.14	5.97	6.74
10	5.71	6.84	7.62	7.75	7.87	7.31	5.48		13.17	6.53	7.59	9.24	5.88	6.02	4.10	5.91	7.46
11	6.24	6.83	7.37	7.42	8.39	7.41	5.08		12.74	6.45	7.12	8.69	5.56	6.22	3.97	5.94	8.02
12	5.92	7.13	7.65	6.79	7.54	6.84	5.74		12.67	6.79	7.67	8.62	6.09	6.12	4.77	6.15	7.94
13	5.07	7.08	7.60	6.14	6.36	7.82	5.70		12.25	7.59	8.61	8.32	6.28	7.02	5.05	6.75	7.52
14	4.79	6.55	7.80	6.23	6.00	7.46	5.75		11.46	8.15	8.27	8.04	7.12	8.22	6.18	7.22	7.15
15	5.04	6.04	7.86	5.35	5.70	6.45	6.29		9.96	7.49	7.82	9.19	6.30	8.02	5.90	7.26	6.45
16	5.26	5.24	7.77	5.50	5.72	5.55	6.71		9.18	7.32	7.23	10.55	5.74	8.62	7.33	7.55	6.04
17	4.52	4.62	6.84	6.08	6.57	5.04	7.55		9.14	8.65	7.22	11.51	5.16	9.22	6.66	7.80	6.33
18	5.30	4.67	7.55	6.84	5.80	4.39	7.38		8.39	8.34	6.87	11.58	4.39	9.52	6.38	7.22	6.31
19	6.39	4.27	6.51	6.64	5.88	3.94	8.10		7.98	8.14	6.91	11.72	4.84	9.52	6.34	7.10	5.61
20	6.68	4.39	7.06	6.89	6.34	3.86	8.03			7.57	6.27	11.23	4.81	8.82	6.94	6.79	5.08
21	7.32	4.61	7.97	7.04	6.50	3.78	7.38			6.58	6.19	10.13	5.21	7.82	6.50	7.06	5.12
22	7.88	4.62	7.30	7.43	6.43	3.78	6.83			6.32	6.16	9.81	6.25	7.82	5.77	6.98	5.23
23	7.24	4.61	6.76	6.98	6.16	3.47	6.47			6.02	6.34	9.45	6.05	6.12	5.43	7.44	6.41
24	7.28	4.20	6.04	6.84	5.62	3.50	5.96			5.45	6.23	8.61	6.00	5.32	4.93	7.81	5.82
25	6.16	4.11	6.26	6.45	5.18	4.04	4.98			5.37	6.11	8.04	5.69	4.72	4.94	7.40	5.66
26	5.01	4.52	5.72	5.28	5.44	4.52	5.66			5.31	6.04	7.39	5.60	4.82	5.11	6.39	5.91
27	5.50	5.26	6.41	5.44	4.96	4.70	7.36			5.94	7.10	7.08	5.23	5.42	6.11	5.81	5.67
28	5.28	5.47	6.55	5.74	5.88	5.02	7.56			6.19	12.05	6.90	4.76	6.02	6.18	5.50	5.71
29	5.28	5.35	6.86	5.58	6.16	4.76	7.84			6.53	14.40	6.79	4.41	6.12	6.39	5.89	5.55
30	6.42	3.41	6.80	5.32	5.86	4.93	7.47			6.82	15.00	6.28		6.22	7.18	6.10	5.66
31	5.94	4.03	7.31	5.36	6.05					6.92	14.83	5.38	3.97	6.32	7.72	6.16	5.44

Date	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
October																	
1	4.21	2.96	4.22	3.99	3.29	3.83	4.90	4.08	5.72	3.50	5.22	4.18	3.09	4.34	4.94	4.47	
2	3.73	3.00	4.33	4.17	3.60	3.83	4.58	4.00	5.58	3.46	4.39	4.02	3.55	4.06	4.62	4.41	
3	4.02	3.55	3.91	4.72	3.58	3.79	4.84	4.01	5.38	3.65	4.04	4.01	3.84	4.11	4.59	4.41	
4	4.34	3.99	3.87	4.30	3.87	3.41	4.61	3.85	5.04	3.84	3.67	4.26	4.09	4.13	3.70	4.54	
5	4.81	4.42	3.96	3.33	3.99	3.97	4.63	3.31	4.92	3.81	3.55	4.66	4.64	3.83	2.82	4.39	
6	4.91	4.39	3.23	3.02	4.03	4.63	4.31	2.98	5.16	4.73	3.44	3.92	4.67	4.49	2.67	4.01	
7	5.02	4.67	3.49	2.68	4.22	5.23	4.02	2.86	5.36	5.24	3.67	3.66	4.66	3.97	2.66	4.09	
8	4.78	4.88	3.60	2.34	4.68	5.33	3.88	2.86	5.36	5.60	3.71	3.31	4.49	4.12	2.91	3.89	
9	4.16	5.02	4.46	2.55	4.24	5.77	4.24	2.86	5.17	5.66	3.74	3.23	5.02	4.61	3.08	3.68	
10	4.09	4.98	4.78	2.64	3.64	5.71	4.85	3.04	4.72	5.42	4.27	3.24	4.71	4.75	3.16	3.40	
11	3.93	4.72	4.58	2.84	3.54	4.68	5.45	3.36	4.23	4.98	4.07	3.35	4.29	4.64	3.38	4.08	
12	3.53	4.67	4.96	2.93	3.54	4.50	5.03	3.58	4.04	4.58	3.97	3.74	4.43	4.53	3.35	4.19	
13	3.78	4.10	4.50	3.30	4.00	4.08	4.84	3.78	3.86	4.91	4.14	5.29	4.05	3.92	3.88	4.61	
14	4.22	3.89	4.18	3.70	4.47	3.54	5.12	4.17	3.75	4.40	4.39	7.19	3.65	3.30	3.95	5.14	
15	4.74	3.01	3.94	4.97	4.81	3.27	4.95	4.92	3.91	3.91	5.01	7.35	3.14	3.23	4.13	4.65	
16	4.48	3.39	4.56	4.80	4.81	2.75	4.56	5.50	4.40	3.67	5.13	7.82	3.62	2.72	4.79	4.81	
17	4.75	3.24	3.82	5.14	5.26	2.74	4.12	5.20	4.90	3.81	4.77	7.92	4.07	2.52	4.92	5.42	
18	5.25	2.89	4.69	4.76	5.10	2.99	3.88	5.13	5.32	4.13	4.08	7.49	4.71	2.54	4.86	5.34	
19	5.48	3.44	4.48	4.22	5.23	3.49	3.51	4.75	5.09	4.17	3.94	6.82	5.50	3.17	4.47	5.24	
20	5.13	3.43	3.34	4.08	4.98	3.95	3.27	4.57	4.88	4.74	3.43	6.33	5.63	3.19	4.56	4.53	
21	4.80	4.00	3.39	3.52	5.34	4.07	3.26	4.34	4.65	5.01	3.35	5.90	5.76	3.30	3.61	4.48	
22	4.61	3.90	3.48	3.49	4.78	4.38	4.13	4.43	4.61	5.68	3.53	5.67	7.02	4.17	3.18	3.85	
23	3.65	4.26	4.17	3.37	4.09	4.54	4.19	4.45	4.32	6.23	3.80	5.06	5.99	4.69	2.98	3.82	
24	3.34	4.37	4.75	3.15	3.08	5.49	4.41	4.24	3.83	5.97	4.28	5.34	4.85	4.97	3.33	3.51	
25	3.25	4.15	4.97	3.42	2.79	5.80	4.93	4.16	3.07	5.61	4.91	5.37	3.92	5.07	3.70	2.86	
26	3.17	3.72	4.72	3.20	3.36	5.55	5.52	4.68	2.70	5.82	5.56	5.65	3.25	5.57	3.90	3.26	
27	3.23	3.58	4.79	3.94	2.80	4.85	5.61	5.16	2.96	5.54	5.62	6.06	2.61	5.14	4.26	3.61	
28	4.08	3.21	4.68	4.37	3.10	4.66	5.93		3.00	5.81	5.90	6.26	3.05	5.13	4.84	3.98	
29	4.04	2.82	4.94	4.61	3.79	4.09	5.80		3.26	5.18	5.39	6.49	3.11	4.86	4.78	4.24	
30	3.87	3.10	4.11	4.78	3.86	3.94	5.12		3.57	5.12	5.43	6.53	3.50	4.30	4.77	4.21	
31	4.94	3.27	3.74	4.80	4.64	3.90	4.28	6.26	4.14	4.97	5.43	6.77	3.97	3.90	4.47	4.13	
November																	
1	5.92	3.81	3.13	4.21	4.64	4.99	3.84	6.09	4.08	5.10	5.43	6.53	4.35	3.74	3.94	4.78	
2	5.84	4.40	2.78	4.21	4.93	5.28	3.73	5.48	5.37	5.14	4.54	6.55	5.00	4.31	3.95	5.05	
3	6.68	5.38	2.40	4.18	5.31	5.51	3.96	5.15	5.35	5.81	3.85	6.11	5.50	4.48	2.82	5.37	
4	6.65	5.43	2.56	3.45	5.60	6.02	4.09	4.52	5.49	6.45	3.43	5.80	6.36	5.27	2.87	5.12	
5	5.82	6.41	3.00	2.99	6.07	6.23	4.24	3.92	6.07	6.33	3.74	5.47	6.36	5.45	3.09	4.99	
6	6.14	8.04	3.77	3.19	6.33	6.65	4.55	3.66	5.70	6.93	3.63	5.16	6.00	5.55	3.38	4.68	
7	5.43	10.33	4.02	3.97	5.93	6.65	4.45	3.81	6.48	6.40	4.36	4.76	5.66	5.41	3.71	4.05	
8	5.03	10.69	3.99	4.73	5.10	6.26	4.48	4.40	5.17	6.10	5.03	4.85	5.37	5.10	4.30	3.50	
9	4.42	10.34	4.12	5.29	4.96	6.15	4.76	4.72	4.58	6.20	5.13	5.00	5.61	5.14	4.42	3.21	
10	4.13	8.80	5.25	5.30	4.87	5.22	4.92	4.96	4.54	5.53	4.86	5.49	5.03	4.96	4.67	4.28	
11	4.85	8.15	5.03	6.09	5.04	4.47	5.50	5.29	4.60	4.42	5.15	6.00	4.73	4.42	4.73	4.62	
12	5.20	7.37	6.11	6.93	5.37	3.73	5.20	6.32	5.02	3.43	5.18	6.80	5.16	3.87	5.00	5.05	
13	6.27	7.81	4.66	7.58	5.96	3.35	5.35	6.65	4.89	3.49	5.99	6.68	6.01	3.42	5.16	7.10	
14	5.91	7.85	4.18	7.65	5.47	3.74	4.92	6.65	5.32	4.16	6.00	7.24	5.80	3.09	5.33	6.70	
15	5.56	6.59	4.31	6.70	5.65	3.80	4.32	6.60	5.56	3.92	5.76	7.91	6.58	3.17	5.36	7.69	
16	5.92	6.82	3.96	6.10	6.35	4.40	4.68	6.36	5.98	3.94	4.89	7.59	6.66	3.45	4.86	7.50	
17	5.15	6.46	3.98	5.69	6.74	5.07	4.80	6.49	5.85	4.13	6.87	7.08	6.50	3.54	4.75	7.96	
18	4.93	6.14	4.26	4.62	6.12	5.67	4.85	5.93	5.91	4.57	6.43	6.58	6.14	3.89	4.64	7.18	
19	4.97	6.60	4.67	4.15	6.46	5.75	4.90	7.52	6.15	5.05	6.17	6.45	6.18	4.42	4.11	6.16	
20	4.20	6.27	4.74	4.53	6.61	6.30	5.03	8.53	5.23	5.55	6.03	6.31	6.89	4.77	3.82	5.59	
21	3.77	7.07	5.09	4.36	5.28	6.33	5.89	8.65	4.48	6.15	5.36	6.10	6.78	5.45	3.99	5.25	
22	3.32	6.81	5.35	4.75	7.08	6.59	7.10	8.78	3.97	6.96	5.70	5.48	6.76	6.07	4.33	4.87	
23	3.00	7.16	5.51	4.70	4.86	5.83	8.53	7.99	3.63	6.69	6.16	5.66	6.85	6.42	4.67	4.93	
24	3.21	7.12	6.03	4.85	4.26	5.31	8.03	7.88	3.52	6.47	6.83	6.48	6.72	6.05	5.26	4.81	
25	4.31	7.35	6.12	5.01	4.10	5.30	7.45	8.17	3.30	6.64	6.41	7.29	6.43	5.92	5.51	5.25	
26	4.51	7.25	5.88	4.84	4.75	5.43	6.88	7.53	3.50	6.21	6.03	7.75	6.34	6.10	5.83	4.87	
27	4.38	7.22	5.64	5.06	5.11	4.90	6.87	7.30	4.15	6.10	5.91	8.06	6.22	6.25	6.01	4.74	
28	4.58	6.73	4.82	4.97	5.01	4.79	6.04	7.22	4.51	6.15	5.80	7.96	5.96	5.47	5.51	5.09	
29	5.71	6.31	4.32	4.93	5.47	4.58	5.32	7.56	4.73	6.88	5.66	7.57	6.10	5.27	5.43	5.19	
30	5.52	6.15	4.07	4.77	5.84	5.50	4.96	7.74	5.06	6.78	5.04	7.40	6.33	4.94	4.71	5.71	
December																	
1	6.37	6.01	4.05	4.82	6.11	6.38		7.87	6.02	6.69	4.76	6.99	6.66	5.15	4.28	5.24	
2	6.50	5.74	5.04	4.21	6.08	6.56		8.26	7.15	6.67	4.50	6.25	7.30	5.07	3.85	5.08	
3	6.16	5.88	7.47	3.56	6.23	6.57	3.62	8.46	6.76	6.65	5.23	6.10	7.33	5.03	3.59	5.03	
4	5.54	6.26	8.98	3.39	6.18	6.35	3.66	9.57	6.42	6.93	5.27	5.81	6.99	4.99	4.10	4.65	
5	5.06	6.38	9.28	3.45	5.75	6.34	3.97	10.09	6.09	7.25	4.96	5.50	6.73	5.18	4.14	4.47	
6	4.76	6.19	8.75	3.78	4.89	6.15	4.25	10.02	5.71	7.52	6.14	5.53	6.02	5.29	4.36	3.64	
7	4.51	5.90	7.12	4.38	4.52	6.08	4.48	10.03	5.02	7.26	7.64	5.49	5.71	5.34	4.86	3.69	
8	4.10	5.86	5.94	4.66	4.79	6.40	4.78	9.57	4.67	7.17	9.87	5.27	5.18	5.25	5.01	4.43	
9	4.22	5.35	5.40	4.78	4.79	6.40	4.80	9.25	4.42	7.11	11.50	6.01	4.88	5.13	4.99	4.67	
10	4.36	4.85	5.44	5.11	5.13	6.87	5.12	8.73	4.43	7.38	11.98	6.69	4.72	4.92	5.20	5.05	
11	5.18	5.25	6.11	5.50	5.40	7.08	5.32	8.99	4.66	7.37	11.64	7.56	4.44	5.59		5.60	
12	5.25	5.88	5.21	6.39	5.80	7.66	5.02	9.36	4.79	7.21	11.52	7.40	4.96	4.50	6.26	5.77	
13	5.15	6.24	4.54	6.39	5.84	7.91	4.96	9.49	5.04	6.48	11.20	7.54	5.27	4.37	6.14	6.38	
14	5.20	8.58	4.30	5.74	5.86	9.11	4.61	9.50	5.02	5.59	10.39	7.27	5.17	4.62	6.01	6.68	
15	5.27	11.43	4.39	5.51	6.44	9.68	4.45	9.06	5.10	5.45	9.40	7.34	5.42	4.23	5.50	7.04	
16	5.42	11.67	4.49	4.91	7.11	9.31	4.13	8.57	5.03	5.58	8.56	6.93	5.34	4.95	4.98	6.74	
17	4.80	8.90	5.32	4.93	6.55	8.14	4.11	9.29	5.15	5.92	8.79	6.42	5.45	5.23	4.47	6.67	
18	4.20	6.84	5.29	5.39	6.14	7.24	4.64	9.21	5.22	6.03	9.83	6.17	5.48	6.51	4.46	5.83	
19	4.56	7.62	6.13	4.63	5.93	7.43	4.59	9.27	4.65	6.78	10.16	5.99	6.35	6.44	5.01	5.43	
20	4.53	7.62	6.48	4.18	5.86	7.64	4.80	8.89	4.92	8.46	9.90	6.58	5.63	7.80	6.17	6.73	
21	4.72	7.78	6.28	4.79	5.75	7.59	5.05	8.45	4.26	10.56	10.05	6.50	5.08	6.79	6.62	7.60	
22	5.40	6.94	7.22	5.49	5.48	7.72	5.09	8.58	4.02	10.53	10.66	6.62	4.94	6.66	6.70	7.81	
23	5.89	7.18	7.64	4.91	4.92	7.48	5.41	8.25	3.98	10.18	10.12	7.48	4.25	7.44	6.38	7.59	
24	5.93	6.82	7.91	5.55	4.92	7.16	5.68	7.45	3.82	9.29	8.87	6.95	3.82	7.55	6.25	7.12	
25	6.21	6.94	7.84	5.94	4.78	6.72	6.24	7.45	3.74	8.98	8.07	6.14	4.67	6.51	6.47	6.56	
26	6.45	7.85	7.07	5.15	4.70	6.37	5.57	7.56	4.01	8.58	7.51	5.95	4.68	6.01	6.12	6.50	
27	6.80	8.54	7.83	6.04	5.02	6.35	5.68	7.57	4.50	8.49	7.61	6.97	4.96	5.14	5.93	6.35	
28	8.97	8.11	7.97	6.33	5.57	7.15	6.49	7.59	4.82	8.16	7.30	6.37	5.70	4.86	5.44	6.40	
29	10.33	8.39	7.69	6.90	6.01	8.35	6.39	7.22	5.03	8.04	6.80	6.15	7.18	5.22	5.23	6.09	
30	11.52	7.41	7.20	6.70	6.61	8.43	8.24	7.38	5.51	7.50	6.71	6.26	8.04	5.34	4.40	6.76	
31	13.16	6.88	5.26	7.05	6.87	8.54	8.15	7.20	5.86	7.71	5.46	5.60	7.93	5.02	4.51	6.83	

Columbia River Water Elevation at the Interstate Bridges, daily Minimum (feet, Columbia River Datum)

Date	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
January																
1		4.20	9.40	3.90	8.50	2.70	4.40	2.00	3.70	11.90	6.60	5.25	5.90	4.10	2.50	5.81
2		4.30	8.10	3.90	7.60	1.70	3.70	1.60	4.00	11.40	6.25	5.05	5.50	4.60	2.30	6.21
3		5.20	8.30	5.20	7.20	1.90	3.20	3.20	4.40	11.30	5.70	4.70	5.65	5.60	2.80	6.05
4		5.50	8.10	5.70	6.80	3.00	3.20	5.30	4.50	10.30	6.15	5.15	7.25	5.20	3.00	6.24
5		5.70	7.50	5.00	7.40	3.00	5.70	5.10	4.40	9.10	7.40	7.40	8.60	5.00	2.80	5.76
6		5.00	5.40	6.90	8.30	3.30	5.80	3.50	5.40	7.60	7.55	10.60	8.70	4.80	3.70	5.66
7		3.80	5.30	7.40	7.00	2.70	7.10	1.10	4.90	7.60	7.37	14.30	8.25	4.40	3.80	5.38
8		3.10	5.80	8.90	11.80	3.40	7.40	0.70	5.80	7.20	7.14	14.80	7.75	5.60	4.10	5.84
9		4.90	5.40	8.90	12.20	2.20	7.40	0.70	6.30	7.00	6.91	13.60	7.35	5.90	4.30	5.60
10		4.20	5.40	9.30	11.80	1.60	7.40	2.22	7.40	6.80	6.70	11.80	7.25	5.80	4.50	4.97
11		4.00	5.80	8.00	11.20	1.80	7.80	2.98	7.80	5.90	6.00	11.20	7.35	5.50	4.80	4.45
12		4.70	5.46	6.40	10.60	2.30	8.00	3.74	7.80	4.80	5.70	9.70	6.50	5.20	4.40	4.62
13		5.10	5.49	7.70	10.50	2.90	7.90	4.50	8.00	5.40	5.50	9.70	6.10	4.60	4.30	5.10
14		7.00	5.50	9.90	10.80	2.40	7.40	3.60	10.90	5.60	5.50	9.90	6.20	4.60	4.30	5.04
15		7.40	8.00	11.10	12.20	2.30	6.70	3.20	11.70	5.50	5.00	8.90	6.20	4.70	4.20	5.20
16		8.00	18.20	10.40	12.00	2.20	6.20	4.70	12.50	5.50	5.20	7.60	6.20	4.81	4.20	5.78
17		8.10	21.10	8.50	11.90	2.20	6.20	4.10	12.20	5.60	6.90	6.90	6.75	4.80	4.80	4.91
18		8.20	22.70	7.40	12.10	2.70	7.00	4.00	10.20	5.20	8.40	7.10	6.90	5.10	4.80	4.50
19		8.80	23.20	6.50	11.70	2.80	7.00	4.00	8.00	4.00	8.35	7.65	7.05	5.30	6.40	4.32
20		7.70	21.40	6.10	10.10	2.80	7.70	3.20	6.40	4.00	7.80	7.70	6.90	5.80	6.80	4.57
21		6.60	19.20	5.60	9.00	3.40	6.50	2.60	5.80	5.00	7.75	7.20	6.15	5.20	6.20	4.34
22		6.00	18.00	6.20	8.70	3.30	6.60	2.30	5.50	5.00	7.05	6.35	5.30	5.30	6.10	4.00
23		6.00	17.50	6.00	8.50	2.50	6.30	2.40	6.20	5.80	7.00	5.90	5.15	6.30	6.00	3.93
24		5.20	17.20	6.00	7.77	2.50	6.50	4.40	5.50	5.50	10.10	5.80	6.40	6.00	6.70	4.28
25		4.80	17.00	6.60	6.90	3.10	6.50	5.40	4.60	4.90	11.20	6.75	7.80	5.70	7.00	4.51
26		4.10	17.10	10.20	6.90	3.80	6.30	4.50	4.00	3.50	11.05	7.00	8.70	5.10	6.30	4.88
27		4.10	16.50	10.30	6.50	3.20	6.00	3.90	4.00	4.70	11.20	8.05	8.50	4.10	5.70	6.07
28		3.20	16.00	8.80	6.30	2.90	6.10	1.90	4.00	5.60	10.80	8.85	7.40	4.20	5.30	6.80
29		3.70	15.40	8.70	6.80	2.60	5.40	1.20	4.10	5.40	10.50	8.60	6.50	4.30	4.70	7.15
30		4.60	14.80	8.10	6.80	2.30	4.80	4.50	5.80	4.90	9.57	7.15	6.15	3.60	4.90	7.40
31		4.40	14.40	7.70	6.90	2.30	5.20	4.00	4.60	4.90	8.44	6.15	5.90	3.60	5.50	7.00
February																
1		3.70	14.10	6.70	6.60	2.80	5.20	4.90	4.60	4.30	7.30	6.60	5.80	3.80	5.50	7.49
2		3.90	14.00	5.70	6.70	3.10	5.30	5.20	4.70	4.30	6.75	7.30	6.65	4.20	5.60	10.80
3		4.60	13.90	5.20	6.60	3.20	5.30	4.70	4.70	4.30	6.50	7.25	6.75	4.00	5.70	10.29
4		3.50	13.80	5.90	6.60	3.20	5.90	2.20	4.70	3.30	6.10	7.65	5.35	4.20	5.80	8.71
5		2.60	13.50	5.10	6.60	2.30	5.90	1.60	4.00	5.60	5.90	6.60	4.40	5.60	5.50	7.00
6		3.10	12.70	5.10	5.20	2.00	6.20	3.50	3.50	5.90	5.80	5.05	4.20	5.90	5.50	6.01
7		2.90	11.10	5.00	4.00	1.40	6.50	6.30	3.40	5.00	5.80	5.30	5.50	5.30	5.60	4.97
8		3.90	10.30	5.20	4.00	1.60	6.80	8.20	3.70	4.30	5.90	6.35	5.30	5.40	5.41	4.44
9		3.90	9.20	4.70	4.30	2.30	8.00	7.70	4.00	4.40	6.00	7.20	5.70	6.00	5.54	4.00
10		3.70	8.80	4.60	4.30	1.90	8.20	7.70	2.90	4.40	5.80	8.35	6.00	6.00	5.47	4.37
11		3.00	8.50	6.30	4.70	1.90	7.60	7.60	2.70	5.20	5.70	9.30	5.90	5.70	5.84	4.25
12		2.70	8.60	7.10	5.30	1.30	6.70	7.50	2.60	5.10	5.80	9.00	6.10	5.90	5.54	4.13
13		2.90	7.70	7.80	5.40	0.80	5.60	8.50	2.80	4.80	5.65	9.50	6.35	5.70	5.59	4.46
14		2.50	6.30	8.70	5.40	0.80	5.00	8.90	4.20	4.80	6.50	10.30	8.85	6.30	5.86	5.40
15		3.20	6.20	9.30	6.50	1.40	5.10	8.90	4.90	4.80	8.55	10.40	11.45	6.60	5.92	5.32
16		3.80	6.80	7.20	6.50	1.70	5.20	8.40	4.80	4.80	9.50	10.10	12.20	6.40	5.95	5.32
17		3.90	6.30	6.30	6.90	1.70	5.10	7.00	3.90	6.10	10.50	9.60	10.60	5.80	5.50	4.97
18		2.40	6.10	6.10	8.70	1.50	4.60	5.40	3.80	8.40	11.30	10.00	10.40	5.10	9.02	5.31
19		2.00	8.20	6.00	10.20	1.80	3.40	4.50	4.90	8.50	13.10	11.90	9.40	5.10	9.69	4.56
20		3.30	9.70	7.80	9.00	1.80	3.30	4.70	4.90	10.75	15.70	12.60	9.20	5.90	10.00	4.59
21		2.80	9.40	7.60	8.00	1.80	3.70	6.10	4.50	13.00	19.30	13.10	8.55	5.80	9.73	4.12
22		3.20	10.10	8.80	6.80	2.30	3.90	5.90	5.30	12.00	18.30	13.60	7.90	5.60	9.36	3.77
23		2.90	10.10	6.50	6.30	2.40	4.30	5.90	3.90	10.00	17.90	14.15	8.00	5.30	10.81	3.42
24		2.60	9.50	6.40	6.10	2.30	4.30	6.10	3.20	8.40	17.60	14.50	8.55	4.60	16.03	3.72
25		1.90	8.00	6.10	6.70	1.90	4.70	5.50	3.20	7.75	17.30	14.10	8.30	3.80	17.76	4.18
26		2.40	8.70	6.70	8.30	1.70	4.70	5.50	3.10	7.65	16.50	13.70	8.10	4.50	18.08	4.09
27		2.60	8.50	6.50	8.90	1.70	4.70	6.20	3.40	6.10	15.10	13.20	6.80	4.20	16.92	4.07
28		2.50	9.20	7.10	10.00	1.70	5.20	7.60	4.80	5.40	14.80	13.10	6.65	4.20	15.87	3.87
29					10.80				5.50				6.60			
March																
1		3.20	9.20	7.40	11.00	2.40	5.40	7.70	5.00	4.00	14.30	13.60	6.90	4.50	15.01	3.84
2		4.10	10.40	7.40	10.50	3.00	5.00	7.80	4.60	4.00	14.66	13.30	6.65	4.40	14.19	4.02
3		3.70	10.00	7.80	9.80	3.10	4.90	5.60	4.40	4.00	14.50	13.45	6.25	4.00	13.42	4.62
4		3.50	10.00	8.50	9.30	3.30	3.70	5.00	4.10	5.10	14.35	13.20	6.10	3.90	12.35	6.23
5		3.50	10.40	8.30	7.80	2.70	3.20	5.70	4.50	5.00	14.10	13.00	6.70	4.50	10.77	6.13
6		4.90	10.20	8.60	6.30	2.70	3.20	6.40	5.80	4.80	13.00	12.00	6.60	4.40	9.65	5.07
7		5.00	10.30	8.40	5.40	2.80	3.90	6.60	5.40	4.70	11.50	11.90	5.70	4.30	9.36	3.58
8		4.90	9.50	7.30	4.90	3.60	4.60	6.30	4.00	4.10	11.00	12.60	5.50	4.20	10.32	3.29
9		4.60	9.20	6.10	5.50	4.60	4.50	6.30	2.90	4.00	10.95	13.65	5.60	5.00	12.56	3.76
10		4.32	8.10	5.60	5.80	4.70	4.50	5.90	2.80	3.90	11.00	14.70	5.55	3.80	13.37	4.18
11		4.04	6.70	6.80	5.70	3.80	4.50	5.00	2.80	3.95	12.05	15.10	4.70	4.20	12.08	4.23
12		3.76	7.70	6.30	5.40	3.80	3.90	4.80	3.10	3.80	12.90	15.05	4.60	4.10	11.94	4.74
13		3.48	8.20	7.30	5.30	3.60	3.60	4.30	4.10	3.60	12.90	14.85	5.20	2.50	11.51	4.98
14		3.20	8.30	6.90	5.40	3.20	3.20	4.60	6.70	2.70	13.10	15.10	7.25	2.10	12.01	5.70
15		2.90	9.20	7.20	5.70	3.20	3.20	4.60	6.50	2.40	13.10	15.30	7.60	2.60	12.28	6.08
16		3.20	9.30	6.20	5.90	3.20	3.20	5.20	5.50	2.60	13.00	15.45	8.90	2.70	11.40	6.89
17		3.70	10.10	5.90	6.20	3.30	2.80	5.30	5.40	2.80	12.90	15.40	9.20	2.60	10.00	6.22
18		2.80	9.40	7.50	6.30	3.00	2.60	5.00	5.40	3.70	12.75	15.20	10.05	2.50	8.80	6.17
19		3.10	9.70	8.50	6.30	2.90	2.10	4.90	5.40	3.80	11.10	14.70	9.60	2.60	8.16	6.19
20		4.40	9.70	8.70	7.60	2.40	2.10	4.60	4.80	4.40	9.30	13.85	9.10	3.50	8.30	5.44
21		4.60	8.50	10.00	7.00	2.30	2.80	3.90	4.40	3.40	9.20	12.95	8.70	4.40	8.15	4.57
22		4.00	8.10	8.80	6.90	2.40	3.40	3.90	3.70	3.20	9.00	12.20	9.30	4.70	7.27	3.71
23		3.40	8.10	8.90	6.90	2.40	3.00	3.70	3.20	3.10	8.90	11.70	10.10	5.20	6.62	3.43
24		2.70	7.20	9.10	7.10	2.50	4.60	3.60	2.70	3.70	8.90	11.50	10.30	5.90	6.27	2.89
25		2.10	6.60	9.20	8.80	2.00	5.60	3.60	2.50	3.70	9.00	11.50	9.60	5.80	6.31	3.11
26		2.20	7.80	9.60	9.20	1.30	5.70	3.10	2.00	3.80	9.10	10.50	8.80	6.40	7.68	2.82
27		3.30	8.10	10.00	9.80	1.70	5.40	4.20	2.00	3.70	8.80	10.10	8.30	6.10	9.09	2.91
28		3.50	8.40	10.20	9.10	1.50	5.40	5.90	2.20	3.05	8.70	10.20	9.15	5.70	8.88	3.84
29		3.70	10.30	8.40	6.70	1.50	5.80	6.60	2.10	3.35	8.80	10.80	9.45	4.60	7.80	3.38
30		3.70	10.70	6.00	6.90	1.70	6.20	5.60	2.50	3.10	8.45	13.40	9.10	4.10	7.30	3.32
31		3.30	11.25	5.40	6.70	1.70	6.30	4.50	2.50	3.30	8.50	15.50	9.15	3.80	8.98	3.31

Date	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
January																			
1	3.77	3.84	2.56	4.88	2.47			3.56		17.27	4.71	13.00	3.89	1.97		5.83	4.91	3.09	12.74
2	2.81	3.39	1.83	4.17	2.50	3.33		2.47	7.63	21.63	4.62	11.34	3.81	1.48		6.58	3.97	2.40	13.01
3	3.10	3.78	2.20	4.99	3.23	3.36		2.14	8.34		4.55	10.66	4.61	1.19	3.72	6.59	3.95	2.03	12.51
4	3.66	4.00	2.93	3.63	4.43	3.81	3.63	1.67	8.90		4.22	10.00	4.97	1.36	3.12	6.41	4.35	2.91	10.65
5	4.20	4.63	3.41	4.48	3.95	4.04		1.60	8.93		4.46	8.91	6.27	1.97	2.92	6.31	4.20	2.64	9.38
6	3.99	5.20	3.75	4.16	4.04	4.36		2.18	8.86	17.35	6.02	8.39	5.95	2.05	3.12	5.43	4.23	2.85	8.12
7	3.99	6.03	4.36	3.99	4.54	4.85		1.84	9.07	15.55	6.39	7.83	5.80	2.28	4.22	4.86	4.71	3.36	7.67
8	4.20	6.38	6.41	4.49	4.56	5.16	4.45	1.85	10.23	14.21	5.51	7.17	6.24	2.53	6.82	4.01	5.43	3.95	7.96
9	3.96	6.81	8.84	4.83	4.16	5.22		1.73	10.67	13.45	5.54	7.12	6.12	2.80	7.12	4.07	4.94	3.80	7.86
10	3.67	8.88	10.71	4.63	3.47	4.95	3.64	1.86	9.47	13.20	6.11	7.03	7.66	2.89	7.52	3.31	5.09	3.18	8.54
11	5.22	9.79	11.30	4.84	4.25	5.01	4.61	2.26	9.07	13.36	6.44	6.15	8.20	3.06	6.22	2.66	4.68	3.61	12.09
12	6.31	9.54	9.83	6.18	4.00	4.26	4.51	3.29	10.55	12.70	6.70	5.50	8.25	3.11	5.42	2.80	4.57	3.63	13.55
13	7.05	9.73	8.04	7.35	2.84	4.10	4.52	4.48	10.52	12.34	7.08	5.70	8.45	2.71	5.02	2.95	4.36	2.80	14.38
14	7.40	7.96	6.83	7.26	2.88	4.29	3.94	4.51	9.84	11.80	8.12	6.61	8.54	2.44	4.62	3.14	4.12	4.13	13.97
15	9.36	6.20	5.43	8.43	3.24	3.85		5.06	9.84	11.72	9.64	7.80	8.71	1.87	3.92	3.15	3.91		12.21
16	9.86	7.36	5.75	9.00	3.48	2.93		8.41	10.82	10.12	9.35	8.35	9.12	1.50	4.32	3.02	4.23	2.56	11.19
17	8.64	6.93	5.53	8.95	3.78			7.96	11.63	10.51	9.56	10.07	8.64	1.31	5.02	2.88	4.19	1.85	10.92
18	7.90	6.62	5.31	8.02	3.59	1.95		6.86	11.75	10.42	9.21	11.01	8.30	1.14	4.22	2.81	4.10	3.33	12.26
19	7.96	6.56	4.76	7.88	3.58	2.51		6.89	12.07	10.83	8.52	12.70	8.10	2.18	3.72	2.88	4.25	3.99	12.17
20	7.25	6.12	3.92	7.76	3.16	3.91		6.23	12.64	10.43	8.04	12.45	7.87	1.83	2.92	2.69	4.31	3.91	12.25
21	6.95	5.82	3.25	7.59	3.68	4.20	2.45	5.51	13.61	10.58	8.20	12.80	7.68	1.78	3.82	2.69	4.58	3.66	12.02
22	6.16	5.56	3.41	6.95	4.22	4.90	2.42	5.23	14.51	9.98	8.01	12.92	7.87		4.42	2.70	3.97	3.60	11.05
23	5.43	5.15	4.27	6.56	4.31	5.13	2.41	5.71	14.49	8.97	8.10	13.41	7.03	1.83	5.32	2.85	3.91	3.50	9.65
24	4.60	5.60	4.03	6.53	4.45	4.83	2.29	5.90	14.23	8.55	8.64	13.25	6.72	1.99	5.82	2.60	5.12	3.16	8.90
25	4.00	5.66	4.54	6.51	4.40	4.08	3.30	5.31	13.27	8.34	8.22	11.75	6.74	1.95	6.12	2.55	5.54	3.42	8.54
26	4.08	5.02	5.47	5.64	4.10	4.72		5.37	12.61	8.69	8.14	10.31	7.16	2.14	6.82	2.92	5.00	3.25	8.14
27	3.42	4.26	5.54	5.23	2.99	4.91	3.32	5.63	11.17	9.21	8.24	9.63	6.93	2.07	7.52	3.91	5.54	3.92	7.91
28	3.66	2.52	5.31	5.58	3.47	4.32		6.23	10.25	9.34	8.36	9.63	6.95	1.81	7.42	4.53	5.57	3.96	7.78
29	3.46	1.75	7.43	6.28	4.84	3.31		6.21	9.80	8.82	9.04	10.28	6.59	1.71	7.12	5.51	7.04	3.37	7.87
30	3.64	2.16	8.28	5.84	5.10	2.81	2.67	7.10	10.16	8.55	8.86	10.67	5.70	1.47	6.82	6.19	9.30	2.90	8.52
31	4.00	3.45	8.24	5.80	5.26	2.40		7.27	9.58	10.23	8.06	9.68		1.14	6.12	7.48	9.46	2.20	11.06
February																			
1	4.66	4.37	8.19	6.07	5.55	2.16	2.72	10.11	8.66	15.34		9.03	5.56	0.99	5.92	11.78	7.58	2.11	11.41
2	4.92	6.43	7.20	6.31	4.96	2.75	2.89	14.51	8.44	16.08	6.82	9.07	6.88	1.31	5.02	12.52	7.49	2.19	11.54
3	5.13	5.28	6.87	6.08	4.03	2.70	3.08	16.55	7.57	14.45	6.78	8.84	8.52	1.48	4.22	10.70	6.96	2.33	11.32
4	4.20	3.49	5.96	5.90	3.83	3.05	2.98	17.91	7.35	13.83	6.51	9.30	8.51	1.61	3.22	9.19	6.31	2.25	10.24
5	4.30	2.37	5.80	5.78	3.67	3.07	2.60	17.79	8.22	13.34	6.12	9.14	7.14	1.89	4.32	6.89	5.93	2.82	9.76
6	3.62	4.19	5.96	6.44	3.70	2.72	2.63	17.38	8.22	12.56	6.15	9.04	6.25	2.05	4.02	5.33	5.29	3.23	9.56
7	3.30	5.21	5.88	6.25	3.65	2.70	2.45	16.46	14.48	11.73	6.28	10.07	6.12	2.18	4.32	4.69	5.10	3.24	8.80
8	2.81	4.31	6.63	5.77	3.36	2.75	2.91	13.74	20.86	10.43	7.19	11.03	5.96	2.11	4.82	3.87	4.69	3.31	7.99
9	2.78	3.98	7.11	5.48	3.20	3.26	3.22	12.20	26.11	10.15	6.28	11.32	6.43	2.20	5.92	2.91	3.81	3.10	6.69
10	3.08	3.88	8.39	4.58	2.90	3.22	3.53	11.31	26.03	9.98	6.50	10.44	5.71	2.41	4.62	2.46	3.64	3.43	5.87
11	4.35	2.98	8.85	4.68	3.17	3.25	3.04	10.79	23.79	8.55	7.08	9.24	5.87	2.32	3.92	2.38	3.32	3.53	5.22
12	3.55	1.87	8.35	5.43	2.99	2.71	2.51	10.45	21.15	8.62	6.96	8.47	5.71	2.16	4.42	2.18	3.08	3.45	4.52
13	3.20	1.80	8.55	6.08	3.26	2.60	3.05	10.63	19.00	8.17	7.80	7.72	7.09	1.84	3.72	2.22	2.97	2.84	4.45
14	3.08	2.67	7.95	6.89	3.53	1.60	2.59	10.72	17.58	8.07	7.95	7.58	6.68	1.50	3.62	2.49	2.91	2.14	4.89
15	3.37	3.32	7.53	7.59		1.51	3.62	12.07	16.43	7.86	6.84	7.20	6.32	1.76	3.32	2.66	2.85	1.87	4.15
16	3.44	3.31	7.71	7.72	2.83	1.80	3.41	13.97	15.95	7.83	6.20	7.06	6.94	2.06	2.22	2.84	2.97	2.33	4.36
17	3.90	3.37	6.49	7.13	3.19	2.47	2.91	15.80	16.16	8.27	6.15	7.23	7.69	1.39	2.62	2.95	3.05	2.28	4.45
18	4.59	3.96	6.34	6.65	3.70	3.02	2.95	16.15	16.14	7.50	6.23	7.55	7.26	1.46	2.22	3.43	3.71	2.40	3.97
19	4.07	3.61	4.88	6.25	4.64		2.46	15.32	17.24	7.47	5.87	8.69	6.60	1.46	2.42	3.82	4.81	2.45	3.46
20	3.23	3.24	4.93	6.53	5.81	3.44	1.94	14.40	18.17	8.31	6.53	9.51	5.09	1.67	3.02	4.39	5.70	1.99	3.01
21	2.76	3.60	5.43	7.66	7.11		2.17	13.23	18.57	9.11	6.90	9.11	4.66	1.69	3.22	3.98	4.41	1.89	2.73
22	2.51	3.96	5.88	7.11		2.77	3.16	11.64	17.61	9.78	7.60	8.43	4.40	1.85	3.32	3.85	4.03	1.85	2.62
23	2.93	4.22	6.08	6.41	7.96	3.44	3.32	11.10	17.51	10.90	8.06	8.28	4.72	2.13	3.52	3.15	3.76	1.88	2.64
24	2.69	4.16	5.82	6.01	6.82	3.41	4.04	10.77	17.41	9.54	7.90	10.03	4.56	2.05	3.52	2.59	3.66	1.95	3.19
25	2.12	3.70	5.45	4.69	6.52	3.38	7.16	10.44	16.99	8.62	7.82	11.54	5.48	2.12	3.92	2.40	4.12	2.22	3.66
26	1.63	2.58	6.34	5.63	4.67	3.10	6.62	10.22	16.19	8.23	7.17	12.24	5.10	1.79	3.92	2.67	3.91	2.11	3.38
27	1.60	2.11	6.29	6.08	4.04	1.68	5.91	9.94	15.15	8.25	7.27	12.50	5.32	1.64	3.92	2.30	3.60	2.18	3.04
28	1.74	2.65	5.71	5.91	4.20	1.57	5.24	9.10	14.18	8.05	6.72	13.23	5.83	1.54	4.12	2.24	3.44	2.20	4.42
29	1.63				4.15				13.87				5.77				2.72		
March																			
1	1.84	2.68	5.56	6.53	4.31	1.80	5.32	7.19	12.87	7.46	6.66	13.70	6.16	1.57	4.02	2.55	2.99	2.20	5.20
2	2.02	3.49	5.65	6.96	3.87	2.06	5.15	6.69	11.62	8.36	6.62	13.48	6.17	1.97	2.92	2.57	2.86	2.30	6.00
3	2.51	3.90	5.29	7.21	4.32	1.44	5.03	6.70	9.88	8.99	6.76	13.46	6.19	1.65	2.52	2.43	2.86	2.02	4.82
4	2.49	2.75	4.72	7.51	4.80	1.70	4.84	6.67	9.74	7.81	6.19	13.72	5.88	1.63	2.12	2.91	3.33	2.02	3.72
5	2.79	2.77	4.87	8.81	4.95	2.16	4.14	6.31	10.72	7.92	6.71	13.36	5.72	1.57	2.22	3.05	3.29	1.91	3.40
6	2.82	3.20	4.90	8.81	4.53	2.25	2.67		12.39	8.51	6.19	12.54	5.53	1.63	2.32	3.81	4.02	1.38	3.56
7	2.90	5.32	5.11	9.04	4.25	2.51	2.64		11.72	9.15	4.84	11.23	6.12	1.63	2.72	3.64	3.59	1.39	4.11
8	3.08	5.71	5.58	8.56	4.44	2.84	3.07		11.50	9.34	4.16	9.35	6.44	1.96	2.22	5.36	3.13	1.56	4.05
9	2.94	4.84	5.84	7.71	4.49	3.56	3.47		11.38	8.73	4.18	7.83	6.14	1.98	2.12	6.93	3.07	1.67	4.40
10	2.49	5.80	5.84	6.83	4.37	3.16	3.28		10.26	9.12	4.32	7.89	5.70	1.92	2.12	6.59	2.83	1.93	4.84
11	2.69	5.68	7.03	6.06	3.85	2.38	2.51		9.94	10.46	4.52	8.60	5.56	1.74	2.72	5.70	2.89	2.56	5.14
12	1.92	7.62	6.51	6.19	4.34	2.24	2.23		10.93	11.52	5.03	7.32	5.36	1.59	3.92	4.64	2.94	2.45	4.46
13	1.60	7.75	6.81	6.35	3.65	2.08	1.88		11.22	11.41	5.02	7.40	5.23	1.44	5.82	4.94	2.65	2.00	4.20
14	1.59	7.35	6.18	7.21	3.57	2.28	1.96		11.78	11.48	4.98	7.47	5.03	1.46	6.22	5.82	2.06	1.91	3.84
15	2.09	7.70	5.94	7.24	3.28	2.40	2.67		11.66	10.86	4.49	7.40	4.73	1.33	5.52	6.03	1.86	1.76	3.88
16	2.43	6.83	4.60	7.32	3.48	3.61	2.99		11.05	10.40	3.87	7.68	4.80	1.22	5.52	5.92	2.14	1.76	4.65
17	2.43	6.34	4.32	7.45	3.55	4.32	3.24		10.83	10.53	4.48	7.84	5.56	0.90	4.22	6.08	2.36	1.35	4.40
18	2.23	6.10	4.68	6.96	3.76	4.98	3.24		10.38	11.38	4.81	7.97	5.72	1.04	3.02	6.19	2.35	1.17	3.23
19	2.03	5.91	3.88	6.44	4.53	5.99	3.91		9.94	12.10	4.80	7.64	5.69	1.79	3.82	6.26	3.72	1.57	2.82
20	2.03	5.80	4.30	6.54	4.27	6.18	3.42		9.99	13.34	4.41	7.75	5.37	1.88	3.82	6.19	3.74	1.85	3.31
21	2.13	6.23	4.56	6.45	3.61	6.79	3.93		9.56	13.34	3.68	7.67	5.12	1.49	3.22	5.69	2.72	1.95	2.98
22	2.63	6.45	4.88	5.48	2.84	7.71	4.12		9.26	13.28	3.59	7.70	4.98	1.42	2.82	5.95	2.92	1.96	3.24
23	2.93	6.55	6.18	5.24	2.71	8.50	4.22		8.63	13.07	4.20	7.51	5.25	1.96	2.42	7.14	3.22	2.04	3.66
24	3.63	6.23	5.97	4.90	2.72	10.28	4.07		8.36	12.48	5.96	7.87	5.54	1.90	2.32	5.96	3.48	2.47	2.28
25	5.03	6.22	5.00	5.91	2.53	10.52	3.51		7.52	11.67	6.68	8.33	5.06	1.50	2.32	5.83	3.33	2.10	2.68
26	4.43	5.80	4.84	6.31	2.24	9.67	2.71		7.86	10.94	7.53	8.51	3.88	1.62	2.52	6.37	3.89	2.22	2.93
27	4.43	5.66	7.44	5.57	1.96	8.29	2.59		7.65	11.40	8.59	8.89	3.49	1.99	2.72	6.54	3.51	2.87	3.17
28	4.63	6.51	6.51	5.72	2.11	7.15	3.18		6.95	11.63	9.18	8.95	3.36	2.67	3.32	7.95	2.33	4.99	4.30
29	4.63	6.63	5.88	5.94	1.19	5.88	2.94		6.86	13.80	7.62	10.13	3.57	2.59	3.12	7.71	2.67	6.14	4.69
30	5.03	6.31	6.05	4.43	1.11	4.93	3.39		6.35	13.97	6.24	10.51	4.01	2.49	2.92	6.92	2.58	5.98	4.60
31	3.63	6.64	5.02	4.35	1.55		3.44		5.52	12.03	5.81	10.46	3.81	2.28	2.92	6.64	2.87	5.46	5.17

Date	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
January															
1	5.03	3.43	5.46	4.24	6.56	6.74	5.35	2.18	6.48	3.58	3.62	5.68	2.40	2.03	
2	4.81	3.67	8.11	5.47	5.74	4.85	4.83	2.23	6.25	3.04	4.52	5.24	2.58	2.07	
3	5.43	4.07	9.53	5.54	5.54	4.24	4.59	2.38	5.94	2.99	3.96	5.32	2.62	2.13	
4	8.44	4.08	9.14	5.30	6.09	4.57	4.52	2.37	6.12	3.23	3.77	5.34	3.18	2.43	
5	8.71	5.23	8.30	5.09	4.92	4.52	4.21	1.98	6.29	3.51	3.71	5.25	3.26	2.01	
6	9.27	6.25	8.60	5.75	3.88	3.99	3.83	1.78	6.36	3.84	4.12	5.26	4.07	2.36	
7	8.18	5.71	9.16	6.02	3.59	3.40	3.50	2.19	5.59	4.01	3.85	4.18	3.45	3.32	
8	7.90	5.93	11.81	5.61	3.35	3.09	3.83	2.65	5.50	3.91	3.90	3.58	3.07	3.76	
9	7.44	6.86	11.55	5.17	2.78	2.90	5.13	2.85	5.17	3.78	4.34	4.99	3.45	3.86	
10	7.16	7.03	9.83	4.58	3.31	3.23	6.20	3.56	4.76	3.49	4.76	4.60	3.49	4.10	
11	6.15	7.20	8.37	4.57	2.44	3.25	6.22	3.82	4.76	3.35	5.91	4.46	3.54	5.41	
12	6.12	7.56	7.74	4.55	3.02	3.28	5.61	3.92	4.86	3.92	6.46	6.13	3.21	5.67	
13	5.99	6.85	7.58	4.96	4.68	2.83	5.49	4.72	4.20	4.18	6.35	7.46	2.51	6.23	
14	5.66	5.87	6.86	5.24	5.39	2.56	5.04	4.13	3.89	5.23	5.23	6.89	2.07	6.36	
15	5.61	6.13	7.41	5.14	6.18	2.43	4.57	3.49	4.00	5.04	5.03	6.29	2.12	5.65	
16	5.85	5.36	7.24	5.03	6.78	2.18	4.70	2.99	4.48	4.91	4.82	5.98	2.67	5.51	
17	5.89	5.47	6.09	5.13	10.59	2.42	4.38	3.10	4.53	5.91	4.66	6.21	3.14	5.37	
18	5.60	4.04	5.19	5.41	12.28	3.09	3.85	3.06	6.11	5.70	4.92	6.49	3.27	4.82	
19	5.34	4.04	4.67	5.43	13.23	5.21	3.45	2.59	7.85	6.15	6.84	6.73	3.23	4.17	
20	5.35	3.71	4.37	5.14	12.00	8.97	3.30	2.47	8.46	6.86	7.08	7.04	3.76	3.86	
21	4.51	3.43	4.12	4.97	11.07	11.12	3.28	2.26	8.57	7.09	6.29	6.69	4.14	4.20	
22	3.98	3.83	3.91	4.54	10.26	11.36	3.71	2.39	8.05	7.36	5.56	6.73	3.91	4.71	
23	4.50	3.94	3.74	3.67	10.48	10.45	3.88	2.15	7.04	6.78	5.16	6.16	4.41	5.03	
24	3.99	4.12	3.51	3.19	10.18	9.75	3.73	1.51	6.10	7.14	4.96	6.82	4.05	6.53	
25	4.09	3.96	3.62	3.58	10.04	9.69	3.68	1.55	5.62	6.96	5.01	7.53	4.10	7.64	
26	3.92	3.58	3.35	3.94	8.46	9.32	4.42	1.65	5.25	7.06	4.54	7.91	3.34	7.69	
27	3.96	3.59	3.60	3.48	8.32	9.01	3.98	2.02	5.33	6.25	4.08	7.66	2.67	6.95	
28	2.93	3.08	4.05	3.41	8.50	8.29	3.93	2.02	4.91	5.63	3.83	7.93	2.13	7.07	
29	2.90	4.30	2.76	3.51	7.53	7.16	4.25	2.28	4.92	6.94	3.40	8.13	2.18	8.62	
30	2.87	3.73	2.64	3.63	6.29	6.80	4.49	3.25	4.73	7.02	3.16	8.26	2.24	8.59	
31	2.80	3.60	2.45	3.57	6.26	6.45	5.16	3.35	4.55	7.01	3.13	8.39	2.78	8.26	
February															
1	2.80	3.75	1.93	3.50	6.42	5.95	5.08	3.28	4.82	6.40	3.78	8.33	2.52	7.61	
2	3.31	3.79	1.70	3.44	5.42	4.83	4.24	3.15	5.39	5.72	2.97	8.41	2.41	6.70	
3	3.17	4.62	1.39	3.45	5.13	3.99	3.79	2.95	5.25	5.04	2.85	8.23	3.16	6.12	
4	2.93	4.55	1.65	3.35	4.64	3.67	3.53	2.54	5.40	5.10	3.68	7.85	2.87	5.43	
5	2.63	4.96	1.88	3.26	4.46	3.66	3.57	2.06	6.13	4.67	4.88	7.53	3.03	5.46	
6	2.55	4.44	1.93	3.33	3.59	3.64	3.62	1.47	6.89	3.97	7.15	7.58	3.16	6.34	
7	2.47	4.04	1.92	2.78	3.22	3.56	3.64	1.90	7.74	3.75	8.08	6.44	2.68	7.34	
8	2.43	4.41	1.82	2.48	3.51	3.91	3.85	1.90	9.53	3.64	7.97	6.25	1.98	8.62	
9	2.39	4.67	2.28	2.30	4.20	3.87	3.73	2.01	9.89	4.15	8.34	6.74	2.31	9.02	
10	2.38	4.60	2.22	2.30	4.40	3.58	3.65	2.11	9.82	4.25	10.39	6.54	2.10	8.48	
11	2.49	3.94	2.38	2.38	4.24	4.02	3.48	2.39	10.35	4.59	11.33	6.54	2.40	7.59	
12	2.33	3.77	3.13	2.82	4.75	3.60	3.37	3.15	10.05	4.94	11.09	7.09	3.00	6.55	
13	2.26	4.03	2.79	3.15	4.02	3.58	3.21	4.98	9.05	4.96	9.85	6.41	3.94	6.05	
14	2.26	4.37	2.28	3.10	4.12	3.26	3.00	5.45	8.00	5.21	8.59	6.24	4.15	5.71	
15	2.47	4.01	2.00	3.20	4.68	3.00	2.73	7.30	7.57	5.20	8.02	6.06	3.73	5.34	
16	4.35	2.57	1.91	2.97	6.46	3.04	2.68	8.42	7.30	5.98	8.02	5.76	3.78	4.89	
17	5.42	2.29	1.71	2.95	7.20	2.49	2.60	8.30	7.48	6.78	9.54	5.68	3.77	4.62	
18	5.56	2.27	1.17	2.73	7.22	2.57	2.53	9.29	7.24	7.85	10.07	6.46	3.94	4.74	
19	5.07	2.93	1.13	2.51	6.94	2.88	2.57	9.38	6.94	7.18	9.90	6.74	3.93	4.07	
20	5.31	4.20	1.18	2.45	6.44	2.76	2.18	8.63	6.35	7.21	10.20	6.10	3.61	3.67	
21	5.95	3.94	1.19	2.37	5.87	3.43	2.25	7.33	6.80	7.11	9.89	5.96	3.36	3.54	
22	5.07	3.50	1.38	2.07	5.49	4.17	2.25	6.70	5.98	7.41	10.50	5.36	3.22	3.64	
23	4.30	3.53	1.65	2.16	5.18	5.75	2.92	5.84	5.58	6.90	10.67	4.93	3.22	3.36	
24	3.90	2.86	1.85	2.48	5.37	5.84	2.69	5.51	5.55	5.90	10.75	5.01	3.27	3.12	
25	4.39	2.58	2.61	2.60	4.16	5.12	2.64	4.56	4.89	5.69	9.87	5.00	3.34	2.61	
26	4.49	2.10	3.50	2.64	3.76	4.44	2.73	4.26	4.02	5.55	9.65	5.21	3.18	2.98	
27	4.56	2.24	4.31	3.30	3.75	4.38	2.73	4.25	4.21	4.93	8.87	5.21	3.16	3.14	
28	4.41	2.18	3.92	3.80	4.61	4.33	2.86	4.79	4.37	4.58	7.86	5.53	2.16	2.97	
29		1.97				4.12				4.24				2.86	
March															
1	4.31	1.66	3.00	3.63	5.70	3.40	3.00	5.11	4.13	4.67	7.38	5.73	2.06	2.64	
2	5.24	1.22	2.76	3.53	7.47	3.30	3.06	5.29	4.07	5.84	7.00	6.63	2.11	1.98	
3	5.16	1.33	2.99	3.53	8.19	3.43	2.76	6.06	3.63	4.92	6.71	6.83	1.87	1.57	
4	4.81	2.01	3.18	3.18	7.46	3.41	2.41	7.07	3.21	5.20	7.26	5.94	1.75	2.06	
5	4.58	2.71	2.98	2.88	6.85	3.43	2.53	8.02	3.74	5.90	7.94	5.58	2.05	2.51	
6	4.35	2.85	3.28	2.58	6.46	3.86	2.63	8.83	3.86	6.64	6.93	5.21	2.45	2.65	
7	4.22	2.53	2.37	2.35	6.23	4.26	2.58	10.78	4.42	7.22	7.10	4.48	3.03	2.76	
8	4.35	2.93	2.37	1.91	6.55	4.24	2.66	11.34	4.52	6.87	7.49	4.01	3.38	2.90	
9	4.91	2.69	2.32	1.42	6.38	4.47	2.51	11.51	3.92	7.81	8.54	4.37	3.42	2.94	
10	4.12	2.51	2.40	1.63	7.01	4.38	2.40	12.29	3.46	8.35	10.69	4.67	3.12	3.22	
11	3.95	2.43	2.37	1.78	8.39	4.32	2.41	12.13	3.08	9.55		4.50	1.94	2.79	
12	4.07	2.60	2.16	2.37	8.46	4.39	2.46	12.21	3.23	9.58		4.63	1.97	2.12	
13	4.69	3.12	2.03	2.85	7.12	5.96	2.69	11.34	3.31	9.15		4.67	1.70	1.92	
14	5.54	3.75	2.21	2.71	7.12	7.05	2.62	10.26	3.02	8.63		4.75	1.37	2.16	
15	5.82	3.78	2.67	2.60	7.70	7.36	2.55	9.84	3.39	8.42		5.06	1.32	1.90	
16	5.93	2.98	3.16	2.50	8.48	8.85	2.48	9.04	3.82	9.02		5.30	1.31	1.55	
17	5.83	2.98	3.26	2.38	8.52	10.16	2.24	9.27	5.05	8.50		5.46	1.52	1.46	
18	6.01	3.96	3.26	2.05	9.54	9.88	1.84	8.73	4.52	7.62		5.05	1.54	1.36	
19	5.78	3.90	2.43	1.74	9.44	9.21	1.56	8.58	4.80	7.28	16.41	5.07	1.70	1.38	
20	6.30	4.70	2.21	1.78	8.32	8.84	2.45	8.43	5.54	6.83		5.02	2.20	1.38	
21	7.35	4.83	2.07	2.03	8.04	8.61	2.44	7.34	5.51	6.88		4.83	2.99	1.38	
22	7.78	4.29	2.07	1.31	7.03	9.60	2.34	7.11	5.45	7.20	16.49	4.95	3.26	1.40	
23	5.24	3.33	2.16	1.10	7.00	9.74	2.33	6.15	5.89	7.29	16.55	5.11	4.26	1.60	
24	5.42	3.00	2.82	1.27	7.58	9.74	2.29	5.24	5.98	7.13	16.59	5.51	4.42	1.91	
25	7.08	3.17	3.24	1.72	7.37	10.27	2.41	5.08	5.57	6.85	16.94	4.93	4.32	1.98	
26	7.75	3.81	3.49	1.63	6.91	9.49	2.70	5.30	5.69	7.05	17.25	4.67	4.53	1.86	
27	7.67	3.55	4.36	1.63	7.06	8.46	2.90	5.65	5.93	6.52	17.22	4.84	4.34	1.74	
28	6.83	3.81	3.45	2.54	6.91	8.81	3.06	6.32	5.21	6.14	17.15	4.74	3.69	1.78	
29	6.77	2.87	4.53	3.21	6.68	9.65	2.99	7.87	5.17	5.79	17.06	4.75	3.62	2.12	
30	7.35	1.64	4.68	5.87	6.80	10.62	2.86	9.13	5.28	4.97	17.18	4.74	3.53	2.27	
31	7.25	1.65	4.63	6.84	8.18	14.01	3.93	10.03	5.61	4.73	17.02	4.40	3.36	3.10	

Columbia River Water Elevation at the Interstate Bridges, daily Minimum (feet, Columbia River Datum), cont'd

Date	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
April																
1		1.70	11.80	7.10	7.50	1.70	6.00	4.30	2.60	4.80	8.80	15.70	8.80	3.90	8.75	3.44
2		2.30	12.80	7.70	7.60	2.20	5.80	4.00	2.50	5.10	8.55	15.70	7.50	4.60	8.31	3.05
3		3.90	13.90	6.10	7.00	1.90	5.80	4.00	2.40	5.40	8.60	14.50	7.30	5.70	8.36	3.10
4		4.40	14.30	5.50	6.80	1.50	7.60	4.40	2.40	5.10	8.40	13.10	7.55	5.70	8.30	2.24
5		3.70	13.60	5.30	6.80	1.70	7.30	5.00	2.60	4.75	8.20	12.10	7.10	5.90	8.24	2.22
6		3.50	12.40	3.80	7.00	1.70	7.40	3.90	2.80	4.40	8.25	11.80	6.50	5.80	7.50	2.78
7		1.80	11.70	3.60	6.60	2.00	7.40	3.10	2.40	4.30	9.10	11.90	7.30	5.40	7.09	1.96
8		1.20	11.60	5.30	8.80	2.10	6.60	3.00	2.40	4.75	8.30	8.90	7.90	4.90	6.96	3.17
9		1.60	11.60	5.00	9.00	1.60	6.00	3.90	2.70	4.90	7.65	7.20	7.75	5.30	6.47	3.10
10		2.70	11.30	5.90	8.90	0.80	6.00	4.20	4.30	5.00	6.40	7.20	7.90	5.70	6.02	3.33
11		2.60	11.30	5.40	8.80	0.80	6.20	6.60	4.70	4.40	6.60	7.90	9.20	6.80	6.06	3.53
12		2.40	11.80	4.60	7.40	0.80	6.20	6.30	4.10	4.10	7.95	8.20	10.00	5.60	6.88	3.47
13		2.70	11.80	3.20	7.30	0.80	6.20	6.70	3.50	4.30	9.50	8.10	9.05	5.30	6.50	3.49
14		2.40	11.60	3.40	8.60	1.30	6.30	5.60	3.50	4.20	11.00	8.60	8.70	5.30	6.99	4.40
15		1.70	10.30	5.70	11.40	1.80	6.20	5.60	4.00	4.25	13.70	8.00	9.50	5.50	7.40	4.60
16		1.80	9.50	6.40	11.90	1.80	5.30	5.70	4.00	4.25	14.30	7.20	9.55	6.60	7.18	3.89
17		3.20	10.00	5.50	11.30	0.90	4.70	5.60	4.60	4.50	12.70	6.90	10.55	6.90	7.01	3.86
18		4.40	10.60	3.90	10.50	0.40	4.70	5.00	4.50	3.80	11.30	6.90	10.71	8.10	7.28	4.17
19		4.70	10.50	3.80	9.70	0.40	5.40	5.00	4.70	3.80	10.70	7.10	10.87	7.60	6.87	3.29
20		3.50	10.80	3.80	9.50	0.80	5.50	5.30	4.10	3.50	10.70	6.20	11.45	8.00	5.20	3.16
21		2.20	10.70	4.60	9.60	1.20	6.60	4.80	4.10	3.15	10.95	4.90	11.00	7.70	5.63	2.84
22		1.10	10.20	4.50	9.60	1.60	6.40	3.80	4.40	3.30	10.75	4.70	11.00	6.40	5.84	2.64
23		1.50	10.40	5.20	10.20	0.90	5.90	3.80	5.20	4.80	9.60	5.00	11.35	5.00	6.66	3.06
24		1.60	10.10	6.60	9.20	0.50	6.20	3.80	5.80	3.80	8.85	7.30	10.93	5.60	7.04	2.84
25		1.30	9.00	7.90	8.40	0.80	6.80	4.50	6.10	4.50	9.40	8.60	10.50	6.80	8.09	3.18
26		1.40	9.20	8.20	8.00	1.10	6.90	5.40	5.10	4.20	8.80	9.40	10.50	6.10	8.27	3.18
27		1.70	11.40	8.10	7.90	1.50	7.00	5.00	4.30	3.70	8.40	11.20	10.50	4.50	8.56	3.03
28		1.60	12.70	8.40	7.80	1.00	7.50	4.70	3.80	4.70	8.30	10.80	9.65	4.80	8.32	2.99
29		1.30	13.20	8.10	8.13	1.10	7.90	4.70	4.50	5.40	8.80	10.40	8.30	5.70	8.19	3.40
30		1.40	13.50	6.50	8.46	1.10	7.60	4.80	5.80	5.50	8.40	10.00	8.15	5.70	7.78	4.57
May																
1		2.40	13.90	5.90	8.80	1.50	7.40	5.90	7.50	5.80	7.70	9.40	8.55	6.40	7.55	6.47
2		2.70	14.10	5.60	9.00	1.70	7.30	5.70	7.40	5.95	7.80	8.90	9.85	6.60	7.47	6.60
3		2.80	14.40	6.80	9.10	2.50	7.70	4.20	7.40	6.20	8.20	8.90	9.60	7.00	7.24	6.25
4		3.30	14.40	8.20	9.10	4.10	7.80	4.70	6.10	7.20	8.75	8.80	9.95	6.30	6.63	6.63
5		3.10	14.30	9.10	9.60	4.70	7.80	4.50	6.00	7.90	9.75	8.70	10.30	6.60	6.28	5.20
6		2.20	14.40	9.00	9.70	4.20	8.10	6.00	6.10	8.00	10.30	8.50	9.60	8.50	7.13	5.76
7		2.50	14.80	9.10	10.20	3.60	7.30	6.50	6.50	7.00	10.00	8.50	9.10	7.90	7.44	6.35
8		3.00	15.10	7.70	10.60	3.30	6.90	8.20	7.40	7.50	9.30	9.40	9.00	6.60	7.29	6.38
9		3.10	15.10	7.50	10.60	3.00	7.20	9.20	8.10	5.65	9.15	10.10	9.00	6.20	7.30	6.73
10		3.20	15.20	7.30	10.60	2.70	6.50	9.10	7.90	3.80	9.55	10.00	8.45	6.50	7.50	6.54
11		2.60	14.30	7.20	12.20	2.60	7.20	9.10	7.70	4.50	9.45	10.60	9.10	6.20	7.57	7.11
12		2.00	13.40	7.40	13.80	2.60	6.80	9.50	7.60	5.00	9.50	10.40	9.75	6.00	7.69	7.25
13		2.10	11.60	9.10	13.80	2.60	7.00	7.80	7.40	5.20	9.85	10.00	10.40	6.10	8.09	7.07
14		2.60	10.70	10.30	14.30	2.60	7.10	7.30	6.60	5.20	10.25	10.00	10.05	5.80	6.87	7.58
15		3.10	10.40	11.00	13.96	2.60	7.20	7.00	6.30	5.20	10.70	9.10	10.00	5.10	7.46	7.98
16		2.70	10.30	12.00	13.62	2.70	8.25	6.60	6.10	5.30	10.50	9.10	10.45	6.10	7.59	7.42
17		3.30	9.60	13.20	13.28	2.90	9.30	6.20	6.10	4.50	9.95	8.20	12.20	5.10	6.70	7.36
18		3.50	10.40	14.20	12.94	3.00	9.30	6.00	6.10	4.30	10.00	7.70	12.80	5.70	5.68	7.22
19		3.60	11.00	13.60	12.60	2.20	9.20	6.60	5.90	5.75	11.60	7.50	12.15	5.80	5.95	6.08
20		3.30	10.80	12.50	11.20	1.70	9.40	6.60	4.80	5.40	12.20	7.60	11.70	6.00	7.29	5.45
21		2.80	10.50	12.00	11.50	1.70	5.40	6.30	4.80	5.50	12.20	7.10	10.60	6.00	7.40	4.53
22		1.70	10.40	11.80	11.30	2.50	5.60	6.30	5.10	5.55	12.45	6.60	10.45	6.30	8.39	3.98
23		2.60	10.20	11.70	11.10	2.60	6.40	6.60	5.70	5.90	11.90	7.40	10.50	6.60	8.70	3.80
24		2.60	10.10	10.50	11.00	2.20	8.20	6.20	6.30	5.90	12.05	8.10	11.10	6.60	7.83	3.61
25		2.60	10.50	10.80	10.90	2.20	9.30	7.50	7.00	6.35	12.20	9.40	11.95	6.70	6.37	3.83
26		1.90	11.10	11.10	10.80	2.30	8.90	8.50	6.40	5.95	12.80	10.10	12.45	6.55	5.96	4.58
27		1.60	11.00	11.00	10.70	3.90	8.70	7.40	6.40	6.80	12.70	11.20	12.60	6.45	6.06	4.19
28		1.80	11.70	10.60	10.20	3.00	6.70	7.40	6.60	8.50	13.50	12.40	10.75	6.05	7.50	4.45
29		2.20	12.60	10.40	10.90	2.80	5.50	6.80	7.60	9.55	12.35	13.10	10.45	5.95	9.03	4.78
30		2.70	13.00	10.30	11.00	2.00	5.50	6.50	7.90	10.20	12.30	13.20	10.55	6.10	10.22	5.30
31		2.80	13.20	10.20	11.10	1.80	6.00	5.90	8.30	11.00	10.40	13.40	11.25	6.70	11.00	4.58
June																
1		3.20	12.90	10.30	11.10	2.70	6.00	5.90	8.90	11.75	9.30	13.50	11.90	6.95	11.47	3.99
2		2.70	12.60	11.20	10.80	4.10	6.30	5.10	8.70	12.40	9.30	13.40	12.65	6.90	11.83	3.96
3		2.40	12.60	11.80	10.10	4.20	5.20	4.00	8.70	12.30	9.35	12.90	12.65	6.85	11.95	4.18
4		2.80	12.80	12.20	9.70	3.80	4.50	2.80	8.40	12.30	9.60	12.00	12.15	7.25	11.94	3.51
5		3.50	13.80	11.80	8.70	2.60	4.70	2.80	8.20	12.10	9.90	11.20	11.75	7.85	11.80	3.42
6		2.10	15.10	11.70	8.10	2.60	5.10	3.70	7.90	12.70	9.90	11.00	12.10	6.45	11.56	3.89
7		2.20	15.50	11.90	8.10	3.00	5.80	5.20	7.90	12.60	10.00	10.90	11.95	5.65	10.82	4.07
8		3.10	15.40	12.10	8.60	2.90	5.80	3.80	8.00	12.80	9.80	10.60	11.80	6.05	10.29	4.40
9		2.40	15.20	11.90	8.40	2.70	6.50	3.20	8.80	14.30	9.40	10.50	11.85	8.25	9.70	4.27
10		0.90	14.80	11.50	9.10	2.60	7.40	3.20	8.90	15.80	8.65	10.50	12.10	7.45	8.47	4.02
11		1.60	14.20	11.40	9.20	1.70	8.30	3.30	9.00	16.40	8.60	10.40	12.15	7.40	7.55	4.68
12		2.00	14.30	11.20	8.80	1.40	8.20	4.40	9.00	15.60	8.65	10.60	12.10	7.20	7.20	4.02
13		2.30	14.60	10.40	7.90	1.40	7.40	4.20	9.10	15.00	8.70	10.70	11.70	6.55	6.38	2.97
14		2.50	15.20	10.10	7.80	1.40	6.70	3.80	9.10	14.40	8.60	9.60	11.70	5.25	5.71	2.60
15		2.40	15.90	9.20	7.60	2.20	6.60	3.40	9.00	13.70	9.30	8.50	11.35	4.95	5.07	2.29
16		2.30	16.80	9.00	7.40	2.20	6.60	2.40	8.70	12.70	11.10	7.00	11.65	4.65	5.47	2.18
17		1.70	17.90	8.70	7.00	2.50	6.20	2.00	8.90	11.80	12.30	7.60	11.30	4.75	5.88	1.78
18		1.90	19.20	8.80	7.00	2.00	6.20	2.00	9.40	11.30	13.20	7.00	11.55	4.70	5.87	1.98
19		2.30	20.10	9.10	7.30	1.10	5.40	2.50	9.30	11.40	13.50	6.20	12.30	4.40	6.14	1.89
20		1.80	20.70	10.20	7.70	0.90	5.40	2.80	9.50	12.00	13.55	6.20	12.35	4.80	6.06	2.20
21		2.40	21.00	9.80	7.90	0.60	6.00	3.20	8.00	12.45	13.80	6.30	12.40	5.30	5.78	2.27
22		2.20	21.00	10.00	8.40	0.60	5.80	3.40	7.50	12.40	14.05	6.70	12.50	4.60	5.06	1.96
23		1.30	20.90	10.60	8.50	0.70	5.30	2.60	7.50	12.20	14.15	6.60	12.80	3.70	4.33	2.00
24		0.80	20.70	10.40	8.70	0.70	5.20	2.40	7.80	11.40	14.30	6.80	12.50	3.25	4.36	1.21
25		2.00	20.50	10.10	9.20	0.70	4.10	2.40	8.30	10.70	14.20	5.80	11.90	2.85	4.03	1.93
26		2.60	20.50	9.60	8.50	0.30	4.10	2.40	8.30	10.20	13.60	5.00	11.60	2.70	4.07	1.83
27		2.80	20.30	9.60	7.90	0.30	5.00	2.40	8.20	9.40	13.40	5.30	11.55	2.55	3.66	1.78
28		2.70	20.10	9.60	7.90	0.70	4.90	2.50	6.50	8.70	13.20	5.20	11.95	2.60	2.67	1.44
29		2.70	19.50	9.10	8.00	0.90	5.30	2.30	4.80	7.90	13.10	4.80	12.50	2.75	2.12	1.47
30		2.40	18.30	8.10	8.10	1.30	5.20	1.90	4.60	7.30	13.05	4.60	12.70	2.70	1.94	2.17

Date	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
April																	
1	3.23	6.07	4.07	4.63	1.99	3.55	3.40		5.55	11.03	5.28	10.24	3.52	1.49	2.62	6.21	2.78
2	2.73	5.91	4.14	4.96	2.16	3.68	2.45		6.01	10.80	4.49	9.51	3.24	1.70	3.72	6.18	2.75
3	3.33	5.64	4.41	4.88	2.40	4.52	1.54		6.86	9.89	3.96	8.22	3.56	1.89	2.82	6.42	2.73
4	4.43	6.02	5.00	5.37	2.45	5.60	2.00		6.76	9.59	2.81	8.37	4.19	1.91	2.12	5.78	3.04
5	5.03	6.19	5.40	5.42	2.62	6.47	2.59		7.61	9.26	2.70	8.07	4.61	1.74	2.12	5.26	2.63
6	5.83	5.91	5.61	7.83	2.79	7.43	3.55		7.65	8.55	2.93	7.80	5.57	2.09	1.82	5.75	2.81
7	5.53	5.60	4.76	8.83	2.78	7.44	3.61		8.01	7.79	3.19	6.52	6.89	2.65	1.92	5.39	2.93
8	4.43	6.08	4.44	8.43	2.83	7.47	3.66		7.03	7.68	3.32	6.52	7.79	2.20	1.82	5.55	3.69
9	3.03	5.95	5.58	8.15	2.43	7.44	4.16		6.19	8.05	3.15	5.95	5.68	2.18	3.12	5.29	3.45
10	2.43	6.47	6.26	8.80	3.12	7.10	3.75		6.47	7.77	2.84	5.78	4.96	2.54	3.42	5.65	2.83
11	2.43	6.25	6.16	7.67	3.43	7.18	3.88		8.22	7.74	3.20	5.00	5.92	3.07	4.72	5.27	2.71
12	2.53	5.05	5.06	7.64	2.61	7.08	4.30		9.59	7.48	3.71	4.54	6.32	2.35	5.72	5.34	2.64
13	2.73	4.64	4.67	7.85	2.40	6.37	4.11		10.89	5.62	3.72	4.88	6.45	2.08	5.92	5.43	2.72
14	3.13	4.48	3.48	7.72	2.92	5.47	3.74		10.95	5.34	3.62	4.92	7.37	0.90	7.32	5.91	2.90
15	3.83	4.25	3.34	7.29	3.61		2.72		10.96	6.19	3.75	5.99	8.92	0.62	9.02	6.30	3.55
16	4.33	4.30	3.88	7.43	3.27		2.44		11.22	6.51	2.71	5.83	8.28	0.76	10.32	6.83	4.25
17	4.43	5.04	4.28	7.12	4.31	4.43	1.50		11.28	7.40	2.64	5.18	7.89	1.09	12.42	7.09	4.38
18	4.13	6.30	4.73	7.07	4.60	4.76	1.79		11.30	7.74	2.86	5.54	8.06	1.28	12.02	7.44	3.81
19	4.98	6.47	5.18	6.79	4.98	4.47	2.39		12.23	8.27	1.93	6.15	9.05	1.55	10.82	7.27	3.46
20	4.98	7.10	5.20	6.16	4.60	4.64	2.85		11.81	9.30	2.40	6.76	9.39	1.53	8.92	6.60	3.99
21	4.06	7.50	5.48	5.67	4.46	4.91	3.08		11.57	10.60	2.33	7.54	10.05	1.78	8.62	5.94	4.48
22	4.06	7.38	5.24	5.07	3.96	4.57	3.31		11.23	11.94	2.48		9.38	1.14	7.42	5.82	5.30
23	3.60	6.38	5.36	5.31	3.68	4.88	4.04		11.67	14.66	2.51		9.85	0.78	7.32	6.11	3.84
24	3.14	6.39	6.52	5.41	4.42	4.79	4.20		14.30	16.41	4.04		10.87	1.32	7.22	6.31	3.22
25	2.68	7.41	6.89	6.28	3.72	4.76	4.25		16.75	17.46	5.07		9.85	1.74	6.72	5.94	2.78
26	2.85	7.52	8.25	7.87	3.39	5.54	4.40		17.23	16.55	4.92		9.11	2.26	6.62	5.97	2.38
27	3.17	6.83	8.55	7.72	3.28	5.70	4.54		17.33	15.47	5.13			2.11	6.22	6.65	2.38
28	3.36	6.96	9.77	7.90	2.96	5.07	4.52		16.71	15.08	5.36		8.29	1.81	5.62	6.34	2.13
29	3.58	7.26	9.78	7.60	3.35	5.22	4.60		14.53	15.15	5.22	9.77	8.29	1.82	5.02	6.69	2.28
30	3.76	6.09	9.08	7.72	3.96	5.01	4.58		12.83	15.91	5.44	9.43	8.04	2.87	5.22	6.83	2.42
May																	
1	3.60	6.04	8.18	6.43	4.84	5.52	4.51		12.39	16.55	6.25	9.04	7.92	3.55	5.42	6.63	2.61
2	3.48	6.45	7.71	6.41	5.47	6.21	4.41		12.37	16.89	5.66	8.84	8.08		4.92	6.15	3.12
3	3.98	7.64	7.93	6.02	5.17	6.06	4.46		11.30	16.31	6.56	9.22	8.21	2.80	4.92	5.57	3.00
4	5.33	8.45	7.49	5.80	5.17	6.60	4.32		11.11	15.20	7.02	9.74	8.56	2.60	4.92	5.49	3.44
5	5.48	8.95	6.88	6.27	5.15		4.59		10.67	14.44	7.73	9.68	8.79	2.68	5.12	5.23	4.80
6	4.59	7.94	6.16	5.74	5.11		5.07		10.62	14.09	8.13	9.47	9.11	2.86	4.32	5.50	5.76
7	4.16	7.12	6.40	5.47	5.07		5.35		9.29	14.08	8.64	9.21	8.30	2.60	4.32	6.55	5.64
8	3.99	7.11	6.79	5.51	5.25	9.13	4.88		8.76	14.07	9.80	8.15	7.79	2.58	5.12	5.29	5.02
9	4.03	8.24	7.16	6.59	5.17	9.34	4.47		8.51	13.91	9.96	7.34	8.24	2.06	4.82	5.50	4.85
10	4.77	8.44	7.06	7.34	4.70		4.53		7.77	13.71	10.53	7.69	7.80	1.62	4.02	4.84	4.18
11	5.51	8.81	7.35	8.56	3.64		4.97		6.59	12.71	9.75	7.84	7.93	1.14	3.82	4.12	4.64
12	6.40	9.06	6.28	7.60	0.00		5.26		6.74	12.84	9.07	7.03	8.28	1.80	4.22	4.16	4.95
13	6.48	8.22	5.28	7.04	4.39		4.99		6.79	14.14	8.93	6.72	7.74	0.98	3.92	4.26	4.96
14	6.60	6.55	5.15	7.08	0.00		4.90		6.99	16.38	9.16	7.08	7.74	1.44	4.42	4.48	4.09
15	6.62	5.73	5.48	6.78	5.03		4.28		7.97	16.15	10.23	7.64	7.84	1.90	4.52	6.31	4.11
16	6.50	6.54	5.54	7.57	5.25		3.83		10.23	15.40	9.55	7.52	7.85	3.02	4.42	6.51	3.92
17	6.78	7.04	5.02	8.00	4.74		4.41		10.66	15.51	9.51	7.94	7.00	3.44	4.32	6.55	3.88
18	6.99	7.25	3.85	8.72	4.88	12.43	3.92		11.82	16.02	9.57	8.36	6.83	3.42	4.72	6.36	4.52
19	6.58	6.79	3.73	9.02	4.71	12.63	4.11		13.87	16.86	9.43	8.76	7.26	2.22	4.42	5.93	4.29
20	6.24	7.15	3.84	11.20	4.57	12.57	4.12		15.13	17.56	9.51	9.08	6.40	1.62	4.82	5.15	4.97
21	6.12	6.31	3.73	12.31	4.46	12.75	5.23		15.75	17.76	9.88	8.96	6.69	2.08	5.32	4.88	5.38
22	6.07	6.49	4.25	12.04	4.30	12.63	3.99		15.07	17.55	10.19	8.16	6.56	2.08	6.02	5.30	4.66
23	3.99	6.82	4.82	11.72	4.26	12.55	4.32		14.87	17.23	9.83	7.97	6.76	3.46	7.22	5.63	5.08
24	4.45	6.50	5.66	11.37	3.42	12.38	5.19		15.06	17.16	9.81	7.77	7.43	3.70	7.32	5.94	5.25
25	5.45	5.67	6.11	11.42	2.69	11.75	5.09		14.57	16.19	10.44	7.96	7.42	3.30	7.32	5.66	4.53
26	5.34	6.36	6.60	11.40	2.56	10.64	5.02		13.70	15.51	10.19	8.80	6.20	2.82	6.62	5.74	4.49
27	5.40	6.05	5.44	10.61	3.46	10.01	5.57		12.78	15.19	10.64	10.18	5.45	2.40	6.02	6.10	5.38
28	5.12	5.52	5.34	9.79	3.96	9.73	5.04		12.62	15.12	12.56	11.73	5.50	1.94	6.72	7.16	6.45
29	4.27	5.75	5.35	9.37	4.03	9.61	4.95		12.83	15.39	13.62	12.14	4.61	2.14	8.02	7.59	7.07
30	4.02	5.89	5.94	9.41	4.08	9.19	4.08		13.38	15.03	14.19	11.73	4.62	2.54	8.82	7.91	6.96
31	4.00	5.80	6.95	9.38	3.55	9.03	4.28		13.38	15.07	14.53	11.25	5.27	2.64	8.92	9.40	6.97
June																	
1	5.23	6.42	8.10	9.20	3.59	9.15	4.00		13.05	15.66	14.76	11.06	5.83		9.12	9.86	7.15
2	7.14	6.68	9.10	9.16	3.44	9.25	4.00		13.35	16.32	14.23	11.28	6.29	2.30	9.22	8.85	7.26
3	7.63	6.32	9.90	9.20	3.51	9.83	3.84		13.00	17.20	13.95	11.69	4.91	1.92	8.32	8.13	7.20
4	7.52	5.60	10.06	9.03	3.40	10.16	4.10		12.76	18.47	13.21	11.94	4.90	1.82	8.62	7.51	6.25
5	6.75	5.64	9.02	8.91	3.51	10.28	4.06		12.94	18.70	12.12	11.49	5.06	2.52	9.12	7.38	6.97
6	6.29	6.44	9.33	8.88	3.54	8.83	4.29		13.50	18.13	11.80	11.77	5.44	2.86	10.42	6.92	6.50
7	5.60	6.01	10.29	8.75	2.86	8.06	4.43		13.30	17.84	11.06		6.35	2.44	10.52	6.86	6.74
8	4.96	6.34	11.06	8.60	2.11	8.71	4.72		13.07	17.63	9.95	10.80	5.28	2.48	10.42	6.95	6.48
9	5.49	7.25	11.68	8.86	2.20		4.92		13.52	17.34	9.96	10.43	4.89	2.92	9.42	6.43	6.11
10	5.39	5.64	12.56	8.71	2.82		4.30		13.87	17.17	9.87	10.51	3.97	1.34	8.52	6.51	5.88
11	4.06	4.06	11.67	8.67	3.44		4.78		14.15	16.97	9.46	9.88	3.69	1.56	8.42	6.94	5.96
12	3.37	4.91	10.90	8.70	3.45		3.90		14.66	17.14		9.49	3.95	2.24	8.22	7.82	6.46
13	3.31	5.96	11.08	8.92	3.95		4.43		14.56	17.71	9.04	9.23	5.26	1.74	8.12	7.35	6.25
14	2.87	5.04	11.95	9.54	3.60		4.80		13.72	18.43	8.50	9.09	6.26	1.02	7.82	7.14	5.94
15	3.23	4.82	11.28	9.26	3.70	5.59	5.56		13.05	18.68	8.25	9.87	6.61	0.54	7.52	6.91	5.51
16	3.52	3.89	9.92	8.42	3.58	5.12	4.62		12.98	18.77	6.38	9.73	6.70	0.78	7.02	5.76	5.73
17	3.27	4.14	9.65	7.82	3.75	5.14	4.43		13.04	18.58	5.11	10.45	5.52	0.38	6.82	5.92	4.78
18	3.11	3.65	9.70	7.10	3.84	5.40	4.06		13.27	18.32	6.14	11.49	4.77	0.50	7.52	6.22	4.42
19	2.62	2.77	8.29	6.46	3.97	5.75	3.71		13.27	18.11	5.89	10.80	3.94	1.08	8.12	6.02	4.73
20	2.35	3.41	7.99	5.88	3.52	5.37	3.18		11.91	17.32	6.17	10.58	4.29	2.08	9.32	4.17	3.33
21	2.07	3.67	7.73	5.54	2.84	5.16	4.07		10.54	16.62	6.59	10.53	4.63	1.86	10.22	2.82	3.80
22	1.79	3.23	7.62	5.68	2.52	5.11	4.39		8.91	16.04	6.08	9.79	4.20	2.14	9.32	2.64	4.05
23	2.47	2.84	7.80	4.42	2.75	4.96	4.36		7.40	15.27	5.16	9.72	3.95	1.96	8.22	2.69	3.68
24	2.60	2.21	7.64	4.44	3.43	4.93	4.14		7.43	14.80	5.16	10.16	3.15	1.62	8.32	2.65	2.62
25	2.73	1.58	7.12	5.05	3.54		4.18		7.58	14.02	7.07	10.09	3.35	1.44	8.22	2.23	2.13
26	3.01	1.67	7.13	5.44	3.85		3.24		8.01	12.24	6.98	9.80	3.43	1.18	7.62	3.14	2.54
27	2.48	1.55	6.87	6.00	4.25		3.14		8.63	11.95	7.53	9.95	2.99	1.70	7.72	4.04	2.63
28	2.43	2.16	7.43	6.26	3.65		3.04		8.76	11.53	7.07	8.96	3.69	1.42	8.32	3.49	3.14
29	2.45	2.57	7.55	6.92	3.70		2.04		8.82	11.02	6.48	8.50	4.70	1.44	9.22	3.34	3.13
30	2.20	2.68	7.36	6.62	3.73	4.43	1.96		9.00	9.59	5.33	8.68	5.01	1.12	9.02	3.33	3.30

Date	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
April																	
1	5.02	5.45	7.97	1.80	3.55	6.31	9.81	15.35	4.41	9.82	5.36	4.98	16.67	4.82	3.43	2.96	
2	4.15	5.51	7.16	2.46	4.28	5.38	10.63	15.51	3.62	8.66	5.09	4.50	16.39	4.64	3.35	2.74	
3	3.39	5.16	6.80	2.39	3.68	4.82	11.81	15.36	3.30	8.20	5.19	3.76	15.83	4.56	3.28	1.86	
4	3.02	5.46	6.62	2.49	3.54	4.44	12.88	14.38	3.90	7.38	5.33	3.76	15.22	4.54	3.17	2.11	
5	2.99	5.26	6.96	2.36	2.95	4.06	13.01	12.59	4.45	7.15	5.68	4.24	14.69	4.79	3.77	2.20	
6	3.48	5.68	6.59	2.21	2.95	3.39	13.76	12.02	5.24	6.93	5.87	5.19	14.08	5.20	4.80	2.48	
7	4.54	7.03	5.75	2.86	3.57	2.65	12.70	12.19	6.26	6.19	5.47	5.71	13.29	5.75	6.35	2.49	
8	3.55	8.39	5.17	3.32	3.70	2.46	11.42	12.18	7.86	5.66	5.08	6.80	12.80	7.60	7.87	2.46	
9	3.70	7.56	5.19	3.55	3.51	1.93	10.83	10.88	8.13	5.58	4.06	7.06	12.84	9.02	9.84	2.47	
10	2.95	7.67	5.19	3.08	4.85	1.94	10.76	9.24	8.98	5.61	3.94	6.65	13.12	9.51	11.27	2.58	
11	3.09	9.29	5.63	2.43	5.94	2.39	10.50	8.95	8.69	6.45	3.88	6.59	12.61	9.37	13.66	2.91	
12	3.39	10.12	4.55	2.65	6.15	2.85	9.91	9.62	8.87	6.25	2.89	6.61	12.42	8.93	14.83	2.49	
13	3.57	9.62	4.58	2.31	6.57	2.84	9.38	9.16	8.13	6.16	3.36	6.51	12.58	8.86	13.15	1.95	
14	2.78	9.57	5.68	2.28	6.35	2.87	8.76	9.44	7.06	6.26	3.78	7.38	13.16	9.54	11.67	1.65	
15	2.66	9.98	5.63	2.44	7.05	2.96	8.76	8.67	7.34	5.65	2.80	8.08	12.87	9.67	10.55	1.41	
16	2.46	10.74	5.55	2.68	5.92	3.05	9.19	8.48	7.66	5.83	2.77	8.33	12.33	10.15	8.83	1.21	
17	2.43	11.47	5.51	3.77	5.66	3.05	9.38	8.61	6.59	6.91	3.19	8.81	11.54	10.06	8.27	1.91	
18	2.21	11.77	6.54	3.23	5.48	3.01	9.95	9.17	5.53	6.61	2.98	8.77	11.51	10.10	7.94	2.11	
19	2.30	11.63	5.84	2.56	4.94	3.18	10.42	9.86	5.17	6.77	2.94	8.56	11.19	10.38	7.71	2.18	
20	2.34	10.96	6.23	2.48	4.97	3.34	10.33	10.44	4.96	6.99	3.50	8.41	10.62	9.46	7.66	2.21	
21	2.28	10.36	6.04	3.05	5.37	3.84	9.63	10.75	5.34	6.63	4.28	8.00	10.57	9.01	7.07	2.57	
22	2.23	9.29	5.91	3.86	5.98	3.57	9.53	10.88	5.60	6.52	2.98	8.13	11.46	7.77	7.50	2.84	
23	3.26	8.95	5.76	3.75	6.84	4.08	8.54	11.35	5.89	6.85	2.94	9.36	11.72	7.32	8.10	3.24	
24	3.52	8.95	4.56	4.07	7.56	4.40	7.56	12.08	5.25	7.50	2.42	9.84	11.90	7.33	8.30	3.62	
25	3.02	9.18	4.48	3.97	9.04	4.19	7.59	12.16	5.24	8.45	2.25	10.01	12.07	7.23	9.19	4.16	
26	3.14	9.11	4.66	4.00	8.34	4.52	7.38	13.05	5.07	9.09	1.77	9.74	12.59	7.34	8.66	4.02	
27	4.58	9.49	4.82	3.34	8.01	4.56	7.50	14.48	5.40	9.15	2.49	8.45	13.48	7.71	7.65	4.39	
28	4.85	9.95	4.82	3.47	7.44	5.42	8.20	14.56	5.77	9.43	2.35	7.85	14.19	8.02	7.19	4.56	
29	3.94	9.37	5.15	3.82	7.20	5.45	7.72	14.27	5.78	9.26	2.11	7.49	14.18	8.03	6.69	5.68	
30	3.49	8.89	5.39	3.53	6.17	5.31	6.63	13.57	5.73	8.76	1.85	7.07	13.35	9.32	6.43	5.11	
May																	
1	3.03	9.00	5.61	3.70	5.28	5.01	6.53	13.45	5.63	8.52	1.82	6.51	12.33	9.92	6.16	4.73	
2	3.67	9.65	6.40	4.60	4.80	5.02	7.51	13.54	5.00	7.79	2.41	6.31	11.59	9.43	5.50	5.70	
3	3.55	10.76	6.79	4.25	4.53	4.67	6.88	13.60	4.90	7.49	3.17	6.08	11.08	9.35	5.46	6.13	
4	3.64	10.14	7.17	3.67	4.51	4.90	7.30	14.28	4.68	7.97	3.65	6.07	10.78	8.91	5.43	6.24	
5	3.98	8.72	7.45	3.45	4.65	4.63	7.53	14.28	4.90	8.33	3.58	6.09	10.90	8.72	5.50	6.55	
6	4.50	7.39	7.10	4.81	6.17	3.52	6.84	14.19	5.01	8.72	3.15	6.26	11.22	9.69	5.28	6.54	
7	4.92	7.44	6.24	5.24	7.90	3.86	6.77	13.26	5.42	8.83	2.93	7.28	12.30	10.04	5.34	6.50	
8	5.11	7.87	5.79	5.90	9.02	3.33	6.80	12.30	6.11	8.50	2.72	7.40	13.89	10.68	5.14	6.78	
9	5.77	8.10	6.11	6.58	8.16	3.60	7.32	11.37	6.71	8.53	2.08	7.47	14.65	11.39	5.21	7.18	
10	6.43	8.10	6.44	7.91	7.24	3.39	8.05	11.00	7.16	8.61	1.79	7.86	14.49	11.92	5.51	6.75	
11	6.87	7.77	6.61	6.27	6.54	3.24	8.35	10.60	8.21	8.72	1.54	7.66	14.30	12.41	6.06	6.77	
12	7.87	6.87	6.77	6.03	6.92	3.19	7.50	10.34	9.61	9.01	2.21	7.19	14.34	13.23	6.25	7.52	
13	7.18	7.27	5.93	6.69	7.16	4.23	8.23	9.54	9.38	9.61	2.93	6.58	14.37	14.18	6.14	7.87	
14	6.50	7.03	5.94	6.22	7.73	4.94	9.60	8.62	9.05	8.80	3.48	5.97	14.46	14.67	6.83	8.57	
15	6.18	6.98	7.28	6.16	6.89	3.92	10.92	8.76	9.37	8.42	3.69	5.59	14.35	14.73	7.36	8.72	
16	6.32	7.00	7.32	6.82	6.69	4.09	12.23	9.33	9.15	7.98	3.60	5.68	14.40	14.80	8.46	8.00	
17	6.00	7.33	6.94	7.92	6.62	4.36	14.13	9.33	8.07	8.33	3.28	5.86	14.70	15.56	8.83	7.76	
18	6.71	7.90	6.87	8.35	6.60	5.14	15.12	9.72	8.11	9.34	3.59	5.38	14.63	15.62	8.79	7.83	
19	8.18	9.41	6.94	10.54	6.92	5.55	15.59	10.72	8.25	9.98	4.63	5.14	14.41	15.61	9.37	7.90	
20	8.59	10.35	6.94	12.54	7.66	5.59	15.67	10.80	7.96	10.57	4.22	5.23	13.73	15.27	9.54	8.97	
21	8.53	10.82	6.13	13.16	8.61	6.08	15.72	10.86	7.65	9.98	4.50	6.18	13.18	15.25	8.90	9.58	
22	8.74	10.99	6.27	13.86	9.07	6.64	15.46	10.34	6.96	9.20	4.19	5.20	12.63	15.21	8.06	9.77	
23	8.54	11.18	5.79	13.97	8.72	5.81	15.50	10.71	7.13	9.38	3.59	4.26	12.65	14.80	7.58	9.60	
24	8.10	11.55	5.69	13.15	7.97	5.88	15.71	11.33	8.54	9.54	3.54	4.85	12.65	14.87	6.70	9.50	
25	7.71	11.82	6.07	12.57	8.47	6.46	15.79	11.33	8.58	10.16	3.91	5.00		14.93	5.97	9.15	
26	6.86	11.72	5.60	11.99	9.48	5.88	15.68	11.40	8.65	10.45	3.52	4.52	14.25	14.67	6.28	8.73	
27	6.75	11.71	4.63	11.28	9.97	5.68	15.71	10.02	8.73	10.41	3.90	4.44	14.53	14.62	5.98	8.22	
28	7.13	12.17	4.63	11.40	9.82	5.66	16.25	9.26	9.14	10.89	3.96	3.71	14.17	14.49	6.26	8.06	
29	6.00	12.21	5.49	12.11	9.82	4.77	16.54	8.30	9.00	10.67	3.91	3.41	13.69	13.76	6.71	8.40	
30	4.71	12.48	5.31	12.58	9.60	4.92	16.85	8.42	8.00	10.53	3.16	3.40	13.57	13.50	6.99	9.87	
31	3.94	11.51	5.21	12.64	9.71	5.95	17.11	7.66	7.69	9.94	2.88	3.99	13.82	12.48	7.31	9.80	
June																	
1	4.51	10.17	5.05	12.73	9.77	5.42	17.17	7.72	6.88	8.95	3.44		14.56	11.21	8.07	10.39	
2	5.20	9.27	5.17	12.89	9.69	5.80	17.09	7.62	5.36	9.12	4.17		14.41	11.50	7.98	10.93	
3	5.20	8.81	4.63	12.96	9.68	7.56	16.97	7.56	5.65	9.50	3.86	4.53	14.50	10.81	7.54	11.30	
4	4.48	9.21	4.89	13.25	9.70	9.90	17.09	7.80	5.69	8.93	3.38	4.51	14.09	10.05	7.63	10.23	
5	4.59	9.46	4.90	13.49		11.88	17.15	8.65	5.66	8.59	3.60	4.88	14.07	9.21	7.31	10.21	
6	4.29	9.65	5.01	13.67	9.90	12.79	17.15	9.18	6.09	8.38	3.32	5.61	13.78	8.94	7.17	10.51	
7	4.29	10.14	5.08	13.03	9.80	13.31	16.95	10.03	5.82	7.93	2.90	5.78	13.49	8.27	6.46	10.46	
8	4.09	10.31	4.83	12.27	9.77	13.57	16.82	10.79	5.68	7.84	3.09	5.53	13.47	7.15	5.24	10.14	
9	4.35	10.46	5.91	10.93	10.21	13.85	16.65	11.21	5.56	7.14	3.17	4.56	13.60	7.13	4.74	9.33	
10	4.48	10.78	5.99	10.42	9.79	13.94	16.55	11.09	5.76	7.00	2.83	3.96	13.69	6.99	4.87	8.27	
11	4.10	10.66	5.64	10.56	8.25	14.06	16.43	10.25	4.78	7.22	2.47	3.80	13.44	7.04	4.47	8.03	
12	3.38	10.12	5.51	11.58	6.63	14.37	16.32	10.20	5.10	6.56	2.20	3.36	12.57	7.14	4.42	8.30	
13	2.69	10.00	5.51	11.76	6.06	12.62	16.33	10.11	5.45	6.30	2.23	2.58	11.32	6.62	4.68	7.22	
14	3.03	10.17	5.46	10.85	5.50	10.69	16.38	9.85	5.01	6.25	2.30	3.14	11.24	5.71	4.15	6.67	
15	2.28	10.27	5.42	9.17	5.45	9.95	16.42	9.62	4.94	5.82	2.43	2.70	11.76	5.10	4.25	7.28	
16	2.88	10.54	5.24	8.33	5.13	10.21	16.49	9.01	4.24	4.87	2.91	3.02	11.36	4.91	3.64	7.26	
17	3.64	10.12	4.06	8.86	5.13	10.79	16.49	8.86	3.77	4.86	2.76	3.51	10.25	4.59	3.65	7.13	
18	3.77	9.16	3.83	9.66	4.69	10.63	15.95	9.03	3.93	5.52	2.27	3.53	9.74	3.91	3.29	7.23	
19	3.18	8.26	4.34	10.56	5.91	9.84	15.19	9.35	4.09	5.68	1.67	3.16	9.87	3.85	2.56	7.51	
20	3.19	7.85	3.79	10.03	6.59	8.12	14.41	10.18	4.41	5.47	1.13	2.82	9.11	4.23	2.47	7.96	
21	4.48	7.29	3.09	9.07	6.15	7.83	13.97	10.50	4.60	5.90	0.91	3.42	9.04	3.90	2.74	7.44	
22	4.48	6.30	3.41	8.89	5.54	8.44	14.01	10.09	5.14	6.44	0.43	3.44	9.01	3.58	3.24	7.19	
23	4.92	6.48	3.38	7.91	5.74	9.62	13.94	10.27	6.07	6.78	0.44	3.25	8.63	4.04	1.79	7.53	
24	4.74	7.22	2.91	7.93	6.86	9.58	14.05	10.45	6.55	6.41	0.65	3.26	8.49	4.49	1.43	7.42	
25	4.74	5.83	2.06	8.82	6.71	9.48	15.03	10.72	6.96	6.57	1.04	2.83	8.57	4.95	1.96	7.24	
26	4.23	5.52	2.16	8.51	5.76	9.13	13.57	11.74	7.04	6.85	1.19	3.05	8.27	4.98	1.91	7.55	
27	4.12	6.25	2.52	8.91	5.05	8.71	13.00	11.97	7.16	6.84	1.72	3.22	7.10	5.59	2.25	7.11	
28	3.85	5.43	2.34	9.20	5.51	8.56	12.57	12.19	6.79	6.78	2.13	3.10	6.77	5.49	2.31	7.13	
29	3.39	5.34	2.37	8.92	4.56	8.00	12.38	11.72	7.01	6.94	2.23	3.24	6.26	5.32	2.43	7.27	
30	3.72	5.11	3.43	8.87	3.91	8.48	12.05	11.79	6.69	7.54	2.38	2.80	6.31	4.81	2.23	7.52	

Columbia River Water Elevation at the Interstate Bridges, daily Minimum (feet, Columbia River Datum), cont'd

Date	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
July																																																		
1		1.70	17.60	6.90	7.90	1.40	4.80	1.90	4.60	6.80	12.95	4.40	12.20	2.95	1.93	2.10	1.95	2.74	6.13	6.43	2.53	4.33	2.70		7.64	8.14	5.78	8.93	3.97	0.66	8.32	2.88	3.40	3.98	3.60	3.23	8.23	4.23	7.50	12.08	11.87	6.38	7.58	2.20	2.87	4.86	4.42	2.56	7.42	
2		1.80	17.00	5.00	7.20	0.80	4.70	1.10	4.10	6.50	12.90	4.20	12.00	2.95	2.14	1.77	1.70	2.34	5.98	6.34	2.15		2.14		7.09	8.04	5.71	8.36	3.19	0.82	8.42	2.82	3.92	4.14	3.17	1.88	8.41	2.73	5.88	12.96	11.66	6.62	6.98	2.55	3.23	4.94	2.53	2.42	7.36	
3		2.30	16.60	5.00	5.50	0.70	3.60	1.10	3.40	6.20	12.55	5.10	11.05	4.05	2.29	0.92	1.52	2.39	6.11	6.95	1.91	4.11	1.66		6.40	8.06	4.01	7.89	3.03	1.10	7.52	1.70	3.05	3.38	2.71	2.23	8.87	2.46	5.17	13.27	11.11	6.36	6.26	2.71	3.18	4.10	2.46	2.00	7.76	
4		1.30	16.50	6.60	4.90	0.50	3.70	1.70	3.40	6.05	12.30	5.10	9.30	3.60	1.40	0.60	1.47	1.82	5.31	6.01	1.81	3.31	3.46		6.68	8.27	4.51	7.52	2.91	1.22	7.62	1.12	2.85	2.82	2.76	2.27	8.98	2.26	3.83	13.43	10.06	5.93	6.20	2.38	2.88	4.05	2.18	2.02	7.58	
5		1.20	16.10	6.00	4.90	0.10	3.60	1.70	3.10	5.60	11.75	5.10	7.20	2.65	0.88	1.32	0.92	1.80	4.63	5.84	1.58	2.94	1.37		7.02	7.95	4.13	6.50	2.94	0.68	6.72		2.54	2.03	1.73	2.15	7.70	2.13	3.50	11.84	10.08	5.67	5.66	2.30	2.93	4.75	1.13	1.89	6.36	
6		1.70	15.40	6.10	4.80	-0.40	3.90	2.00	3.10	5.70	10.90	5.50	7.70	2.35	0.90	0.84	1.20	2.19	5.18	5.74	1.21	3.05	2.18		6.06	7.80	3.95	6.26	3.11	0.34	5.62	1.31	2.97	3.14	2.43	2.85	6.27	2.96	3.12	11.48	10.51	6.25	4.61	2.56	2.53	4.16	1.74	1.66	5.01	
7		0.90	14.20	7.20	4.90	-0.40	4.60	2.00	3.90	6.70	10.65	6.40	7.50	2.00	1.02	0.98	1.67	2.03	5.36	6.16	1.02	3.59	2.68		6.87	7.93	4.00	5.50	4.28	0.14	5.42	0.71	2.75	2.27	2.70	2.13	5.86	2.90	3.47	11.55	9.80	6.08	4.84	2.22	2.99	4.20	1.51	1.53	4.82	
8		0.60	13.30	8.30	5.10	-0.40	3.80	1.50	4.50	7.80	10.30	5.80	6.90	1.40	1.00	1.53	1.78	1.49	4.79	6.56	0.94		2.80		6.26	7.33	4.08	6.09	3.89	-0.04	5.22	0.88	2.50	3.23	3.76	1.98	5.48	3.35	3.39	11.44	8.81	5.22	5.29	1.93	2.92	4.32	1.94	1.34	4.75	
9		1.10	12.40	9.20	5.50	-0.30	3.10	1.40	4.50	8.25	9.50	4.30	7.20	1.00	2.29	1.79	1.40	0.51	4.56	5.78	0.87	3.87	2.99		6.17	6.32	4.85	6.47	2.92	-0.10		1.83	2.46	3.44	4.34	2.50	5.34	3.62	4.25	11.28	8.76	5.22	4.86	1.71	2.49	3.92	2.07	1.28	4.41	
10		2.00	11.10	8.50	5.80	-0.60	3.10	2.40	4.40	8.30	8.30	4.10	6.30	1.05	1.03	2.28	1.45	0.89	5.23	5.27	1.08		3.30		6.54	6.79	4.75	5.96	2.97	0.26		3.19	2.85	2.89	3.88	2.82	4.63	3.51	4.12	11.05	8.59	4.17	4.50	1.54	1.73	3.99	2.22	1.35	4.58	
11		2.10	10.00	7.80	5.70	-0.60	4.80	2.30	4.40	6.15	8.75	3.70	5.25	1.10	2.69	2.36	1.58	0.19	4.88	5.47	2.30		2.60		6.26	6.91	4.00	6.06	3.05	0.18	4.95	3.04	2.02	2.90	4.47	2.82	4.14		4.24	10.53	8.97	3.61	5.14	1.39	1.30	3.16	2.79	1.43	4.52	
12		2.10	9.50	6.70	6.00	0.00	4.70	2.50	3.70	4.70	8.50	4.50	4.98	1.40	3.55	1.94	1.36	1.00	5.05	5.43	1.78	1.75	2.79		6.41	7.30	3.50	6.80	3.37	-0.18	5.66	2.99	2.06	2.63	4.25	3.29	3.58		3.95	9.40	8.95	3.36	5.18	1.43	1.45	3.21	3.46	1.71	3.19	
13		2.80	8.10	5.70	6.00	0.30	5.20	2.70	2.70	4.10	8.00	6.00	4.72	1.05	3.06	1.87	2.13	1.29	4.92	5.59	1.38	2.52	2.86		6.63	6.31	4.15	6.87		-0.52	5.97	2.73	2.71	2.41	3.73	3.94	3.75		3.60	8.81	8.42	3.26	5.65	1.78	1.40	2.94	3.40	2.14	3.26	
14		2.00	6.40	4.90	6.10	0.40	5.20	1.30	2.70	4.50	7.70	6.60	4.45	1.00	2.92	2.09	2.04	1.63	3.70	5.68	2.14	2.41	2.54		6.58	5.88	4.39	6.62	3.69	-0.74	5.42	2.42	1.86	2.70	3.86	4.04	2.72		3.50	8.63	8.83	3.53	4.93	2.07	1.69	3.13	3.11	1.94	3.75	
15		0.90	6.10	5.50	6.80	0.40	4.90	0.80	2.60	5.40	7.50	5.40	4.20	0.75	2.70	1.95	1.99	1.64	2.93	4.96	2.34	2.29	2.15		6.65	6.47	4.44	7.31	3.54	-0.58	5.58	2.95	2.55	3.42	3.24	3.94	2.26		3.27	9.06	8.20	3.41	4.26	2.47	1.47	3.21	3.58	1.74	3.59	
16		1.60	5.60	4.70	6.60	0.50	2.90	0.80	2.50	5.70	7.00	6.40	4.05	1.20	3.69	1.55	1.33	0.98	2.53	4.48	2.31	2.31	1.97		6.06	7.08	4.52	7.25	2.66	-0.28	4.63	2.25	1.61	3.35	2.61	4.31	2.54	1.76	3.66	8.84	8.21	3.51	4.34	1.98	1.59	2.84	3.43	2.09	3.20	
17		2.80	5.90	4.40	6.50	0.10	2.90	1.40	2.30	6.40	6.30	5.80	4.05	1.40	3.19	1.21	0.52	0.80	2.69	3.88	2.56	2.79	1.66		6.25		3.91	6.74	2.75	-0.08	4.29	2.56	1.87	3.37	2.58	4.31	1.96	2.48	2.94	7.92	9.12	3.05	4.05	1.68	2.03	2.39	3.19	1.87	3.33	
18		3.20	5.90	4.60	6.30	0.10	3.00	1.90	2.00	4.85	6.20	5.80	4.50	1.80	3.15	0.77	0.58	0.98	2.92	2.86	2.31	3.42	1.74		5.43	7.75	3.70	6.15	2.75	0.14	5.25	2.16	1.48	3.11	2.53	3.04	2.03	2.27	2.11	7.82	8.20	3.21	4.22	1.67	1.86	2.97	2.52	1.88	3.09	
19		3.10	6.90	4.10	6.20	0.80	4.40	2.10	1.70	3.50	5.35	5.90	4.30	2.10	3.15	0.76	0.48	1.00	2.89	2.42	2.05	3.52	2.42		5.21	7.97	3.54	6.00	3.08	0.72	4.59	0.75	1.36	3.04	2.27	2.61	1.71	2.19	2.15	7.97	7.58	3.29	3.13	2.09	2.52	3.25	2.30	1.63	3.01	
20		2.80	7.00	3.70	6.40	1.20	3.80	2.60	1.70	3.40	5.80	5.50	3.85	2.25	2.80	0.87	0.87	1.54	3.17	2.20	1.47	3.69	2.88		4.86	7.84	3.86	5.01	2.89	0.54	4.34	0.50	1.68	2.96	2.51	2.30	2.37	2.40	2.38	7.47	7.29	3.28	3.32	1.79	2.25	3.21	1.27	1.46	3.09	
21		1.00	7.10	3.20	6.50	0.90	3.80	1.30	1.80	5.00	5.75	5.60	2.55	1.75	3.33	1.36	0.73	1.64	3.23	2.39	1.36	3.45	3.67		4.23	7.67	3.98	4.80	3.10	0.80	4.50	1.34	1.19	2.77	2.66	2.08	2.24	2.70	2.12	6.68	7.79	3.78	3.38	1.49	2.43	3.23	2.05	1.42	4.16	
22		0.40	6.60	4.20	7.40	0.30	4.10	0.80	1.90	4.10	6.00	5.60	2.40	1.00	3.92	1.66	0.92	1.28	3.38	2.18	1.69	4.46	3.47		4.08	7.10	3.92	5.37	2.44	0.66	4.97	1.34	0.95	3.65	2.87	2.30	1.78	2.45	1.73	6.54	9.11	3.73	3.36	1.44	2.23	2.85	1.65	1.21	3.72	
23		1.00	6.40	3.50	6.80	-0.20	3.00	0.80	2.50	3.90	6.30	5.20	2.25	0.40	3.96	1.20	0.43	0.33	2.66	2.25	1.56	3.52	3.10		4.14	7.28	4.42	4.60	1.57	0.54	4.50	1.53	0.76	3.28	2.58	2.86	1.59	2.20	1.81	5.71	8.65	3.78	2.97	0.84	1.65	2.98	1.58	0.96	3.74	
24		1.30	6.90	2.70	5.90	-0.20	3.60	0.80	2.50	4.30	4.70	4.30	1.95	0.75	3.93	1.53	0.36	0.37	2.66	2.86	0.85	3.35	2.77		4.53	6.91	3.87	4.60	1.77	0.56	4.21	2.27	1.11	2.81	2.89	2.26	1.38	1.99	2.38	5.65	8.27	3.17	3.23	0.77	1.50	2.33	2.62	0.32	3.10	
25		1.40	7.00	3.40	4.70	0.10	3.60	1.60	2.30	4.50	4.20	4.30	2.10	0.10	3.07	1.24	0.50	0.53	2.41	3.29	1.14	2.35	2.44		5.02	6.62	3.75	4.91	2.12	0.32	4.17	1.90	0.43	2.28	3.00	1.99	1.62	2.57	2.34	5.64	6.94	2.83	3.61	1.28	1.36	2.77	2.61	0.76	2.71	
26		1.50	6.50	2.90	4.70	0.10	3.50	2.20	2.20	3.25	4.80	4.40	2.15	0.10	2.72	1.19	1.27	1.09	2.32	3.01	0.56	2.40	3.04		5.15	6.18	3.37	5.50	2.29	0.20	3.38	1.18	0.97	2.68	3.23	1.94	1.87	2.10	2.16	5.50	6.78	3.25	3.93	1.39	1.28	2.87	2.12	1.28	2.70	
27		2.30	5.00	1.40	4.80	0.50	3.00	2.30	2.10	3.20	4.85	4.80	2.30	0.20	2.44	1.00	1.21	1.29	2.09	2.52	0.59	3.14			4.43	4.98	3.38	4.64	2.85	0.18	2.89	1.21	1.65	2.53	2.76	2.21	2.12	1.83	1.75	5.27	7.10	2.57	3.61	1.24	1.40	2.33	2.45	1.21	2.82	
28		1.90	3.90	1.20	5.80	0.50	2.40	0.90	1.70	4.90	4.90	5.20	3.00	-0.20	2.04	1.46	0.91	0.92	1.09	2.22	1.47	3.11	1.90		3.45	5.27	3.83	4.41	2.86	0.24	2.19	1.10	1.79	2.19	2.14	2.69	2.01	2.41	2.09	5.19	6.04	1.84	3.58	1.41	1.66	1.95	2.20	0.87	2.87	
29		1.80	4.20	1.60	5.90	0.70	1.60	0.20	1.70	5.00	4.90	5.10	3.85	0.20	1.65	1.73	0.93	0.55	0.62	2.46	1.92	3.23	1.48		3.44	5.75	3.48	5.01	2.89	-0.06	1.75	2.15	1.98	2.23	2.31	2.54	2.11	2.67	2.18	4.68	5.94	1.76	3.67	1.56	1.98	2.60	2.25	1.32	2.96	
30		1.60	5.10	1.20	5.60	0.70	0.80	0.20	1.80	4.85	4.60	4.30	3.50	0.60	1.70	1.26	1.06	0.44	1.00	2.95	2.17	3.43	1.55		4.23	4.89	3.01	5.04	3.10	0.06	2.70	2.18	2.34	2.66	2.00	2.45	2.02	2.98	1.82	4.88	5.46	2.02	3.34	1.84	2.10	1.72	2.50	1.39	3.37	
31		2.50	4.80	1.40	5.30	0.70	0.80	0.70	2.50	5.10	3.20	2.70	3.13	1.60	1.72	1.15	0.99	1.00	1.80	3.12	1.97	3.54	0.85		3.37	5.02	2.48	4.11	2.70	0.06	1.91	1.81	2.25	2.54	1.74	3.01	2.39	2.11	1.24	4.57	5.46	2.35	3.25	2.64	1.91	1.28	2.41	2.07	3.42	
August																																																		
1		2.70	5.30	1.60	4.20	0.70	1.00	0.70	2.20	5.00	1.90	1.40	2.75	1.20	1.70	0.72	0.70	1.88	1.84	3.17	1.94	2.56	0.66		4.24	3.95	1.58	3.71	3.39	0.00	2.05	1.64	2.47	3.04	1.03	2.87	2.86	1.82	0.98	5.19	6.10	2.48	2.84	2.37	2.42	1.74	1.69	2.54	2.78	
2		2.90	4.60	1.70	3.90	1.00	2.40	0.80	1.10	3.50	2.05	1.80	2.38	1.70	2.35	0.40	0.95	1.80	2.23	2.51	1.72		0.41		4.59	4.05	1.86	3.96	3.08	0.06	1.90	2.07	2.07	2.52	1.05	3.36	2.10	2.01	0.59	5.40	5.58	2.48	2.57	2.40	2.54	1.97	1.11	2.84	2.90	
3		3.00	4.80	2.10	4.90	1.20	2.80	0.80	0.70	3.40	2.75	3.90	2.00	1.75	2.40	0.55	0.59	0.94	2.11	2.35	1.65	2.37	0.37		3.99	3.39	1.54	3.20	3.59	0.38	2.24	1.27	1.75	2.16	1.64	2.98	1.87	1.54	0.57	4.27	5.51	2.28	1.96	2.22	1.97	2.09	0.74	2.56	2.62	
4		2.20	3.50	1.90	5.70	1.20	2.80	0.70	1.70	3.30	2.85	4.40	1.60	1.80	2.35	0.91	0.88	0.71	2.36	2.19	1.43	3.36	0.91		2.75	3.36	1.71	4.32	3.35	0.50	1.79	1.06	1.94	1.44	1.59	1.74	1.36	1.60	1.08	4.46	5.25	2.34	2.37	1.96	1.69	1.84	0.54	2.36	2.43	
5		0.30	3.60	1.90	6.50	1.30	1.30	0.30	1.70	3.60	3.65	4.10	1.00	1.60	1.72	0.76	0.67	0.39	2.59	1.75	1.11	2.54	1.08		2.87	3.30	2.13	4.71	2.69	-0.01	1.51	0.97	1.38	1.73	1.59	1.61	1.36	1.66	2.16	3.93	5.16	2.40	2.20	1.69	1.72	1.83	1.16	1.99	3.28	
6		1.10	4.10	2.20	7.00	0.50	0.80	0.20	2.00	3.90	4.50	4.00	2.40	0.90	1.91	0.95	0.36	0.15	2.91	2.35	1.19	3.03	1.11		3.63	4.20	2.71	4.58	1.68	0.78	2.73	1.13	1.03	2.17	1.63	1.51	1.49	1.84	1.61	3.12	4.83	2.72	2.09	1.43	1.58	2.15	1.74	1.81	2.54	
7		1.70	4.00	2.80	7.00	0.20	0.80	1.20	2.10	3.80	5.35	4.40	3.10	0.90	2.30	1.99	0.01	0.79	3.16	2.99	1.03	1.80	0.64		3.73	4.73	3.01	4.65	1.95	0.78		1.42	0.60	1.99	1.77	1.57	1.96	1.73	1.30	3.29	4.90	2.70	2.28	1.86	1.53	2.05	1.92	1.54	2.15	
8		1.90	3.80	2.90	6.60	0.20	1.00	1.90	2.20	4.00	5.35	4.80	4.60	1.10	2.20	2.25	0.38	0.81	2.68	3.61	0.56	1.14	0.84		3.70	4.44	3.27	4.17	2.65	0.92	2.31	1.62	0.36	1.81	1.89	1.91	1.29	1.08	1.55	3.90	3.86	2.62	2.28	2.02	1.36	2.07	1.72	1.66	1.92	
9		2.20	3.90	2.10	6.70	0.00	1.80	2.10	1.40	2.60	5.25	4.40	3.60	0.90	2.25	1.99	0.16	0.15	2.68	3.81	0.25	1.36	1.27		4.19	4.26	2.96	4.17	2.70	1.10	3.06	1.46		1.73	2.08	2.22	0.89	1.23	1.60	3.65	3.85	2.10	2.84	1.75	0.98	2.13	1.79	1.39	1.36	
10		1.40	3.80	1.30	6.00	0.00	1.80	2.30	1.10	2.52	3.60	4.55	2.40	0.20	2.33	1.65	0.36	0.10	2.67	4.36	0.33	1.08	0.91		3.39	4.09	2.69	4.18	2.23	0.80	2.59	1.90	0.67	1.30	2.50	2.42	0.80	1.12	1.68	3.12	3.42	2.27	3.20	1.89	0.82	2.36	2.45	1.11	1.40	
11		1.10	3.40	1.40	6.40	0.20	1.70	1.40	1.10	2.45	3.20	4.35	2.10	0.30	2.18	1.86	0.77	0.23	2.49	4.52	0.91	1.01	0.51		3.13	3.09	2.96	4.99	2.32	0.34	2.65	1.48	1.16	1.52	2.24	2.54	0.47	0.81	1.81	3.66	2.91	1.76	3.10	1.98	0.99	2.44	2.68	0.93	1.87	
12		0.70	3.10	2.10	6.70	0.60	1.10	0.90	1.80	2.90	3.30	4.10	2.30	0.40	2.00	2.46	1.23	0.55	1.80	4.56	1.51	1.35	0.59			2.96	2.95	4.76	2.47	0.58	2.17	2.22		1.61	1.69	2.76	0.83	0.73	2.05	3.89	3.67	1.52	3.42	1.75	1.22	1.98	2.00	0.82	1.40	
13		1.20	4.60	1.80	6.20	0.60	0.60	0.90	2.10	2.85	3.65	3.95	1.90	0.50	2.46	1.82	1.23	0.31	1.20	3.99	1.98	1.20	0.59		4.71	3.75	3.15	5.13	2.38	0.76	2.34	2.55		1.15	1.42	1.82	1.11	0.97	1.76	3.97	4.36	2.06	3.32	1.78	1.52	1.75	1.71	0.84	1.09	
14		1.20	3.40	2.20	5.80	0.50	0.50	0.50	1.40	2.65	2.80	3.25	2.90	0.65	2.41	1.30	0.35	0.63	1.57	3.95	2.44	0.84	0.28		4.07	4.18	3.38	5.80	1.97	0.54	2.53	1.93		1.17	1.27	2.04	0.70	0.72	1.60	3.06	3.61	2.36	3.18	2.20	1.37	1.49	1.94	1.69	0.92	
15		1.20	2.90	2.20	5.20	0.50	0.50	0.50	0.60	3.25	2.20	3.20	2.30	0.80	2.13	1.00	0.33	1.09	1.90	3.96	1.66	1.16	0.71			4.02	2.71	5.30	2.59	0.82	2.43	1.63		0.96	0.99	2.82	0.80	0.43	1.70	3.01	3.11	2.08	2.66	1.95	1.00	1.63	2.20	1.44	1.28	
16		1.10	3.60	1.20	4.90	0.90	1.90	0.40	0.70	4.25	2.00	2.70	2.10	1.00	1.93	0.65	0.85	0.60	1.59	3.54	0.74	1.24	1.01		3.87	4.14	2.07	3.96	2.48	0.90	2.70	0.96		1.20	1.01	2.47	1.30	0.14	1.46	3.64	3.67	2.15	2.34	2.00	0.88	1.65	1.95	0.99	1.58	
17		1.80	3.50	0.50	5.10	1.60	2.70	0.80	0.50	3.80	2.40	2.40	2.30	1.10	1.69	0.34	0.87	0.80	1.51	2.91	1.08	1.65	0.75		3.25	4.41	1.78	4.04	2.80	0.94	2.10	1.33		1.22	1.17	2.05	1.36	0.12	1.45	3.57	3.27	2.30	1.79	1.86	1.11	1.42	1.06	0.82	2.49	
18		1.40	2.20	1.00	4.70	1.50	2.60	0.30	0.50	3.10	3.45	2.80	1.70	0.10	1.96	0.23	0.13	0.75	1.97	2.51	1.65	2.55	0.83		3.05	4.41	1.69	4.33	2.79	1.00	1.54	0.85		2.25	1.34	1.54	1.43	0.26	1.32	3.28	4.25	2.05	1.96	1.64	1.43	1.16	0.74	0.88	2.63	
19		0.40	2.40	1.90	4.70	1.30	2.40	0.20	0.90	2.75	3.90	3.15	1.60	1.60	2.28	0.52	0.20	0.60	1.68	1.84	1.52	2.62	0.98		2.75	4.36	1.69	4.27	1.96	0.70	1.86	1.70		2.47	1.75	1.05	1.45	0.74	1.54	3.68	3.54	2.06	2.29	1.78	1.74	1.12	0.74	0.58	2.58	
20		1.00	3.30	1.40	5.80	0.80	1.70	0.10	1.30	2.35	4.20	3.80	1.50	0.70	2.33	0.55	0.06	0.60	1.72	1.86	1.38	2.43	0.94		3.21	4.99	2.00	3.83	1.13	1.10	2.13	1.21	1.81	2.27	1.62	0.92	1.47	1.99	0.66	2.79	3.65	2.50	1.94	1.72	2.43	1.53	0.48	0.78	2.90	
21		1.10	2.70	1.50	5.70	0.30	1.70	0.80	1.30	1.75	3.85	3.80	2.20	0.70	2.32	0.86	0.08	0.62	1.99	2.20	1.24	1.54	0.81		3.18	4.95	2.60	4.19	1.01	0.84	2.46	1.65	1.64	2.04	1.37	0.91	1.79	2.06	0.67	2.57	3.75	2.67	1.69	1.35	2.26	1.40	1.17	1.11	3.11	
22		0.70	2.40	1.80	5.70	0.30	1.90	1.00	1.10	1.85	3.00	3.70	2.80	0.70	2.23	1.20	0.04	1.09	2.07	1.27	1.08	1.19	0.72		3.22	5.08	2.41	3.20	0.67	1.02	2.22	1.44	1.43	1.64	1.39	1.29	1.27	1.90	0.70	2.41	3.40	2.70	1.85	1.34	1.38	1.89	1.55	1.29	3.14	
23		1.40	2.40	1.50	5.70	0.50	1.90	1.00	0.40	2.30	2.20	2.80	3.80	0.70	2.12	1.19	0.14	1.16	2.12	1.77	0.32	1.42	0.63		3.55	4.60	2.13	2.55	1.55	1.16	2.23	1.16	1.01	1.69	1.61	1.48	1.24	1.69	0.60	2.30	3.66	2.49	2.08	1.51	1.15	2.20	1.81	1.22	2.72	
24		1.60	1.60	0.90	5.70	1.10	1.90	2.00	0.40	2.15	2.30	2.65	2.60	0.70	1.26	1.02	0.53	0.97	2.13	2.96	0.51	0.95	0.19		2.98	3.80	2.27	3.32	0.73	0.46	2.25	0.68	1.37	1.90	1.71	1.07	1.93	1.13	0.71	2.55	3.22	2.31	1.93	1.56	0.96	1.98	1.58	0.80	2.43	
25		1.30	0.80	1.30	5.60	1.30	2.20	1.50	0.80	2.10	2.20	2.25	2.90	1.60	0.73	1.00	1.31	0.36	2.31	2.71	0.37	0.87	0.15		2.54	3.87	1.52	3.21		0.58	1.70	1.25	1.73	1.40	1.63	1.23	1.83	0.76	0.77	3.47	3.20	1.69	1.86	1.71	0.91	1.65	1.35	0.22	1.76	
26		0.90	1.00	1.00	5.10	1.30	1.10	0.50	0.90	2.20	1.35	2.20	3.20	0.60	0.94	1.07	1.72	0.55	2.10	2.75	0.41	0.94	0.40		3.26	4.04	1.40	3.53	0.77	1.12	1.31	1.48	1.48	1.23	2.48	0.87	1.49	0.62	1.03	3.16	2.84	1.38	2.05	1.70	1.17	1.20	1.85	0.02	1.62	
27		0.80	1.70	2.00	4.70	0.80	0.90	0.50	1.50	2.40	1.05	2.15	2.70	0.60	1.37	1.22	1.34	0.17	2.44	1.86	0.71		0.59		2.57	3.63	0.84	4.03	0.98	0.74	1.11	2.58	2.64	0.84	2.15	1.08	1.25	1.02	0.75	3.10	2.84	1.47	2.39	1.89	1.20	0.58	1.83	0.47	1.61	
28		1.20	2.10	3.70	5.60	0.80	0.90	1.30	2.10	2.50	0.50	2.10	3.00	0.20	1.25	1.46	1.10	0.26	2.44	2.67	0.83		0.64		2.84	3.33	0.44	4.63	1.07	0.58	1.37	2.35	3.07	1.04	1.31	1.17	0.94	0.89	0.97	3.25	2.99	1.50	2.18	2.22	0.92	0.53	1.33	0.98	1.53	
29		2.00	3.20	3.60	5.00	0.90	1.20	1.90	1.80	2.60	0.55	1.95	2.70	0.20	0.71	1.25	1.31	1.15	1.83	2.11	1.44		0.51		3.33	3.36	1.03	4.37	1.21	1.02	1.49	1.44	2.74	0.76	1.37	1.82	1.38	0.51	0.64	2.84	2.73	1.58	1.99	2.22	1.18	1.54	1.67	1.55	1.51	
30		2.40	2.90	2.50	5.80	1.30	1.50	1.60	1.70	1.90	0.55	2.05	3.00	0.70	0.22	0.83	1.56	1.00	1.14	2.52	1.03		0.07		3.18	3.65	1.20	2.92	2.28	0.68	0.91	1.14	2.78	0.70	1.52	2.15	1.94	0.53	0.50	2.92	3.11	1.57	1.95	2.06	1.75	1.61	1.67	1.83	0.76	
31		2.30	1.80	2.10	5.60	1.20	2.50	0.70	1.70	2.00	1.25	2.60	2.30	0.70	0.06	0.91	1.81	0.84	1.28	1.75	0.84		0.07		3.17	4.53	0.89	2.76	2.69	0.70	1.26	1.43	3.32	1.15	1.06	2.17	1.52	0.74	0.16	3.01	3.02	1.52	1.73	1.75	1.33	1.20	1.44	1.78	0.96	
September																																																		
1		1.00	1.50	1.50	5.00	1.00	2.60	0.70	1.70	2.30	2.40	3.10	1.70	0.70	1.17	1.47	1.86	1.50	0.86	1.52	0.86		0.15		2.55	3.24	1.03	3.65	1.40	0.50	1.05	1.25	2.84	0.81	0.20	1.71	0.73	0.25	0.10	2.73	2.73	1.22	0.96	1.79	1.00	1.37	0.53	1.68	0.61	
2		0.20	1.20	1.50	5.70	0.50	2.20	1.08	1.50	2.10	2.00	3.15	1.70	0.60	0.83	0.83	1.81	1.46	0.98	1.42	0.92		-0.21		1.62	2.28	1.68	3.09	1.74	0.64	0.60	0.63	2.92	0.75	-0.07	0.95	0.65	-0.03	0.06	1.46	2.11	0.89	0.84	1.63	0.96	1.37	0.49	0.99	1.06	
3		0.30	1.80	1.50	4.60	0.50	1.30	1.08	1.10	1.70	2.25	2.15	1.30	0.70	1.03	0.55	1.51	0.91	0.76	1.15	0.72		0.12		1.26	2.44	1.68	1.83	1.08	0.58	0.05	0.64	2.23	0.56	0.28	0.73	0.82	0.22	0.18	1.00	1.34	0.85	0.58	1.25	0.66	0.93	0.17	1.01	1.00	
4		0.20	2.80	1.90	3.40	0.80	1.30	1.62	0.90	1.45	1.50	2.20	1.40	0.70	1.90	1.08	0.51	0.46	0.95	1.44	0.63	0.98	0.24		1.46	2.19	1.32	2.68	0.65	0.54	0.38	0.67	1.17	0.67	0.33	1.00	0.32	0.29	-0.27	0.75	1.16	0.90	0.47	1.47	0.68	0.65	0.29	1.04	1.18	
5		0.00	2.50	1.70	2.50	0.40	1.30	1.71	1.00	1.30	1.20	1.80	1.90	0.30	2.84	0.98	0.33	0.74	1.76	1.59	0.19	0.90	0.30		1.11	2.30	0.94	2.36	0.35	0.22	1.28	0.70	0.59	0.38	0.23	0.68	0.64	0.42	-0.35	0.91	1.55	1.05	0.32	0.67	0.10	1.02	0.40	0.69	1.01	
6		0.00	2.60	1.70	2.50	0.50	1.40	1.76	0.90	0.55	1.20	1.75	1.40	0.30	2.21	0.86	0.39	0.88	2.27	1.70	0.23		0.37		1.02	2.11	1.40	1.27	0.17	0.12	1.31	0.37	0.50	0.32	0.58	0.24	0.21	0.49	-0.47	1.31	2.32	1.53	0.91	0.20	0.23	1.40	0.49	0.75	0.69	
7		-0.10	2.10	1.90	2.50	0.50	2.60	2.34	1.00	0.10	1.50	2.40	1.90	1.10	2.59	1.12	1.32	1.17	1.56	2.20	0.00	0.50	0.52		0.99	1.98	1.64	1.03	0.73	0.04	1.30	0.47	0.14	0.33	0.79	0.14	0.02	0.47	0.00	1.12	1.69	1.28	1.36	0.01	0.21	2.17	0.65	0.34	0.55	
8		-0.40	1.00	1.80	3.10	0.90	4.40	2.08	1.20	1.20	2.55	3.65	2.30	0.50	2.45	1.45	0.76	1.30	1.20	1.63	0.30	1.00	0.69		0.34	1.52	1.14	1.74	0.61	-0.40	0.95	0.49	0.08	0.32	0.77	-0.32	-0.59	0.26	0.76	1.07	1.40	1.05	1.20	0.21	-0.05	2.11	0.79	0.26	0.08	
9		-0.70	1.50	1.00	4.80	0.40	4.40	1.60	1.40	1.40	3.30	2.40	1.90	0.20	2.03	1.89	1.04	1.07	1.03	2.04	0.40	1.10	0.72		1.31	0.78	1.44	2.73	0.39	-0.16	0.73	0.64	-0.11	0.65	0.84	-0.23	0.18	0.20	1.05	1.56	1.13	0.52	1.01	0.40	-0.60	1.45	0.73	0.07	0.18	
10		-0.10	2.10	2.30	4.40	0.60	3.30	2.00	1.50	1.30	3.10	2.10	1.50	1.00	1.79	2.06	0.81	0.66	1.23	2.44	0.56	0.96	0.74		1.63	1.44	0.83		0.28	0.02	0.94	0.91	0.51	0.66	0.71	-0.17	-0.41	0.28	0.70	1.56	0.64	1.01	1.13	0.80	-0.59	1.13	0.78	0.08	0.57	
11		1.00	1.80	1.90	4.40	0.50	2.60	1.90	1.40	0.95	2.35	2.95	1.80	0.78	1.29	1.83	1.19	0.44	1.35	1.98	0.59	1.16	0.59		1.39	1.77	0.99	2.72	0.56	-0.10	1.22	0.43	1.77	0.07	1.05	0.14	0.18	0.24	0.29	1.56	0.67	1.72	0.86	0.85	-0.02	0.93	0.95	0.13	0.44	
12		1.10	2.20	1.20	4.50	0.50	2.00	1.40	1.20	0.55	1.95	1.90	2.40	0.00	1.07	1.84	0.55	0.23	1.10	2.30	0.41	0.42	0.51		1.12	1.79	1.48	1.81	1.20	-0.06	0.66	0.20	1.31	-0.23	0.91	0.79	-0.22	0.62	0.18	1.50	0.89	1.61	0.60	0.94	-0.38	1.46	1.06	0.60	0.20	
13		1.20	3.30	0.70	4.10	0.50	3.20	0.80	0.90	0.95	1.90	1.50	2.80	1.81	1.09	1.96	0.41	0.55	1.06	2.16	0.48	0.70	0.20		1.95	2.27	1.23	1.42	1.72	0.34	0.31	0.06	1.52	0.00	0.46	0.76	-0.13	0.57	0.26	1.61	0.97	1.47	1.38	1.15	-0.12	1.12	0.71	0.63	0.60	
14		1.50	2.90	0.70	4.10	1.10	3.20	0.70	0.60	1.20	2.55	1.20	1.30	1.87	1.22	1.79	0.83	1.11	1.47	1.32	1.19		-0.07		2.91	1.88	1.16	1.64	2.00	0.46	0.33	0.31	1.50	0.33	0.53	0.56	-0.17	0.05	0.44	1.17	0.93	1.44	1.05	0.71	-0.08	1.13	0.55	0.29	1.02	
15		1.00	1.90	0.80	3.10	1.90	4.90	0.70	0.50	2.00	2.70	1.60	1.50	1.63	1.55	1.38	1.29	1.81	1.39	0.88	1.31	0.98	-0.09		2.38	2.39	1.38	1.32	2.09	0.54	0.86	0.12	1.88	0.06	0.90	0.52	-0.16	0.03	0.33	1.21	1.60	1.06	1.01	0.93	0.68	0.93	0.90	0.72	0.97	
16		0.40	1.50	0.90	2.80	2.00	3.40	0.30	0.60	1.90	3.00	1.20	2.10	1.77	1.84	0.72	1.02	1.87	1.06	0.43	0.56	1.47	0.10		1.99	2.46	1.92	1.41	2.40	0.54	0.01	0.24	1.80	0.50	-0.14	0.17	0.25	0.68	0.19	1.37	1.78	0.80	1.00	1.19	0.99	1.21	0.67	0.72	0.90	
17		0.70	2.00	0.80	2.00	1.80	3.10	0.40	0.60	2.35	2.65	1.35	2.10	2.14	2.49	1.22	0.65	1.90	1.09	1.06	0.89	1.62	0.30		1.76	3.52	2.41	1.57	1.71	0.50	0.19	0.57	1.65	0.53	-0.56	0.01	1.27	0.68	0.46	0.89	1.73	1.18	0.91	1.21	1.09	1.39	0.21	0.95	1.26	
18		0.90	2.50	0.90	1.80	1.40	3.00	0.80	1.30	2.40	2.40	1.80	1.90	2.31	2.14	0.85	0.32	1.74	1.90	1.16	1.04	1.28	0.49		1.34	4.76	1.96	1.80	1.36	0.42	0.80	0.10	2.09	1.05	-0.38	0.05	1.08	0.51	0.25	0.76	1.83	1.62	0.58	0.87	0.87	1.27	0.31	1.59	1.87	
19		0.80	2.60	1.00	1.80	1.40	3.20	1.10	1.20	2.00	2.05	1.30	1.60	2.33	2.00	0.42	0.58	1.79	2.05	1.23	1.13	1.27	0.37		1.47	4.47	2.11	1.24	1.05	0.46	0.88	0.05	2.25	0.57	0.19	-0.13	0.65	0.93	0.22	0.75	2.17	1.12	0.12	1.00	0.92	1.54	-0.55	0.98	1.63	
20		1.40	3.00	1.20	2.20	1.60	3.80	1.20	1.10	1.10	2.60	1.60	1.50	1.89	2.12	0.63	0.50	1.31	1.63	1.61	0.20	0.66	0.00		2.15	4.35	1.64	0.36	1.58	0.40	1.03	-0.70	1.99	0.52	0.37	-0.20	0.39	0.41	0.42	0.99	1.96	1.78	0.49	0.71	1.31	1.93	-0.56	0.47	1.15	
21		1.40	1.90	0.70	2.60	1.30	3.90	1.50	0.90	1.30	2.50	1.50	1.70	1.61	1.56	0.84	0.60	0.92	1.66	0.80	0.16	0.70	0.41		1.49	3.95	1.33	1.28	2.24	0.46	1.16	-0.84	1.54	0.98	0.56	-0.49	0.07	0.07	0.45	0.73	1.62	1.44	0.57	0.24	1.29	2.01	-0.50	0.16	1.03	
22		1.00	1.20	0.70	2.80	1.30	3.20	0.70	0.90	1.15	2.15	2.00	1.80	0.77	1.45	1.16	0.71	1.39	1.31	0.58	0.40	0.71	0.59		1.04	4.20	1.03	2.17	1.92	0.66	0.78	-0.39	1.07	0.85	0.97	-0.23	-0.15	0.35	0.87	0.89	1.26	1.18	0.83	0.15	0.97	1.88	-0.01	-0.03	0.81	
23		1.00	1.30	1.70	3.60	2.20	2.60	0.70	1.00	1.50	1.85	2.70	1.70	0.72	1.57	1.51	1.28	1.00	1.27	0.76	0.63	0.96	0.96		1.76	3.05	0.94	2.62	0.85	0.64	1.06	0.72	1.05	0.81	1.19	-0.23	-0.55	0.82	0.55	0.48	1.02	1.33	0.83	0.29	0.38	1.10	-0.23	0.05	0.72	
24		1.20	1.60	1.90	3.20	2.10	2.00	0.90	1.30	1.70	1.90	2.15	1.40	1.05	2.11	2.17	1.24	0.62	1.04	1.48	1.43	0.45	0.73		1.46	3.47	0.90	2.10	1.16	0.26	1.64	0.81	1.80	0.50	0.24	-0.23	0.13	0.74	0.57	0.83	0.93	1.49	2.07	0.73	0.24	0.56	-0.04	-0.33	1.09	
25		1.50	1.90	1.80	3.20	1.90	1.50	0.90	1.50	1.50	1.45	1.70	2.00	0.00	2.22	1.87	1.06	1.23	1.23	2.11	2.00		0.44		2.03	4.04	0.84	2.48	0.88	0.26	1.07	0.59	1.33	0.04	0.08	-0.25	0.35	0.30	0.55	1.23	1.00	1.33	1.84	1.22	-0.28	0.23	0.67	-0.24	0.71	
26		1.60	2.20	1.30	3.30	1.90	1.50	0.90	1.50	1.50	0.90	1.70	2.20	1.88	2.26	1.50	1.69	1.08	1.44	2.56	2.14		0.15		2.31	3.35	1.00	1.77	1.51	0.42	1.28	1.20	1.55	-0.63	0.30	0.20	0.38	0.40	0.56	1.53	0.97	1.09	1.75	1.27	0.33	0.45	1.02	-0.02	0.87	
27		1.70	2.10	0.70	3.10	2.20	2.20	1.00	1.80	1.40	0.75	1.80	2.50	2.07	1.63	1.22	2.40	1.28	1.33	2.28	1.12	0.06	0.09		2.42	3.28	1.26	1.55	1.91	0.24	1.48	1.50	1.54	-0.19	0.31	0.47	0.28	-0.69	0.38	2.03	1.10	0.63	1.43	0.72	0.86	0.89	0.73	0.14	0.05	
28		1.20	1.80	0.60	3.20	2.40	2.10	0.90	2.10	1.80	1.60	1.80	2.00	0.00	0.71	0.97	1.24	1.56	0.48	1.85	0.95	0.77	0.14		2.20	2.96	0.61	1.98	1.48	0.12	0.83	1.67	2.09	-0.47	0.91	0.88	0.27	-0.73	1.07	2.00	1.06	0.81	1.21	0.92	0.78	0.86	0.80	0.58	0.32	
29		1.10	0.80	0.50	3.20	2.60	1.80	0.10	2.20	1.90	1.40	2.00	1.90	1.34	1.17	1.22	1.60	1.98	0.88	1.08	1.48	1.11	0.00		1.34	2.99	0.27	1.49	1.45	-0.02	0.53	1.15	1.90	-0.34	0.55	0.60	0.12	-0.19	0.80	1.84	1.90	2.18	1.07	1.50	0.68	0.74	0.94	0.96	1.00	
30		0.60	1.50	0.30	2.80	2.50	1.80	0.00	1.90	1.80	1.40	1.75	2.00	1.40	1.43	1.31	1.36	2.07	0.14	0.99	2.05	1.34	-0.07		1.54	2.31	0.76	1.68	1.53	0.16	0.13	0.90	1.80	0.92	-0.16	0.59	0.81	-0.15	0.63	1.86	1.09	3.99	0.68	1.80	0.39	0.30	0.63	1.09	1.32	

Columbia River Water Elevation at the Interstate Bridges, daily Minimum (feet, Columbia River Datum), cont'd

Date	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
October																
1		0.50	2.30	1.30	2.40	1.90	1.10	0.00	1.80	1.90	1.45	1.10	1.30	1.78	1.88	2.02
2		1.20	2.40	0.80	2.00	1.10	1.90	0.70	1.50	2.25	1.45	1.20	1.50	1.94	1.79	1.55
3		0.80	2.40	0.80	1.90	1.10	1.90	0.70	1.70	1.40	1.10	1.20	2.40	1.80	2.26	1.11
4		0.80	2.30	1.10	1.90	1.40	2.00	1.00	1.89	0.50	1.20	1.90	2.30	1.46	1.75	0.94
5		0.40	2.10	2.20	2.10	0.80	3.40	2.00	0.84	0.60	1.60	2.60	2.85	1.59	1.24	1.06
6		0.10	1.80	2.20	3.90	0.80	2.80	2.20	2.10	2.30	2.10	2.60	1.50	1.09	1.31	1.95
7		0.30	1.30	2.30	3.30	1.10	2.30	1.60	1.00	3.00	2.65	2.20	1.35	0.94	1.82	1.25
8		0.20	1.70	2.30	2.80	1.10	2.20	2.00	1.00	2.90	2.50	2.00	1.55	1.12	2.57	2.78
9		1.20	2.00	1.70	2.80	0.80	2.10	1.80	0.80	3.00	2.10	1.75	1.95	0.62	2.23	2.66
10		1.10	1.80	1.80	2.10	0.60	2.10	1.70	1.00	2.20	1.10	1.85	2.40	1.04	1.93	2.13
11		1.30	1.90	1.90	2.20	0.85	2.10	1.80	1.00	1.90	0.85	1.75	2.75	1.58	1.38	1.54
12		1.60	1.00	0.80	2.50	1.10	2.40	1.10	1.20	2.40	1.80	2.30	3.15	1.72	0.65	1.24
13		1.70	0.80	0.40	2.60	1.10	2.70	0.20	1.40	3.15	1.85	2.35	3.40	1.76	1.31	1.40
14		1.30	0.90	0.40	2.80	1.80	1.40	0.10	0.80	2.80	2.25	0.95	2.75	1.31	1.98	1.83
15		1.20	1.60	0.40	2.80	1.20	1.30	0.20	0.80	2.75	2.70	0.55	2.80	1.68	2.67	2.13
16		1.10	2.20	1.60	2.90	1.10	1.40	0.70	0.86	2.85	2.70	0.90	2.45	2.20	2.90	1.85
17		1.80	2.70	1.70	1.40	1.10	1.70	0.60	0.93	2.60	2.65	0.70	2.10	2.32	3.11	1.44
18		1.40	2.80	1.50	1.40	1.30	2.10	1.20	1.00	1.55	2.75	1.35	0.70	2.41	2.69	0.40
19		0.70	1.70	1.10	1.40	1.40	2.00	1.20	1.00	1.40	3.30	2.00	1.10	2.51	2.15	0.56
20		0.70	1.00	1.10	2.90	1.20	2.10	2.70	1.60	1.60	3.10	2.05	2.10	1.92	1.97	1.50
21		0.80	1.00	1.40	3.00	0.60	2.70	2.80	2.56	1.60	3.10	2.30	1.40	1.88	2.86	2.17
22		1.30	1.30	2.70	3.00	0.60	1.80	2.70	2.08	1.90	2.70	2.20	2.35	2.05	2.82	2.55
23		2.10	1.60	2.80	3.30	0.60	1.10	2.90	1.60	1.90	2.50	1.85	3.10	2.40	1.75	2.47
24		2.50	2.10	2.80	2.20	0.90	1.10	3.00	1.80	2.75	1.50	1.60	3.00	2.70	1.43	2.21
25		2.50	2.50	3.60	2.20	0.80	1.30	2.90	2.00	2.40	1.50	1.80	2.65	3.38	1.81	1.69
26		2.20	1.20	3.80	2.60	1.40	1.20	2.90	1.80	1.40	2.05	2.05	3.05	3.49	1.20	1.79
27		1.70	0.90	3.90	3.00	1.60	1.30	2.70	2.00	1.90	2.40	1.45	4.65	3.81	1.75	1.81
28		1.50	1.80	3.70	2.80	2.40	1.70	2.50	1.90	2.80	2.65	1.20	4.05	3.25	1.50	2.08
29		1.40	2.70	3.60	2.90	2.70	1.70	2.10	1.40	3.60	3.70	1.60	3.45	2.98	1.68	1.80
30		1.60	3.00	3.70	2.50	2.40	1.60	1.90	1.20	3.20	5.65	1.75	2.65	2.82	2.82	1.40
31		1.80	3.10	4.20	1.90	2.20	1.70	1.90	1.00	3.00	5.35	1.80	2.75	2.81	3.23	1.54
November																
1		3.20	3.50	3.90	2.20	2.40	2.10	2.10	1.00	2.00	5.15	2.05	2.40	3.49	3.72	1.30
2		2.90	2.30	3.90	2.50	3.20	2.30	2.10	1.50	1.50	5.25	2.45	3.40	3.11	2.93	1.06
3		2.50	1.10	4.00	2.40	3.50	2.40	2.40	1.50	1.85	4.75	2.90	6.70	2.42	2.92	1.28
4		2.10	1.40	4.20	2.40	2.70	2.70	3.40	1.50	1.30	4.50	4.35	5.90	1.80	3.02	1.60
5		2.30	2.10	4.40	2.50	2.30	2.80	3.90	1.70	1.75	4.25	4.50	5.50	1.52	2.94	1.82
6		2.40	2.40	4.90	2.20	1.70	2.30	3.90	1.80	2.10	4.75	4.45	5.30	2.50	3.25	1.97
7		2.60	2.70	4.90	2.20	1.10	2.00	3.70	1.80	1.50	4.00	4.70	5.40	3.31	3.37	2.27
8		2.10	2.40	5.30	2.20	1.70	2.00	3.40	3.30	1.20	3.60	4.30	5.40	4.82	2.77	1.57
9		3.00	2.70	4.30	2.10	1.70	1.70	3.10	3.80	1.20	4.15	4.10	5.50	5.16	2.02	1.17
10		4.80	1.70	4.30	2.40	2.70	1.70	2.20	3.60	2.00	3.65	3.95	6.00	5.65	2.37	1.42
11		5.60	1.60	4.25	2.40	2.90	1.80	2.30	3.60	2.75	3.60	4.30	7.20	5.47	2.92	0.77
12		6.60	1.80	3.90	2.30	2.50	2.30	1.90	2.90	3.60	3.50	3.55	6.80	5.94	2.66	0.96
13		7.40	1.80	3.90	2.00	2.40	1.70	1.70	3.10	3.40	3.70	3.20	7.00	5.05	2.50	1.63
14		7.80	2.30	3.60	2.00	2.50	3.30	1.50	3.70	3.40	3.30	4.20	7.00	5.28	3.09	1.28
15		8.00	2.70	3.60	2.00	3.40	3.70	1.50	2.20	4.50	3.30	4.20	6.60	4.64	3.08	1.01
16		10.30	3.30	4.60	1.90	4.20	3.80	1.50	1.10	4.95	3.60	4.65	7.30	4.24	2.89	1.32
17		9.50	3.50	5.40	1.90	4.30	3.50	1.90	1.00	3.70	4.50	5.80	6.40	3.22	3.43	1.47
18		8.70	3.10	6.00	2.60	4.30	2.90	2.60	1.60	4.20	5.15	7.10	6.10	2.88	4.29	1.91
19		7.90	2.60	6.50	2.30	4.10	1.90	3.00	2.20	4.10	5.10	8.10	6.10	3.20	5.33	2.16
20		7.50	2.80	6.30	2.60	3.10	1.60	2.80	2.90	4.45	5.30	9.10	5.80	3.56	5.20	2.26
21		7.10	3.10	5.50	2.60	3.10	2.90	1.60	3.00	4.70	4.40	8.80	5.90	4.80	5.29	2.42
22		6.60	3.00	4.90	2.80	3.40	4.10	2.70	3.00	4.50	3.85	8.90	5.70	5.21	6.09	2.36
23		7.00	3.70	4.20	3.10	4.30	2.30	4.10	4.90	4.45	3.80	8.15	4.70	4.16	5.54	2.98
24		7.10	3.80	3.60	3.10	4.90	0.70	3.80	4.20	4.85	3.50	8.30	6.00	4.67	7.09	2.62
25		6.40	3.10	3.70	3.20	5.00	1.50	3.90	3.70	5.15	3.15	8.25	5.90	5.41	7.79	2.52
26		7.00	3.30	3.80	2.70	6.50	1.20	4.10	3.30	5.10	2.50	7.90	5.80	5.37	6.93	2.41
27		7.10	3.40	4.20	1.80	9.20	1.20	3.90	3.60	4.70	3.10	7.10	5.40	3.99	6.67	2.34
28		7.20	3.80	4.20	1.80	8.50	1.50	3.80	3.10	4.90	3.85	6.50	6.80	3.75	7.88	1.76
29		8.10	2.80	5.00	1.40	8.10	3.40	3.50	3.00	3.95	4.30	6.40	7.40	2.99	7.98	1.07
30		8.00	3.60	4.80	1.40	7.50	3.50	3.40	3.00	3.40	5.45	6.55	8.30	3.98	6.98	0.92
December																
1		7.60	2.90	4.80	2.80	7.00	5.30	3.40	3.30	2.90	6.50	7.20	9.10	3.69	7.15	2.39
2		6.80	3.00	7.10	3.00	7.00	5.80	3.50	3.30	4.30	7.15	7.30	8.50	3.40	7.52	4.59
3		6.20	3.90	10.90	3.00	7.80	5.20	4.80	3.40	6.25	8.35	6.90	7.90	3.64	7.09	4.48
4		5.70	4.20	12.60	2.20	11.80	4.80	5.60	9.10	6.30	9.00	6.20	7.10	3.89	6.86	5.70
5		5.50	3.80	14.40	1.10	10.90	5.70	6.30	9.60	6.40	8.60	6.00	5.60	4.25	6.32	5.96
6		6.20	3.20	14.50	1.10	10.40	6.80	7.00	9.90	8.60	7.75	7.75	5.60	4.64	5.13	5.50
7		6.10	2.40	13.10	1.60	9.80	6.40	6.70	9.00	10.05	7.70	7.15	5.60	4.94	4.37	5.42
8		7.80	1.70	13.10	2.20	9.60	5.60	5.40	7.78	11.00	8.00	7.30	5.60	5.91	3.66	5.99
9		6.90	1.80	13.80	2.70	9.40	3.30	4.10	7.00	10.40	7.30	7.85	4.90	6.65	4.07	5.82
10		7.40	3.10	13.70	2.10	8.30	2.60	4.20	6.50	9.80	6.90	7.90	5.20	7.17	4.03	7.45
11		7.30	3.80	11.70	1.70	7.90	2.60	3.50	5.90	10.25	5.70	7.25	6.10	6.72	4.00	8.62
12		8.00	4.60	10.40	1.70	7.70	3.20	3.50	5.80	10.60	5.20	6.65	6.10	6.27	3.81	7.34
13		8.30	5.60	9.60	1.60	12.10	5.40	4.10	5.10	11.10	5.40	7.10	6.20	5.82	4.15	5.31
14		8.50	5.30	8.20	2.10	16.60	5.30	4.30	4.30	11.30	5.30	7.70	5.70	5.37	4.16	5.17
15		9.80	4.30	7.70	2.20	17.40	5.00	4.30	3.30	10.00	6.20	7.90	5.40	4.92	4.84	5.14
16		9.40	4.80	6.80	2.30	17.30	5.10	3.60	3.30	9.90	7.10	7.90	5.10	4.45	5.25	4.65
17		10.10	5.30	6.60	2.40	16.60	4.30	3.40	4.00	10.00	9.35	8.30	5.10	3.46	4.52	5.26
18		11.10	5.65	6.60	2.60	15.10	4.30	3.80	4.00	9.80	9.60	7.90	6.40	4.75	4.29	5.22
19		11.10	6.00	7.30	2.50	13.20	4.20	4.80	4.60	9.80	10.00	7.60	5.00	4.04	4.40	5.11
20		11.90	5.90	6.20	1.90	11.50	3.90	5.50	4.50	9.80	8.55	7.80	4.50	3.54	3.49	4.29
21		12.20	7.80	5.70	1.90	9.80	3.50	5.80	4.40	9.20	9.95	8.25	5.50	3.05	2.65	4.07
22		13.20	8.00	5.30	2.80	8.30	2.70	5.70	4.60	8.60	10.35	8.20	5.50	2.74	3.00	4.90
23		12.10	7.40	5.30	3.10	8.00	2.30	5.30	6.00	8.30	8.60	7.65	5.20	2.84	3.36	4.91
24		11.70	7.40	6.10	2.90	7.10	1.50	5.30	7.10	8.20	7.50	7.00	4.50	2.32	3.10	4.29
25		12.50	4.40	5.40	2.20	6.20	1.80	5.50	8.10	8.30	6.65	4.05	3.70	1.92	3.10	3.73
26		11.80	4.50	6.00	2.10	5.40	1.80	4.70	13.90	8.05	5.55	3.30	3.10	1.63	3.30	3.09
27		11.40	7.30	6.10	2.60	5.40	2.40	4.10	15.80	8.10	5.10	3.60	3.90	2.04	3.40	2.51
28		13.00	7.80	8.80	2.20	5.50	2.90	3.50	16.00	8.10	5.20	4.20	4.20	1.98	3.68	2.18
29		13.30	6.60	8.10	2.00	6.00	4.80	3.30	15.20	8.30	5.55	4.50	4.30	2.61	3.89	2.82
30		12.40	6.50	8.10	2.00	5.90	5.90	3.20	13.20	7.40	5.60	5.15	5.10	2.42	5.41	3.35
31		11.30	6.10	9.30	2.50	5.20	4.30	3.20	12.80	6.65	5.55	6.00	4.70	2.15	5.62	3.75

Date	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
October																			
1	1.12	1.52	0.87	1.40	2.23	1.24	0.12		1.71	3.02	0.95	1.69	2.17	-0.02	-0.25	0.69	1.50	1.29	-0.37
2	0.88	1.50	0.87	0.71	1.61	1.47	0.03		1.90	4.14	0.81	1.27	1.37	0.42	-0.35	0.58	0.80	0.60	-0.31
3	0.37	1.50	1.52	1.00	1.24		0.49		1.46	4.38	1.39	0.62	1.09	0.50	-0.06	1.06	1.03	0.70	0.07
4	0.22	1.45	1.91	1.92	0.43	1.25	0.60		1.66	4.96	1.03	0.56	1.27	0.16	0.66	0.28	0.66	1.12	0.62
5	0.07	1.10	2.22	1.44	0.20	1.15	0.54		1.36	4.36	1.20	1.20	1.02	0.00	0.99	-0.31	0.97	1.68	0.94
6	0.08	0.96	1.99	1.12	0.01		0.75		0.99	4.79	1.63	1.69	0.32	0.48	0.38	-0.20	0.48	1.40	0.91
7	0.60	0.42	1.96	1.24		0.96	0.79		0.34	4.31	2.19	1.99	0.23	0.20	0.65	0.31	0.57	1.77	1.09
8	0.50	0.11	1.51	1.50	0.54	1.31			0.85	3.86	2.24		0.70	-0.10	1.02	0.94	0.92	1.81	1.04
9	0.15	0.03	1.24	2.11	0.78	1.05	0.89		1.51	5.42	1.86		1.10	-0.26	1.32	1.53	1.77	1.43	1.29
10	0.53	0.08	1.31	1.66	0.75	0.33	0.76		1.06	4.81	1.84		0.95	-0.64	1.82	1.55	0.67	0.76	1.44
11	1.09	0.71	1.34	2.23	0.65		0.48		2.07	4.59	1.45		1.68	0.22	1.51	1.15	0.50	0.93	1.20
12	1.46	1.30	0.41	1.71	0.72	0.56	0.76		2.51	5.30	1.06	1.71	1.61	-0.46	0.76	1.56	0.66	0.51	0.91
13	2.12	1.99	0.94	1.18	1.35	1.04	0.71		2.68	5.87	1.71	1.69	1.79	-0.26	-0.10	0.81	0.89	0.70	1.27
14	1.35	2.03	0.89	0.94	1.28	1.46	0.85		2.50	4.91	1.42	1.57	1.35	0.00	-0.24	0.94	0.88	0.84	1.12
15	1.16	1.96	1.56	0.44	1.25		0.86		3.03	5.48	1.72		1.51	0.36	0.37	0.89	1.08	1.62	-0.16
16	1.08	1.67	1.78	0.52	0.93		1.63		2.44	5.62	1.23	1.32	1.64	0.90	0.06	1.11	1.83	1.13	0.33
17	0.75	2.05	1.96	0.19	0.51		0.99		1.90	5.80	1.18	0.55	1.77	1.00	0.34	1.65	1.38	1.15	0.37
18	0.45	2.23	2.28	1.35	0.48	1.76	0.48		2.63	5.40	1.29	0.37	1.93	1.50	0.62	1.06	1.90	1.41	-0.30
19	1.21	1.58	1.68	1.15	0.87		0.68		2.85	3.76	0.68	0.29	1.26	1.04	0.45	0.22	2.34	2.34	0.10
20	1.83	1.86	1.24	0.91	0.98	1.95	1.02		2.29	3.66	0.56	0.44	1.18	0.64	0.21	-0.08	3.08	2.12	0.23
21	1.02	1.20	1.33	1.03	1.03		1.86		2.05	2.75	0.86	0.77	2.15	0.14	0.33	0.78	2.87	1.82	0.67
22	1.04	1.01	1.86	2.00					2.18	2.16	1.20	1.60	0.98	0.00	0.75	1.15	2.29	1.45	0.51
23	1.33	0.89	2.39	2.43	0.86	0.36			2.06	1.55	1.26	1.80	0.57	0.76	0.86	1.14	2.61	0.86	0.62
24	1.82	1.28	1.43	2.23	1.02				3.46	2.40	1.16	1.96	0.70	-0.40	1.39	1.62	1.98	0.30	0.91
25	2.19	2.44	1.78	2.98	1.05		1.03		4.14	1.70		2.09	1.33	-0.08	1.44	2.08	2.17	0.84	0.85
26	2.15	2.43	1.70	3.26	1.19	0.49	0.88		4.43	0.76	0.71	2.43	1.77	-0.68	1.37	1.98	2.58	0.84	0.76
27	2.23	2.14	0.66	2.27	1.53	0.87	1.78		2.86	1.90	0.74	2.29	2.53	-0.08	0.76	2.11	3.24	0.77	0.41
28	2.84	1.44	1.03	2.14	1.90	1.10	2.99		2.64	2.13	0.55	2.93	2.53	-0.16	0.29	2.22	2.73	1.12	0.51
29	1.80	1.51	0.91	2.26	2.01		2.05		3.81	3.22	0.06	2.42	2.66	0.28	0.63	2.15	2.40	1.15	-0.14
30	1.49	1.82	1.88	2.00	2.52	1.44	1.57		3.57	4.03	0.16		2.56	0.68	0.27	2.21	2.26	0.82	-0.54
31	1.36	2.30	2.84	1.92	2.41	1.79	1.19		2.65	5.99	0.51	1.96	2.16	0.98	0.37	1.54	2.24	0.77	0.79
November																			
1	1.67	2.38	2.75	2.07	1.73	1.67	4.68		2.29	6.18	0.97	1.20	1.74	1.28	0.78	1.10	1.97	2.50	0.68
2	1.38	1.91	3.38	1.60	1.44		5.27		1.27	4.71	1.35	0.89	1.56	1.38	1.43	0.34	2.33	3.26	0.95
3	1.90	2.79	2.95	1.17	1.05		4.91		1.18	4.44	1.71		1.45	1.30	1.62	1.46	2.54	3.37	1.75
4	1.53	2.20	3.24	1.60	0.71	1.44	4.65		0.47	4.47	1.83		0.88	0.86	1.42	1.06	1.97	3.86	1.55
5	1.31	1.00	3.47	2.93	1.02		4.12		1.43	4.35	2.65	1.85	0.95	0.80	1.92	1.38	1.88	3.91	2.51
6	2.31	0.52	3.76	3.31	0.88		4.11		1.23	4.40	2.90	2.08	0.88	0.72	2.07	1.43	1.30	4.13	3.60
7	2.43	0.98	3.51	3.22	1.64		3.42		1.68	4.69	3.08	2.71	0.78	0.98	2.35	1.59	1.60	3.85	7.08
8	2.95	1.76	3.42	3.13	1.39		3.00		1.74	3.79	3.02	2.84	1.36	0.56	2.65	1.77	1.48	3.46	10.00
9	2.95	2.24	3.63	3.11	1.82		2.99		1.92	2.83	2.48	2.99	1.90	0.92	2.88	1.78	1.78	3.00	8.73
10	3.07	2.68	2.67	2.34	2.19		3.28		2.50	3.40	1.99	3.31	2.16	0.72	2.74	1.75	2.20	1.89	7.50
11	3.61	2.93	2.78	1.55	1.71		1.99		2.34	3.78	1.74	3.37	2.22	0.32	1.82	1.86	2.38	2.09	7.09
12	3.46	2.99	3.04	1.50	2.09		2.03		3.00	4.14	1.45	3.41	2.56	0.64	1.67	1.64	2.50	2.54	6.03
13	3.49	3.16	3.64	2.17	1.66		1.43		2.90	3.76	1.79	3.39	2.40	1.40	2.02	1.39	2.59	2.83	6.40
14	3.57	3.66	4.24	2.52	1.84		1.66		2.91	4.32	2.04	3.04	2.60	1.62	1.80	1.39	2.67	3.31	6.27
15	3.56	3.66	4.64	1.49	1.92		2.40		3.19	4.03	2.57	2.61	2.51	3.42	1.42	1.47	2.58	3.12	5.62
16	3.31	3.66	4.82	1.86	1.77		3.11		2.95	3.48	2.75	2.51	2.24	2.92	1.75	1.35	2.74	2.96	5.60
17	3.72	4.34	4.84	3.06	1.16		3.08		3.16	3.79	2.78	2.37	1.95	2.52	2.07	2.07	2.27	2.88	5.10
18	3.55	3.73	4.68	3.61	1.58		3.15		3.74	4.42	2.60	2.21	1.35	2.42	1.98	1.86	2.05	2.80	4.23
19	3.37	2.29	4.47	3.19	1.85		2.76		5.78	3.88	2.40		1.19	1.62	2.17	2.46	2.10	2.35	4.19
20	3.55	1.83	4.15	4.51	1.40		2.25		9.93	4.80	2.39	3.97	1.05	2.02	2.10	2.14	1.20	2.31	4.19
21	3.77	2.41	4.55	5.84	1.62		3.96		10.32	4.76	4.16	3.87	1.18	2.42	2.08	2.27	1.25	1.84	4.18
22	5.12	2.08	4.55	5.31	4.67		2.77		10.14	4.91	5.93	4.11	1.60	2.32	2.07	2.73	1.45	1.89	5.03
23	7.71	1.42	4.78	5.40	5.15		2.55		9.63	4.91	6.00	4.39	1.71	3.42	2.02	2.87	1.81	1.29	4.86
24	7.83	2.03	5.39	4.79	5.62				9.56	5.36	6.41	4.53	2.16	3.52	1.71	2.95	1.94	1.19	5.48
25	7.56	2.55	5.76	4.88	4.75		2.44		9.05	5.32	6.44	6.13	2.15	3.32	1.39	2.50	2.28	1.35	6.25
26	7.35	2.48	8.20	5.14	3.95		2.20		8.34	5.41	8.56	10.19	2.40	2.72	1.14		2.43	1.85	6.16
27	6.98	3.03	8.74	5.55	3.02		2.35		7.44	5.28	8.65	11.76	2.69	2.72	1.51	2.37	2.85	2.09	5.91
28	6.90	3.47	9.11	5.87	2.74		2.37		7.69	4.59	7.70	9.63	2.64	3.32	1.19	1.94	2.24	2.06	5.55
29	7.01	3.60	9.03	4.67	2.35		3.04		7.58	5.19	7.16	8.29	2.29	4.92	1.12	2.63	1.69	2.24	4.78
30	6.04	3.78	8.21	4.35	1.86		4.32		7.16	4.49	7.07	7.73	2.50	5.82	1.40	2.62	1.87	2.75	5.01
December																			
1	6.06	4.03	5.23	3.64	2.64		6.74		8.26	4.76	7.00	7.12	2.17	6.42	1.68	2.48	2.39	3.53	3.96
2	5.64	2.14	7.23	3.14	2.89		8.00		8.06	4.71	7.51	7.10	1.81	7.12	1.85	2.33	1.49	3.36	3.57
3	4.23	1.46	7.84	4.25	3.05	2.37	7.37		8.41	4.46	9.69	7.56	1.71	6.92	2.21	2.46	1.06	4.02	3.82
4	3.60	2.06	7.75	4.11	4.15	2.11	6.31		8.50	5.37	9.78	7.44	1.23	6.12	2.22	2.48	2.39	3.45	3.82
5	3.80	4.90	7.76	4.32	3.60		5.82		9.88	4.63	9.08	7.44	1.16	5.82	2.07	2.82	2.86	3.28	3.82
6	4.10	4.35	6.76	5.07	3.56	0.95	5.85		11.85	4.32	8.00	7.93	1.20	5.72	2.11	3.70	3.00	3.16	3.98
7	4.44	3.95	6.65	7.12	4.07	1.76	5.74		11.25	3.64	7.16	8.13	1.77	5.42	1.99	4.69	3.05	2.85	3.82
8	4.39	4.81	6.44	7.03	4.48	2.11	4.79		11.22	4.43	7.40	8.10	2.26	4.92	1.79	4.60	3.55	2.09	3.66
9	4.52	5.02	5.73	6.75	5.15	3.27	3.99		12.55	3.84	7.34	8.33	2.76	4.52	1.46	4.74	4.85	2.07	3.54
10	3.83	4.92	5.75	6.80	5.20	4.25	3.87		12.62	4.16	6.82	8.33	2.60	4.02	1.48	4.55	5.04	1.69	3.21
11	3.15	4.33	6.03	6.47	6.46		3.03		12.48	4.71	6.28	8.09	2.58	4.02	1.54	4.50	6.07	1.95	2.97
12	4.18	4.67	5.23	5.58	6.16	4.41	3.07		12.42	4.73	6.55	7.62	2.80	4.32	1.77	4.79	6.48	2.12	4.40
13	3.87	5.30	6.51	5.09	4.80		3.91		11.55	5.01	7.55	7.60	3.28	4.42	2.29	5.23	5.82	2.13	4.35
14	2.92	4.83	6.50	5.47	4.13	5.00	3.92		10.05	5.56	7.65	7.37	4.02	6.32	2.71	6.07	5.58	2.04	6.10
15	3.57	4.52	6.61	4.24	4.07	4.25	4.08		9.04	5.06	6.92	7.61	4.52	6.82	3.56	5.97	4.96	2.15	8.58
16	3.72	2.96	5.66	3.78	4.34	3.47	4.57		8.16	5.69	6.43	9.17	3.12	7.02	3.82	6.15	4.56	2.80	8.90
17	2.15	3.05	5.60	4.12	4.55		4.86		8.21	7.79	6.21	10.55	3.55	8.12	5.02	6.13	5.15	2.96	6.51
18	2.55	2.83	5.19	4.66	4.23	2.86	5.99		7.64	7.65	5.79	11.25	2.58	8.02	4.82	6.14	4.59	2.67	6.09
19	3.67	2.62	4.75	4.78	3.52	1.93	5.84		7.20	7.41	5.47	11.10	2.77	8.02	4.65	5.83	3.39	2.35	6.40
20	4.01	2.23	6.26	4.91	4.06		6.71			6.46	5.27	10.13	2.59	6.62	4.64	5.38	3.15	2.04	6.24
21	4.37	2.46	7.00	5.14	3.99	1.45	6.20			5.30	4.36	9.44	2.76	6.82	4.16	5.29	3.51	2.32	6.36
22	4.96	2.69	6.43	4.70	4.32	1.40	5.42			5.23	4.86	9.16	2.86	5.52	3.62	4.73	3.80	3.14	5.70
23	5.48	2.48	6.08	4.47	4.48		5.40			4.49	5.07	8.52	3.61	4.72	3.07	4.59	3.80	4.71	5.82
24	5.40	1.47	5.27	4.58	3.98		4.44			3.87	4.97	7.47	3.88	3.92	2.77	4.95	3.20	4.73	5.43
25	4.90	1.34	5.12	3.75	3.10	0.72	3.31			3.32	4.56	7.25	3.92	3.12	2.45	5.03	3.05	4.60	5.50
26	3.88	1.19	4.84	2.73	2.63	1.16	2.73			3.22	4.62	5.81	3.57	2.92	2.66	4.42	3.30	4.69	5.87
27	3.23	1.55	3.23	2.51	2.86		4.53			3.44	4.00	5.04	3.24	3.02	2.37	4.02	3.65	4.75	7.35
28	4.23	2.63	4.15	2.39	2.77		6.21			3.73	7.10	5.49	2.92	3.02	3.37	3.99	3.51	5.27	7.14
29	3.91	3.00	5.19	2.31	4.47		6.03			3.38	12.05	5.38	2.43	3.32	3.78	4.31	3.39	8.66	6.70
30	4.49	2.75	4.68	2.31	4.64	1.49	6.15			3.88	14.40	5.00	2.20	3.22	4.07	4.73	2.89	9.67	6.06
31	4.17	2.66	4.99	2.87	4.39					4.44	14.13	3.72	2.13	3.22	4.94	5.17	3.57	11.41	5.25

Date	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
October															
1	0.95	0.53	-0.06	0.78	1.59	0.65	4.09	0.30	1.66	0.71	-0.17	0.75	1.15	1.14	
2	0.55	0.43	0.40	0.41	1.08	0.73	3.90	0.11	1.04	0.77	0.09	0.48	0.94	0.90	
3	0.80	0.73	0.20	0.46	1.00	0.59	3.29	0.40	0.80	0.61	0.72	0.23	0.95	0.92	
4	0.65	1.19	0.35	-0.08	1.16	0.72	2.74	0.45	0.55	0.70	0.77	0.55	0.68	1.09	
5	1.04	0.75	0.39	0.35	1.61	0.35	1.96	0.42	0.33	0.98	0.97	0.03	0.15	1.09	
6	-0.10	0.02	0.33	0.99	1.31	-0.03	1.71	0.96	0.33	1.25	1.45	0.69	-0.68	0.72	
7	0.30	0.12	0.50	1.51	1.13	-0.22	2.01	1.62	0.60	0.90	0.98	0.25	-0.74	0.43	
8	0.35	-0.55	0.64	1.33	0.56	-0.27	1.95	1.80	0.70	0.69	0.85	0.38	-0.41	0.64	
9	0.82	-0.35	0.75	2.11	1.04	-0.05	2.07	1.86	0.44	0.57	0.67	0.65	-0.23	0.52	
10	1.60	0.00	0.64	2.19	1.37	0.01	1.97	2.04	0.76	0.71	1.24	1.01	0.19	0.57	
11	1.39	0.04	-0.09	1.35	2.55	0.30	1.64	1.52	0.83	1.05	0.97	0.95	0.04	0.10	
12	1.60	-0.34	0.06	1.30	2.16	0.45	1.60	1.25	0.74	0.67	0.59	0.91	0.03	0.96	
13	1.46	-0.44	0.45	1.16	1.72	0.28	1.14	1.10	0.64	1.83	0.80	0.89	0.13	0.80	
14	1.02	0.09	0.91	1.31	2.08	0.50	1.21	1.62	0.83	2.41	0.58	0.18	0.43	2.14	
15	0.75	0.85	1.35	0.88	2.40	0.82	1.13	1.20	1.51	4.60	-0.19	-0.32	0.56	1.66	
16	0.59	1.03	1.47	0.24	2.15	1.78	1.41	0.92	1.76	5.38	0.18	-0.16	0.85	1.06	
17	0.96	1.02	1.34	-0.05	1.60	1.55	1.66	1.04	1.40	5.25	0.36	-0.57	1.36	1.58	
18	1.04	1.22	1.65	-0.24	1.56	1.36	2.40	1.33	1.31	5.06	0.70	-0.55	1.26	1.49	
19	1.99	0.95	1.50	0.36	1.06	1.38	2.04	1.12	0.63	4.64	1.69	-0.09	1.21	1.65	
20	0.80	0.45	1.54	0.39	0.57	1.05	1.81	1.45	0.43	4.30	2.34	0.05	0.85	1.11	
21	1.27	0.69	1.38	0.76	0.37	1.14	1.68	1.69	0.18	3.81	2.09	-0.03	1.16	0.78	
22	1.15	0.82	1.92	0.88	0.75	1.00	1.77	2.06	0.27	3.25	3.66	0.21	0.37	0.85	
23	1.02	0.21	1.12	0.95	1.08	1.47	1.72	2.65	0.44	3.37	4.43	0.86	-0.24	0.50	
24	1.43	0.06	0.59	1.10	0.72	1.00	1.68	3.07	0.84	2.96	3.29	1.47	0.09	0.92	
25	1.50	-0.11	0.06	2.13	1.05	1.17	1.07	2.34	1.36	2.96	2.13	2.00	0.12	0.16	
26	1.42	-0.09	0.57	2.35	2.12	1.77	0.61	2.65	1.70	3.02	1.11	1.59	0.18	0.04	
27	1.03	-0.17	-0.02	2.26	1.60	2.05	0.44	2.52	1.76	3.74	0.61	1.66	0.49	0.42	
28	1.08	0.86	0.35	1.74	1.76		0.25	2.11	2.20	4.02	0.18	1.66	0.52	0.71	
29	1.07	1.00	0.80	1.56	2.57		0.93	2.80	2.13	4.45	0.45	1.32	1.03	1.21	
30	1.20	1.41	0.82	1.23	1.92		0.94	2.42	1.41	4.56	0.27	1.04	1.23	0.99	
31	0.62	1.60	0.81	1.30	1.48	4.21	0.90	2.83	1.83	4.50	0.44	0.91	0.82	0.62	
November															
1	0.43	1.40	1.24	1.21	1.09	4.08	0.75	2.85	3.22	4.63	0.80	0.71	0.55	0.76	
2	0.16	1.14	1.24	2.44	1.75	3.58	0.86	2.63	2.72	4.67	1.04	0.52	0.21	1.62	
3	-0.49	0.82	1.78	2.53	1.54	3.40	1.86	2.74	1.75	4.51	1.88	1.26	0.62	1.82	
4	-0.59	1.24	2.00	2.69	1.28	2.98	1.89	3.24	1.00	4.17	2.10	1.72	-0.41	2.10	
5	-0.42	0.53	2.24	2.75	1.21	2.69	2.63	3.29	0.85	4.09	2.47	1.89	0.54	2.03	
6	0.63	1.22	2.83	2.75	1.49	1.94	2.70	3.40	0.48	4.10	2.97	2.11	0.56	2.02	
7	0.93	1.46	2.83	2.95	1.48	1.73	3.13	3.42	1.05	3.37	2.35	2.09	0.75	1.89	
8	0.78	1.77	2.83	3.12	1.49	1.69	3.17	3.26	1.91	3.44	2.50	1.80	0.99	1.57	
9	0.44	2.13	3.26	2.91	1.69	1.90	2.65	3.07	2.15	2.92	2.37	1.61	1.32	0.97	
10	1.08	2.23	3.02	3.10	1.55	2.00	2.37	3.13	2.03	2.77	2.66	1.59	1.47	1.25	
11	2.00	2.37	2.33	2.67	1.64	2.25	2.18	2.87	1.81	2.99	2.42	1.49	1.55	1.71	
12	1.84	2.94	2.32	2.22	2.13	2.67	2.20	1.98	1.93	3.52	2.44	1.29	1.55	2.04	
13	2.56	5.45	2.51	1.57	2.08	3.60	2.03	1.62	2.00	3.57	2.75	1.08	1.59	2.50	
14	1.83	5.62	2.57	1.43	2.01	3.68	2.15	1.86	2.69	3.89	3.06	0.77	1.70	3.86	
15	1.63	4.76	2.46	1.56	2.08	3.84	2.37	2.10	3.15	4.34	3.45	0.59	1.74	4.17	
16	1.83	3.65	2.47	2.23	1.77	3.55	2.60	2.12	2.79	5.03	4.01	0.58	1.68	4.61	
17	1.98	3.21	3.10	2.17	2.87	3.91	2.81	2.22	2.55	5.08	4.32	0.63	1.40	5.17	
18	2.42	2.78	3.48	3.15	3.12	3.90	2.78	2.33	5.15	4.91	4.24	0.68	1.36	5.02	
19	2.84	2.05	3.32	3.57	2.71	4.62	3.08	2.47	4.83	4.83	4.26	1.06	1.54	4.71	
20	2.88	2.36	4.67	3.92	2.52	7.21	3.73	2.56	4.27	4.86	4.09	1.42	1.03	4.28	
21	2.88	2.06	3.87	4.24	2.52	7.53	3.29	2.90	3.55	4.38	5.21	1.64	0.82	3.84	
22	2.84	1.86	3.19	3.99	3.48	7.13	2.87	3.49	3.09	3.96	5.62	1.93	0.91	3.62	
23	2.78	1.73	3.50	4.12	5.14	6.69	2.50	3.93	3.07	3.83	5.82	2.41	1.00	3.46	
24	2.78	1.86	2.76	3.74	5.93	6.96	2.06	3.91	3.66	4.43	5.79	2.56	1.39	2.81	
25	2.83	1.94	2.35	3.31	5.56	6.89	1.46	3.84	3.59	5.56	5.50	2.26	1.67	3.04	
26	2.75	1.84	2.19	3.48	4.43	6.36	1.29	4.69	2.99	6.37	5.47	2.16	1.72	2.62	
27	2.87	1.82	2.68	3.16	4.12	6.15	1.40	4.69	2.65	6.75	4.99	2.48	2.03	2.29	
28	2.44	1.73	2.60	2.74	3.84	6.08	1.60	4.14	2.62	6.57	4.83	2.66	2.12	2.39	
29	2.39	1.64	2.79	2.92	3.63	5.73	1.61	5.16	2.71	6.27	4.78	2.50	1.75	2.65	
30	2.54	1.62	2.92	2.99	3.27	5.88	1.80	5.61	3.07	6.05	4.46	2.18	1.69	2.56	
December															
1	2.28	1.53	2.88	4.42		6.41	1.93	5.38	3.01	5.68	4.48	1.94	1.36	2.78	
2	2.46	1.72	2.90	4.68		7.22	3.21	5.39	2.13	4.98	4.67	1.78	1.34	2.62	
3	4.60	1.42	2.77	5.06	1.27	7.55	4.70	5.15	2.24	4.82	5.03	1.63	1.22	2.25	
4	7.47	1.39	2.69	4.81	1.05	8.11	4.50	5.09	2.73	4.65	4.56	1.66	1.08	2.04	
5	8.61	1.31	2.64	4.39	1.26	9.50	4.03	5.57	2.64	4.12	4.52	1.82	1.18	1.87	
6	7.12	1.15	2.89	3.85	1.76	9.57	3.68	5.88	3.42	4.32	4.11	1.82	1.22	1.77	
7	5.27	0.99	2.52	3.93	1.77	9.32	3.41	5.81	4.24	4.38	3.53	1.99	1.40	1.31	
8	4.69	1.27	2.55	3.98	1.85	8.96	3.03	5.69	7.64	4.29	3.61	2.06	1.67	1.47	
9	4.19	1.33	2.34	4.53	2.02	8.52	2.66	5.61	9.87	4.44	3.39	2.02	1.68	1.75	
10	3.83	1.42	2.57	5.63	2.02	7.77	2.19	5.77	10.90	4.92	3.09	1.98	1.62	1.52	
11	4.08	1.50	2.63	5.67	2.29	7.22	2.25	5.66	11.09	5.11	2.60	1.83		1.87	
12	3.53	1.66	2.69	6.55	2.44	7.71	2.23	5.65	10.92	5.83	2.62	2.68	2.14	2.44	
13	2.99	2.66	3.07	6.88	2.27	8.01	2.08	4.70	10.39	5.83	3.05	2.27	2.50	2.63	
14	2.91	2.46	2.77	7.53	2.25	7.92	2.07	4.22	8.94	5.59	2.71	2.29	2.43	2.99	
15	2.71	2.66	2.52	9.11	2.45	7.49	1.94	4.03	7.69	5.47	2.71	2.31	2.34	3.36	
16	2.68	2.56	4.15	8.14	1.73	7.32	1.99	4.01	7.88	5.25	2.60	1.73	1.92	3.88	
17	2.64	2.35	4.95	6.31	1.15	7.36	1.91	4.18	7.34	4.85	2.31	1.99	1.69	4.48	
18	2.27	2.75	4.50	5.83	1.21	8.29	1.95	4.08	8.50	4.65	2.28	2.78	1.60	4.15	
19	2.52	1.65	3.72	6.20	1.04	8.20	2.31	4.70	9.58	4.48	2.18	4.17	1.88	4.08	
20	3.67	1.92	3.53	6.25	1.00	7.78	2.09	5.15	9.11	4.75	3.67	4.25	2.63	4.15	
21	4.32	2.11	3.57	5.92	1.39	7.50	2.08	7.13	9.13	5.49	3.30	4.22	3.36	6.48	
22	4.48	2.24	3.93	5.92	1.43	7.65	1.82	9.79	9.18	5.29	2.66	3.66	3.48	6.66	
23	5.23	2.27	3.46	5.76	1.48	6.88	1.63	9.29	8.54	5.71	2.84	3.66	3.30	6.22	
24	6.09	2.63	3.45	5.43	1.72	6.32	1.68	8.29	7.62	4.90	2.30	4.38	3.10	5.92	
25	6.11	3.10	3.00	5.23	2.06	6.16	1.34	8.02	6.90	4.47	2.34	4.43	2.86	5.18	
26	5.73	2.76	2.51	4.50	2.36	6.03	1.22	7.59	6.12	4.55	2.44	3.58	2.97	4.75	
27	5.81	2.40	2.45	4.04	2.45	6.35	1.38	7.70	5.95	4.46	2.93	3.18	2.56	4.63	
28	6.83	3.65	2.64	4.37	3.07	6.28	1.58	7.25	5.79	4.98	2.94	2.54	2.37	4.47	
29	6.33	4.76	2.93	6.35	4.88	5.80	1.70	6.98	5.59	4.51	3.87	2.58	2.07	4.65	
30	5.26	5.31	3.27	7.40	5.77	6.16	1.80	6.50	5.46	4.04	6.25	2.62	1.93	4.50	
31	4.02	5.89	3.18	7.51	6.88	6.20	1.98	6.27	4.35	3.92	6.26	2.62	1.51	5.22	

Attachment B. Tunnel Concept Assessment

Interstate BRIDGE Replacement Program

Tunnel Concept Assessment

Revision 2

September 18, 2023

9.18.2023

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Tunnel Concept Assessment

Revision 2

Prepared for:

Oregon Department of Transportation

Washington State Department of Transportation

Revision	Item	Date
0	Tunnel Concept Assessment	March 1, 2021
1	Sealed and added states of professional registration (Cover, Page iii, Page 1, and Page 32)	April 19, 2023
2	To address duplication that occurred in the model where some excavation quantities were counted more than once, excavation quantities and costs were revised (Table 1 and Table 2) and there is revised/additional text (Pages 14, 15, 17, 19 and 32). Revisions are underlined.	September 18, 2023

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ACRONYMS AND ABBREVIATIONS

AHJ	authority having jurisdiction
BNSF	Burlington Northern Santa Fe Railroad
BRT	bus rapid transit
CRBG	Columbia River Basalt Group
CSZ	Cascadia Subduction Zone
FDCs	fire department connections
FFFS	fixed fire fighting system
HCT	high-capacity transit
I-5	Interstate 5
IBR	Interstate Bridge Replacement
ITT	immersed tube tunnel
LRT	light-rail transit
MUP	multiuse path
NB	northbound
SB	southbound
SCADA	Supervisory control and data acquisition
SR	State Route
USACE	US Army Corps of Engineers

1. INTRODUCTION

The Interstate Bridge Replacement (IBR) program will replace the existing Interstate 5 (I-5) bridges crossing the Columbia River between Vancouver, Washington, and Portland, Oregon. Multiple alternatives will be considered for the bridge replacement.

As part of the preliminary phase of alternatives development, the IBR program assembled a group of engineers with international experience in tunnel design and construction to provide a comprehensive conceptual review of the suitability of an immersed tube tunnel (ITT).

Two alignments, one upstream and one downstream of the existing Interstate Bridges, were investigated from multiple perspectives, including design, construction, operations, environmental, and cost considerations.

This is an assessment of preliminary concepts. These concepts are not in design and remain at the conceptual level. They will not be advanced to design until or if it is deemed appropriate during the alternatives development process.

The following professionals participated in the development of this document:

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2. DESIGN CONSIDERATIONS

The IBR program will replace the existing I-5 bridges crossing the Columbia River between Vancouver, Washington, and Portland, Oregon. In addition to vehicular traffic, the conceptual tunnel facility explored here would also accommodate high-capacity transit (HCT) and a multi-use path (MUP).

Two types of tunnels are typically considered for crossing below bodies of water. One is a bored tunnel where the tunnel is constructed using a tunnel boring machine. Given the length, size, and soil conditions present at this location, a bored tunnel is not appropriate. The other type is an ITT in which a series of prefabricated tunnel segments are constructed in a casting basin or on dry docks, and then sunk onto a prepared soil substrate. Tunnel segments are then connected underwater and the tunnel is dewatered. An ITT is assumed for this assessment.

The ITT concept reviewed here would accommodate all three transportation modes: roadway, HCT, and a MUP. The tunnel section would consist of six cells separated by concrete walls. One cell would accommodate four lanes of traffic for northbound (NB) I-5 and another cell would accommodate four lanes of traffic for southbound (SB) I-5. Two cells, one direction each, would accommodate NB and SB HCT. One cell would accommodate the MUP. One cell would accommodate the operations and maintenance/egress route. It is assumed that all these modes would be housed within a single immersed tube cross-section (see Figure 1).

The length of the facility would consist of an ITT for in-water sections, transitioning to cut-and-cover tunnel sections beyond the river, and then into a retained cut (U-section) until I-5 attains grade.

2.1 Alignments

Two alignments were evaluated: upstream and downstream of the existing Interstate Bridges. Each alignment was assessed considering highway geometry, navigation requirements, geotechnical conditions, structural design requirements, constructability, and environmental considerations. See Figure 2 for a plan showing the two alignments.

Figure 1. Immersed Tube Tunnel Typical Section

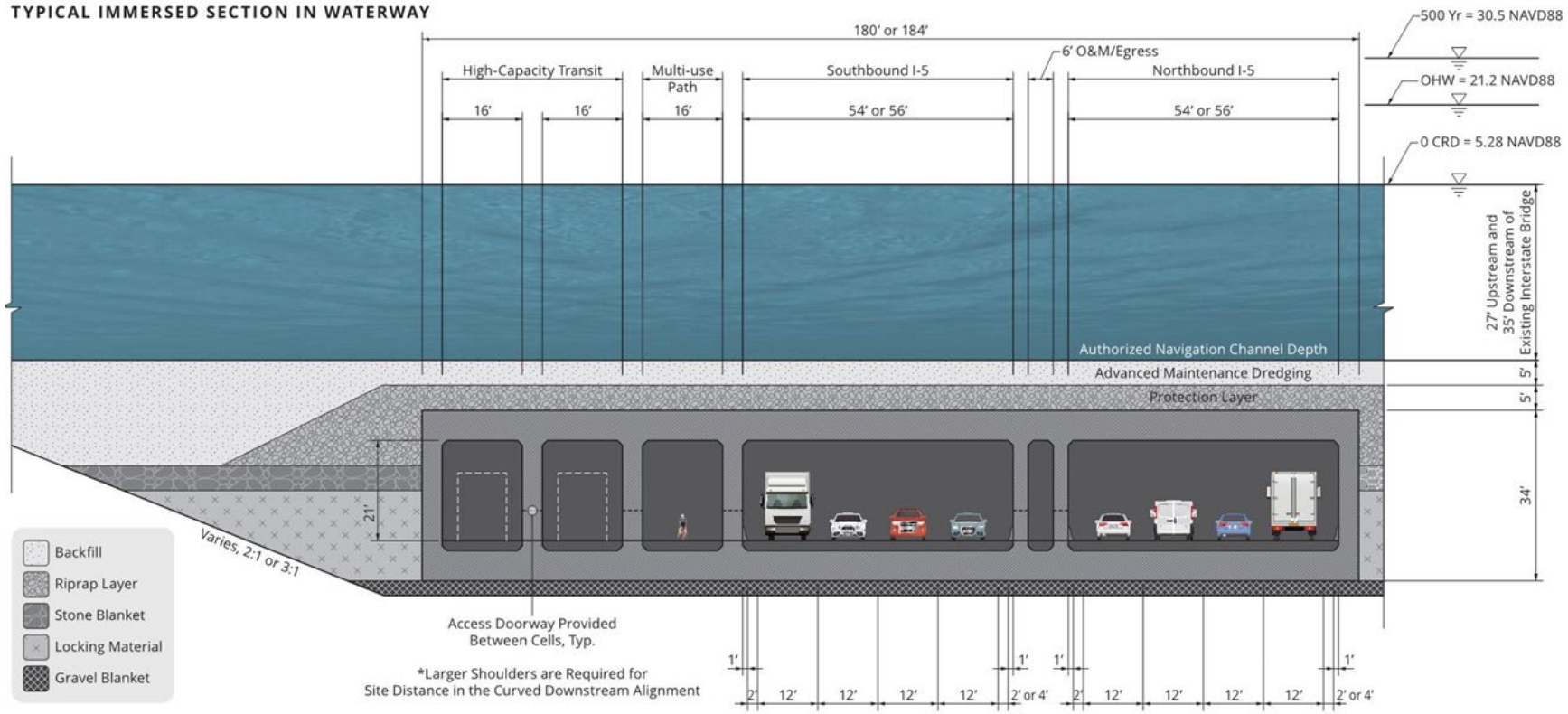


Figure 2. Upstream and Downstream Tunnel Alignments

2.2 Columbia River Navigation

Operational requirements for vessel navigation on the Columbia River define how deep a tunnel must be as it crosses below the Columbia River.

The United States Army Corps of Engineers (USACE) maintains the navigation channels on the Columbia River. River navigation features are authorized to specific locations, widths, and depths, as shown in Figure 3. Navigation features differ upstream and downstream of the existing Interstate Bridges.

Figure 3. Columbia River Navigation Channels

The Upper Vancouver Turning Basin, downstream of the existing Interstate Bridges, has an authorized depth of 35 feet (see Figure 4).

Upstream of the existing Interstate Bridge are three navigation channels: the primary channel, barge channel, and alternate barge channel. All three channels have an authorized depth of 27 feet (see Figure 5). USACE maintains the navigation channels through continuous dredging operations. Currently, USACE maintains the channels to a depth of 17 feet below zero Columbia River Datum

(CRD); however, any project must comply with the authorized depth of the channel. The authorized channel depth of 27 feet extends approximately 90 miles upriver to The Dalles, Oregon.

Figure 4. Navigation Channel for the Downstream Alignment

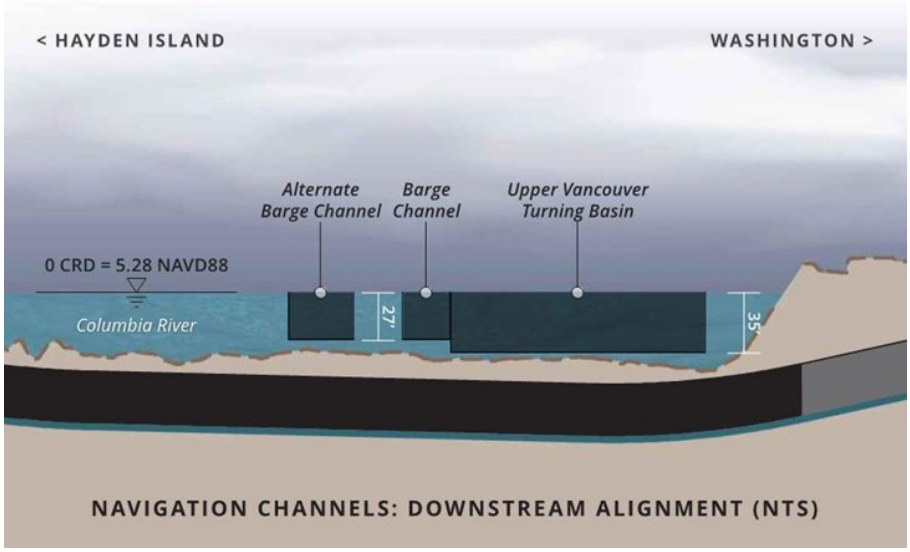
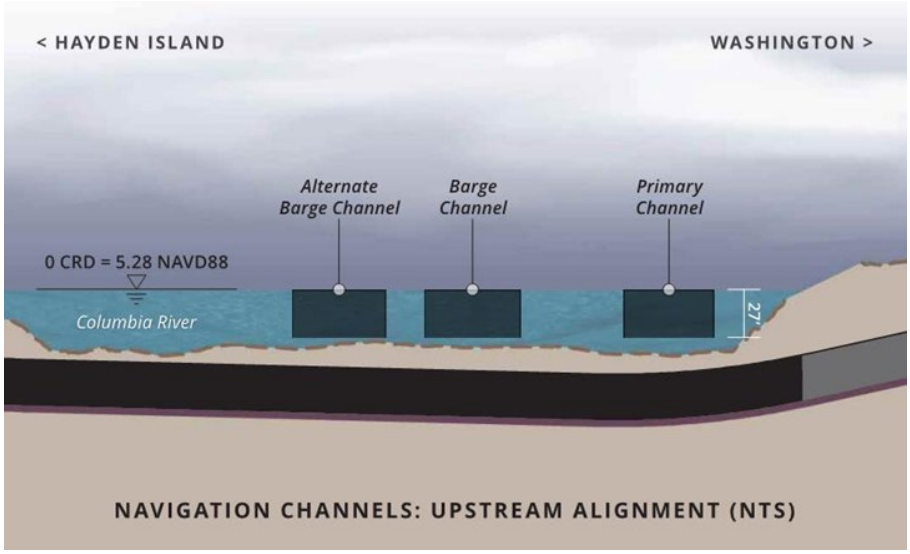


Figure 5. Navigation Channel for the Upstream Alignment



USACE requires that any civil works below the turning basin or navigation channels must be placed below the authorized depths and include an additional 5 feet of depth for advanced maintenance dredging. This is to allow for excess over-dredging required to maintain the authorized channel depth.

Below the advanced maintenance dredging depth, a 5-foot protective layer of rip rap would be required (see Figure 1). The rip rap layer would protect the ITT from unintended additional dredge

excavation, sunken vessels, dragging anchors, river scour, and other hazards that could be detrimental to the structural section of the ITT.

2.3 Highway Design

Two mainline I-5 alignments were evaluated; one upstream of the existing Interstate Bridges and one downstream. Both alignments were established to minimize impacts to the existing Interstate Bridges and facilitate construction phasing.

The ITT depth would be controlled by the authorized depths of the statutory Columbia River navigation channels. Maximum grades for the tunnel would be approximately 4.5%, controlled by highway design requirements. (This exceeds the maximum interstate grade of 4% prescribed by the departments of transportation. However, 4.5% grades can still accommodate the HCT and MUP.) A design speed of 60 miles per hour is assumed for both alignments. At the south end of the facility for both alignments, I-5 would attain grade near the south shore of Hayden Island. At the north end of the facility for both alignments, I-5 would attain grade near Evergreen Boulevard (see Figure 2).

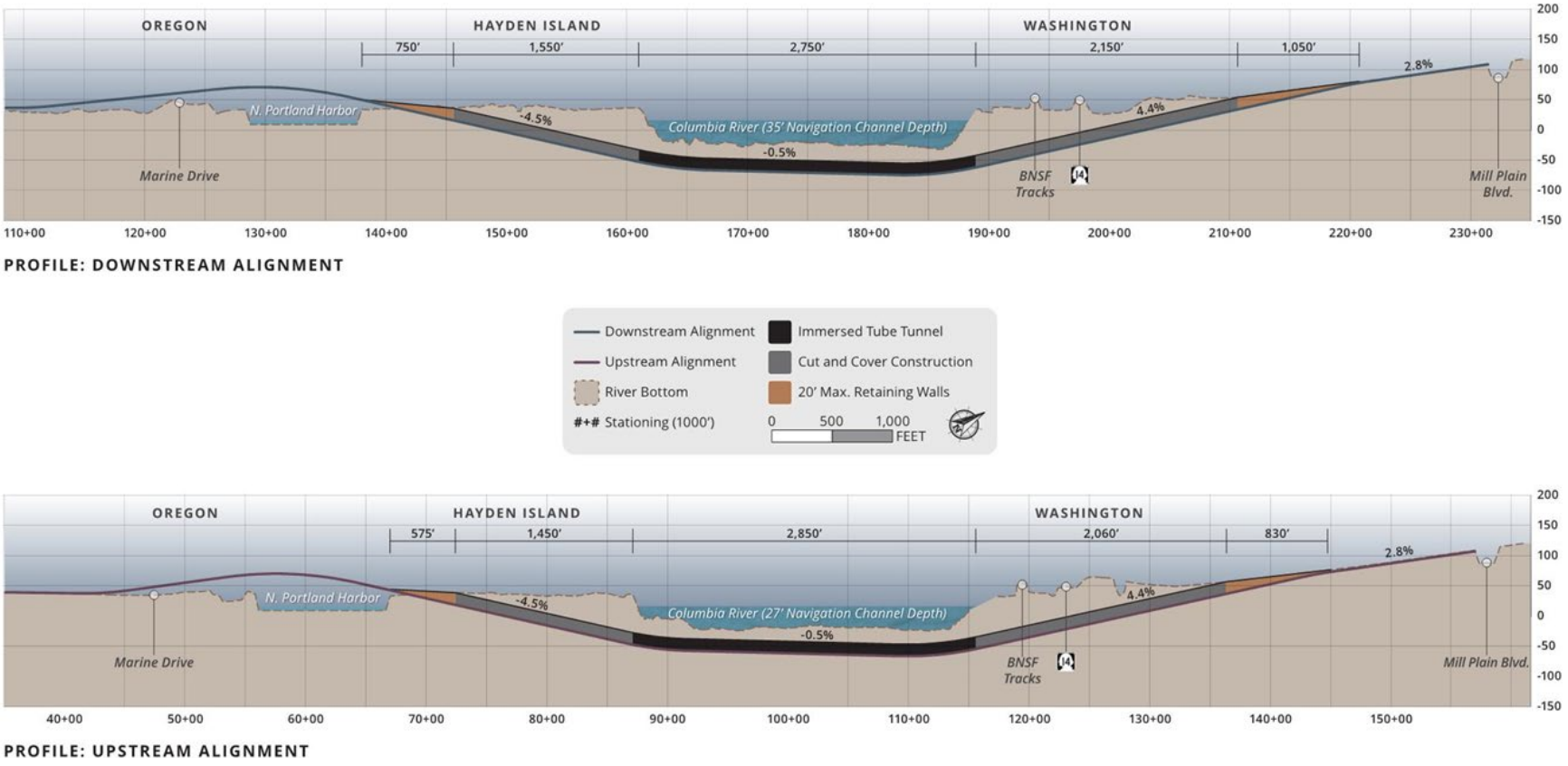
Shoulder widths in the facility are assumed to be 2 to 4 feet wide (see Figure 1). This would require a design exception from the Oregon and Washington departments of transportation, but these widths are typical of similar proposed and constructed tunnels currently in service.

2.4 Downstream Alignment

The downstream alignment as shown in Figure 2 would incorporate a horizontal curve to avoid temporary impacts to the existing Interstate Bridges during construction. This alignment would result in a portal-to-portal tunnel length of 6,450 feet. The grades associated with the downstream alignment are shown in Figure 6. Due to the horizontal curve, 4-foot shoulders would be required to accommodate site distance as shown in Figure 1.

A deeper excavation would be required for this alignment than for the upstream alignment.

Figure 6. Downstream Alignment Profile (top) and the Upstream Alignment Profile (bottom)



2.4.1 Upstream Alignment

The upstream alignment as shown in Figure 2 would follow a more direct route across the river with a shorter portal-to-portal length of 6,360 feet. The grades associated with this alignment are shown in Figure 5.

Due to the upstream USACE-authorized channel depths, this alignment would require less overall excavation. Refer to the Construction Considerations section for further details.

2.4.2 Interchanges

In this assessment of a conceptual ITT, interchanges were not addressed in detail. However, interchanges at Hayden Island, downtown Vancouver, and State Route (SR) 14 would require unconventional and complex below-grade construction. For example, at the center of Hayden Island, I-5 would be 34 feet below grade for the upstream alignment and 38 feet below grade for the downstream alignment. Where I-5 intersects SR-14, I-5 would be 71 feet below grade for the upstream alignment and 73 feet below grade for the downstream alignment (see Figure 5).

The only way to provide connectivity would be to construct cut-and-cover tunnels for ramps to achieve the required interchange connections. The ramp geometry required to accomplish this has not been verified. Large temporary excavations would be required to construct the cut-and-cover ramps. This type of construction is not typical and would have operational implications that are addressed in Chapter 4, Operational Considerations.

2.5 High-Capacity Transit

HCT, regardless of whether it is bus rapid transit (BRT) or light rail transit (LRT), would be accommodated at the 4.5% grades established for the highway profiles. (LRT has a maximum recommended grade of 5%.)

2.5.1 Multi-Use Path

The MUP can have a maximum sustained grade of 5%, which would be accommodated by the grades shown on the highway profiles. The MUP would be in a tunnel section for the entire portal-to-portal lengths described above.

2.6 Aviation

The ITT would result in removal of the obstruction caused by the existing iInterstate Bridges and would not impact permanent operations at Pearson Field or Portland International Airport.

2.7 Geotechnical Considerations

2.7.1 Regional Geology

The project area is located within the Portland Basin, approximately 5 miles east of the confluence of the Columbia River and the Willamette River. The Portland Basin is a northwest-trending structural basin, roughly 40 miles in length and 20 miles in width, flanked by the Tualatin Mountains to the west and the Cascade foothills to the east. The basin is underlain by sequences of lava flows of the Columbia River Basalt Group (CRBG).

During and following the period of extensive lava flows forming the CRBG (ca. 17 to 6 million years ago), the Portland Basin subsided and Sandy River Mudstone and Troutdale Formation were deposited [primarily] by the ancestral Columbia River. Troutdale Formation conformably overlies Sandy River Mudstone and may be up to 400 feet thick in some locations. The Troutdale Formation has been variably eroded by the ancestral Columbia and Willamette Rivers, and by a series of late Pleistocene glacial outburst floods which deposited up to 200 feet of sediment ranging from silts and sands with occasional clay interbeds (fine-grained facies) to gravels and boulders (coarse-grained facies). Following the last of the catastrophic glacial outburst floods, the sea level rose and the deep channels of the Columbia River were infilled with silty/sandy alluvium and broad floodplains were formed along the Columbia River.

2.7.2 Seismicity and Faulting

The regional seismicity is largely driven by proximity to an active convergent-plate boundary. This zone, called the Cascadia Subduction Zone (CSZ), is a broad, eastward-dipping zone of contact between the upper portion of the subducting slabs of the Gorda, Juan de Fuca, and Explorer plates and the overriding North American plate. Regional seismicity associated with the CSZ includes mega-thrust interface events as well as deeper intraslab events.

Local seismicity is generally driven by shallow crustal sources in the vicinity of or within the Portland Basin. The Portland Basin is bounded by high-angle, northwest-trending, right-lateral strike-slip faults considered to be seismogenic; however, the relationship between specific earthquakes and individual faults in the area is not well understood since few of these faults are expressed clearly at the ground surface and the foci of the observed earthquakes have not been located with precision.

2.7.3 Geologic Units

Fill

Fill materials are only anticipated to be encountered near the shoreline and where excavations extend beyond the banks of the river. The fill materials include loose to medium dense, clean to silty, sand to gravel with some wood and other debris, consistent with the historical development and frequent, local modifications to facility use type and operation.

Sand/Silt Alluvium

Sand/silt alluvium is anticipated to be present in nearly all excavation and dredging operations extending from the south end of the proposed alignments to within about 500 feet of the north riverbank. These materials include very soft/loose to stiff/dense silts and sands that are frequently interbedded and generally non-plastic to low plasticity.

Gravel Alluvium

Gravel alluvium is anticipated to be present in excavation and dredging operations extending from about 500 feet south of the north riverbank and continuing to the north. These materials include gravels with variable amounts of silt and sand, and sometimes appear as openwork gravels. This unit is documented as containing scattered cobbles and boulders.

Troutdale Formation

Troutdale may be present for a short distance at the base of dredging operations between about 1,000 feet and 500 feet south of the north riverbank. These materials may appear as a weakly to moderately cemented conglomerate which comprises gravels within a sand and silt matrix. Similar to the gravel alluvium, this unit is documented as containing scattered cobbles and boulders.

2.7.4 Geologic Hazards

Ground Shaking

An ITT would need to be designed to withstand the transient strains associated with ground shaking. Tunnels are regularly designed to account for ground behavior during a seismic event.

Liquefaction

Previous geotechnical studies conducted in this location found that saturated fill materials and silt/sand alluvium are likely susceptible to excess pore pressure development leading to liquefaction-induced strength loss, settlement and lateral spreading during a design seismic event. To mitigate against liquefaction effects, most particularly the potential for differential liquefaction-induced settlements along the tunnel alignment, it is expected that some level of ground improvement may be required. A discussion of ground improvement is provided in the Construction Considerations section.

2.8 Structural Design

A preliminary structural design was developed for the ITT cross-section. Dimensions of the section considered in-service loading and temporary conditions as the section is floated out and placed. The general arrangement and dimensions are shown in Figure 1.

The maximum interior clear height is assumed to be 21 feet with equipment niches of up to an additional 2 feet to allow for ventilation, fire suppression, signage, and lighting while maintaining the

required vertical clearance of 17 feet, 4 inches. The 2-foot equipment niches are located in the cut-and-cover sections of the facility.

2.8.1 Preliminary Analysis

Based on experience, the required structural dimensions are most often controlled by the transverse cross-sectional analysis. Because of this, a longitudinal analysis was not performed at this preliminary stage. A transverse analysis was performed for the cross-section. The section was checked for strength and service loads for moment, axial force, and shear demands, showing that the conceptual section depicted in Figure 1 is adequate.

ITTs can be subjected to several extreme load cases. These load cases are typically checked during later stages of design and were thus not checked as part of this conceptual assessment. These load cases include ship anchors, ship sinking and grounding, heat effects associated with a design fire, explosion, tunnel flooding, and loss of support during construction.

This cross-section (see Figure 1) allows for a buoyant condition during transport and would achieve an acceptable factor of safety against buoyancy during immersion.

3. CONSTRUCTION CONSIDERATIONS

The following sections identify considerations associated with construction of a tunnel facility. Focus is primarily on construction of the ITT section of the facility and the interfaces with the cut-and-cover sections on Hayden Island and in Vancouver.

3.1 Dredging and Excavation

Prior to placement of the ITT segments, a trapezoidal channel would be dredged, with the base of the trapezoid wider than the base of the immersed tunnel segment and side slopes laid back to minimize sloughing or raveling. Table 1 shows the anticipated preliminary excavation quantities on Hayden Island, in the Columbia River, and in Vancouver for the full cross-section shown in Figure 1.

Some of the dredged materials would typically be used as backfill over the rip rap protection layer. However, much of the excavated material would be replaced by engineered fill designed to protect the tunnel from scour and potential impacts, as well as to provide tunnel support both during construction and a potential seismic event. Figure 7 shows a cross-section of the conceptual dredge prism for the ITT across the Columbia River.

Table 1. Preliminary Tunnel Excavation Quantities

Location	Upstream Alignment	Downstream Alignment
Hayden Island (on land)	800,000 yd^3	1,000,000 yd^3
Columbia River (in water)	2,100,000 yd^3	2,300,000 yd^3
Vancouver (on land)	1,000,000 yd^3	1,100,000 yd^3
Total	**3,900,000 yd^3**	**4,400,000 yd^3**

3.1.1 Dredging Operations

Dredged materials are anticipated to consist primarily of loose/soft alluvial and fluvial-marine deposits that could be excavated using conventional methods. Any dredge operations would abide by jurisdictional permitting requirements, which could include the use of silt curtains and seasonal work-window limitations.

3.1.2 Dredging Configuration

For the purposes of this assessment, a 3H:1V slope was assumed for the cut slopes of the dredged prism when dredging in silt/sand alluvium and a 2H:1V slope when dredging in gravel alluvium and Troutdale Formation materials. This configuration could possibly be refined based on subsequent geotechnical and river hydraulic investigations.

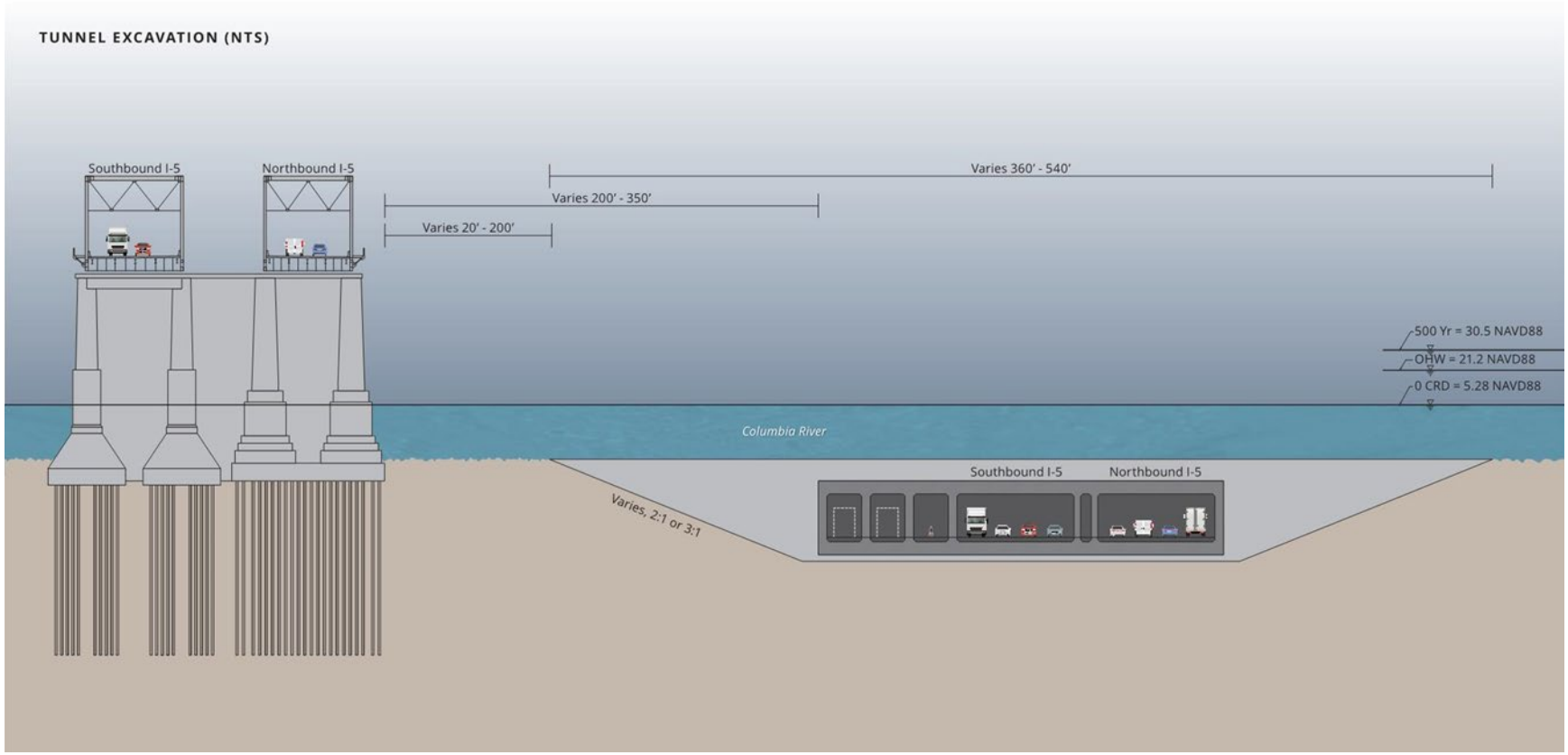
The dredge prism would continue to the north and south banks of the Columbia River. It is anticipated that the dredged prism would be approximately 2,800 feet in length. The quantities shown above in Table 1 are based on "neat line" excavation limits with a 10% allowance for over-excavation.

3.1.3 Dredging and Excavation Risks

The proximity of dredge slopes to the existing I-5 bridge foundations introduces a risk of foundation support loss or undermining. Temporary works to protect the existing foundations, if required, would be extensive, expensive, and have environmental impacts. Tunnel alignments are intended to minimize the potential for protective temporary works.

The excavation will also be under constant threat by sand perpetually swept downstream by the Columbia River. This would require supplemental dredging to clean out and re-establish the excavation geometry and possibly enlargement of the excavation to introduce intermediate benches aimed at capturing the migrating sand waves.

Figure 7. Estimated Excavation for ITT Construction



3.1.4 Shoreline Excavation

Excavation support would be required to facilitate excavations for the transition from the immersed tunnel segments to the cut-and-cover and retained cut segments. Support for excavations outside of the river would likely consist of sheet pile wall shoring systems that are anchored, braced, or some combination of the two. Potential conflicts between anchors and adjacent subsurface infrastructure were not evaluated as part of this assessment.

3.2 Ground Improvement

Ground improvement will likely be required to mitigate against liquefaction effects. Several ITTs designed and constructed in the recent past have included ground improvement programs to mitigate against these effects, such as stone columns for the Aktio-Preveza Tunnel (Greece) and the Limerick Tunnel (Ireland) or compaction grouting for the Marmaray Tunnel (Turkey). For the New George Massey Tunnel (Canada), multiple ground improvement options are being considered, including stone columns beneath the tunnel and cut-off walls on the sides of the new tunnel (to resist lateral spreading type deformations, limit the potential for interaction between the new and an existing tunnel, and limit the dredging footprint).

Any ground improvement program would need to consider and mitigate against the potential for adverse impacts during construction, including both environmental impacts and impacts to the existing Interstate Bridges. For example, grouting-type programs include the risk of cementitious material release into the river and displacement/replacement methods require vibration to advance a probe into the subsurface materials.

3.3 ITT Construction

3.3.1 Segment Fabrication

ITT segments are typically constructed in dry docks or casting basins adjacent to a navigable waterway. Many immersed tunnel projects have required the development of dedicated casting facilities designed specifically for the project, such as for the Fehmarnbelt Tunnel project (Denmark/Germany), though some have been able to utilize existing dry-dock facilities such as the Elizabeth River Tunnels project (Virginia). The cost to develop a project-specific casting facility is typically quite high. However, project constraints can often make this the only practical solution due to lack of adequate existing facilities and/or navigation challenges.

Due to the lack of suitable facilities in the region, it is expected that a new casting facility would need to be designed and constructed specifically for this project. Potential sites for a new casting facility were not identified or included as part of this assessment. It is recommended that any new casting facility developed for this project be sized to accommodate the simultaneous fabrication of multiple ITT segments as temporary float storage of segments and/or significant downtime between placement of immersed segments can increase project costs and risks.

3.3.2 Segment Delivery

The delivery of the tunnel segments would require coordination with private and public entities in the region to ensure navigation requirements were adhered to. Additionally, seasonal constraints, such as river levels, flow velocities, and in-water work windows, would need to be considered.

3.3.3 Segment Placement and Connection

After dredging is completed, a level bedding layer of gravel would be placed. The tunnel segments would be ballasted and lowered. Once the tunnel segments are aligned and set at the proper grade, any void space between the base of the segments and the gravel layer would be filled. When these phases are complete and an initial seal between tunnel segments is established, the water within the sealed zone between segments would be pumped out for construction of a final seal and structural connections.

3.3.4 Segment Cover and Backfill

The proper placement of lateral support and vertical protection and restraint materials is integral to the performance of the ITT. Lateral support is generally derived from keying/locking materials that compact naturally and that would remain stable under seismic conditions. The keying/locking materials and the tunnel segments would be covered with a blanket of well-graded stones followed by rip rap armoring to further lock the segment in place and provide protection against potential impact loads.

3.4 Cut-and-Cover and Retained Cut Construction

The ITT would be connected to the above-ground roadway network via cut-and-cover and retained cut connections at either end. Excavation support for these end connections could differ between Vancouver and Hayden Island, as excavations in Vancouver are anticipated to be primarily in gravel alluvium, whereas excavations on Hayden Island are anticipated to be primarily in silt/sand alluvium. The deepest excavations could require ground support systems consisting of braced or restrained secant pile or slurry walls, while shallower excavations may require less robust ground support systems. Ground improvement measures could be incorporated to decrease the potential for seepage through the base of the excavation and to provide long-term support for the constructed cut-and-cover and retained cut sections.

3.5 BNSF Railroad Coordination

Temporary shoring would be required to excavate and construct the cut-and-cover sections through Vancouver, including below the existing BNSF Railroad berm and tracks. Two methods of constructing the cut-and-cover tunnel below the BNSF tracks were considered. Both methods would require extensive coordination and permitting with BNSF.

The first would be a jacking procedure in which all or portions of the ITT cross-section would be advanced below ground using hydraulic jacks and a reaction structure.

The second method would reroute the existing tracks via temporary tracks, or a “shoo-fly” for the duration of construction. The cut-and-cover section could then be excavated and constructed in the BNSF right-of-way before the tracks would be restored over the newly constructed tunnel. There is limited right-of-way to accommodate a shoo-fly.

Provisions for either approach were not considered or included in this assessment.

3.6 Traffic Staging

During construction, I-5 maintenance of traffic would require complex staging, particularly south of Evergreen Boulevard in the vicinity of the historic post hospital, where the retained cut section attains grade. To maintain traffic during construction, additional right-of-way west of I-5 could be required.

4. OPERATIONAL CONSIDERATIONS

Tunnel facilities require an extensive variety of operating systems to support safe traffic operation and provide for life safety of motorists and emergency responders. The following sections address the systems required for traffic operation and fire/life safety. Information is presented based on the mode: highway, HCT, and MUP.

4.1 Highway

It is assumed that hazardous cargos would be permitted for this route. Hazardous cargos are normally banned from road tunnels, as the potential fire size is an extreme risk to both life safety and the facility itself. However, I-5 is an integral part of the Western US freight corridor. The fire size for a gasoline tanker can escalate to full heat release rate in a matter of minutes, creating a situation that is difficult, if not impossible, to manage or contain in terms of smoke control, firefighting, spill capture, and structural protection.

Certain elements of the fire protection and life safety systems have significant spatial requirements. Feasible concepts for these systems have been assessed to ensure that the conceptual tunnel structure has adequate space to accommodate them. Fire protection and life safety system elements with spatial impacts include:

- Emergency ventilation system
- Fixed fire suppression system
- Tunnel drainage system
- Emergency egress

The primary national standard for fire protection systems in road tunnels is NFPA 502, Standard for Road Tunnels, Bridges, and Other Limited Access Highways. The standard provides performance goals and general guidance for fire protection design.

For a tunnel of this length (6,500 feet, Category D), NFPA 502 mandates the following minimum road tunnel fire protection requirements:

- Emergency ventilation system sized to meet minimum ventilation requirements with one fan out of service or providing operational measures to ensure that life safety is not compromised with one fan out of service.
- Fire protection of structural elements. The structure shall be able to withstand the temperature exposure represented by the Rijkswaterstaat time-temperature curve or other recognized time-temperature curve approved by the authority having jurisdiction (AHJ), following an engineering analysis.
- Fire alarm control panel and detection, identification, and location of fire in the tunnel.
- Fire standpipe designed and installed in accordance with NFPA 14.

- Fire hose valve connections are required so that no location on the tunnel is more than 150 feet from a hose connection.
- An emergency power system in accordance with Article 700 of NFPA 70 is required, and it shall provide power to all major tunnel systems, including the ventilation system.
- Tunnel drainage collection system designed so that spills of hazardous and flammable liquids cannot spread or cause flame propagation.

The following requirements are conditionally mandatory pending the results of an engineering analysis:

- Water-based fire-fighting system
- Closed-circuit television and automatic fire detection systems

The tunnel would need to accommodate a variety of operational systems and features to support safe traffic operations and to provide the necessary level of fire protection and life safety, including:

- Emergency egress
- Normal and emergency tunnel ventilation
- Fixed firefighting system and fire standpipe
- Fire detection and alarm
- Emergency communications
- Roadway drainage
- Normal and emergency electrical power
- Supervisory control and data acquisition (SCADA)
- Roadway lighting
- Traffic control and monitoring
- Tunnel finishes and special signage
- Operations and maintenance

4.1.1 Highway Egress

The egress strategy would be a fire-rated corridor (cell) that runs between the NB and SB I-5 cells. The door spacing must be 1,000 feet or less; 600 feet is typical. Suitable emergency signage, lighting, and pressurization of the fire-rated corridor is also required.

The egress corridor should have a width of 6 feet to accommodate drainage pipes, water mains, and other services. The space above the egress envelope would house these items.

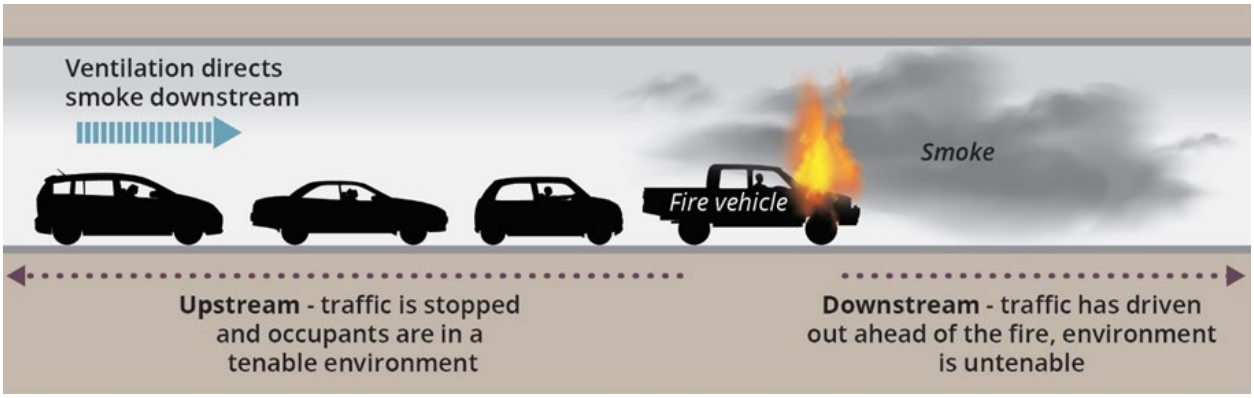
4.1.2 Highway Ventilation

Ventilation is required for normal operations (vehicle emissions management) and emergency operations (smoke management). NFPA 502 requires tenable conditions for egress and facilitation of conditions for firefighting. Achieving these conditions relies on ventilation, means of egress, and fire control. Based on the tunnel length and traffic configuration, a longitudinal ventilation system is recommended for this facility.

Portal emissions and air quality compliance in surrounding areas would be critical with a longitudinal ventilation system. If acceptable air quality cannot be achieved or maintained, then ventilation buildings at each portal would be required.

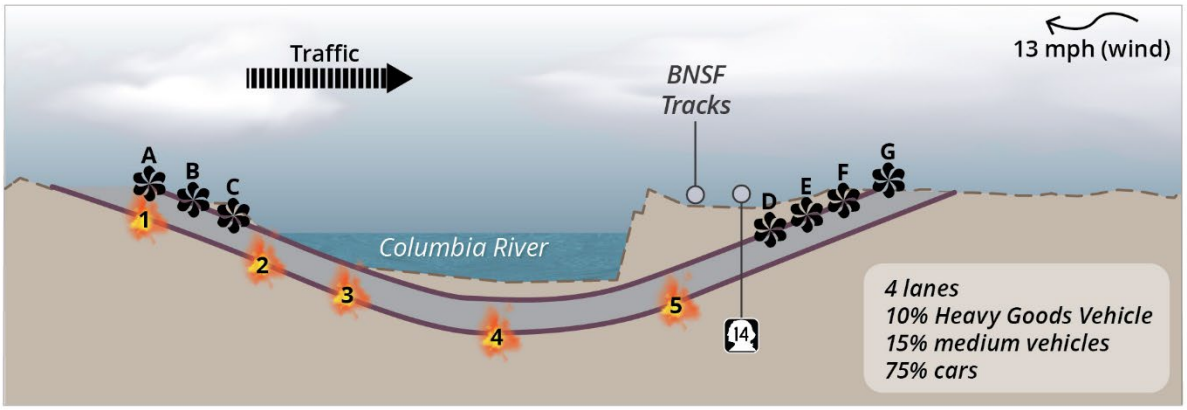
A likely ventilation concept based on one-way traffic would direct the smoke downstream of the fire site (vehicles downstream drive out ahead of the fire) in a longitudinal ventilation concept (see Figure 8).

Figure 8. Longitudinal Ventilation Concept



Jet fans would be placed in the cut-and-cover sections of the tunnel to generate the longitudinal airflow. A general fan arrangement is shown in Figure 9. Letters A through F indicate the approximate locations of the jet fan niches, while numbers 1 through 5 show approximate fire locations. There would be six to seven jet fans per niche. Assuming that hazardous materials would be permitted for this route, it would also be necessary to supplement the jet fans with an automatic sprinkler system.

Figure 9. Highway Tunnel Fan Layout



4.1.3 Highway Fire Protection Systems

NFPA sprinkler system requirements for tunnels include material properties, hydraulic performance, functional provisions for fire department interaction, system approval, and occupancy classification.

Roadway Fixed Fire Fighting System

The fixed fire fighting system (FFFS) would be an automatic sprinkler system providing water spray covering the entire roadway surface. The FFFS would be supplied with a permanent water supply from the local water utility. It is not anticipated that fire pumps or water storage tanks would be required, though holding tanks and treatment would be needed for the discharged water. The FFFS is also provided with fire department connections (FDCs) to allow responding fire departments to boost system pressure if needed.

Roadway Standpipe System

A fire standpipe system would be provided to supply fire hose valve outlets throughout both roadway cells at 275-foot intervals. The standpipe system would be supplied with a permanent water supply from the local utility. Should additional pressure be required, FDCs at the tunnel portals would be used to boost the pressure.

Structural Thermal Protection System

The extreme temperatures possible in a tunnel fire can do extensive damage to a tunnel's structural elements. Thermal protective board or other protective insulation would be required.

4.1.4 Highway Drainage Systems

Tunnel drainage systems normally consist of two independent systems: a stormwater control system and a tunnel drainage system. Stormwater control systems would be required at the tunnel portals to intercept stormwater flows that accumulate on the open approaches and transition roadways leading into and out of the tunnel. A separate tunnel drainage system, independent of inflow from sources outside the tunnel, would be required to collect and discharge water and effluents generated within the tunnel. These effluent flows would result from tunnel washing, use of fire suppression systems, vehicle carryover, and some seepage. The tunnel drainage system would also have to accommodate a potential fuel or hazardous material spill.

The profile of the selected tunnel alignment would dictate the tunnel's low point. A drainage pump station would be required at this location. Systems would also be required for the MUP, HCT, and egress cells. The tunnel drainage effluent would require some form of pre-treatment prior to discharge depending on local permitting requirements.

4.1.5 Highway Electrical Systems

Several electrical operating systems would be necessary to support safe traffic operations. Tunnel electrical systems would include:

- Normal power distribution
- Emergency power distribution
- Fire alarm and detection
- Emergency communications
- Security
- SCADA
- Communication systems

4.1.6 Highway Lighting Systems

The tunnel lighting system would provide the required illumination so that a motorist could safely navigate and maintain speed while in the tunnel. This objective must be met during daytime, nighttime, and during an emergency (loss of power). Daylight conditions require high levels of illumination at the tunnel's entry portals. Nighttime lighting levels are lower. During an emergency, lighting would be maintained at the nighttime level to allow for egress.

4.1.7 Traffic Control and Monitoring Systems

Roadway tunnels require a means for control of traffic within the tunnel, as well as traffic on the approach roadways leading into the tunnel. The types of traffic control systems and devices would likely include:

- Automatic incident identification system
- Closed-circuit television

- Variable message signs
- Lane use/control signals
- Over-height vehicle detection

4.2 Transit

The primary national standard for fire protection systems in underground trainways is NFPA 130. If LRT were selected as the HCT, these requirements would apply. (If BRT were selected as the HCT, NFPA 502 would apply; see Section 4.1 above.) NFPA 130 protection requirements include:

- Cross-passageways at a maximum spacing of 800 feet for egress
- An emergency power system for all tunnel systems
- Minimum clear walkway width of 24 inches for egress

The tunnel would need to accommodate a variety of systems to support safe operations, fire protection, and life safety. Various trainway tunnel systems would include:

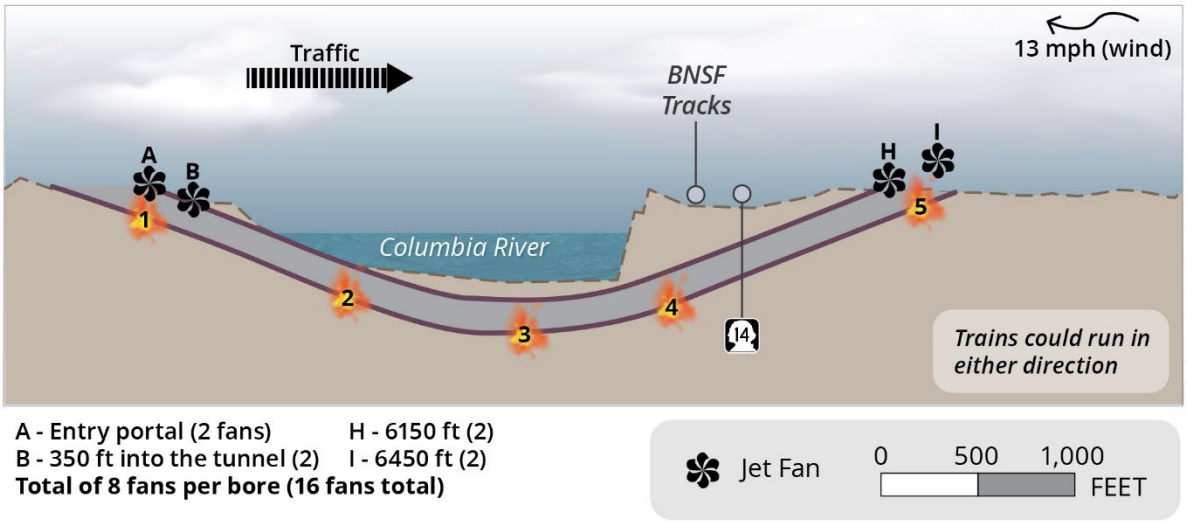
- Emergency egress
- Tunnel ventilation
- Fire protection
- Tunnel drainage
- Electrical systems
- Tunnel lighting
- Tunnel finishes (fire protection)
- Operations and maintenance

4.2.1 Transit Ventilation Systems

Ventilation is required for smoke management per NFPA 130. The design fire is representative of a fully engulfed railcar or bus.

Jet fans would be placed in the tunnel to generate the longitudinal airflow. Fans would be placed in the cut-and-cover sections. A general fan arrangement is shown in Figure 10. Letters A, B, H, and I indicate the approximate locations of the jet fan niches, while numbers 1 through 5 show approximate fire locations. There would be two jet fans per niche.

Figure 10. HCT Tunnel Fan Layout



4.2.2 Transit Fire Protection Systems

NFPA sprinkler system requirements for tunnels include material properties, hydraulic performance, functional provisions for fire department interaction, system approval, and occupancy classification.

Transit Standpipe System Configuration

A fire standpipe system would be provided to supply fire hose valve outlets throughout both HCT cells at 275-foot intervals. The standpipe system would be supplied with a permanent water supply from the local utility. Should additional pressure be required, FDCs at the tunnel portals would be used to boost the pressure.

4.3 Multi-Use Path

The MUP cell would require lighting, ventilation, drainage, security, and fire and life-safety systems.

Walkways and bikeways in tunnels are not uncommon, but there are no known MUPs in facilities of this length. Egress with respect to smoke management would need to allow people downstream of the fire enough time to reach an egress point. This is of particular concern because any doors from the MUP would lead either to the transit or roadway cells, creating a security and safety risk.

Based on experience, a ventilation system similar to that proposed for the transit tunnel would likely be enough to provide sufficient fresh air. Supply air would be provided via jet fans.

4.4 Operations and Maintenance

A comprehensive operations and maintenance program is necessary to ensure a safe, well-maintained, and reliable tunnel facility. The program would include emergency management plans, maintenance management plans, and operational procedure manuals.

A staffed operations center would be required for monitoring the mechanical, electrical, traffic control systems, and security. A tunnel system support building would be required at each end of the tunnel to house electrical distribution equipment, communications equipment, intelligent transportation system equipment, ventilation systems, fire systems, etc.

Additional facilities may include maintenance shops, garages, and storage spaces to house equipment and spare parts.

An operational ITT would require a full-time staff. A mix of personnel would be required, including electricians, mechanics, millwrights, and general maintenance staff to maintain the facilities and various systems.

5. ENVIRONMENTAL CONSIDERATIONS

This section provides a general overview of the environmental considerations associated with a tunnel alternative.

5.1 Biological

- In-water trenching during construction would disturb the river bottom across the entire width of the Columbia River, including the riverbanks.
- Dredged material would need to be placed in an in-water or upland site and may require special handling if contaminated materials are found.
- Disturbance to the river bottom and nearshore habitat would require mitigation.
- In-water construction would impact aquatic plants, fish, marine mammals, and birds.
- The tunnel would eliminate over-water shading.

5.2 Hazardous Material

- Excavation would cause disturbance and suspension of potentially contaminated sediment in the Columbia River.
- Large excavations required on land would potentially encounter contaminated soils requiring treatment and/or disposal in approved facilities.
- The volume of potentially contaminated material associated with tunnel excavation may exceed the capacity of existing disposal locations.

5.3 Historic Structures and Archaeological

- Historic structures and archaeological resources may be disturbed and permanently impacted due to the size and volume of excavation required for the tunnel.
- There are tribal concerns about burials along the Columbia River shoreline.
- Construction vibration could cause impacts to historic structures and archeological resources.
- The tunnel could impact Fort Vancouver and the Old Apple Tree Park.

5.4 Land Use

- Construction activities would impact businesses, neighborhoods, and parks and recreation areas. These impacts would include construction noise, vibration, and additional traffic congestion.
- Utility relocations would be required for the tunnel facility.
- Tunnel right-of-way would require negotiation with BNSF for construction impacts and temporary track reroutes.
- A tunnel would provide opportunities for trail connectivity on the Washington shore and increase the potential for more park space along the river.

- The tunnel provides an unimpaired viewshed along the river.

5.5 Navigation and Aviation

- A tunnel would not impact aviation operations at Pearson Field or Portland International Airport.
- The tunnel would eliminate navigation hazards in the river.

5.6 Permitting

- In-water work windows and related work restrictions would impact the construction schedule.
- It is yet to be determined whether existing dredge spoil disposal sites could accommodate the volume of sediment generated.
- Permitting a new dredge spoil disposal site may not be feasible to complete within the expected project schedule.

5.7 Safety and Emergency Response

- The tunnel would impact emergency response routes on both sides of the river.
- The MUP, which would be enclosed for over one mile, poses a safety concern for users.

5.8 Storm Water Management

- Once constructed, the tunnel would require a continuously operating low-point sump and pump system. The sump and pump system would require storm water retention and treatment facilities.

6. CONCEPTUAL COSTS

Conceptual costs were developed based on previously completed projects and the collective expertise of this team. These costs are for a facility that would accommodate I-5, HCT, and the MUP. Interchange costs are not included.

Based on the preliminary assessment, the downstream alignment would result in a deeper, longer, and therefore more expensive facility compared to the upstream alignment. As a result, conceptual costs in Table 2 are based on the upstream alignment and shown in 2021 dollars.

Ancillary facilities would include an operations building and fan plants.

The conceptual costs do not include an allowance for soft costs such as design, construction management, or right-of-way. The conceptual costs also do not include any allowance for contingency or life-cycle considerations. However, based on previous experience, operation and maintenance costs of the facility would be on the order of $465 million over a 75-year design life.

Table 2. Reasonable Order-of-Magnitude Construction Costs

Description	Conceptual Cost
ITT	$890,000,000
Cut-and-cover	$1,305,000,000
Retained cut	$170,000,000
Ancillary facilities	$150,000,000
Total cost	**$2,515,000,000**

7. SUMMARY

The following is a summary of the considerations associated with the ITT concept.

7.1 Design

- Upstream and downstream tunnel alignments were considered.
- The facility would consist of an ITT for in-water sections, transitioning to cut-and-cover tunnel sections beyond the river and then into a retained cut (U-section) until I-5 attains grade.
- At the south end of the facility, I-5 would attain grade near the south shore of Hayden Island.
- At the north end of the facility, I-5 would attain grade near Evergreen Boulevard.
- The facility would consist of six cells: four lanes for NB I-5 and four lanes for SB I-5, a MUP, NB and SB HCT, and a maintenance/egress corridor. Each mode and direction are separated by a wall.
- Maximum grades for the tunnel would be approximately 4.5% controlled by highway design requirements.
- The ITT depth would be controlled by the authorized depths of the statutory Columbia River navigation channels.
- The ITT would be designed to meet current seismic safety standards.
- The combination of the controlling grades and the depth of the river channel would require interchange access modifications. Connectivity to Hayden Island, downtown Vancouver, and SR-14 would be extremely difficult and require unconventional construction below grade.

7.2 Constructability

- Large excavations in excess of 70 feet deep at the Washington shoreline and in excess of 30 feet deep on Hayden Island would be required to facilitate construction of the cut-and-cover tunnel sections.
- The high groundwater and permeable soil would require extensive measures, such as temporary shoring and dewatering systems, to provide a suitably dry and stable excavation for construction of the cut-and-cover and retained cut sections.
- The proximity of in-water and on-land excavations to the existing Interstate Bridges' foundations could require extensive temporary works to preserve the structural integrity of the existing bridges during ITT construction. The alignments considered sought to avoid this risk.
- Washington excavations would require temporary relocation of the dual BNSF mainline tracks or complex staged and phased construction techniques.
- Maintenance of traffic on I-5 would require complex staging south of Evergreen Boulevard in the vicinity of the historic post hospital.

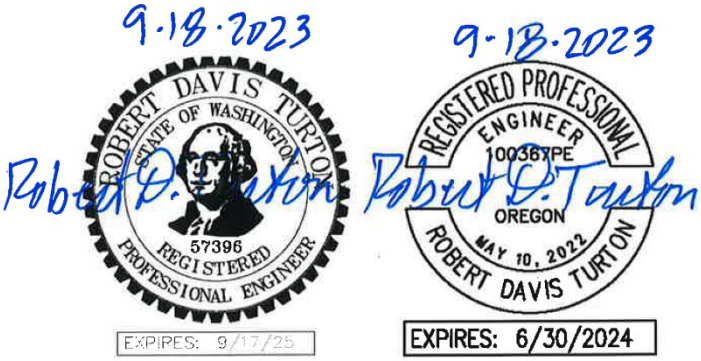
- Due to the lack of suitable facilities in the region, it is expected that a new casting facility would need to be developed.

7.3 Operations

- The ITT would require an operations and maintenance/egress tunnel from end to end between NB and SB I-5.
- Extensive fire and life safety systems would be required.
- The ITT would require a continuously operational low-point sump and pump system.
- Operations and maintenance equipment housing would be required at each end of the facility.

7.4 Environmental Considerations

- In-water excavation would require approximately 2 million cubic yards of material. Total excavation for the tunnel facility would be approximately 4 million cubic yards of material.
- In-water construction would impact aquatic plants, fish, marine mammals and birds.
- Excavations in the vicinity of SR-14 would likely encounter cultural resources.
- In-water work windows and related work restrictions would impact the construction schedule.
- A tunnel would not impact aviation operations at Pearson Field or Portland International Airport.
- The tunnel would eliminate navigation hazards in the river.



Attachment C. River Crossing Bridge Clearance Assessment Report – Movable Span Options

Interstate BRIDGE Replacement Program

River Crossing Bridge Clearance Assessment Report – Movable Span Options

November 2022

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ACRONYMS AND ABBREVIATIONS

BNSF	BNSF Railway
CFR	Code of Federal Regulations
CRC	Columbia River Crossing
FAA	Federal Aviation Administration
I-5	Interstate 5
IBR	Interstate Bridge Replacement
LRT	light-rail transit
O&M	operation and maintenance
OCS	overhead catenary system
ODOT	Oregon Department of Transportation
PNCD	Preliminary Navigation Clearance Determination
SUP	shared use path
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
WSDOT	Washington State Department of Transportation

1. INTRODUCTION

The Interstate Bridge Replacement (IBR) program will replace the existing Interstate 5 (I-5) bridges crossing the Columbia River between Vancouver, Washington, and Portland, Oregon. Multiple design options are being considered for the bridge replacement.

In June 2022, the U.S. Coast Guard (USCG) responded to the IBR's program's Navigation Impact Report and issued a Preliminary Navigation Clearance Determination (PNCD) for the IBR program that prescribed the vertical and horizontal navigation clearance that would have a high likelihood of obtaining a favorable permit decision. The PNCD indicated that vertical navigation clearance over the Columbia River is currently, and needs to continue to be, equal to or greater than the existing I-5 bridges' clearance of 178 feet. The USCG also requires that the horizontal navigation clearance meet the U.S. Army Corps of Engineers' (USACE) requirement. The IBR program's Navigation Impact Report assumed a mid-level fixed span bridge providing 116 feet of vertical clearance (herein referred to as the Fixed Span Bridge) and a horizontal navigational clearance of 300 feet with an additional 50 foot buffer on either side of the navigation channel.[1] A movable span bridge is an option that could achieve 178 feet of vertical clearance. The purpose of this report is to clarify the implications of using a movable span bridge that would use a dynamic mechanical design to provide 178 feet of or unlimited vertical clearance as needed for vessel passage.

The IBR program assembled a group of professional engineers, including those with international experience in movable bridge design and construction, to provide a comprehensive conceptual review of the suitability of a movable bridge span that would provide a navigational opening with a vertical clearance that meets or exceeds that provided by the existing movable bridge span.

The following three movable span options were investigated from interdisciplinary perspectives, including design, construction, operations, environmental considerations, and cost considerations:

1) **Vertical lift span** (178 feet of vertical clearance)

2) **Bascule span** (unlimited vertical clearance)

3) **Swing span** (unlimited vertical clearance)

[1] The USCG made a preliminary determination of a 400-foot-wide navigation channel based on an authorized 300-foot channel plus 50-foot additional clearance on each side requested by the USACE for channel maintenance. In the event the federal agencies reconsider and allow a 300-foot-wide navigation channel, the design, construction, operation, and environmental considerations for a movable bridge span as described herein would be similar to those reported for the 400-foot-wide channel. The USACE decision to allow modification to the navigation channel buffer requirements is pending. The conceptual costs shown in this report are based on historical costs per square foot, so for comparison purposes, the cost for 300-foot-wide navigation channel options can be estimated at 75% of the cost for the 400-foot-wide navigation channel options.

The concepts assessed in this report are preliminary. They are not under design and remain at the planning conceptual level. They will not be advanced to the design stage until or unless deemed appropriate by program leadership.

2. FIXED SPAN BRIDGE

The IBR program will replace the existing I-5 bridges crossing the Columbia River between Vancouver, Washington, and Portland, Oregon. For comparison purposes, this assessment assumes a Fixed Span Bridge comprising two side-by-side fixed-span bridges as the basis for the river crossing (Figure 1). The upstream bridge would accommodate northbound I-5 lanes on the upper deck and a shared-use path (SUP) on the lower deck. The downstream bridge would accommodate southbound I-5 lanes on the upper deck and two-way light rail transit (LRT) (two tracks) on the lower deck. The roadway would consist of three through-lanes and one auxiliary lane in each direction, along with full inside and outside shoulders.

The Fixed Span Bridge's alignment provides a horizontal tangent across the river and allows for the ability to construct a new bridge and maintain traffic on I-5 during construction. The two bridges have a horizontal curvature introduced in the north two spans (between Piers 6 and 8) as the bridge approaches Vancouver. Based on past work, the Fixed Span Bridge is assumed to have a grade of just under 4% as it transitions from each land side of the river with a long crest vertical curve providing the high point for navigation at the proposed primary navigation channel.

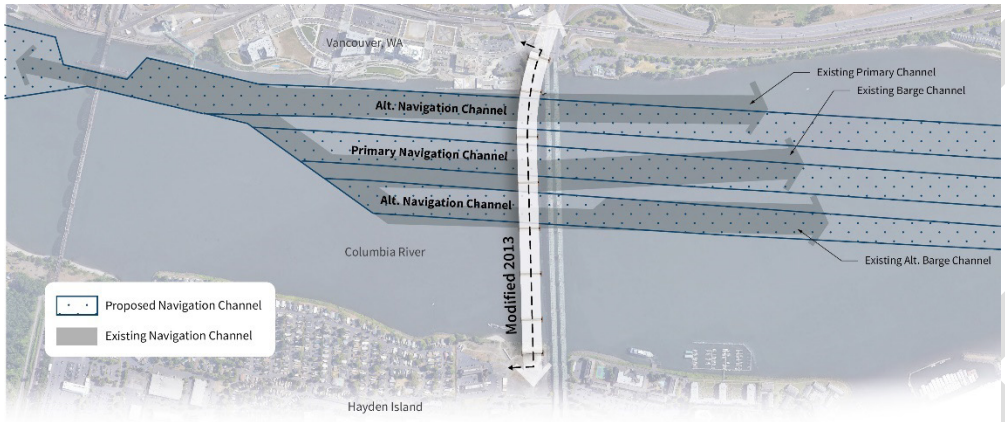
3. MOVABLE SPAN OPTIONS

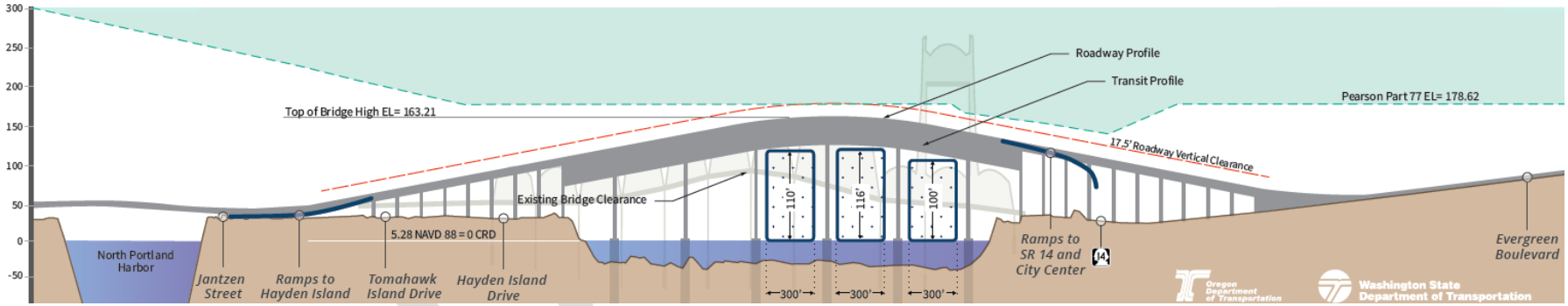
This assessment assumes that the upstream and downstream fixed spans between Piers 5 and 6 of the Fixed Span Bridge, which flank the proposed primary navigation channel, would be replaced with movable spans. The movable spans would accommodate vehicular traffic, LRT, and a SUP and would be among the largest of their kind in the world.

The three types of movable spans considered are described as follows:

1. A **vertical lift span** is similar to the type of movable span that exists on the crossing today, in which the span would rise vertically while remaining parallel with the deck.
2. A double-leaf **bascule span** would open in the middle, with each leaf rotating from a normal horizontal position to a nearly vertical position; to reach this position, each leaf would pivot around a horizontal axis on trunnion shafts attached to each side of the span.
3. A **swing span** is similar to the downstream BNSF Railway (BNSF) bridge; in this design, the span opens by pivoting on a central pier and then rotating in a horizontal plane around a center support (vertical axis). For the IBR program, two swing spans would be required in order to provide the necessary horizontal clearance.

Figure 1. Mid-Level Fixed Span Bridge Plan and Profile





3.1 Vertical Lift Span

Vertical lift span bridges have been constructed with navigation channel (horizontal) clearances in the range of up to 500 feet and vertical clearance of approximately 200 feet. This type of span would provide a predetermined vertical clearance for river navigation, which, in this case, has been prescribed by the USCG to meet or exceed that of the current lift span (178 feet).

The cross-section of a vertical lift span would be consistent with that proposed for the Fixed Span Bridge with two[2] double-deck side-by-side bridges. The upstream bridge would have northbound I-5 lanes on the upper deck and a SUP on the lower deck, and the downstream bridge would have southbound I-5 lanes on the upper deck and two-way LRT on the lower deck.

The lift spans would be located between Piers 5 and 6 to provide up to 178 feet of vertical clearance over the proposed primary channel. Vertical lift spans are required to be on a straight section of bridge that has a level (or nearly level) deck.

Figure 2 shows an example of a single double-deck vertical lift bridge in Houghton, Michigan. The IBR program would require two side-by-side double-deck vertical lift bridges to accommodate multimodal traffic.

Figure 2. Double-deck Vertical Lift Bridge Example – Portage Lake Bridge, Houghton, MI

3.2 Bascule Span

The practical limit for a double-leaf bascule span is approximately 350 feet long. If the IBR program were to use this type, the bascule spans would hinge from Piers 5 and 6 to provide unlimited vertical

[2] The combination of the length, width, and depth of the lift spans required for the IBR program would result in one of the biggest, if not the biggest, lift span in the world. A single wider lift span was not considered as it would significantly exceed the widest movable bridge span in the world.

clearance over the proposed primary channel. Bascule spans are required to be on a straight section of bridge that has a level (or nearly level) deck.

A double-leaf bascule arrangement would be needed to accommodate the required width of the navigation channel. This option could be accommodated by a two-bridge double-deck arrangement[3] similar to the Fixed Span Bridge. Figure 3 shows an example of a double-deck double-leaf bascule bridge in Chicago, Illinois.

Figure 3. Double-deck Double-leaf Bascule Bridge Example – Wells Street Bridge, Chicago, IL

3.3 Swing Span

The swing span option would require one double-deck swing span on Pier 5 and one on Pier 6. The spans would be approximately 150 feet wide to accommodate the width of both directions of I-5 on the upper deck and LRT and the SUP on the lower deck. The swing spans would pivot on Piers 5 and 6 to provide unlimited vertical clearance for river navigation on the primary navigation channel. The span would need to be approximately 550 feet long to provide the 400-foot-wide horizontal river

[3] Due to the machinery required to operate movable spans of this size, the bascule span option could also comprise three single-deck bridges by adding a third bridge, such that the upstream bridge would accommodate northbound I-5, the adjacent downstream bridge would accommodate southbound I-5, and a third bridge would be adjacent to the southbound I-5 bridge and accommodate LRT and the SUP.

navigation channel (400 feet to accommodate the authorized width of 300 feet plus a buffer of 50 feet on either side for advanced dredging as specified by the USACE).

The cross-section of a swing span would be similar to that proposed for the Fixed Span Bridge, except there would be one bridge instead of two. Northbound and southbound I-5 would be on the upper deck, and a SUP and two-way LRT would be on the lower deck.

Figure 4 shows an example of a single-deck double-swing bridge in York County, Virginia. For this assessment, the swing span would be double-deck.

Figure 4. Single-deck Double-swing Bridge Example – Coleman Bridge, York County, VA

4. DESIGN CONSIDERATIONS

4.1 Columbia River Navigation

Operational requirements for vessel navigation and channel maintenance on the Columbia River would define the length of the movable span.

The USACE maintains the authorized federal navigation channels on the Columbia River. River navigation features are authorized for specific locations, widths, and depths. Navigation features differ upstream and downstream of the existing I-5 bridges, as shown in Figure 5, Figure 6, and Figure 7. As shown, and described further below, there are three navigation channels and a turning basin designated at the location of the existing bridges.

Figure 5. Columbia River Navigation Channels

Figure 6. Navigation Channel Downstream of the Exisiting Bridge

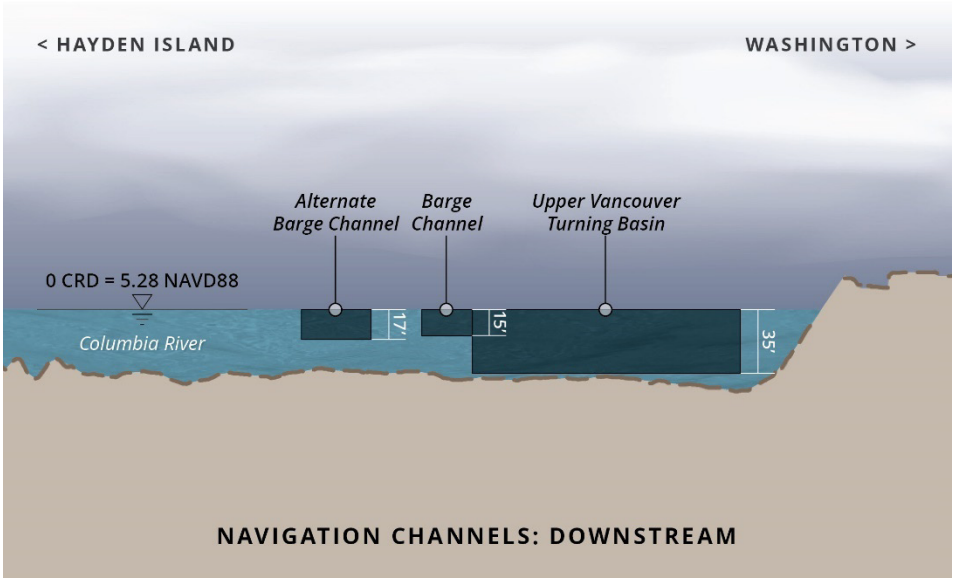
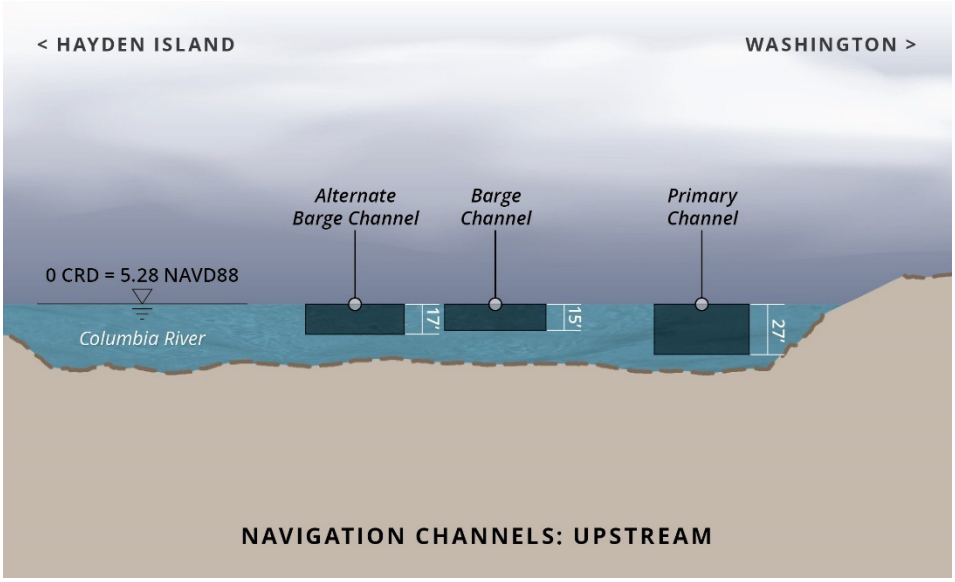


Figure 7. Navigation Channel Upstream of the Existing Bridge



The Vancouver to The Dalles project[4] begins just downstream of the existing I-5 bridges and was originally authorized by the Rivers and Harbors Act of 1937. The authorization specifies a channel 300 feet wide and 27 feet[5] deep. The USACE maintains the channel to 17 feet deep based on current uses. However, the dredging analysis completed in 2014 for the Columbia River Crossing (CRC) project shows that the USACE has not dredged at this location for at least 25 years and that the river naturally maintains a depth greater than 17 feet. None of the movable span options would constrain dredging operations in any way.

Two alternate channels were authorized subsequent to the Vancouver to The Dalles project to accommodate vessel traffic that does not need the vertical clearance provided by the existing lift span. The Alternate Barge channel has an authorized width of 200 feet under the bridge and 300 feet upstream of the bridge, with a depth of 17 feet, and the Barge Channel has an authorized width of 300 feet and a depth of 15 feet. The Upper Vancouver Turning Basin, downstream of the existing I-5 bridges, has an authorized depth of 35 feet (see Figure 6).

The USACE has indicated that an additional 50 feet on each side of the channel is needed for advanced maintenance dredging to accommodate potential side slopes for unstable sloughing of material. Vessels navigating upstream of the BNSF railroad bridge are restricted by the 150 feet of horizontal clearance provided by that bridge. In addition, vessels with origins or destinations above Bonneville Dam are restricted by the 86 feet of horizontal clearance provided by the locks.

The USCG publishes bridge guide clearances for certain navigable waters of the U.S. Compliance with these guide clearances will ordinarily receive favorable consideration under the bridge permitting

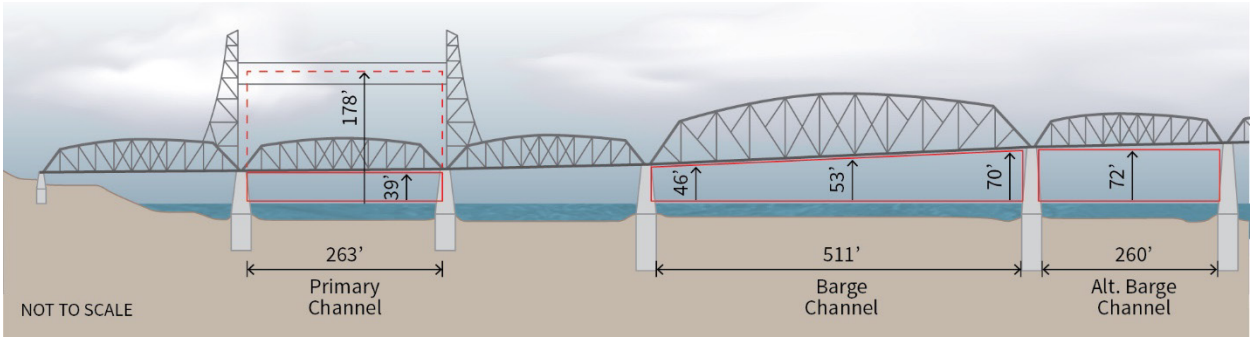
[4] https://www.nwp.usace.army.mil/Missions/Navigation/Channels/Vancouver-to-The-Dalles/
[5] All channel depths are relative to 0 feet Columbia River Datum.

process as providing for the reasonable needs of navigation. According to the clearance guide for the Columbia River, the horizontal navigational clearance is indicated as 450 feet.[6] The USCG notes that guide clearances are not intended to be regulatory, and greater or lesser clearances may be required or approved as necessary to meet navigation needs at a particular location.

The USCG's PNCD specified that the minimum required horizontal clearance must be greater than or equal to that of the current or future permitted USACE federal navigation channel projects. This results in a minimum horizontal width between bridge elements of 400 feet to accommodate the authorized width of 300 feet plus a buffer of 50 feet on either side for advanced dredging as specified by the USACE. The USACE may accept a reduction in the required buffer based on conditions at the site. The existing river depths are greater than the current depth to which the channel is maintained, and there are no side slopes present. This request would be considered as part of the Section 408 Authorization process that is required by the USACE to modify the navigation channel locations and the bridges spanning the navigation channels. If approved this could reduce the horizontal width between bridge elements.

In addition to horizontal clearance, vessels' vertical clearance requirements are relevant to the height of the movable span when open or closed and to adjacent fixed spans. As noted earlier, a movable span would provide either a vertical clearance equivalent to the existing lift span (178 feet) or unlimited vertical clearance (bascule span or swing span). The existing I-5 bridges are only opened for approximately 5% to 7% of river traffic. Because the height of the existing bridge accommodates the majority of vessel traffic, the existing clearances provided by the bridge can be used as a starting point to determine a preferred height of fixed and closed spans to be able to reduce the bridge height as much as possible for costs and other reasons while minimizing the need for an opening and resulting delays to vehicles on I-5, transit, and active transportation. Figure 8 shows the vertical clearances provided by the existing I-5 bridges at both the lift span and fixed spans that align with the federal navigation channels.

Figure 8. Vertical Clearances Provided by the Existing Bridges



*Vertical clearance shown relative to 0 feet Columbia River Datum

[6] The published guide clearance also specifies a vertical clearance of 135 feet as measured from a river stage of 600,000 cubic feet per second. This is superseded by the PNCD issued by the USCG and described in Section 1.

As part of USCG requirements for the Section 9 Bridge Permit, the IBR program completed a Navigation Impact Report that included a survey of vessels that typically pass through the location of the bridge, including their vertical clearance needs. This information can be used to inform the appropriate vertical clearance of the movable span in the closed position or alternate fixed spans so that a height can be selected that is as low as possible but still accommodates the majority of vessel traffic without the opening of a movable span. Table 1 lists the number of estimated openings per year and the number of vessels that would require an opening and could be restricted from passing at specific times when the bridge is restricted from opening per federal regulations. This does not include separate openings that may be needed for maintenance and training. The Code of Federal Regulations (CFR) stipulates that the current bridge shall not be opened for vessels Monday through Friday from 6:30 a.m. to 9 a.m. or from 2:30 p.m. to 6 p.m. (CFR Title 33 Chapter I Subchapter J, Part 117 § 117.869) corresponding to peak commute times. A replacement bridge with an opening would likely include similar restrictions and, depending on the vertical clearance provided in the closed position, may seek to further restrict openings to the period of lowest vehicular traffic (i.e., midnight to 4 a.m.).

Table 1. Number of Bridge Lifts per Year by Vertical Clearance

Bridge Height[a] (closed or highest fixed span)	Estimated Openings/Year	# of Vessels / Users Requesting a Bridge Opening
116 feet[b]	85[c]	9[d]
95 feet	154[e]	53[e]
72 feet	157[f]	270[g]

a. Bridge heights as measured from 0 feet Columbia River Datum. For purposes of calculating potential bridge openings, water is assumed to be 16 feet Columbia River Datum.

b. During the CRC Project, mitigation agreements were negotiated with the four impacted users that were unable to modify operations (such as accepting an air gap of less than 10 feet) in order to transit a bridge height of 116 feet. Three upstream fabricators entered into mitigation agreements with the CRC Project. The anticipated mitigation agreements would have resulted in payments to the companies that would be used by the companies at their business discretion and control. Payments were never made as the project was stopped. The remaining vessel owner decided to terminate negotiations that involved a payment to compensate the owner for vessel modifications and an agreement was never finalized. Compared to a fixed bridge, a movable bridge may not require mitigation to compensate for impacts to river users.

c. Based on vessels identified in the 2021 Navigation Impact Report and reported frequency of transit provided by user.

d. Represents worst case scenario. Five of the nine vessels would not require an opening based on mitigation such as accepting a lesser air gap, thereby also reducing the estimating openings per year.

e. Based on the CRC Navigation Impact Report and updated with 2012 to 2020 lift data and updated user information from the 2021 Navigation Impact Report.

f. Based on the average number of lifts for vessels for the existing bridge from 2012 to 2020 as 72 feet is the height of the highest fixed span on the existing bridge. This likely overestimates the number of openings by a small number as some openings are not due to height constraints.

g. Represents the number of distinct vessels noted in bridge logs from 2012 to 2020. Not every vessel requires a lift every year, and some vessels occur only once in the data.

The movable span would need to span the Vancouver to The Dalles channel as this is the primary channel to accommodate river navigation. To accommodate grades, roadway connections, and the need for the movable span to be located in a tangent (straight and flat) section, the Vancouver to The Dalles channel would be moved south to the approximate location of the existing barge channel.

4.2 Aviation

A movable span could result in a crossing that continues to impact the Pearson Field Part 77 Airspace.[7] The IBR program would be required to submit a Form 7460 for the program's design (by the designer) and one for construction (by the contractor). Each form would delineate any penetrations of the Part 77 Surface that would occur (permanent works relative to design and temporary works pertaining to construction). The Federal Aviation Administration (FAA) would use that information to determine if the proposed facility *poses a hazard to air navigation or causes inefficient use of airspace.* If a hazard or inefficient use of airspace determination results, adjustments to the bridge or construction means and methods may have to be incorporated. Alternatively, it may be possible to restrict construction and/or airfield operations to accommodate any temporary intrusions. Permanent intrusions could require permanent airfield operational adjustments and the bridge owner would likely have to assume liability for any mishaps associated with the penetration(s). In the event the bridge is determined to be a hazard and/or results in efficient use of airspace, the Authority Having Jurisdiction would have the option to take legal action to force a revision to or termination of the development.

With a vertical lift, the lift towers would encroach permanently into FAA airspace. Two of the movable span options—bascule and swing—would improve aviation operations into and out of Pearson Field over the existing condition. The degree of improvement depends on the associated profile, signing, and lighting on the bridge, and the hours of operation of the bascule span. When open, the bascule span leaves would encroach into FAA airspace. When closed, a bascule span would not encroach into FAA airspace. A swing span would not cause an obstruction when open or closed.

4.3 Alignment and Profile

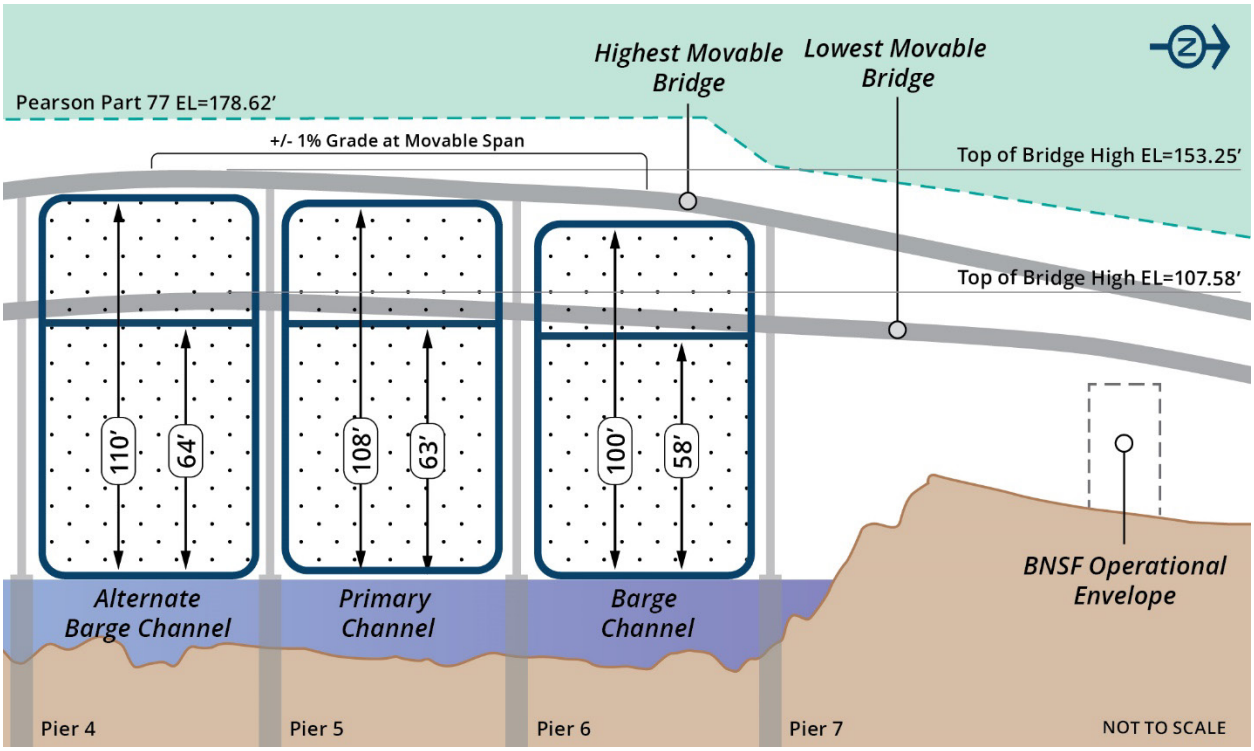
With a movable span, the I-5 alignment would be the same as that proposed for the Fixed Span Bridge (see Section 2 and Figure 1). Regardless of option, the movable span would need to be located in the straight section of the bridge (i.e., south of the current vertical lift span and current primary channel location). The Fixed Span Bridge's profile grade would also need to be altered to provide a level (or near level) profile at the movable span (between Piers 5 and 6). The Fixed Span Bridge's profile does not provide the nearly level profile necessary for a movable span. However, a lowered profile would allow a nearly level section to be located over the proposed primary navigation channel between Piers 5 and 6. A range of profiles is feasible. The profile would be determined based on the desired navigation clearance without a bridge opening. Figure 9 illustrates the bounds of moveable span

[7] Federal Aviation Administration (FAA) Title 14 CFR Part 77, Objects Affecting Navigable Airspace.

bridge heights with the highest and lowest profiles shown and the corresponding vertical navigation clearances.

Lowering the profile would improve operational grades for the highway. The length of the approximately 4% grade portion on both sides of the river would be shorter and could result in improved speed for freight vehicles as they climb the grade between land and the high point at the navigation channel. Lowering the grades would also lower the profile of I-5 over Hayden Island. However, the need to clear the BNSF rail line on the north side of the river would control the profile requirements on the Vancouver end of the bridge.

Figure 9. Movable Bridge Profiles



Note: The USCG's PNCD requires a vertical clearance of at least 72 feet from the barge channels to match the existing high fixed span clearance. Therefore, the lowest possible movable bridge elevation would increase by approximately 14 feet.[8]

4.4 Structural Considerations

The Fixed Span Bridge would have a variety of structural considerations (e.g., load, seismic, etc.). However, the Fixed Span Bridge would not include any mechanical systems to move spans of the

[8] The lowest possible movable span bridge profile shows 58 feet of vertical clearance over the Barge Channel. To provide 72 feet of vertical clearance, the bridge elevation would need to increase by 14 feet.

bridge, as would be required for the movable span options. The following sections identify some of the additional structural considerations that would need to be accounted for with the movable span options.

Vertical Lift Span

The vertical lift span option would require substantially tall towers to support the bridge in the open position. Due to machinery constraints and the counterweight rope connections, these towers would be up to 60 feet taller than the navigation clearance required, similar to existing conditions. As the height of the towers rises, their resultant cost increase at a non-linear rate. This is due to the steep increase in wind and seismic loading considerations at greater heights.

Bascule Span

Bascule bridges can experience operational problems due to span imbalance, keeping counterweight pits dry, and issues with center locks for a double-leaf bridge. The substructure of the bascule span requires larger concrete piers and massive foundations for each leaf, two machinery systems, and more moving parts (e.g., gearworks, etc.) and joints to maintain than other movable span options.

Bascule bridges must resist wind and seismic loading to a greater extent than other common movable bridge types. These load considerations require bascule bridge machinery to be more robust than it otherwise would have to be and are a bigger part of the machinery design than for vertical lift or swing bridges.

Swing Span

Swing bridges provide a low profile and do not require expensive counterweights. A swing bridge can thus be built with smaller piers than a bascule or vertical lift bridge. The swing spans can be through girders, truss, steel, or concrete, and a double-swing bridge can span up to 600 feet in length. Wider swing bridges require a wide center pier and are normally protected by an extensive fender system, which would increase the bridge length to meet the navigation channel width requirement, thus increasing the cost and time to operate the swing bridges.

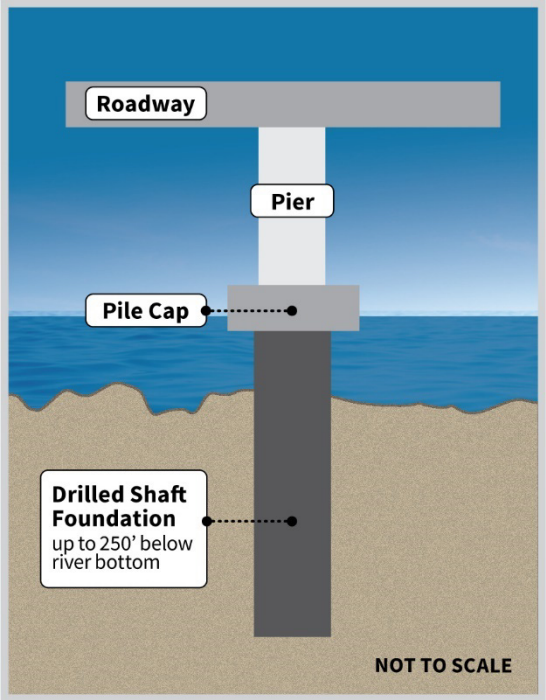
A swing bridge requires more machinery than a bascule or vertical lift bridge. The swing bridge does not automatically align itself when closing and requires an active centering device to quickly align it in the closed position, something not required for bascule bridges or vertical lift bridges. The typical swing bridge also requires end-lifting devices to hold up the ends of the bridge when carrying traffic. The end lifts must develop a positive dead load reaction, as required by the American Association of State Highway and Transportation Officials, so that deflection of the opposite arm of the swing span, due to live load, will not cause the end of the span to lift off its supports.

4.5 Geotechnical Considerations

Deep foundations would be required to support either a fixed or movable span over the Columbia River (see Figure 10). Conceptually, multiple drilled shafts approximately 10 feet in diameter and

extending up to about 250 feet below the river bottom would form the foundation for each pier for either bridge type (fixed or movable). What distinguishes a movable span is the size of the foundation needed for support. Because it is essentially a machine, a movable span would require more substantial river piers and pier foundations to support the span as compared to a fixed span because the movable parts are more sensitive to foundation settlement. This ensures smooth operation during repeated opening cycles over its lifetime. The design would favor consistent diameters of drilled shafts for the in-water work (constructability, economy of scale). The primary difference between piers that support fixed and movable spans is that the latter would require more drilled shafts to ensure adequate stiffness. More shafts translates to a larger foundation cap, which increases the footprint in the river.

Figure 10. Bridge Foundation Concept



4.6 Highway Traffic

4.6.1 Daily Traffic Profiles

Figure 11 and Figure 12 show the existing overall weekday traffic volumes (service volumes) on the I-5 northbound and southbound bridges, respectively. “Service volume” refers to the volume that is actually served during each hour, as opposed to the “demand volume,” which indicates the volume that would ideally be served.

As shown in Figure 11, between 6 a.m. and 11 p.m., there are over 2,000 vehicles per hour driving over the northbound I-5 bridge. The highest volume of northbound traffic occurs between 4 p.m. and 5 p.m. when approximately 4,800 vehicles cross the I-5 bridge from Portland to Vancouver.

Figure 12 shows there are over 2,000 vehicles per hour traveling over the I-5 southbound bridge between 4 a.m. and 9 p.m. The highest volume of southbound traffic occurs between 6 a.m. and 7 a.m., when approximately 5,500 vehicles cross the I-5 bridge from Vancouver to Portland.

The hour with the most vehicles crossing the I-5 bridges in both directions is 5 p.m. to 6 p.m., when approximately 9,000 vehicles are crossing the river.

Figure 11. Interstate Bridge Hourly Profile – Overall Northbound Weekday Service Volumes

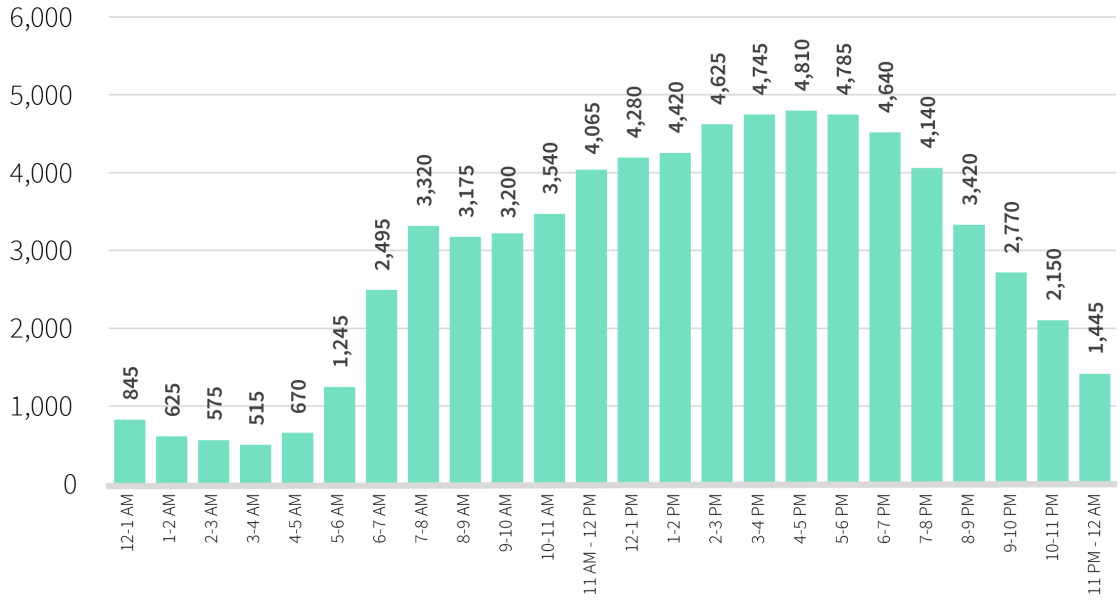


Figure 12. Interstate Bridge Hourly Profile – Overall Southbound Weekday Service Volumes

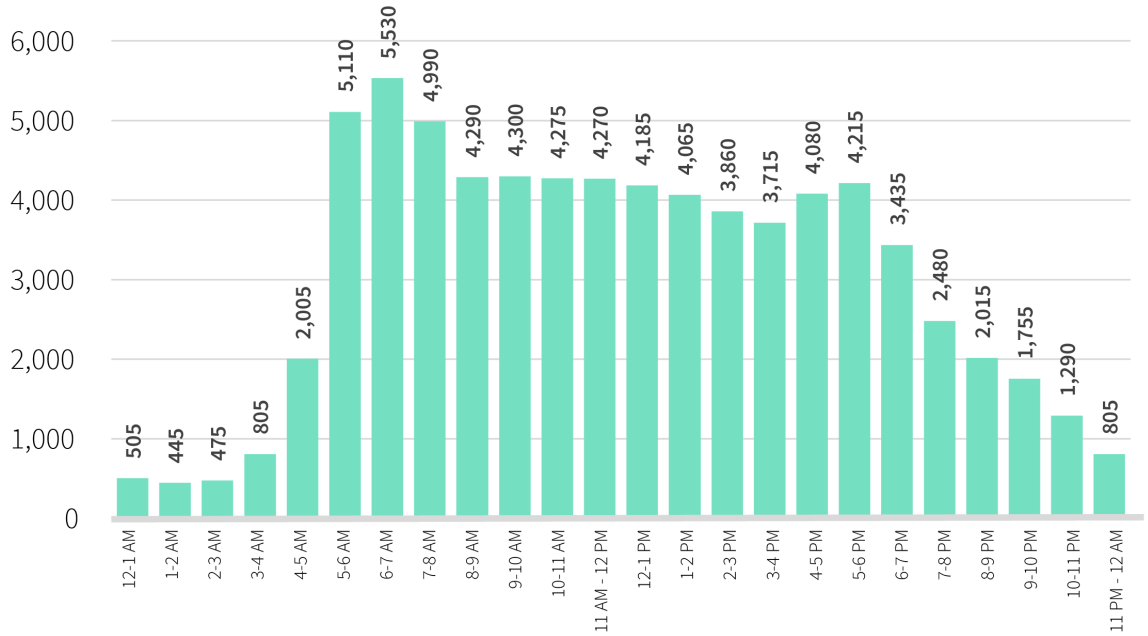


Figure 13 and Figure 14 show hourly bridge profiles across both northbound and southbound I-5 bridges for freight traffic only. As shown in Figure 13, there are more than 200 freight vehicles per hour driving northbound over the I-5 bridge between 4 a.m. and 11 p.m. The highest volume of northbound freight traffic occurs between 10 a.m. and 11 a.m. when approximately 565 freight vehicles cross the I-5 bridge from Portland to Vancouver.

In the southbound direction over the I-5 bridge, there are over 200 freight vehicles per hour between 4 a.m. and 7 p.m. and again from 8 p.m. to 9 p.m. The highest volume of southbound freight traffic occurs between 12 p.m. and 1 p.m., when approximately 520 freight vehicles cross the I-5 bridge from Vancouver to Portland.

The hour with the most freight vehicles crossing the I-5 bridges in both directions is 10 a.m. to 11 a.m., when approximately 995 freight vehicles are crossing the river.

Figure 13. Interstate Bridge Hourly Profile –Northbound Weekday Freight Service Volumes

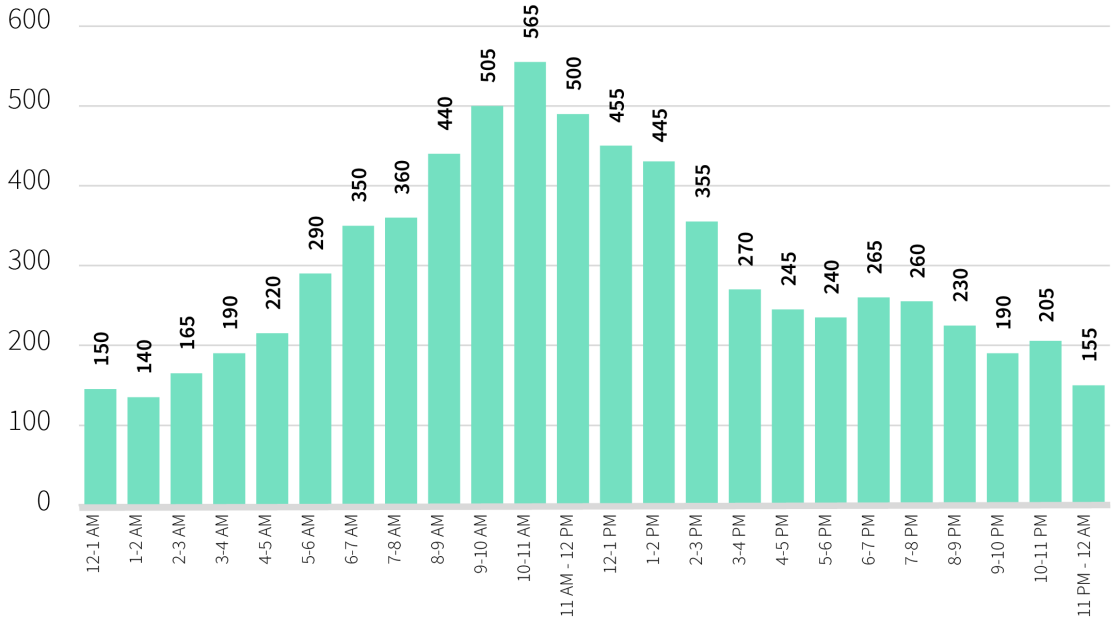
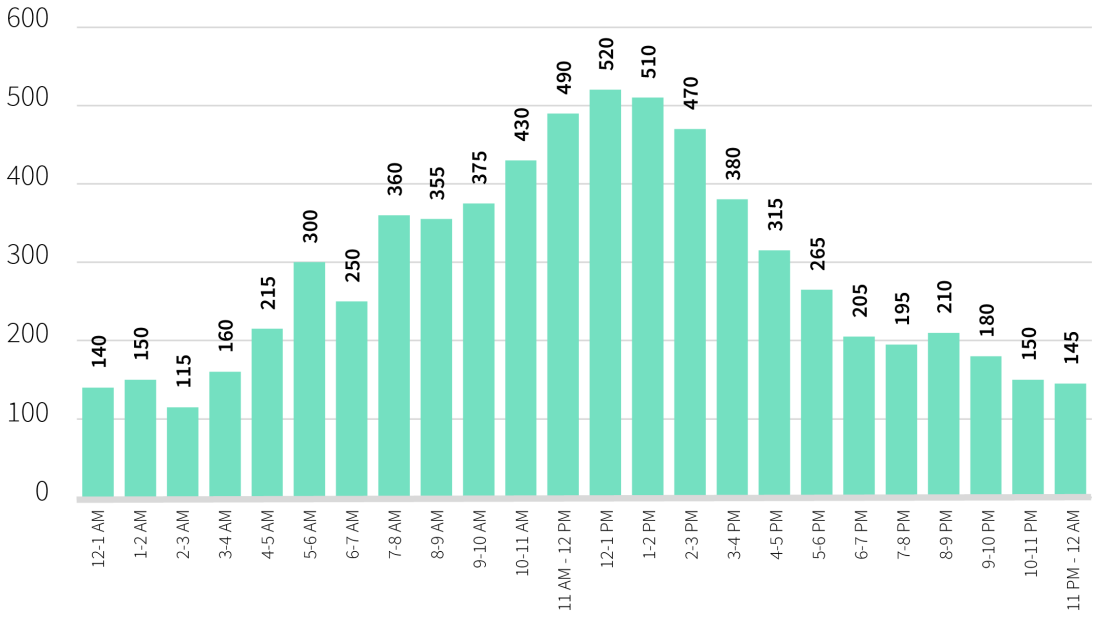


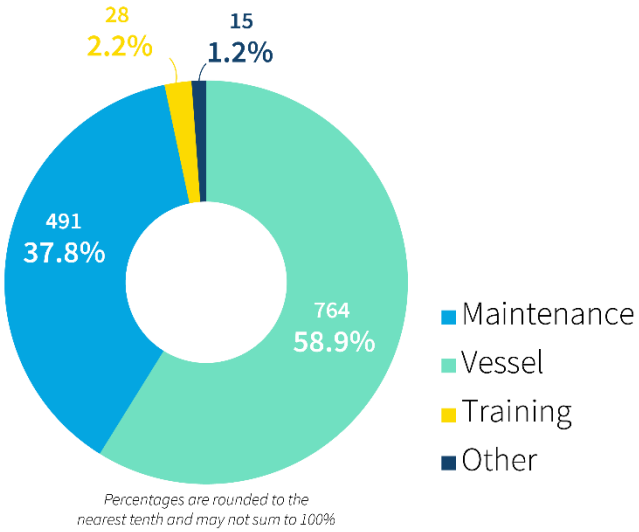
Figure 14. Interstate Bridge Hourly Profile –Southbound Weekday Freight Service Volumes



4.6.2 Bridge Lifts/Traffic Stoppages

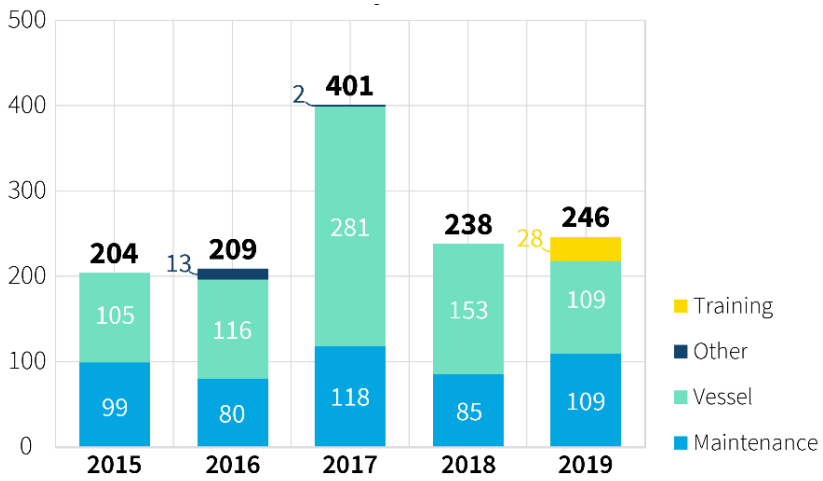
Over the five-year period from 2015 through 2019, there were almost 1,300 bridge lifts/traffic stoppages on the I-5 bridge. Bridge lift/traffic stoppages have been categorized for vessels, maintenance, training, and other purposes. Bridge lift events are those in which the bridge was physically raised, while other traffic stoppage events are those where traffic was stopped to allow for bridge-related activity without the bridge being raised. Training events are related times when the Oregon Department of Transportation (ODOT) conducts training with new employees. See Figure 15 for percentage of events by category.

Figure 15. Bridge Lift/Traffic Stoppage Event Reason, I-5 Bridge, 2015 through 2019



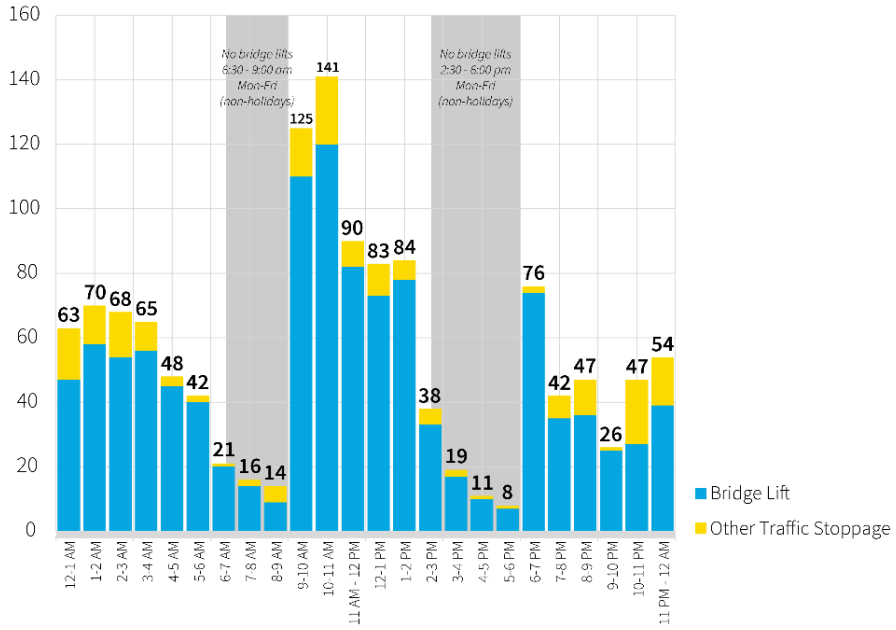
Bridge lifts/traffic stoppages vary by year depending on users, river flows, and river water levels. On average, there were about 260 events per year. Figure 16 shows the number of bridge lifts/traffic stoppages by year for the five-year period from 2015 through 2019.

Figure 16. Bridge Lift/Traffic Stoppage Events by Year



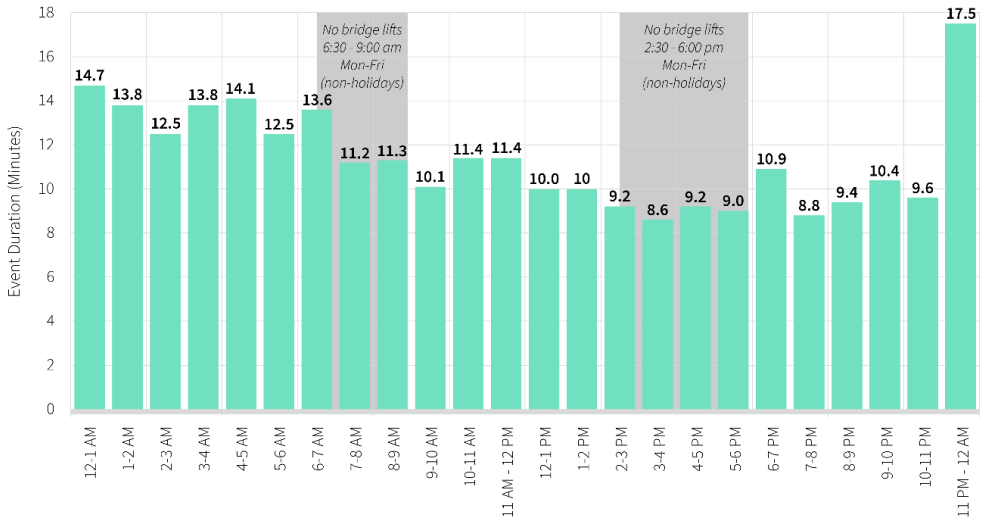
Bridge lifts/traffic stoppages were also summarized by hour to show when the bridge lifts occur. See Figure 17 for the hourly distribution of bridge lifts/traffic stoppages over the five-year period. The bridge lifts shown during the morning and afternoon peak periods (6:30 a.m. to 9:00 a.m. and 2:30 p.m. to 6:00 p.m.) occurred on weekends and federal holidays, when the restrictions on lifts imposed by federal regulations do not apply.

Figure 17. Bridge Lift/Traffic Stoppage Events by Hour



The average bridge lift/traffic stoppage for the five-year period from 2015 through 2019 lasts almost 12 minutes but ranges from 5 to 30 minutes in duration. See Figure 18 for the average event duration by hour.

Figure 18. Bridge Lift/Traffic Stoppage Events by Duration



To determine how long it takes traffic to recover to normal operating conditions from bridge lifts/traffic stoppages, the IBR team analyzed the bridge lift/traffic stoppage data and correlated that with INRIX[9] traffic speed data for days with bridge lifts. This was done for the year 2019 as it represents enough of a sample size to determine the recovery rate. The IBR team reviewed weekday volume, speed, and bridge lift data for two 1-hour periods to see if there was a difference in recovery time. The team analyzed this information for 10 a.m. to 11 a.m., and 10 p.m. to 11 p.m., on non-holiday weekdays. The analysis concluded that during the 10 a.m. to 11 a.m. time period, traffic can take 20 to 60 minutes to recover, if it can recover at all, as sometimes the bridge lift just never recovered for northbound traffic and combined with the northbound afternoon/p.m. peak-period congestion. Northbound congestion in 2019 at the I-5 bridge lasts approximately 7 hours from noon until 7 p.m. If the bridge lift occurs late in the 10 a.m. to 11 a.m. hour, it could not recover before noon. As for the 10 p.m. to 11 p.m. hour, the traffic returns to normal operating conditions in less than 15 minutes. This is based on the hourly volumes shown in Figure 11 and Figure 12, typical uncongested conditions, as well as some traffic diverting to Interstate 205 if needed during uncongested conditions.

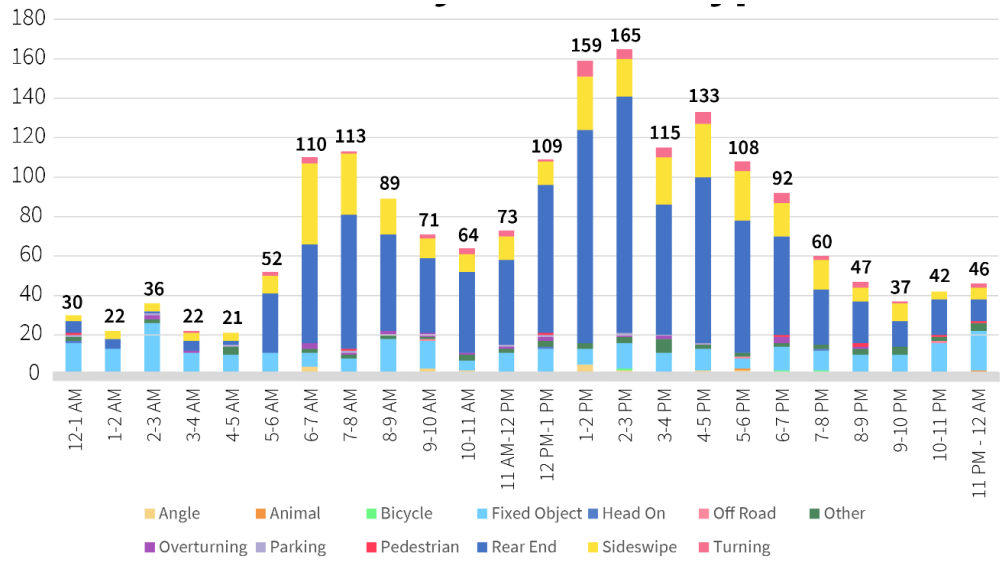
It is anticipated that the cycle time for a bridge opening for the different movable span options would be approximately 20 to 30 minutes (the bascule span would have fastest bridge opening). During the time the bridge is opened, traffic would be stopped in both directions and would be affected differently depending on the hour of the opening. Based on the 2019 traffic volumes, bridge lifts in the overnight hours would have minimal delay on traffic and transit volumes. If the bridge lift occurred during the middle of the day, it could take traffic 30 to greater than 60 minutes to recover, if it recovers at all.

[9] INRIX analyzes real time traffic data from road sensors and vehicles and summarizes this information on a daily basis.

4.6.3 Bridge Lift/Traffic Stoppages Crash Analysis

Figure 19 shows the existing number of crashes on I-5 and the ramps in the five-mile IBR program study area by hour and by type. As shown, more crashes occur during peak periods during congestion.

Figure 19. Crashes by Hour, by Type



Historical crash data gathered during the CRC Project suggests that the vehicular crash rates during bridge lifts/traffic stoppages are three to four times higher than during normal operating conditions. To determine if there was a different crash rate during days with a bridge lift/traffic stoppages and days under normal operations conditions (no bridge lifts/traffic stoppages), the CRC Project team summarized crash data for all hours between 9 a.m. and 2:30 p.m. for the five-year period from 2000 through 2004. This focused time period was chosen because bridge lifts/traffic stoppages are not allowed on weekdays (non-holidays) between 6:30 a.m. and 9:00 a.m., or 2:30 p.m. to 6:00 p.m. ODOT records exactly when bridge lifts/traffic stoppages occur, and both ODOT and the Washington State Department of Transportation (WSDOT) record crash information, including the time, type, and severity of crashes.

Table 2 shows weekday crash data from 2000 through 2004 between 9 a.m. and 2:30 p.m. that was analyzed for the CRC Project. Crash data was analyzed on weekdays when bridge lifts/traffic stoppages did not occur (columns 4 and 5 in Table 2). Using this dataset, the crash rate when bridge lifts/traffic stoppages did not occur was calculated to be approximately 0.019 to 0.021 crashes per hour. Similarly, crash data was analyzed during weekdays that had bridge lifts/traffic stoppages (columns 2 and 3 in Table 2). Using this data, the crash rate when the bridge is open is approximately 0.060 to 0.067 crashes per hour. As such, the crash rate during bridge lifts/traffic stoppages is three to four times higher than during normal operating conditions (days without a bridge lift/traffic stoppage). Crash data is similar for the most recent five-year period collected for the IBR program

(2015 through 2019), so the conclusions about crash rates during bridge lifts/traffic stoppages are assumed to be similar to what was calculated for the CRC Project.

Table 2. Bridge Lift and Traffic Stop Crash Rate Summary (9:00 a.m. to 2:30 p.m., Monday through Friday, 2000 through 2004)

Year	Number of Crashes on Days with Bridge Lifts/Traffic Stoppages	Number of Hours on Days with Bridge Lifts/Traffic Stoppages	Number of Crashes on Days without Bridge Lifts/Traffic Stoppages	Number of Hours on Days without Bridge Lifts/Traffic Stoppages
Northbound				
2000	6	110	27	1,320
2001	10	151	21	1,279
2002	7	114	36	1,316
2003	7	100	28	1,330
2004	4	95	26	1,335
Total	*34*	*570*	*138*	*6,580*
Crashes/hour	*0.060*		*0.021*	
Southbound				
2000	4	110	23	1,320
2001	12	151	26	1,279
2002	8	114	22	1,316
2003	7	100	20	1,330
2004	7	95	33	1,335
Total	*38*	*570*	*124*	*6,580*
Crashes/hour	*0.067*		*0.019*	

Source: Columbia River Crossing I-5 Collision Analysis Technical Memorandum

4.7 High-Capacity Transit

With a movable span, modifications to the bridge's profile would have a nominal effect on transit operations. A decrease in the bridge's profile elevation could result in a decrease in the height of the Vancouver waterfront station, but the decrease would be minimized by clearance requirements over the nearby BNSF railroad on the north side of the river. However, the opportunity to decrease the profile elevation and grade could improve connections to the Vancouver Waterfront station for transit vehicles and transit patrons. However, introducing a movable span would affect train operations and scheduling, as well as require additional maintenance. Maintenance needs would increase over time.

Modifications to accommodate the movable span would affect train speeds. Electric light rail vehicles can sustain speeds at the approximately 4% grades proposed, so lowering the profile over the river is not anticipated to cause any change to train speed. However, introducing movable joints on the rails is likely to slow the train. Typical light rail tracks are continuous welded tracks with no joints, or joints with retainers to maintain the alignment integrity over a joint. Inserting a movable span would create two to three joints in the track that would be specially designed to be able to open. As a result, for safety reasons, the train speed would likely be slower over the movable span. Significant reductions in travel time could reduce ridership and impact the LRT project's competitiveness for federal funding. Given that there are stations proposed in proximity to each end of the bridge, it is likely that trains would travel at a reduced speed between the Hayden Island station and the Vancouver Waterfront station.

Train operations would be interrupted if a movable span opened during operating hours. Currently, TriMet operates the light rail system between 5 a.m. and 1 a.m. The hours between 1 a.m. and 5 a.m. are used for maintenance and to allow trains to travel between their respective routes and the maintenance base. Any bridge openings between 1 a.m. and 5 a.m. could impact the start of service. For example, the first train would need to arrive in Vancouver prior to 5 a.m. If a 30-minute lift occurred between 4:30 a.m. and 5 a.m., trains could be impacted at the start of service.

TriMet's Yellow line would be extended north to Vancouver as part of the IBR program. Current operating frequency on the Yellow line is as follows:

- 5 a.m. to 7 a.m.: 30-minute frequency
- 7 a.m. to 11 p.m.: 15-minute frequency
- 11 p.m. to 1 a.m.: 30-minute frequency

The IBR program proposes to increase train frequency to 12 to 15 minutes during off-peak hours and 5 to 7.5 minutes during peak hours.

The program's Yellow line extended route would begin at Evergreen Boulevard in Vancouver and connect to the Expo Station in Portland. The Yellow line continues to downtown Portland. It then changes to the Orange line, which continues to Milwaukie and Oak Grove. The total route length, with the proposed Yellow line extension, would be approximately 18 miles. A movable span could disrupt operations for the entire 18-mile segment when trains would stop for a bridge opening. Any trains on either side of the river would be held at the stations until the movable span is closed. This disruption

would affect up to five trains in each direction during peak operating hours over the river and up to two trains in each direction during off-peak hours. Riders in, and destined for, Vancouver would be delayed during the opening. If bridge openings occurred between 1 a.m. and 5 a.m., then no interruptions to riders would occur and maintenance could be scheduled around the bridge openings.

Complex designs would be required for the vehicle power and communications systems. The light rail vehicles use an overhead catenary system (OCS) for powering the trains, with the grounding system going through the rails. The OCS system is carefully designed and constructed to allow for high operating speeds. Inserting joints would affect the operation of the electrical system and would likely require extensive maintenance to keep it operational. Communications systems are required for vehicle operations and train safety. This system would require continuous communications, so the communications system would either have to be installed (directionally bored) under the river bottom (applicable for a bascule bridge or a swing span) or be suspended above the bridge (for a vertical lift span).

4.8 Shared-Use Path

To comply with accessibility standards, an SUP can have a maximum sustained grade of 5%, which would be accommodated by the highway profile grades of 4% or less. If a lower profile is used for the movable span bridge, the elevation changes required by path users would be reduced, thereby improving the walkability and rideability of the bridge. A lower bridge would also reduce the length of ramps connecting to the ground on either end of the bridge.

Bridge openings during daytime hours would delay path users as no suitable detour route is available. Current lift span operations have experienced significant safety challenges with active transportation users often attempting to go around safety mechanisms in place on the sidewalks. Additional work would be needed to determine a safe way to prevent active transportation users from entering the movable span in advance of a lift. Due to very low use during nighttime hours, late night bridge openings are not expected to adversely affect users of the path.

5. CONSTRUCTION CONSIDERATIONS

A program requirement stipulated by ODOT and WSDOT is that three lanes of I-5 traffic need to be maintained in each direction throughout construction during peak hours. It is infeasible to reduce the number of lanes of traffic on I-5 during construction because of the long-term impact this would have on regional and statewide traffic operations. During construction, reduced lane and shoulder widths are operationally permittable as needed. To maintain traffic during construction, it is assumed that the typical section will have to provide 76 feet of deck between the faces of the outside barriers on either side. This is derived from the assumption of 2-foot shoulders and three 11-foot lanes in each direction, separated by a 2-foot-wide median barrier. The permanent typical section would be restriped for three 12-foot lanes and one 12-foot auxiliary lane, consistent with the proposed Modified Locally Preferred Alternative. It is also assumed that the northbound bridge would be constructed to the same width to be able to accommodate an in-service incident or circumstance requiring the

southbound bridge to be shut down for maintenance, incidence management, emergency response, or inspection.

Incorporating a movable span would likely increase the duration of the construction schedule, regardless of the type of movable span used, due to the need for more massive foundations and the procurement, installation, and testing of the mechanical, electrical, and support systems required to operate the movable span, as well as the specialized workforce needs. The construction cost and schedule and in-water work would significantly increase—a minimum of one to two construction seasons—with a three-bridge single-level bascule bridge configuration.

Because the swing bridge would have all modes on one structure, it would need to be constructed entirely offline while using the existing I-5 bridges for maintenance of traffic. This would eliminate the need for any staging but would push the new alignment farther downstream, causing additional property impacts and challenging connections to I-5.

6. OPERATIONAL CONSIDERATIONS

Operational considerations would be similar to those required and provided for the present movable spans on the I-5 bridges. The movable span would be designed for the same seismic event(s) as a fixed span would be. However, a movable span with moving parts and machinery is more likely to suffer misalignment and/or damage from a seismic event that would be detrimental to resuming operations without significant cost and down time.

Movable bridges would also require an operator to open and close the span for marine traffic. The current lift span requires enough operators to be staffed 24 hours a day.

The annual maintenance costs of a movable bridge are greater than a fixed bridge and require expertise with mechanical and electrical systems (see Section 8). The additional annual maintenance costs associated with a movable span include performing routine lubrication of the machinery bearings, rotating elements, testing the operation of the electrical and mechanical systems, and replacing worn or broken parts.

7. ENVIRONMENTAL CONSIDERATIONS

Most environmental considerations associated with a movable span would be consistent with the Fixed Span Bridge. However, due to the larger pier foundation required for the movable span options, the intensity of some impacts would be greater. There would be six in-water piers and two land piers per bridge. Therefore, for the lift span bridge and the two-bridge bascule span bridge, there would be a total of 12 in-water piers and four land piers. For the three-bridge bascule span bridge, there would be a total of 18 in-water piers and six land piers. For the swing span bridge, there would be six in-water piers and two land piers. The total width of the three-bridge bascule span bridge would also be approximately 25% greater than the other movable span options due to the addition of a third bridge. Specific impacts that would result from the moveable span options to the environment include:

- **Air Quality and Greenhouse Gas Emissions**. Bridge openings would increase vehicular idling and associated pollutant and greenhouse gas emissions.

- **Biological Resources:**
  - For all three movable span options, the footprint of the pier foundations is expected to be larger than would be required for the Fixed Span Bridge. The increase in footprint would be greatest for the bascule span, and the three-bridge bascule span option would result in a substantially larger footprint and number of piers because of the third bridge. Larger footprints would result in greater in-water disturbance to fisheries, benthic habitat, and other marine species.
  - Overwater coverage associated with a movable bridge would likely be comparable to the Fixed Span Bridge, with the exception of the three-bridge bascule span, which would result in additional new overwater coverage (approximately 25% increase) associated with the third bridge. Larger areas of overwater coverage would create more shading of the river, which could result in greater predation of protected or culturally significant fish and other marine species.
  - The need for larger pier foundations for a movable span bridge would likely increase in-water construction durations, which would increase the extent and duration of disturbance (e.g., degradation of water quality, vibration) on aquatic species and habitat.
  - Impacts from increased foundation footprints, new overwater coverage, and longer construction duration associated with the movable span options would require additional compensatory mitigation and/or conservation measures to offset the unavoidable impacts.
- **Hazardous Materials.** For all three movable span options, the larger footprint of the bridge foundations would increase the potential to encounter hazardous material sites in river bottom sediment. There would also be an increased potential for disturbance of contaminated soil and pollution from suspended sediment, resulting in a greater potential for additional negative impacts on aquatic resources. With the three-bridge bascule span option, potential impacts would be greater due to the additional piers needed to support the third bridge.
- **Historic Structures and Archaeological Resources.** For all three movable span options, submerged historic structures and archaeological resources could have a greater level of disturbance and permanently impact due to the size and volume of excavation required for the larger bridge foundations. With the three-bridge bascule option, there could be additional disturbance by virtue of its larger footprint and additional piers (both over water and landside).
- **Land Use.** The swing span option would be located farther downstream than the other movable span options, thereby increasing impacts to development on Hayden Island and downtown Vancouver.
- **Stormwater Management.** Stormwater treatment systems for each movable span option would be more maintenance-intensive than those associated with fixed bridge designs. These systems may also not perform as well, due to the joints between the movable span and the

fixed section of the bridge; and, therefore be less effective in capturing and treating stormwater.

- **Visual Resources.** The lift span bridge would have permanent visual impacts similar to those of the existing I-5 bridges, but more impacts than the Fixed Span Bridge because the lift towers would protrude into viewsheds toward and from Vancouver, including Fort Vancouver, and toward and from Hayden Island. The bascule span would have similar visual impacts; however, they would be temporary and would only occur during a bridge opening. The swing span bridge would have no new visual impacts, and would have fewer impacts to views than the Fixed Span Bridge.

8. CONCEPTUAL COSTS

Conceptual construction costs for a movable span were developed based on previously completed projects and the collective expertise of the team. These costs are for a movable span that would accommodate I-5, LRT, and the SUP (note that the costs are for the movable span only; there would be additional costs for the other fixed spans of the bridge). The relative conceptual construction costs in Table 3 identify overall construction cost difference measured in 2022 dollars.

The construction cost implications associated with each movable span option are described below.

- A **vertical lift** is the most economical of the three movable span options studied. Planning-level estimates and review of historical unit costs indicate an approximate construction cost of $7,000 per square foot for a vertical lift span.
- A **double-leaf bascule** is more complex and costly when compared to the vertical lift due to several factors. One of the most significant cost drivers of the double-leaf bascule option is the substructure, which requires larger concrete pier foundations for each leaf. Planning-level estimates and review of historical unit costs indicate an approximate construction cost of $6,250 per square foot for a single-deck, double-leaf bascule span and $8,500 per square foot for a double-deck, double-leaf bascule span.
- A **double swing span** is the most costly of the three movable span options studied due to the length of the swing spans (two swing spans that are each 550 feet long). Planning-level estimates and review of historical unit costs indicated an approximate construction cost of $4,500 per square foot for a double swing span. Note, however, the length of the overall swing span option is longer than the vertical lift span option, resulting in a higher overall construction cost.
- For comparison purposes, planning-level estimates and review of historical unit costs indicated an approximate construction cost of $1,000 per square foot for a fixed span.

The conceptual construction costs do not include an allowance for soft costs such as design, construction management, contingency, or life-cycle considerations. However, based on previous experience, O&M costs of the movable span would increase the cost by $0.5 million to $1 million a

year[10] over a 75-year design life, adding $37 to $75 million to the overall cost of the IBR program (in 2022 dollars). Yearly O&M costs for a Fixed Span Bridge would be approximately $100,000 (in 2022 dollars).[11]

Table 3. Reasonable Order-of-Magnitude Construction Costs

Description	Construction Cost	Fixed Span Cost Equivalent to Movable Option (Baseline)*	Change in Cost
Fixed Span (Baseline): two at 450 feet	$70,000,000	--	--
Vertical Lift Span: two at 450 feet	$500,000,000	$70,000,000	+$430,000,000
Bascule Span: two at 400 feet	$550,000,000	$60,000,000	+$490,000,000
Bascule Span: three at 400 feet	$600,000,000	$60,000,000	+$540,000,000
Swing Span: two at 550 feet	$800,000,000	$170,000,000	+$630,000,000

*The Fixed Span Cost Equivalent to Movable Option is calculated by multiplying the cost per square foot of the fixed span ($1,000/square foot) by the length and width of the spans for each movable span option.

It is assumed that none of the movable bridge options would require mitigation of impacts on river users. It is estimated that mitigation for river users could be in the range of approximately $100-120 million and would take approximately six to twelve months to complete mitigation.

[10] The existing lift span bridge costs approximately $1.3 million per year (in 2022 dollars) to operate and maintain. Source: WSDOT. 2017. Columbia River I-5 Bridge Planning Inventory. (Dollars escalated from 2010 to 2022)

[11] WSDOT. 2017. Columbia River I-5 Bridge Planning Inventory. (Dollars escalated from 2010 to 2022)

9. SUMMARY

Table 4 includes a summary of the considerations associated with each movable span option.

Table 4. Summary of Movable Span Considerations

	Lift Span	Bascule Span	Swing Span
Columbia River Navigation	• Provides 178 feet or unlimited vertical clearance for navigation. • Lower vertical clearance (in the closed position) than that provided by the Fixed Span Bridge. • Requires 400 feet of horizontal clearance per the USACE (400 feet to accommodate the authorized width of 300 feet plus a buffer of 50 feet on either side for advanced dredging as specified by the USACE). • Movable span operations, and thus river navigation operations, would likely have to be restricted to nighttime openings to minimize impacts to vehicle traffic and transit operations.		
Aviation	• Lift span towers would permanently penetrate Pearson Field airspace.	• Leaves would temporarily penetrate Pearson Field airspace when open.	• No impact to Pearson Field airspace.
Alignment and Profile	• Movable span would need to be on a straight portion of the bridge (and level or near level grade), located south of the existing lift span over the relocated primary navigation channel between Piers 5 and 6. • Reduced grades would increase the ease of ramp connections, primarily on the Hayden Island end of the bridge. • Reduced length of grade of the lower profile would benefit freight and other vehicles that might be affected by the lower speeds caused by steeper grades. • Reduced grades would increase ease of access and operability of the SUP.		

	Lift Span	Bascule Span	Swing Span
Structural Considerations	• Requires more rigorous design efforts and specialty contractors.		
	• Towers up to 60 feet taller than vertical clearance required. • Counterweights in the towers would require additional seismic design considerations to mitigate earthquake impacts.	• Would be one of the largest double-leaf bascule spans in the world. • Potential for operational problems due to span imbalance, keeping counterweight pit dry, and center locks issues. • Must resist seismic and wind loading to a greater extent than other movable bridge types.	• Would be one of the largest movable spans of its type in the world. • Low profile and does not require expensive counterweights. • Less massive piers than a bascule or vertical lift bridge. • More machinery than a bascule or vertical lift bridge: an end-centering device and end-lifting devices.
Geotechnical Considerations	• Requires more substantial river piers and pier foundations to support the span as compared to a fixed span because the movable parts are more sensitive to foundation settlement. This ensures smooth operation during repeated opening cycles over its lifetime. • Requires a stiffer foundation provided by increasing both the size of the pier's footprint and number of drilled shafts contained therein.		
Highway Traffic	• The cycle time for a bridge opening would be 20 to 30 minutes. • Daytime bridge lifts could impact traffic volumes for up to an hour or more; nighttime bridge lifts would not impact traffic volumes for multiple hours a day. • Crash rate is expected to be 3 to 4 times higher during a bridge lift than during normal operating conditions. • To reduce congestion and improve mobility, movable span operations would likely need to be restricted to specific days and/or times.		
		• Fastest cycle time to open and close the bridge resulting in less congestion.	

	Lift Span	Bascule Span	Swing Span
High-Capacity Transit	• Reduced train speed over bridge. • Interruptions to operations during a bridge opening throughout 18-mile service network unless openings are restricted to nighttime only. • Extensive maintenance to keep communications systems operable. • Opportunity to decrease the profile elevation and grade could improve connections to the Vancouver Waterfront station for transit vehicles and transit patrons.		
Shared-Use Path	• Delay to SUP users during a bridge opening; no suitable detour route is available. • Lower elevation would be a benefit for path users.		
Construction Considerations	• Extended construction schedule (approximately 1 to 2 years) due to in-water work, equipment, and specialized workforce required.		
		• Additional schedule with third bridge configuration.	
Operational Considerations	• More likely to result in misalignment or damage from a seismic event. • Requires a bridge operator on site. • Requires additional maintenance associated with mechanical and electrical systems.		
Environmental Considerations	• Increased air quality pollutant and greenhouse gas emissions due to vehicular idling during a bridge opening. • Increased in-water work due to size of foundations would increase impacts to biological resources, hazardous materials, and historic structures and archaeological resources. • Challenging stormwater containment due to the bridge joints that allow the movable span to function.		
	• Permanent visual impacts due to lift towers, similar to the existing I-5 bridges.	• Additional displacement of benthic habitat with third bridge configuration. • Additional over-water shading with three bridge configuration. • Visual impact during bridge opening.	• Increased land use and development impacts due to downstream location of bridge.

	Lift Span	Bascule Span	Swing Span
Conceptual Construction Costs Change Compared to the Fixed Span Equivalent	• +$430,000,000	• +$540,000,000 (three bridge) • +$490,000,000 (two bridge)	• +$630,000,000

Attachment C-2. Screening Summaries

River Crossing | Relative Design Option Comparison

2013 Curved Bridge

- Climate Impacts/Adaptation*
- Natural Environment
- Built Environment
- Active Transportation
- Vehicles/Freight
- Cost

Equity Lens

- Avoids Harm
- Community Benefit
- Mobility/Accessibility
- Physical Design

Climate Lens

- Multimodal Environmental Factors
- Complete Communities
- Resilience

DO 2: One Bridge (Double Stacked)

Fatally flawed from a Section 4(f) perspective. Impacts are unavoidable.

Design Option 1: Two Straight Bridges

- Climate Impacts/Adaptation*
- Natural Environment
- Built Environment
- Active Transportation
- Vehicles/Freight
- Cost

Equity Lens

- Avoids Harm
- Community Benefit
- Mobility/Accessibility
- Physical Design

Climate Lens

- Multimodal Environmental Factors
- Complete Communities
- Resilience

Design Option 3: One Bridge (Hybrid Stacked)

- Climate Impacts/Adaptation*
- Natural Environment
- Built Environment
- Active Transportation
- Vehicles/Freight
- Cost

Equity Lens

- Avoids Harm
- Community Benefit
- Mobility/Accessibility
- Physical Design

Climate Lens

- Multimodal Environmental Factors
- Complete Communities
- Resilience

Best

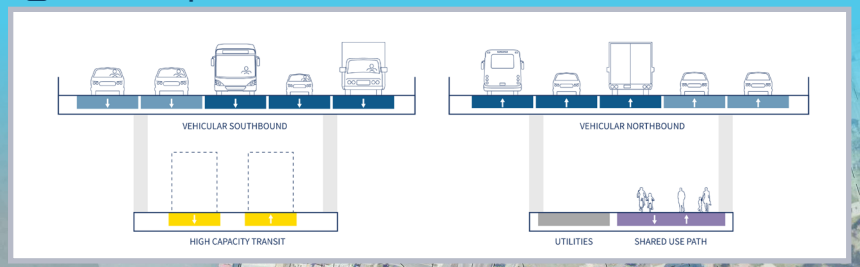
Good

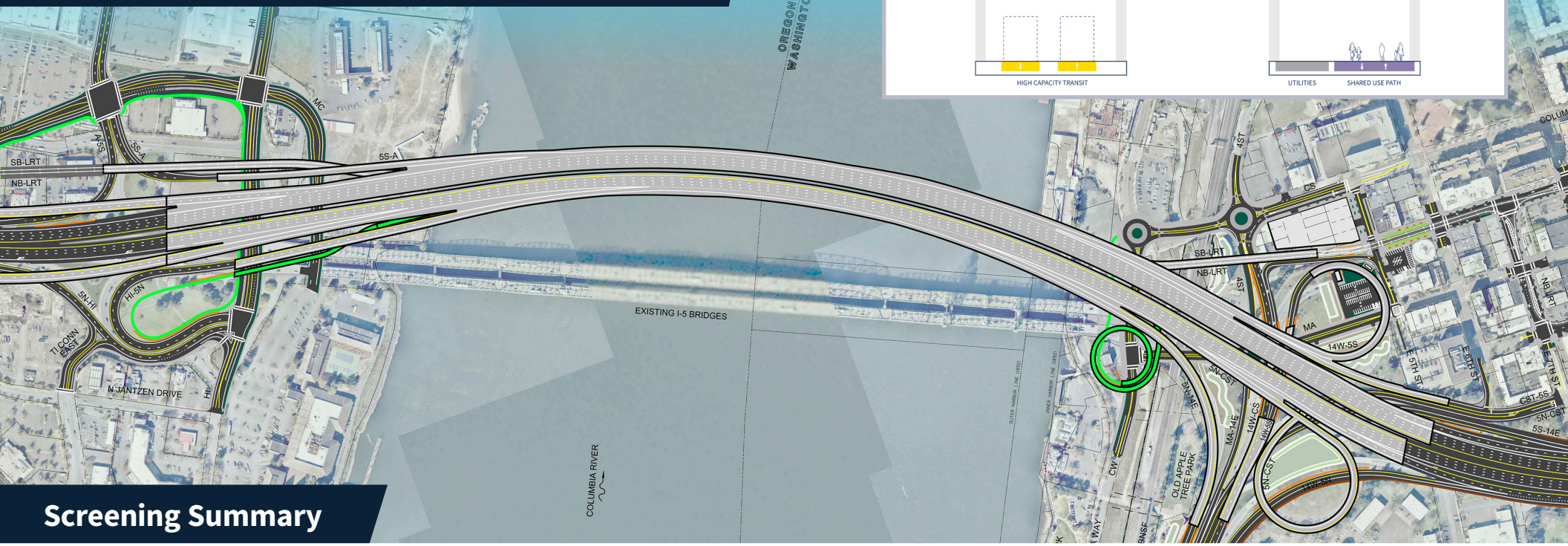
*Based on footprint, not expected user emissions or VMT

River Crossing

2013 Curved Bridge

☑ Meets Purpose and Need





Screening Summary

Climate Impacts/Adaptation	◕	- Likely uses more construction materials (based on footprint, not expected user emissions or VMT) - Improves transit and active transportation to draw mode shift - Design considers future climate disruption from flooding, extreme heat, storms and wind - Bridge elevation accounts for potential river elevation changes due to climate change
Natural Environment	◑	- More in-water piers and a larger footprint over aquatic habitat - Generates more in-water obstructions
Built Environment	◕	- Creates visually uncluttered structures on Hayden Island and scales them to surroundings **(CB, PD)** - Lowers Tomahawk Island Drive, if accommodated **(MA)** - Reduces shared use path's exposure to traffic noise **(MA)** - Main Street extension provides new downtown connection to waterfront **(CB, CC)** - More non-residential buildings impacts **(AH)**
Active Transportation	◑	- Creates a generously wide and accessible shared use path **(MA, ME)** - Shelters shared use path from elements **(MA)** - Lower deck Shared use path not visible to vehicular traffic, does not benefit from "eyes on the path" **(MA, ME)** - Curved bridge makes for a longer crossing **(MA, ME)**
Vehicles/Freight	●	- Maintains access to local streets and SR14 Compatible with Hayden Island full interchange design
Cost	◑	- Two bridges with complex bridge geometry results in high construction cost

Equity Lens

Medium-High

- ◕ Avoids Harm **(AH)**
- ◑ Community Benefit **(CB)**
- ◑ Mobility/Accessibility **(MA)**
- ◕ Physical Design **(PD)**

Climate Lens

Medium

- ◕ Multimodal Environmental Factors **(ME)**
- ◑ Complete Communities **(CC)**
- ◕ Resilience **(RE)**

Best ● ◕ ◑ ◔ ○ Good

Design options are evaluated in comparison to each other and do not reflect overall program ratings.

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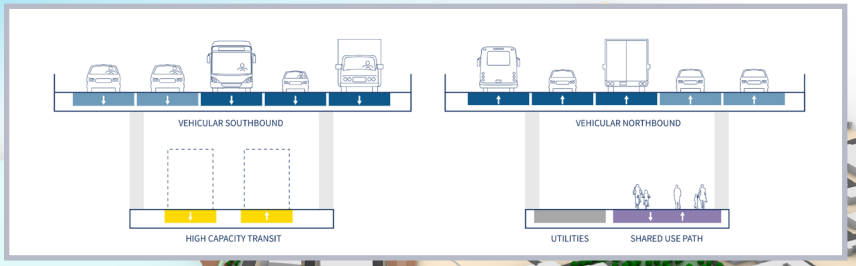
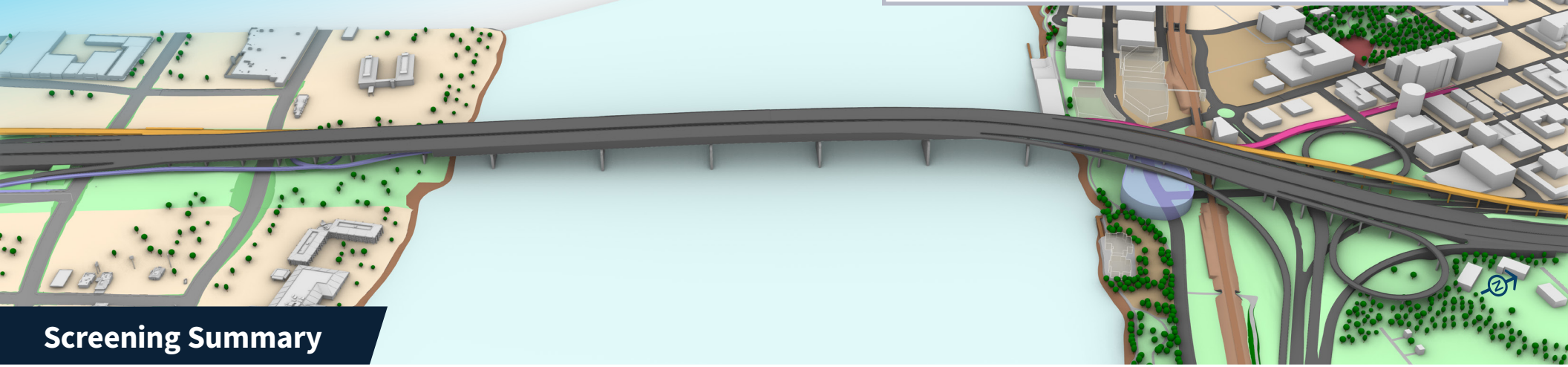
River Crossing

Design Option 1: Two Bridge (2013 Refined LPA)

☑ Meets Purpose and Need





Screening Summary

Climate Impacts/Adaptation	◕	- Likely uses more construction materials (based on footprint, not expected user emissions or VMT) - Improves transit and active transportation to draw mode shift - Design considers future climate disruption from flooding, extreme heat, storms and wind - Bridge elevation accounts for potential river elevation changes due to climate change
Natural Environment	◑	- More in-water piers and a larger footprint over aquatic habitat - Generates more in-water obstructions
Built Environment	◕	- Creates visually uncluttered structures on Hayden Island and scales them to surroundings **(CB, PD)** - Reduces shared use path's exposure to traffic noise **(MA)** - Tomahawk Island Drive crosses straight across island **(MA)** - Main Street extension provides new downtown connection to waterfront **(CB, CC)** - Fewer non-residential buildings impacts **(AH)**
Active Transportation	◑	- Creates a generously wide and accessible shared use path **(MA, ME)** - Shelters shared use path from elements **(MA)** - Lower deck shared use path not visible to vehicular traffic, does not benefit from "eyes on the path" **(MA, ME)**
Vehicles/Freight	●	- Maintains access to local streets and SR14 - Compatible with Hayden Island full interchange design
Cost	◕	- Straight bridge design improves constructability - Two bridge design results in high construction cost
Lower Downtown Vancouver Waterfront Station	N/A	- Station appears technically feasible within constraints of bridge option

Equity Lens

Medium-High

- ◕ Avoids Harm **(AH)**
- ◑ Community Benefit **(CB)**
- ◕ Mobility/Accessibility **(MA)**
- ● Physical Design **(PD)**

Climate Lens

Medium-High

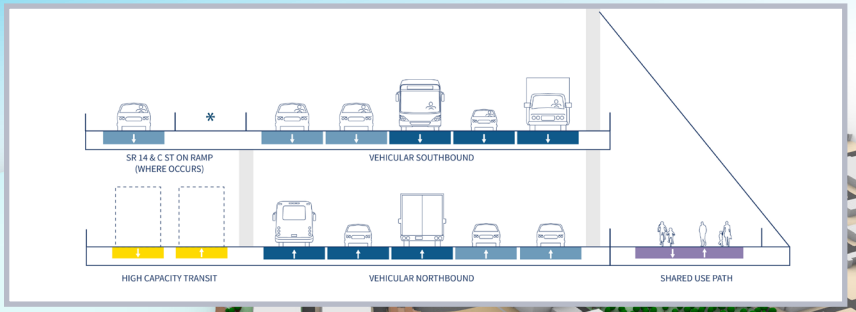
- ◕ Multimodal Environmental Factors **(ME)**
- ◕ Complete Communities **(CC)**
- ◕ Resilience **(RE)**

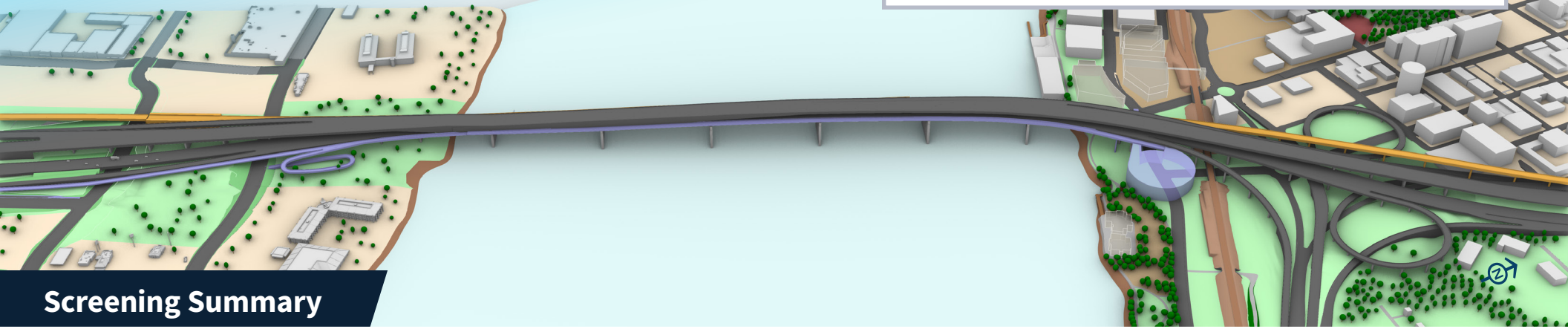
Best
● ◕ ◑ ◔ ○
Good

River Crossing

Design Option 3: One Bridge (Hybrid Stacked)

☑ Meets Purpose and Need





Screening Summary

Climate Impacts/Adaptation	◕	- Uses marginally fewer construction materials (based on footprint, not expected user emissions or VMT) - Improves transit and active transportation to draw mode shift - Design considers future climate disruption from flooding, extreme heat, storms and wind - Bridge elevation accounts for potential river elevation changes due to climate change
Natural Environment	●	- Fewest in-water piers and footprint over aquatic habitat Creates fewer in-water obstructions
Built Environment	◑	- Provides open views from the shared use path and for river users **(CB, PD)** - Results in complex bridge approaches on Hayden Island and in Vancouver **(CB, PD)** - Creates undesignated space on upper deck* - Tomahawk Island Drive crosses straight across island **(MA)** - Increases shared use path's exposure to traffic noise **(MA)** - Main Street extension provides new downtown connection to waterfront **(CB, CC)** - Fewer non-residential building impacts **(AH)**
Active Transportation	◑	- Creates a generously wide and accessible shared use path **(MA, ME)** - Allows some visibility between shared use path and vehicular traffic on lower deck **(MA, ME)** - Exposes shared use path to elements **(MA)** - Generates a higher proportion of space (openness above) **(MA)**
Vehicles/Freight	◕	- Maintains access to local streets and SR14 - Overhead structure complicates wayfinding - Compatible with Hayden Island full interchange design with design exceptions
Cost	◕	- Requires additional bridge width to accommodate shared use path - Single straight bridge design results in straightforward manufacturing and construction
Lower Downtown Vancouver Waterfront Station	N/A	- Station appears technically feasible within constraints of bridge option

Equity Lens

- ◕ Avoids Harm **(AH)**
- ◑ Community Benefit **(CB)**
- ◕ Mobility/Accessibility **(MA)**
- ◑ Physical Design **(PD)**

Climate Lens

- ◕ Multimodal Environmental Factors **(ME)**
- ◑ Complete Communities **(CC)**
- ● Resilience **(RE)**

Best
● ◕ ◑ ◔ ○
Good

Design options are evaluated in comparison to each other and do not reflect overall program ratings.

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Attachment C-3. Screening Matrix

Interstate BRIDGE Replacement Program

River Crossing/SR 14 Alignment

●/● = least impact, high scoring
◑/◑ = few impacts, middle scoring
○/○ = more/most impact, low scoring

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Some numbers have been rounded.

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Metric	Desired Outcomes Supported	Equity Objectives Supported	Climate Objectives Supported	2013 Curved Bridge	Design Option 1: Straight Alignment (Refined 2013 LPA)	Design Option 3: Hybrid Stacked Alignment	Qualitative Description
Climate							
Climate impacts of construction	CL.1, CL.2			Footprint: 84.87 acres. Volumes similar to other side-by-side bridge options ◑	Footprint: 80.19 acres. Anticipated that volumes similar to other side-by-side bridge options ◑	Footprint: 77.3 acres. Estimated to have a similar impact as double-stacked bridges (evaluating numbers 2/16) ◑	Project footprint was used as proxy for greatest construction impacts amongst the options. Differences regarded to be not
Future climate disruption/events are integrated into design performance standards	CL.3		RES	Future river elevation is contemplated in design. Low bridge deck elevation above river is same for all options. Materials endurance to variable climate conditions are the same for all options. ●	Future river elevation is contemplated in design. Low bridge deck elevation above river is same for all options. Materials endurance to variable climate conditions are the same for all options. ●	Future river elevation is contemplated in design. Low bridge deck elevation above river is same for all options. Materials endurance to variable climate conditions are the same for all options. ●	Future climate disruption events considered in design include: high and low water levels, extreme temperatures, storm events and wind.
Support long-term climate change adaptation where feasible (e.g., increased flooding, etc.)	CL.3, CL.4		RES	No identifiable differentiation for this metric among river crossing design options. ●	No identifiable differentiation for this metric among river crossing design options. ●	No identifiable differentiation for this metric among river crossing design options. ●	Future climate events requiring adaptation include: high and low water levels, extreme temperatures, storm events, wind and variable power supply. Bridge elevation, materials selection and operational limits under future climate scenarios are similar/same for all options.
Constructability							
I-5 traffic operations can be maintained during construction				Yes	Yes	Yes	The constructability of Design Options 2 and 3 have not been fully vetted at this time. A MOT plan is in development that allows three I-5 lanes in each direction throughout construction. Staging and phasing would be required from Marine Drive to about Evergreen including temporary detours and connections, and may impact construction packaging and order of construction. It is assumed that MOT for Design Option 1 will be similar to what was established for the 2013 Curved Bridge. At this time is appears that the MOT/staging and phasing for Design Options 2 and 3 would be more complicated and have more impacts than Design Option 1
Environment and Community Health							
Built Environment							
Aesthetics				◑	●	◑	
User experience on the structure	EQ.3	MA	CC, ACT	◑	◑	●	
				SUP location below highway limits open views to sky and horizon	SUP location below highway limits open views to sky and horizon	SUP location adjacent to highway has open views toward the east	
				Underdeck SUP has perceived personal safety challenges	Underdeck SUP has perceived personal safety challenges	Open environment for SUP more positive for perceived personal safety	
				All vehicles within one consistent environment on and off bridge	All vehicles within one consistent environment on and off bridge	Sudden changes in vehicles environment on and off bridge	
User experience surrounding the structure	EQ.3	AH, PD	CC	◑	●	◑	
				Curved alignment clutters visual appearance of bridge and clear (legible) identity is lost	Uncluttered river crossing with legible identity	Uncluttered river crossing with legible identity	
				Piers block views beneath the bridge and of the river	Piers block views beneath the bridge and of the river	Reduction in number of piers will improve 'transparency' of bridge and views of the river.	
				Unclear main I-5 structures across Hayden Island	Clear and identifiable main I-5 structures across Hayden Island	Unstacking of road detrimental to clarity of structures across Hayden Island	Design Option 1 scoring depends on full vs. partial interchange configuration.
				Consistent I-5 cross section off main bridge allows for simple and consistent pier structures	Consistent I-5 cross section off main bridge allows for simple and consistent pier structures	Unstacking and varied I-5 cross section off main bridge results in complex and cluttered pier structures	

Interstate BRIDGE Replacement Program

River Crossing/SR 14 Alignment

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Metric	Desired Outcomes Supported	Equity Objectives Supported	Climate Objectives Supported	2013 Curved Bridge	Design Option 1: Straight Alignment (Refined 2013 LPA)	Design Option 3: Hybrid Stacked Alignment	Qualitative Description
Impacts to views toward the structure from selected viewpoints in equity priority areas	EQ.3	AH, PD	CC	Height of highway decreases quickly north of the bridge ●	Height of highway decreases quickly north of the bridge ●	Distance to unstack resulting in a higher I-5 alignment for a longer distance north of the main bridge affects (blocks) views and increases overshadowing in adjacent areas ◑	
Air quality. Proximity of design option's bicycle/pedestrian infrastructure to vehicle lanes (potential emissions for "next to" or "below" vehicles)	EQ.1, EQ.2, EQ.6	MA	ACT	◑	◑	◑	The distance between high-volume roadways and bicycle or pedestrian infrastructure has an inverse relationship for air quality outcomes, with the influence extending about 500-600' downwind from travel corridors. The IBR team did not find research to demonstrate that configuring a stacked bridge with bicycle and pedestrian infrastructure below highway traffic would be better or worse than alongside the highway travel lanes. Therefore, this metric is not a differentiator between design options for the bridge crossing.
Community resources. Number of known community or cultural resources within the design option footprint and in equity priority areas or identified through community engagement	EQ.6	AH		**OR:** 0 **WA**: 1 ◑	**OR:** 0 **WA**: 1 ◑	**OR:** 0 **WA**: 1 ◑	OR: Hayden Island Community Church WA: Hudson's Bay High School; NW Association for Blind Athletes; Kuni Foundation; Community Roots Collaborative; Boys & Girls Club of SW Washington; Vancouver Community Library; Providence Academy building; Luepke Senior Center; Vancouver School of Arts and Academics
Cultural resources. Number of known or potentially eligible significant historic or cultural resources within the design option footprint				◑ OR ◑ WA ◑ **WA** Archy probability: *Underwater:* High (80-100%) = 0.05 ac *On Land:* Level A (Higher Prob) = 29 ac; Level B (Lower Prob) = 22 ac ○	◑ OR ◑ WA ◑ **WA** Archy probability: Underwater: High (80-100%) = 0.07 ac On Land: Level A (Higher Prob) = 29 ac; Level B (Lower Prob) = 22 ac ○	◑ OR ◑ WA ◑ **WA** Archy probability: Underwater: High (80-100%) = 0.06 ac On Land: Level A (Higher Prob) = 26 ac; Level B (Lower Prob) = 22 ac ○	Archy probability is only available for Washington.
Cultural resources. *Number of known or potentially eligible significant historic or cultural resources within the design option footprint and in equity priority areas or identified through community engagement*	*EQ.6*	*AH*		◑ *OR* ◑ *WA* ◑ ***WA*** *Archy probability:* *On Land: Level A (Higher Prob) = 3 ac; Level B (Lower Prob) = 14 ac* ○	◑ *OR* ◑ *WA* ◑ ***WA*** *Archy probability:* *On Land: Level A (Higher Prob) = 3 ac; Level B (Lower Prob) = 14 ac* ○	◑ *OR* ◑ *WA* ◑ ***WA*** *Archy probability:* *On Land: Level A (Higher Prob) = 3 ac; Level B (Lower Prob) = 14 ac* ○	Archy probability is only available for Washington.
Hazardous Materials. Potential Priority Hazardous Material Sites within the footprint		AH		7 ◑	12 ◑	9 ◑	

Interstate BRIDGE Replacement Program

River Crossing/SR 14 Alignment

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Metric	Desired Outcomes Supported	Equity Objectives Supported	Climate Objectives Supported	2013 Curved Bridge	Design Option 1: Straight Alignment (Refined 2013 LPA)	Design Option 3: Hybrid Stacked Alignment	Qualitative Description
Land Use				◑	◑	◑	
Placemaking opportunities in Vancouver supported by project based on what is appropriate for the location compatible with adopted land use plans and initiatives		CB	CC	Main Street extension provides new opportunity to connect downtown to the waterfront. Design includes overhead ramp structure over Main Street. ◑	Main Street extension provides new opportunity to connect downtown to the waterfront. Design includes overhead ramp structure over Main Street. ◑	Main Street extension provides new opportunity to connect downtown to the waterfront. Design includes overhead ramp structure over Main Street. ◑	
Placemaking opportunities on Hayden Island supported by project based on what is appropriate for the location compatible with adopted land use plans and initiatives		CB	CC	Less contiguous urban fabric due to wider footprint of freeway: 283-foot highway width at Columbia river's edge on Vancouver side and 435' on the Oregon side ○	Less contiguous urban fabric due to wider footprint of freeway: 272-foot highway width at Columbia river's edge on Vancouver side and 269' on the Oregon side ○	Moderately contiguous (relative to other options) urban fabric due to wider footprint of freeway: 143-foot highway width at Columbia river's edge on Vancouver side and 125' on the Oregon side ◑	Wider infrastructure footprint creates a wider break between urban fabric on east and west side of the infrastructure. Placemaking opportunities benefit from greater continuity in the urban fabric and smaller breaks.
Design option supportive of local street network and land use/City development vision on Hayden Island			CC	Clean and minimal bridge geometry relative to height above roadway creates more continuity in the urban fabric ●	Clean and minimal bridge geometry relative to height above roadway creates more continuity in the urban fabric ●	Deep and complex bridge geometry relative to height above roadway creates less continuity in the urban fabric ○	Deeper and more complex bridge geometry create a less comfortable user experience and less visual continuity across the infrastructure, i.e. more difficult to see and navigate to the urban fabric on one side of Hayden Island from the other.
Design option supportive of local street network and land use/City development vision in Vancouver			CC	Less SUP ramp structure than Option 2, less connected Main St extension than Option 2 ◑	Less SUP ramp structure than Option 2, less connected Main St extension than Option 2 ◑	Less SUP ramp structure than Option 2, less connected Main St extension than Option 2 ◑	
Size of total footprint of design option over waterfront (linear foot, widest point)				283-foot highway width at Columbia river's edge on Vancouver side and 435' on the Oregon side ○	272-foot highway width at Columbia river's edge on Vancouver side and 269' on the Oregon side ○	143-foot highway width at Columbia river's edge on Vancouver side and 125' on the Oregon side ◑	
Neighborhoods and population				◑	●	●	
Approximate number of non-residential buildings impacted by footprint		AH		○	◑	◑	
				OR: Commercial = 15 Utilities = 4 **TOTAL** = 19	**OR**: Commercial = 11 Utilities = 5 **TOTAL** = 16	**OR**: Commercial = 12 Utilities = 5 **TOTAL** = 17	
				WA: Commercial = 6 Utilities = 1 **TOTAL** = 7	**WA**: Commercial = 5 Utilities = 1 **TOTAL** = 6	**WA**: Commercial = 5 Utilities = 1 **TOTAL** = 6	
Approximate number of displaced residences		AH		0 ●	0 ●	0 ●	Does not include potential impacts to floating homes; See Marine Drive/Hayden Island matrix
Horizontal alignment and vertical profile of Tomahawk Island Drive under I-5				No TI Drive associated with 2013 Curved Bridge design; if accommodated would be lower than existing ground ○	TI Drive can be accommodated in combination with either full or half interchange on Hayden Island. Straight across island (east/west); elevation range approx. 32'-38' ●	TI Drive can be accommodated in combination with either full or half interchange on Hayden Island. Straight across island (east/west) closer to Hayden Island Drive; elevation range approx. 32'-38' ●	TI Dr. profile not appreciably different between options. Horizontal alignment roughly the same, slightly farther north for stacked.

Interstate BRIDGE Replacement Program

River Crossing/SR 14 Alignment

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Metric	Desired Outcomes Supported	Equity Objectives Supported	Climate Objectives Supported	2013 Curved Bridge	Design Option 1: Straight Alignment (Refined 2013 LPA)	Design Option 3: Hybrid Stacked Alignment	Qualitative Description
Noise				●	●	◑	
Number of high sensitivity and residential receptors within 500 feet of highway in design option	EQ.2, EQ.5			**OR:** Category 1: 0 Category 2: 446 (hotel rms) **WA:** Category 1: 0 Category 2: 407 (100 dwell units, 157 hotel rms + 150 hotel rms under construction) ●	**OR:** Category 1: 0 Category 2: 446 (hotel rms) **WA:** Category 1: 0 Category 2: 407 (100 dwell units, 157 hotel rms + 150 hotel rms under construction) ●	**OR:** Category 1: 0 Category 2: 446 (hotel rms) **WA:** Category 1: 0 Category 2: 407 (100 dwell units, 157 hotel rms + 150 hotel rms under construction) ●	A conservative approach was taken: 500-feet is the standard for unobstructed line of sight. With intervening buildings, the standard screening distance is 250 feet. It is anticipated that some cultural/historic sites may be affected by noise; these impacts would be consistent/the same among the transit options.
Number of high sensitivity and residential receptors within 500 feet of highway in design option, for receptors in equity priority areas or identified through community engagement	*EQ.2, EQ.6*	*AH*		***OR:*** *Category 1: 0* *Category 2: 0* ***WA:*** *Category 1: 0* *Category 2: 257 (100 dwell units, 157 hotel rms)* ◕	***OR:*** *Category 1: 0* *Category 2: 0* ***WA:*** *Category 1: 0* *Category 2: 257 (100 dwell units, 157 hotel rms)* ◕	***OR:*** *Category 1: 0* *Category 2: 0* ***WA:*** *Category 1: 0* *Category 2: 257 (100 dwell units, 157 hotel rms)* ◕	*No EPAs on OR side*
Potential noise impacts to SUP users due to the placement and physical shielding of the SUP in relation to the highway	EQ.8	MA	ACT	SUP is located below highway traffic. Highway traffic noise would be mostly shielded from the SUP because of the closed roadway deck above the SUP. ●	SUP is located below highway traffic. Highway traffic noise would be mostly shielded from the SUP because of the closed roadway deck above the SUP. ●	SUP is adjacent to northbound highway traffic on lower deck. Southbound highway traffic noise would be partially shielded to SUP. Northbound highway traffic noise would include reflective noise from the bottom of the southbound deck and would not be shielded to SUP. ○	FHWA Activity Category C
Parks, Recreation, and Open Space (PROS). Area of acquired or converted existing or planned PROS (by effect and by type of resource)				Fort Vancouver = 0.3-0.4 acre ●	Fort Vancouver = 0.3 - 0.8 acre ◑	Fort Vancouver = 0.3 - 0.6 acre ◑	No parks within the OR footprint.
Parks, Recreation, and Open Space (PROS). *Area of acquired or converted PROS in equity priority areas or identified through community engagement (by effect and by type of resource)*	*EQ.6*	*AH*	*RES*	*0* ◕	*0* ◕	*0* ◕	*No parks within the EPA in WA. No EPAs in the OR footprint.*
Section 4(f). Use of non-historic Section 4(f) resources (net benefit, temporary occupancy, *de minimis* , use or constructive use) and has the least overall harm to Section 4(f) resources				○	○	○	
Section 4(f). *Use of non-historic Section 4(f) resources (net benefit, temporary occupancy,* de minimis*, use or constructive use) and has the least overall harm to Section 4(f) resources in equity priority areas or identified through community engagement*	*EQ.6*	*AH*		◕	◕	◕	*No parks within the EPA in WA. No EPAs in OR study area.*
Natural Environment							
Water quality and hydrology. Area of new impervious surface within FEMA-mapped floodplains (proxy for volume of fill)	CL.3, CL.4		RES	2 acres ●	1 acre ●	1 acre ●	Potential impervious surface along the shoreline of the Columbia River. 2013 data accounts for additional area due to larger interchange design on Hayden Island which should not appreciably change scoring.
Wildlife and habitat. Total acreage of habitat areas (upland and riparian) crossed by design option	CL.4		RES	29 acres ○	28 acres ○	22 acres ●	
Wildlife and habitat. Total acreage of potential shaded aquatic habitat	CL.5		RES	12 acres ◑	11 acres ◑	10 acres ●	

Interstate BRIDGE Replacement Program

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Metric	Desired Outcomes Supported	Equity Objectives Supported	Climate Objectives Supported	2013 Curved Bridge	Design Option 1: Straight Alignment (Refined 2013 LPA)	Design Option 3: Hybrid Stacked Alignment	Qualitative Description
Efficient Movement of People and Goods							
Active Transportation							
Openness vs. Shelter - Perceived personal safety: visual connection between shared use path users and people traveling in vehicles (or any mode)	5.1, 5.3	MA	ACT	SUP across from transit on lower deck (No visual connection, physically separated) ○	SUP across from transit on lower deck (No visual connection, physically separated) ○	SUP is adjacent to northbound traffic on lower deck (visual connection, physically separated) ◑	
Openness vs. Shelter - More or less conducive to intended use (non-intended uses e.g., camping, vandalism, etc.)	5.1, 5.3	MA	ACT	○	○	●	
Openness vs. Shelter - Shared Use Path: exposure to the elements	5.1, 5.3	MA	ACT	Sheltered under structure, but may still be exposed to east-west wind/precipitation through bridge girders/viewports ●	Sheltered under structure, but may still be exposed to east-west wind/precipitation through bridge girders/viewports ●	Exposed on lower deck to overhead, east-west wind/precipitation/heat ◑	Will also depend largely on design elements and materials, e.g. sound barriers, overhead awnings, etc.
Height of Shared Use Path structure over existing ground on HI and Vancouver	5.1, 5.3	MA	ACT	SUP is 86 feet above Columbia Wy (Vancouver); SUP is 70 feet above Hayden Island Drive (Portland) ◑	SUP is 83 feet above Columbia Wy (Vancouver); SUP is 66 feet above Hayden Island Drive (Portland) ◑	SUP is 94* feet above Columbia Wy (Vancouver); SUP is 65 feet above Hayden Island Drive (Portland) ◑	*current design for DO3 is higher, however, further investigation indicates the potential to reduce the elevation to approximately equal with other options
Location of Shared Use Path (west or east side); complexity of ramp connections to Hayden Island and Vancouver Waterfronts	5.1, 5.3	MA	ACT	Double helix ramp at Columbia Way; Hayden Island ramp connection is parallel to NB I-5 on-ramp ◑	Double helix ramp at Columbia Way; Hayden Island ramp connection is parallel to NB I-5 on-ramp ◑	Double helix ramp at Columbia Way; Hayden Island ramp connection is parallel to NB I-5 on-ramp ◑	
Height of Shared Use Path structure over water	5.1, 5.3		ACT	Approx. 132' +/- ◑	Approx. 132' +/- ◑	Approx. 132' +/- ◑	
Proportion of space below I-5			ACT	◑	●	○	
				Tomahawk Island Drive: N/A	Tomahawk Island Drive: Structural depth proportional to space and local steel character below I-5; short length with high and wide proportions of route below Clean (uncluttered) areas around I-5 with minimal negative spaces under the structure. (partial interchange) ●	Tomahawk Island Drive: Bigger visual structural depth with crossing vehicle routes out of proportion to space and local street character below I-5; short length with low and narrow route below I-5. Areas of unused and negative spaces below I-5 where bridge unstacks. (partial interchange) ○	Design Option 1, 2 &3 scoring depends on full vs. partial interchange configuration. 'Negative spaces' are areas beneath and around structures that will be a challenge for perceived personal safety and can include unprogrammed, dark or overshadowed areas or locations with reduced visibility. A more cluttered structure creates more potential for these spaces.
				Hayden Island Drive: Moderate length with moderate height and wide proportions of route below I-5; views toward water ◑	Hayden Island Drive: short length with moderate height and wide proportions of route below; views toward water (partial interchange) ●	Hayden Island Drive: significant visual structural depth out of proportion to low-height space below I-5 (partial interchange) ○	Design Option 1, 2 &3 scoring depends on full vs. partial interchange configuration.
				Vancouver Main Street: Structural depth proportional to high-height space below I-5; long length of crossing below I-5 does not benefit from "eyes on the street" ◑	Vancouver Main Street: Structural depth proportional to high-height space below I-5; long length of crossing below I-5 does not benefit from "eyes on the street" ◑	Vancouver Main Street: Structural depth proportional to high-height space below I-5; reduced length of crossing below I-5 ●	
				Areas around I-5 with less negative spaces under the structure ◑	Areas around I-5 with less negative spaces under the structure ◑	Areas around I-5 with more negative spaces under the structure ○	Negative spaces' are areas beneath and around structures that will be a challenge for perceived personal safety and can include unprogrammed, dark or overshadowed areas or locations with reduced visibility. A more cluttered structure creates more potential for these spaces.

Interstate BRIDGE Replacement Program

River Crossing/SR 14 Alignment

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Metric	Desired Outcomes Supported	Equity Objectives Supported	Climate Objectives Supported	2013 Curved Bridge	Design Option 1: Straight Alignment (Refined 2013 LPA)	Design Option 3: Hybrid Stacked Alignment	Qualitative Description
Transit							
Performance (operating speed) of HCT as corridor departs from river crossing bridge alignment (based on horizontal and vertical geometry)			TRA	25 - 30 mph (LRT) 35 - 40 mph (BRT)	25 - 30 mph (LRT) 35 - 40 mph (BRT)	30 - 35 mph (LRT) 35 - 40 mph (BRT)	LRT operating speed based on TriMet Design Guidelines. BRT operating speed based on AASHTO design guidelines for K value (vertical curve length) and a 4% max superelevation rate. Design Options 1 and 3 assume an I-5 adjacent transit alignment. Data provided for this metric does not reflect the addition of a lower downtown Vancouver waterfront station.
Technical feasibility (horizontal and vertical track geometry) of lower downtown Vancouver waterfront station				N/A	A lower downtown Vancouver waterfront station appears to be technically feasible (horizontal and vertical track geometry) based on the current structural constraints of this bridge design option. But it is likely that adhering to these structural constraints will result in additional property and building impacts. Further refinements to this bridge option are being studied in an effort to minimize property impacts and eliminate building impacts.	A lower downtown Vancouver waterfront station appears to be technically feasible (horizontal and vertical track geometry) based on the current structural constraints of this bridge design option. But it is likely that adhering to these structural constraints will result in additional property and building impacts. Further refinements to this bridge option are being studied in an effort to minimize property impacts and eliminate building impacts.	
Freight/Vehicles							
Impacts to access from I-5 to local streets or east-west connections for vehicles in Vancouver	1.1			C Street to southbound I-5; northbound I-5 to C Street; westbound SR14 to Columbia Street; Main Street to eastbound SR14; Columbia Way under I-5 ●	C Street to southbound I-5; northbound I-5 to C Street; westbound SR14 to Columbia Street; Main Street to eastbound SR14; Columbia Way under I-5 ●	C Street to southbound I-5; northbound I-5 to C Street; westbound SR14 to Columbia Street; Main Street to eastbound SR14; Columbia Way under I-5 ●	
Out of Direction Travel/Confusing to access I-5 from WB SR14	4.2			None ●	None ●	None ●	
Out-of-direction travel/confusing/more intersections to access Downtown Vancouver from I-5	1.1, 2.1			None ●	None ●	None ●	
Volumes of local traffic anticipated to access Downtown Vancouver through the Mill Plain interchange	1.1, 2.2			None ●	None ●	None ●	
Compatibility with full access interchange at Hayden Island	1.1, 2.3			Yes	Yes	SB with Marine Drive SPUI + NB possible with design exceptions	

Interstate BRIDGE Replacement Program

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Green Harvey balls are subsets of blue Harvey balls, where applicable.

Metric	Desired Outcomes Supported	Equity Objectives Supported	Climate Objectives Supported	2013 Curved Bridge	Design Option 1: Straight Alignment (Refined 2013 LPA)	Design Option 3: Hybrid Stacked Alignment	Qualitative Description
Compatible with applicable design standards for all vehicle modes (i.e., anticipate design exceptions for ODOT, WSDOT, COV, or AASHTO)	4.1, 4.2, 4.3		RID	Design Exceptions: 2 Exit Ramp Taper 2 Ramp Spacing Separation between Collector-Distributor and Mainline ●	Design Exceptions: 2 Exit Ramp Taper 2 Ramp Spacing Separation between Collector-Distributor and Mainline ●	Design Exceptions: 3 Exit Ramp Taper 3 Ramp Spacing Separation between Collector-Distributor and Mainline. Modified Overhead Signage ○	
Financing/Cost							
Approximate project cost (data represents the change in cost from the 2013 Design)	CO.3			two bridges; complex geometry ○	two bridges ◑	one bridge w/appendage ◑	
Avoids major utilities (e.g., transformers, substations)	CO.3			●	●	●	
Estimated O&M cost and ownership	CO.3			◑	◑	●	
Design includes durable, low maintenance elements	CO.3		O&M	Yes ●	Yes ●	Yes ●	
Structural							
Approximate number of structures located in the water				12 ◑	12 ◑	6 ●	
Total width of structures at center of navigation channel				200 feet ○	200 feet ○	170 feet ◑	Assumes 5 lanes in each direction
Bridge construction complexity (straight vs. curved vs stacked)				The horizontal curvature of the bridge requires all custom framing due to dimensional variations resulting from the geometry, complicating manufacturing and construction. ○	Straight bridge improves constructability ◑	●	
Structural deck width in relation to space used for travel lanes and shoulders				As required ●	As required ●	Structural system requires wider upper deck than anticipated necessary for vehicle travel lanes, resulting in some undesignated space ◑	
	Teal highlighting is used to identify which design option has the highest score for a given metric						
	Grey highlighting it used when a metric is not a differentiator of design options						

Climate Objectives for Screening Criteria

ACT = Supports mode shift to low or no emission travel (i.e., active transportation: walking, rolling, biking)
CC = Supports complete communities
CONST = compatible with low carbon construction
ITS = Supports intelligent transportation systems
O&M = Supports low emission operations and maintenance
RES = Improves resilience to uncertain climatic conditions
RID = Reduces idling of vehicles (freight, single-occupancy vehicles, transit)
TRA = Supports mode shift to transit (i.e. improves access, travel time, reliability, etc.)

Equity Objectives for Screening Criteria

AH = Avoid further harm: Avoid rather than simply mitigate disproportionate impacts on equity priority groups.
CB = Community benefits: Find opportunities for and implement local community improvements in addition to required mitigations
EO = Economic opportunity: Ensure that economic opportunities generated by the program benefit minority and women owned firms, BIPOC workers, workers with disabilities, and young people.
MA = Mobility and accessibility: Improve mobility, accessibility, and connectivity, especially for lower income travelers, people with disabilities, and communities who experience transportation barriers.

Oregon Department of Transportation WSDOT

Attachment D. Transit Screening and Evaluation Materials - Transit Performance Evaluation

Interstate BRIDGE Replacement Program

Transit Performance Evaluation

Transit Options & Performance Measure Descriptions

	Option B	Option C	Option D	Option E	Option F	Option G	Option H	Option I	Option J	Option L	Option M
	2045 CRC Locally Preferred Alternative	Bus on Shoulder	Extend Vine(s) BRT on a Dedicated Guideway from Turtle Place to Expo Center	Dedicated BRT - Kiggins Bowl to Expo Center on an I-5 Adjacent Dedicated Guideway	Dedicated BRT - McLoughlin/I-5 to Expo Center in a Dedicated Guideway on the 2013 Transit Alignment	Extend Vine(s) BRT on a Dedicated Guideway from Turtle Place to Hayden Island, Extend Yellow Line from Expo Center to Hayden Island	LRT Extension from Expo Center to a terminus near Turtle Place	LRT Extension from Expo Center on an I-5 Adjacent Dedicated Guideway to a Terminus near McLoughlin/I-5	LRT Extension from Expo on an I-5 Adjacent Dedicated Guideway to a Terminus near Kiggins Bowl	LRT Extension from Expo Center on an I-5 Adjacent Dedicated Guideway to a Terminus Near McLoughlin/I-5 with Waterfront Station	LRT Extension from Expo Center on an I-5 Adjacent Dedicated Guideway to a Terminus Near Evergreen/I-5 with Waterfront Station
Alignment Description	2013 CRC LPA project assumes fully dedicated LRT guideway extending from Expo Center to a terminus near McLoughlin/I-5 via Vancouver CBD.	Express bus operating as Bus on Shoulder in BIA (both directions). Route 60 in auxiliary lanes between Vancouver CBD and Hayden Island, Delta Park.	Fully dedicated Bus Rapid Transit (BRT) guideway between Expo Center and a terminus at Turtle Place in downtown Vancouver.	Fully dedicated Bus Rapid Transit (BRT) guideway between Expo Center and a terminus Near McLoughlin Blvd. / I-5. Dedicated guideway on Vancouver segment will be adjacent to I-5 with a connection to Hayden Island and Expo Center similar to 2013 LPA.	Fully dedicated Bus Rapid Transit (BRT) guideway between Expo Center and a terminus near McLoughlin/I-5 with station locations similar to 2013 CRC LPA project.	Fully dedicated LRT guideway between Expo Center and a new station at Hayden Island and fully dedicated Bus Rapid Transit (BRT) guideway between Hayden Island and Turtle Place.	Fully dedicated LRT guideway between Expo Center and a terminus near Turtle Place in downtown Vancouver.	Fully dedicated LRT guideway between Expo Center and a terminus near I-5/McLoughlin. Dedicated guideway on Vancouver segment will be adjacent to I-5 with a connection to Hayden Island and Expo Center similar to 2013 LPA.	Fully dedicated LRT guideway between Expo Center and a terminus near I-5/Kiggins Bowl. Dedicated guideway on Vancouver segment will be adjacent to I-5 with a connection to Hayden Island and Expo Center similar to 2013 LPA.	Fully dedicated LRT guideway between Expo Center and a terminus near I-5/McLoughlin. Dedicated guideway on Vancouver segment will be adjacent to I-5 with a connection to Hayden Island and Expo Center similar to 2013 LPA.	Fully dedicated LRT guideway between Expo Center and a terminus near I-5/ Evergreen. Dedicated guideway on Vancouver segment will be adjacent to I-5 with a connection to Hayden Island and Expo station similar to 2013 LPA.
Proposed Initial Stations	Five(5) - same as 2013 CRC LPA alignment; I-5/McLoughlin, Washington/ Broadway & 15th, Washington/Broadway & Evergreen, Washington/5th, Hayden Island	None	Three (3) - Turtle Place, Hayden Island, Expo Center	Six (6) - Kiggins. E 33rd, McLoughlin Blvd., Evergreen Blvd., Hayden Island, Expo Center	Six (6) - similar to 2013 CRC LPA alignment; I-5/McLoughlin, McLoughlin & Washington St (SB)/16t & Broadway (NB), 12th & Washington (SB)/ 13th & Broadway (NB), Turtle Place, Hayden Island, Expo Center	Two (2) - Hayden Island, Expo Center	Two (2) - Hayden Island, Turtle Place	Three (3) I-5/McLoughlin, Evergreen, Hayden Island	Five (5) Kiggins Bowl, 33rd, I-5/McLoughlin, Evergreen, Hayden Island	Four (4) I-5/ McLoughlin, Evergreen, Waterfront, Hayden Island	Three (3) I-5/ Evergreen, Waterfront, Hayden Island
Park & Ride Locations (and Size)	Same as 2013 CRC LPA alignment locations and sizes; I-5/McLoughlin (1,910 spaces), Mill District (420 spaces), 5th/ Washington (570 spaces)	None	SR-14 Loop (570)	Kiggins (1,400), I-5/ McLoughlin (1,910), I-5/ Evergreen Blvd. (700)	Same as 2013 CRC LPA alignment locations and sizes; I-5/McLoughlin (1,910 spaces), Mill District. (420 spaces), 5th/ Washington (570 spaces)	SR-14 Loop (570)	SR-14 Loop (570)	I-5/McLoughlin (1,910 spaces), Evergreen (700 spaces)	Kiggins Bowl (1,400 spaces), I-5/ McLoughlin (1,910 spaces), Evergreen (700 spaces)	McLouglin / I-5 (1,910 spaces), Evergreen (700 spaces), SR-14 Loop (570 spaces)	I-5/Evergreen (700 spaces), SR-14 Loop (570 spaces)
Northern Terminus	Near I-5/McLoughlin	N/A	Turtle Place	Near I-5/Kiggins Bowl Station	Near I-5/McLoughlin	LRT = Hayden Island BRT = Turtle Place	Turtle Place	Near I-5/McLoughlin	Near I-5/Kiggins Bowl	Near I-5/McLoughlin	Near I-5/Evergreen
Transfer Location	No transfer required - extension of Yellow Line	N/A	Expo Center	Expo Center	Expo Center	Hayden Island	No transfer required - extension of Yellow Line	No transfer required - extension of Yellow Line	No transfer required - extension of Yellow Line	No transfer required - extension of Yellow Line	No transfer required - extension of Yellow Line
Initial Peak Frequency	Yellow Line: 7.5 min peak/15 min off-peak	Route 101: 15 min peak/30 min off-peak Route 105: 10 min peak only Route 190: 10 min peak only Route 60: 10 min peak/10 min off-peak	Hwy 99 BRT: 20 min peak/20 min off-peak Mill Plain/Fourth Plain BRT clockwise: 20 min peak/20 min off-peak Mill Plain/Fourth Plain BRT counterclockwise: 20 min peak/20 min off-peak Combined frequency on dedicated alignment: 6.6 min peak/6.6 min off-peak	Hwy 99 BRT: 20 min peak/20 min off-peak Mill Plain/Fourth Plain BRT clockwise: 20 min peak/20 min off-peak Mill Plain/Fourth Plain BRT counterclockwise: 20 min peak/20 min off-peak Frequency between Kiggins Bowl - Evergreen: 20 min peak/20 min off-peak Combined frequency on dedicated alignment south of Evergreen Station: 6.6 min peak/6.6 min off-peak	Hwy 99 BRT: 20 min peak/20 min off-peak Mill Plain/Fourth Plain BRT clockwise: 20 min peak/20 min off-peak Mill Plain/Fourth Plain BRT counterclockwise: 20 min peak/20 min off-peak Frequency between Kiggins Bowl - Evergreen: 20 min peak/20 min off-peak Combined frequency on dedicated alignment south of Evergreen Station: 6.6 min peak/6.6 min off-peak	Yellow Line:7.5 min peak/15 min off-peak Hwy 99 BRT: 20 min peak/20 min off-peak Mill Plain/Fourth Plain BRT clockwise: 20 min peak/20 min off-peak Mill Plain/Fourth Plain BRT counterclockwise: 20 min peak/20 min off-peak Frequency between Kiggins Bowl - Evergreen: 20 min peak/20 min off-peak Combined frequency on dedicated alignment south of Evergreen Station: 6.6 min peak/6.6 min off-peak	Yellow Line: 7.5 min peak/15 min off-peak	Yellow Line: 7.5 min peak/15 min off-peak	Yellow Line: 7.5 min peak/15 min off-peak	Yellow Line: 7.5 min peak/15 min off-peak	Yellow Line: 7.5 min peak/15 min off-peak
Peak Frequency Needed to Meet Demand	Yellow Line: 5 min	Route 101: 5 min Route 105: 5 min Route 190: 10 min	Same as initial frequencies	Hwy 99 BRT: 9 Min Mill Plain/Forth Plain BRT Counter Clockwise: 16 min	Same as initial frequencies	Yellow Line: 8 min BRT: Same as initial frequencies	Yellow Line: 7 min	Yellow Line: 5 min	Yellow Line: 4 min	Yellow Line: 5 min	Yellow Line: 6 min
Project Length	Northbound, 2.76 miles Southbound, 2.77 miles	N/A	1.67 miles	3.85 miles	Northbound 2.87 miles Southbound 2.89 miles	LRT - .45miles BRT - 1.23 miles	1.62 miles	2.45 miles	3.85 miles	2.45 miles	1.87 miles
Travel Time	Northbound 9.1 minutes, Southbound 8.2 minutes	N/A	3.98 min	7.65 min	Northbound 9.64 minutes, Southbound 9.51 minutes	LRT - 1.73 min BRT 2.95 min	3.82 minutes	5.76 minutes	8.53 minutes	6.39 minutes	4.68 minutes

Measure 1 Project Ridership	Project ridership will be developed as an output from the Regional Travel Demand Model. Project ridership is measured as the number of daily linked trips (complete trips from origin to destination including transfers) using any part of the proposed project. Project is defined as routes or portions of routes that include capital and/or service investments funded by the IBR Program. These may include infrastructure or service enhancements. The definition of a project trip will be clearly identified for each option to allow for a better understanding of what is being measured. For example, an option that includes the operation of a new HCT route in its own right-of-way that also allows for Express Bus use of the right-of-way would capture Project ridership from both the HCT route as well as the Express routes that benefit from the capital investment. Project trips will be summarized for both and combined to arrive at a total for the option.
Measure 2 New System Ridership	New system riders will be developed as an output from the Regional Travel Demand Model. This measure is calculated using total daily linked transit trips for each build option as compared to total daily linked transit trips from the no build option.
Measure 3 Station Activity & Mode of Access / Egress	Total boardings at each station will be developed as an output from the Regional Travel Demand Model. A boarding is defined as a single passenger who boards a transit vehicle. Boardings are counted each time a passenger boards a vehicle no matter how many vehicles they use to travel from their origin to their destination.
Measure 4 / Measure 5 / Measure 6 I-5 Columbia River **Transit** Crossings	Average weekday person trips crossing the Columbia River will be developed using select link and segment assignments as an output from the Regional Travel Demand Model. The specific location of this assignment will be on I-5 at the Columbia River crossing between the City of Vancouver and Hayden Island. Person trips will be reported by mode. A person trip is defined as a trip made by one person between an origin and destination. Measuring the average weekday crossings will illustrate the demand for the I-5 Columbia River crossing throughout the entire day and capture non-commute trips that may be missed by only looking at peak period demand. Project volumes of transit person trip origins and destinations, including park and rides, will be mapped.
Measure 7 Corridor Transit Trips	Transit person trips for the IBR corridor will be developed as an output from the Regional Travel Demand Model. This measure will be calculated as a comparison against the 2045 No Build condition. Transit person trips are a subset of all person trips, focusing only on those trips for which transit is the mode. Corridor transit trips are generally defined as trips that have a trip end within the project area including portions of Clark County, City of Vancouver, north Portland, and the Portland Central City (see Map 1). The transit trip productions will be summarized in aggregate and mapped at a Transportation Analysis Zone (TAZ) level for the region with the corridor outlined to show changes compared to the No Build option. Reported at the corridor level for totals and mapped at the TAZ level.
Measure 9 Park & Ride Demand	Total park and ride demand will be developed as an output from the Regional Travel Demand Model. This measure will be reported as average weekday vehicle demand at each lot location in the project corridor. Park and ride demand will also be mapped to show origins of users of each assumed parking facility. Reported and mapped at the station level.
Measure 12 Capital Cost	This measure is a quantitative analysis of the capital cost of the design option. The methodology for developing this measure is TBD based on available cost information at the time of developing the option summary. Reported at the project level.
Measure 13 Operating & Maintenance Costs	In coordination with TriMet and C-TRAN operations staff, operating costs will be estimated. Reported at the project level.

Transit Performance Evaluation

All Transit Options

Numbers below represent raw data from high-level analysis of scenarios using a regional travel demand model. The model used to develop this information does not account for things such as displacements, more detailed transit operations and transit connectivity along with a number of other important considerations that will be developed in more detail through the use of other tools and analysis during the environmental process.

		Option A	Option B	Option C	Option D	Option E	Option F	Option G	Option H	Option I	Option J	Option L	Option M
		2045 No Build	2045 CRC Locally Preferred Alternative	Bus on Shoulder	Extend Vine(s) BRT on a Dedicated Guideway from Turtle Place to Expo Center	Dedicated BRT - Kiggins Bowl to Expo Center on an I-5 Adjacent Dedicated Guideway	Dedicated BRT - McLoughlin/I-5 to Expo Center in a Dedicated Guideway on the 2013 Transit Alignment	Extend Vine(s) BRT on a Dedicated Guideway from Turtle Place to Hayden Island, Extend Yellow Line from Expo Center to Hayden Island	LRT Extension from Expo Center to a terminus near Turtle Place	LRT Extension from Expo Center on an I-5 Adjacent Dedicated Guideway to a Terminus near McLoughlin/I-5	LRT Extension from Expo Center on an I-5 Adjacent Dedicated Guideway to a Terminus near Kiggins Bowl	LRT Extension from Expo Center on an I-5 Adjacent Dedicated Guideway to a Terminus Near McLoughlin/I-5 with Waterfront Station	LRT Extension from Expo Center on an I-5 Adjacent Dedicated Guideway to a Terminus Near Evergreen/I-5 with Waterfront Station
Measure 1 Project Ridership		N / A	26,600	N / A	7,400	15,300	20,600	10,300	12,100	21,100	24,700	24,600	15,900
Measure 2 New System Ridership		N / A	15,600	4,400	7,700	11,40	11,100	7,600	8,700	13,300	15,300	15,200	11,000
Measure 3 Station Activity & Mode of Access / Egress *(**Average Weekday** Boardings + Alightings at New High Capacity Transit Stations)*		N / A	29,100	N / A	12.300	23,250	27,800	13,400	12,300	22,000	26,300	26,300	16,300
Measure 4 Average Weekday I-5 Columbia River Crossings	Transit Crossings*	19,400	33,300	23,900	26,900	30,000	28,700	26,100	27,100	31,500	33,200	33,200	29,500
	Percentage of Total Crossings	8%	15%	11%	12%	13%	13%	12%	12%	14%	15%	15%	13%
Measure 5 Peak I-5 Columbia River Crossings **(PM 1-Hour)**	Transit Crossings*	3,600	5,600	4,300	4,700	5,200	5,000	4,700	4,800	5,400	5,700	5,600	5,100
	Percentage of Total Crossings	20%	29%	24%	26%	28%	27%	26%	26%	29%	30%	29%	27%
Measure 6 Peak I-5 Columbia River Crossings **(PM 4-Hour)**	Transit Crossings*	7,900	13,000	9,700	10,700	11,800	11,400	10,500	10,800	12,400	12,900	12,900	11,700
	Percentage of Total Crossings	12%	20%	16%	17%	19%	18%	17%	18%	20%	20%	20%	19%
Measure 7 Corridor Transit Ridership **(Average Weekday)**	Transit Riders	454,700	469,500	458,900	461,800	465,400	464,200	461,800	462,800	467,200	469,200	469,200	465,200
	Change vs. No Build	N / A	14,700	4,200	7,100	10,700	10,400	7,000	8,100	12,500	14,500	14,500	10,400
Measure 8 Station Mode of Access / Egress **(Average Weekday)**	**Walk**	N / A	**(37%)** 10,700	N / A	**(33%)** 4,100	**(21%)** 4,900	**(29%)** 8,200	**(34%)** 4,500	**(39%)** 4,800	**(29%)** 6,300	**(32%)** 8,300	**(30%)** 8,000	**(37%)** 6,000
	Transfer	N / A	**(42%)** 12,200	N / A	**(64%)** 7,900	**(59%)** 13,700	**(58%)** 16,200	**(66%)** 8,900	**(52%)** 6,400	**(44%)** 9,700	**(33%)** 8,800	**(46%)** 12,100	**(49%)** 8,000
	Park & Ride	N / A	**(22%)** 6,300	N / A	**(2%)** 300	**(20%)** 4,600	**(13%)** 3,500	-	**(9%)** 1,100	**(27%)** 6,000	**(35%)** 9,200	**(24%)** 6,200	**(14%)** 2,300
	Total	N / A	29,100	N / A	12,300	23,300	27,900	13,400	12,300	22,000	26,300	26, 300	16,300
Measure 9 Park & Ride Demand		N / A	3,060	N / A	620	4,330	2,850	620	620	2,780	4,460	3,470	1,400
Measure 12 Capital Cost		N / A	Medium	N / A	Low	Medium-Low	Low	Low	Medium-Low	Medium	High	Medium-High	Medium
Measure 13 Operating & Maintenance Costs**		N / A	High	Low	Low	Low	Low	Low	Medium	Medium-High	High	Medium-High	Medium

**Transit numbers presented in these tables assume that demand can be met by the service being provided. Given assumed headways and capacities in the network for these options, some of the demand generated by the model would not be served. Therefore, these numbers reflect more transit demand than could be accommodated based on service levels in the options.*

***When considering operations and maintenance costs **per rider**, LRT is typically less expensive than BRT because LRT vehicles can carry more than 2.5 times as many passengers than BRT vehicles.*

Attachment E. Auxiliary Lanes Screening and Evaluation Materials - Tolling Sensitivity Analysis

TOLLING SENSITIVITY ANALYSIS

June 2022

Tolling Scenarios Analyzed

The tolling sensitivity analysis for initial screening for the IBR program used toll rates developed during the Columbia River Crossing (CRC) Final Environmental Impact Statement (FEIS) process and documented as part of the CRC Locally Preferred Alternative (LPA) in the 2040 Financially Constrained Regional Transportation Plan (RTP) for both Metro and the Southwest Washington Regional Transportation Council (RTC). The IBR program was requested by project partners to complete model sensitivity tests that include higher tolls than those developed during the CRC FEIS process, as well to include congestion pricing on other regional freeways; this is similar to what is being studied in the ODOT Regional Mobility Pricing Project (RMPP). The toll sensitivity scenarios run through the travel demand model included different toll levels on the I-5 bridge only, as well as separate sensitivity tests with different toll levels with the inclusion of congestion pricing on I-5 and I-205 south of the Columbia River though the Portland metropolitan area.[1] The purpose of the sensitivity tests was not to recommend a toll rate structure, and the results of this analysis should not be used to estimate revenue. Initial results should be considered draft and will be updated based on travel demand modeling assumptions that will change between the screening phase and the future environmental and traffic and revenue study phase.

The IBR toll scenarios assumed the following:

- Toll rates were assumed to vary by time of day with higher values during peak periods and lower values in off-peak periods.
- Toll rates for northbound and southbound traffic were assumed to be the same.
- Toll rates are expressed in 2010$ and are assumed to keep pace with inflation out to year 2045.

[1] The starting point for modeling conducted as part of the tolling sensitivity analysis was the RTP adopted by both Oregon Metro and RTC with updates to land use to extend the forecasts to the year 2045. These metropolitan planning organizations have coordinated this process in a manner consistent with underlying comprehensive plans and information provided by their jurisdictions as part of the RTP process. The LPA analyzed in this process reflects highway, tolling, and transit assumptions from the CRC LPA that was approved in 2008 and that received a Record of Decision (ROD) in 2011. The 2045 No Build analyzed reflects the RTP without the LPA highway, tolling, and transit elements of the CRC LPA. The 2045 No Build and 2045 LPA that were the initial scenarios used in this tolling analysis are what was used for developing traffic (volumes, travel times, heat maps) and transit results that have been used for analysis during the IBR screening process.

- Consistent with tolling assumptions during the CRC FEIS and pending further direction and inputs from the two state transportation commissions, toll rates for medium-sized trucks (three to four axles) were assumed to be twice the rate of passenger vehicles and toll rates for large trucks (over four axles) were assumed to be four times the rate of passenger vehicles.
- The Metro/RTC regional travel demand model includes 2015 base transit fares in the Portland metropolitan region expressed in 2010$ consistent with other costs in the travel demand model. It is assumed that transit fares keep pace with inflation out to the year 2045. In addition, for the 2045 forecast year, RTP policies include assumptions that result in the reduction of transit fares for all trips to the central city, regional centers, and other areas that have been designated in the RTP to include such transit fare-reduction policies. For example, the transit fare for trips to the Portland central business district reflect a reduction of 60 percent of the base full fare.
- Auto costs include tolls plus parking charges at the trip destination, as well as operating costs reflecting gas, maintenance, registration, insurance, etc. It is assumed that auto costs keep pace with inflation.

Table 1 shows the tolling scenarios analyzed in this study.

Table 1. Tolling Scenarios Analyzed

Scenario	Description
2045 No-Build [1]	Background network assumptions included in the Metro 2040 RTP without IBR highway, tolling, and high-capacity transit in place.
2045 No-Toll	CRC LPA as included in the RTP (both highway and transit improvements in place) without a toll on the I-5 bridge.
Tolled Scenarios	
2045 LPA [1]	FEIS toll rates on I-5 bridge only – CRC LPA as included in the RTP (highway, tolling, high-capacity transit improvements).
2045 LPA + OR Congestion Pricing (representation of RMPP)	FEIS toll rates on I-5 bridge + congestion pricing representation of work being done for the RMPP (pricing on I-5 and I-205 from the Columbia River to the I-5/I-205 merge point at the south end of the Portland metropolitan area).
2045 Higher Bridge Toll Only	Higher toll rates on I-5 bridge (approximately 1.5 x FEIS rates).

Scenario	Description
2045 Higher Bridge Toll + OR Congestion Pricing (representation of RMPP)	Higher toll rates on I-5 bridge (approximately 1.5 x FEIS rates) + congestion pricing representation of work being done for the RMPP (pricing on I-5 and I-205 from the Columbia River to the I-5/I-205 merge point at the south end of the Portland metropolitan area).
Partner agency–requested scenario (2045 Higher Bridge Toll + OR Congestion Pricing)	Higher I-5 toll rate scenario (approximately 4.5 x FEIS rates) to determine if this would reduce auto volumes on I-5 so eight-lane option operates adequately.

[1] The 2045 No Build and 2045 LPA scenarios used for tolling analysis are the same scenarios that have been used for the evaluation of traffic impacts and analysis to support the greater IBR program during the screening phase of the project.

Tolling Sensitivity Preliminary Results

The tolling sensitivity analysis compared the IBR tolling impacts of No-Build to the No-Toll and Toll scenarios. All scenarios reflect 2045 horizon year conditions. In general, with the inclusion of tolls or the inclusion of higher tolls on the I-5 bridge, vehicle volumes crossing the I-5 bridge are reduced. Some auto trips divert to I-205, some auto trips shift to transit, and some choose different destinations that do not require a river crossing. In general, when congestion pricing is introduced on I-5 and I-205 south of the Columbia River through the Portland metropolitan area in addition to the I-5 bridge toll, more vehicles stay on the I-5 bridge rather than diverting to the I-205 bridge, more trips shift from auto to transit, and more trips choose a different destination that does not require a river crossing. Trips that choose to not cross the river under either tolling concept (I-5 only or I-5 bridge with congestion pricing in Oregon) are more likely to be discretionary trips.

Table 2 shows the magnitude of change for auto, transit, and river crossings under each toll sensitivity test as compared with the No-Build Alternative. Note that transit increases in each scenario reflect the demand that would exist without regard for whether there is capacity to serve that demand. All 2045 scenarios would need increased transit service over what was initially modeled to accommodate the resulting demand.

Table 2. Draft IBR Tolling Impacts from Sensitivity Tests – 2045 Toll Scenarios vs. 2045 No-Build*

Scenario	I-5 Average Weekday Vehicle Trips (% change[2])	I-205 Average Weekday Vehicle Trips (% change[2])	Total Average Weekday Vehicle Trips (% change[2])	Total Average Weekday Transit Trips (% change[2])	Total Average Weekday Trips and River Crossing Change1 (% change[2])
2045 No-Build	-	-	-	-	-
2045 No-Toll [3]	+16%	-7%	+4%	+41%	+6%
2045 LPA [4]	-0.6%	-4%	-2%	+63%	+1%
2045 LPA [4] + OR Congestion Pricing	-2%	-15%	-9%	+88%	-4%
2045 Higher Toll Rate	-14%	-1%	-7%	+76%	-3%
2045 Higher Toll Rate + OR Congestion Pricing	-16%	-12%	-14%	+106%	-8%

* Initial DRAFT Post-Processed impacts

[1] Trips that change crossing the Columbia River because of change in trip distribution due to transit/tolling.

[2] Change compared to No-Build Scenario.

[3] Assumes IBR is constructed but not tolled ("Build-No-Toll option").

[4] CRC LPA

Figure 1 and Figure 2 show tolling impacts to traffic volumes on I-5 southbound and I-5 northbound, respectively, under all tolling sensitivity testing scenarios analyzed by the program. The 2019 Existing Scenario in each figure reflects current volumes. The highest volumes occur in the AM peak southbound and in the PM peak northbound with the 2045 No-Toll and 2045 LPA with congestion pricing (OR CP). The 2045 No-Toll Scenario implements the CRC LPA (highway and transit elements) but does not include a toll to cross the bridge; no toll is attractive to drivers and results in higher volumes on the I-5 bridge. The 2045 LPA with congestion pricing has higher volumes similar to the No-Toll Scenario because the implementation of congestion pricing on I-5 and I-205 south of the Columbia River effectively creates a toll to cross the I-205 bridge, as well as for I-5, so vehicles are less likely to divert to avoid paying the toll on I-5.

Figure 1. Tolling Impact on I-5 Southbound Vehicle Volumes

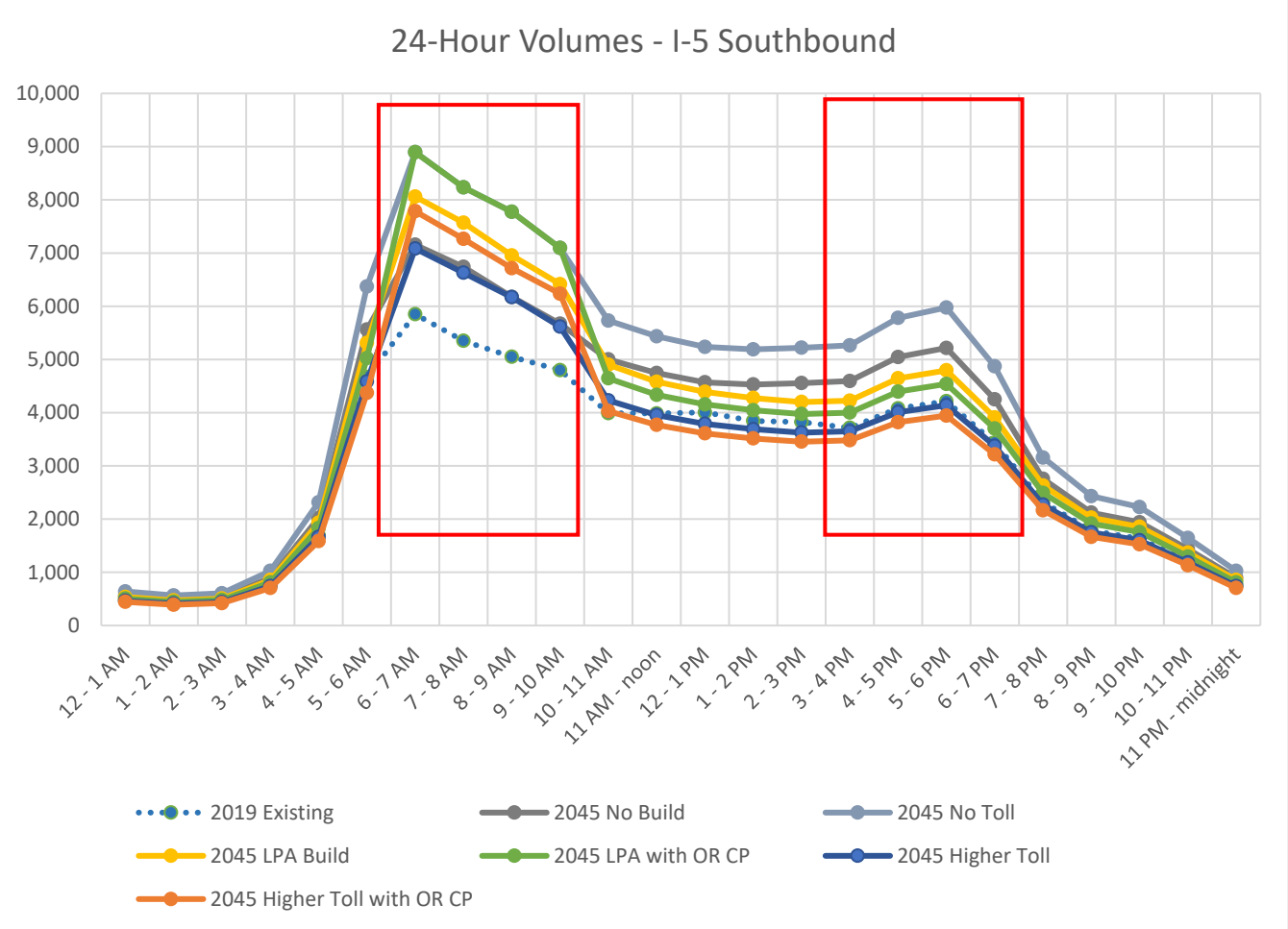


Figure 2. Tolling Impact on I-5 Northbound Vehicle Volumes

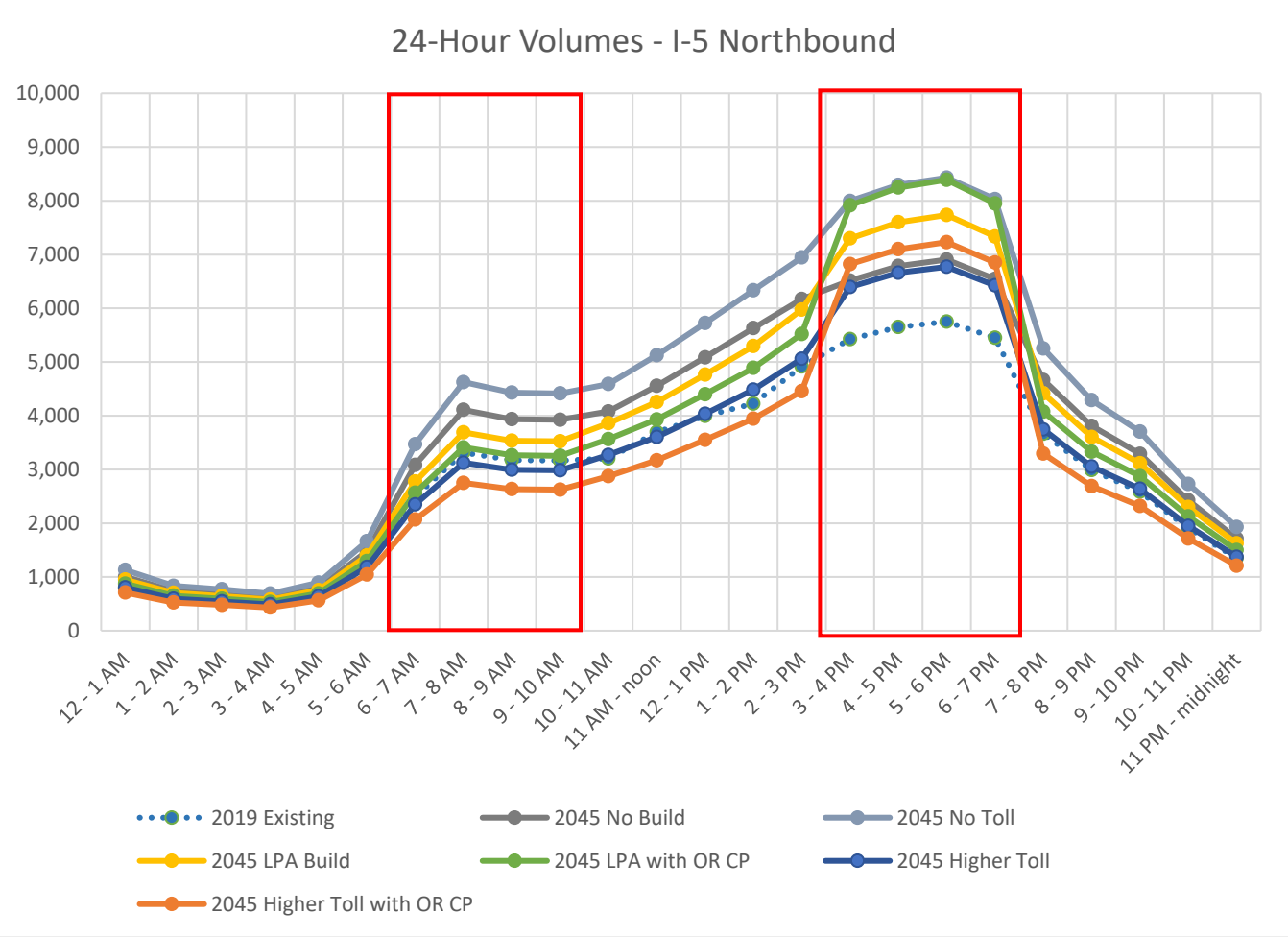


Figure 3 and Figure 4 show tolling impacts to traffic volumes on I-205 Southbound and I-205 Northbound, respectively, under all tolling sensitivity testing scenarios analyzed by the program. The No Build and 2045 Higher Toll scenarios show the highest vehicle volumes on I-205 in both the AM peak southbound and PM peak northbound peak periods. The scenarios with the lowest traffic volume during the AM peak period include the 2045 LPA with OR CP and 2045 Higher Toll with OR CP. As noted previously, the inclusion of congestion pricing on I-205 in Oregon results in more vehicles staying on I-5 to cross the river than if only I-5 is tolled.

Figure 3. Tolling Impact on I-205 Southbound Vehicle Volumes

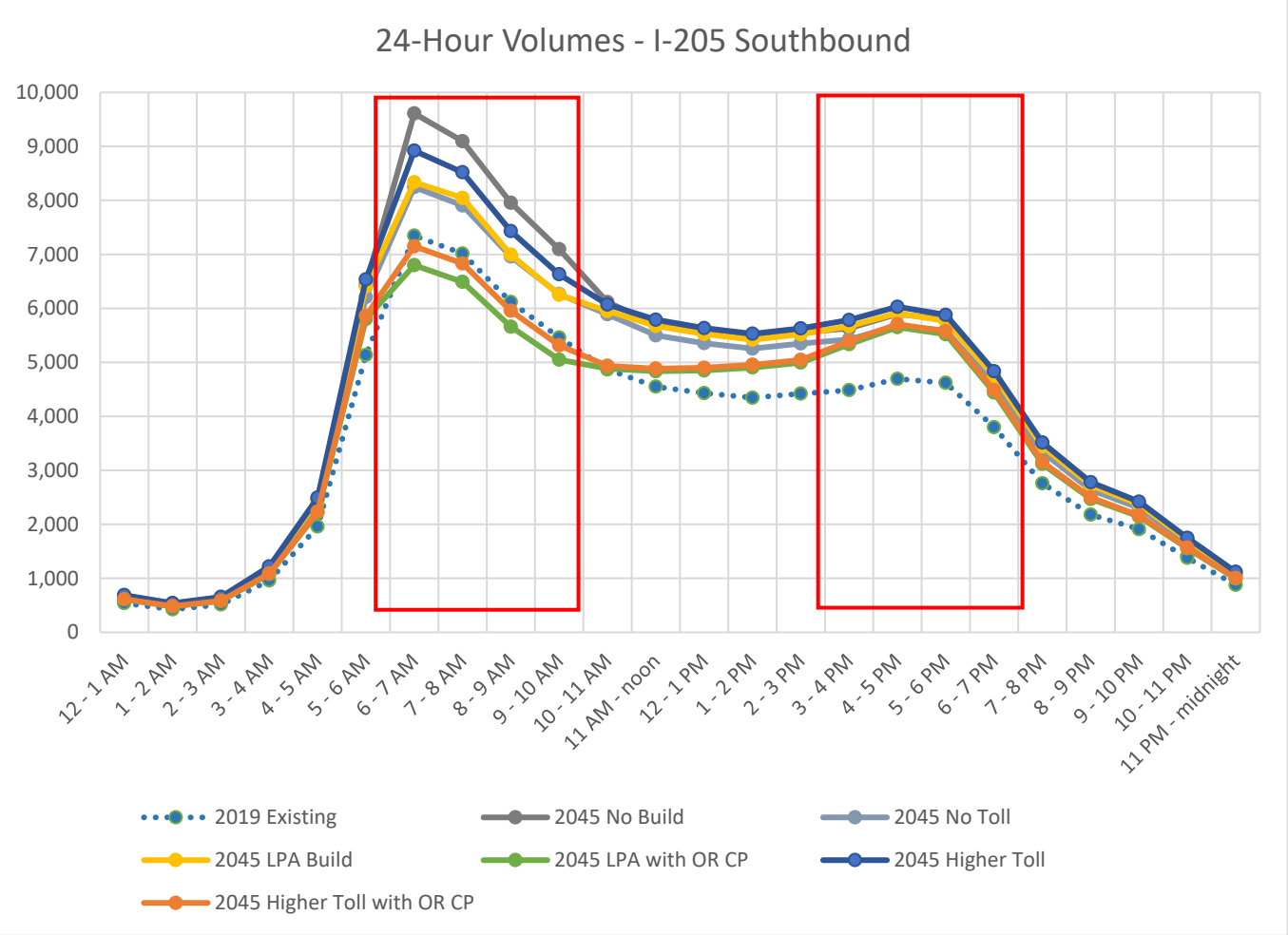
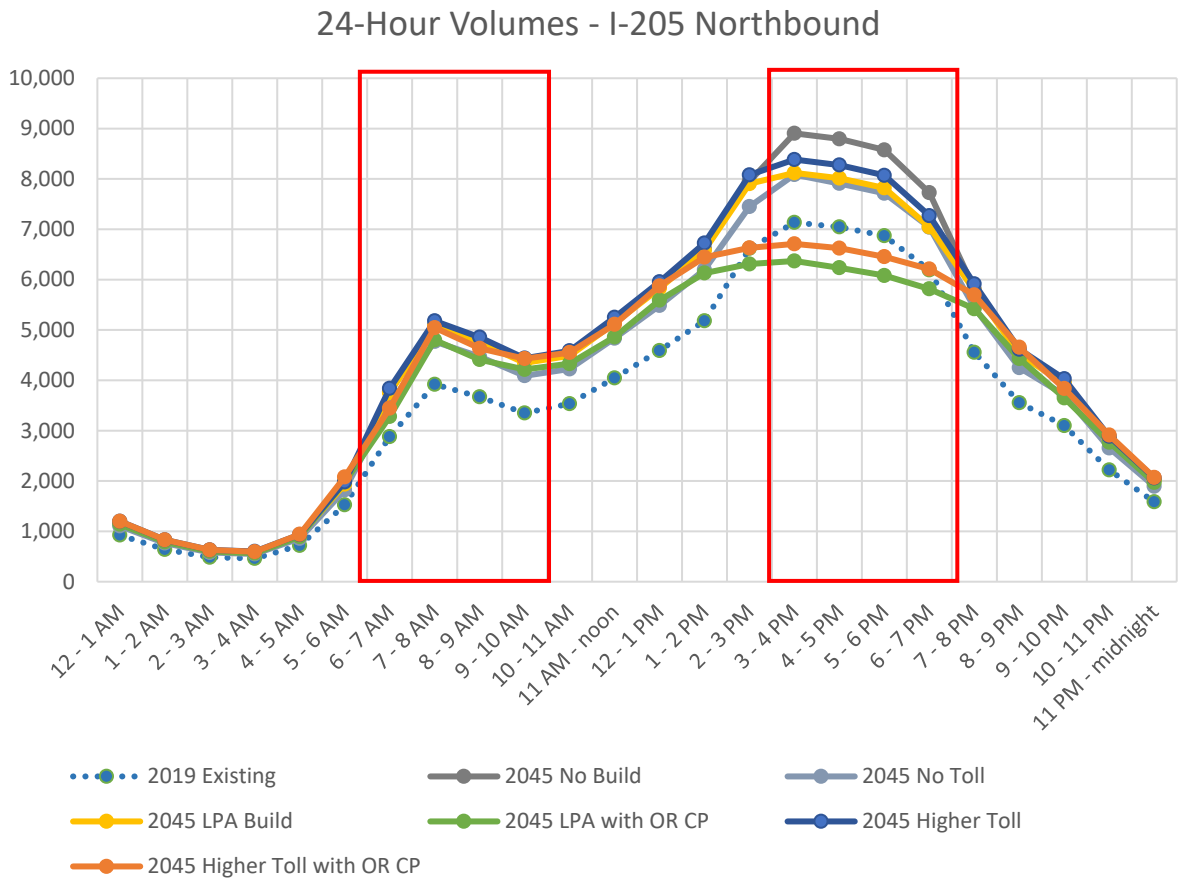


Figure 4. Tolling Impact on I-205 Northbound Vehicle Volumes



Takeaways

When comparing all tolling sensitivity scenarios against a No-Build Scenario, the results of the travel demand model show reductions in daily vehicle trips across the Columbia River from between -2 percent (2045 LPA) to -14 percent (2045 Higher Toll with OR CP). While vehicle trips decrease under these scenarios, transit trips increase which leads to overall river crossing demand changes from between a 1 percent increase under the 2045 LPA scenario to a -8 percent decrease with the 2045 Higher Toll with OR CP scenario. The transit increases in these scenarios reflect demand for transit service which exceeds transit capacity based on the transit service that was assumed in the travel demand model runs to date. Additional work will need to be completed to determine how much of this transit demand can be accommodated and the impact to vehicle trips crossing the river.

It is worth noting that the reduction in trips crossing the river is primarily related to discretionary (optional) travel with much smaller reductions in non-discretionary trips (e.g., home-to-work and work-to-home). Since

tolling and increased rates do not significantly reduce peak-period auto trips even with higher mode shares going to transit, safety improvements that include auxiliary lanes (ramp-to-ramp connections) are still needed to address the numerous safety issues experienced by travelers in the corridor. These safety issues include close interchange spacing that does not allow drivers adequate time to make on/off decisions; short merge, weave, and diverge spacing that does not allow space needed to accelerate to freeway speeds; and high on- and off-ramp volumes all entering the freeway in short distances between ramps.

Appendix E

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Appendix I

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Appendix F

LIST OF PREPARERS

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Louis Alcorn (AICP)/WSP	Author, Draft SEIS	B.A. Urban Studies; M.S. Community and Regional Planning; M.S. Transportation Engineering	10
Adam Alsobrook (Licensed Professional Architect)/Willamette CRA	Author, Historic Built Environment Tech Report	B.S. Architectural Studies	20
Liz Antin/WSP	Deputy Environmental Task Lead; Author, Draft SEIS	B.A. Economics; M.A. Urban and Environmental Policy and Planning	15
Nadine Appenbrink/Parametrix	Author, Draft SEIS, Economics Technical Report	Master of Urban and Regional Planning	14
Sarah Bailey/WSP	Editor, Draft SEIS and technical reports	B.A. English and Comparative Literature; M.F.A. Creative Writing; Certificate in Professional Editing	10
Lindsey Benjamin/Parametrix	Geographic Information Systems, Draft SEIS	B.A. Anthropology; Masters in Library Information Science; Certificate in GIS	11
Isabella Beshouri/WSP	Environmental Technical Team	B.A. Environmental Studies	1
Brian Carico/WSP	Author, Draft SEIS, Navigation Impact Report	B.A. Geography	30
Kelly Carini/Parametrix	Author, Public Services Technical Report	B.A. Environmental Studies	8
Agustin Castro Hernandez (EIT)/Parametrix	Author, Transportation Technical Report	B.S. Civil Engineering	2.5
Amy Cook (BELS)/WSP	Editor, Draft SEIS and technical reports	B.A. Linguistics; Ph.D. English Literature	15
Colin Drake/WSP	Environmental Technical Team	B.A. Human Biology; Master of Urban Planning	20

Name (Registration)/Affiliation	Project Role	Education	Years of Experience
Dusty Day (Professional Wetland Scientist)/WSP	Author, Wetlands and Waters Technical Report	B.S. Biology; M.S. Environmental Management	24
Cassandra Dobson/Parametrix	Section 4(f) Evaluation	B.A. Political Science; Master of Urban and Regional Planning	6
J. Tait Elder, MA, RPA (SOI Qualified)/Parametrix	Section 4(f) Evaluation	B.A. Anthropology; Masters in Arts in Anthropology	20
Erinn Ellig/Parametrix	Author, Draft SEIS, Economics Technical Report, Neighborhoods and Populations Technical Report	B.A. Geography; Master of Urban and Regional Planning	12
Caitlyn Ewers (SOI Qualified)/ARG	Section 4(f) Evaluation	B.A. Art History and Latin; M.S. Historic Preservation	5
Angela Findley (PMP)/WSP	Environmental Task Lead	B.A. Mathematics; M.S. Forest Resources	27
Conrad Fischer/WSP	Author, Geology and Groundwater Technical Report	B.S. Geology, M.S. Earth Sciences - Oceanography	38
Rebecca Frohning/WSP	Author, Air Quality Technical Report, Energy Technical Report	B.S. Earth & Atmospheric Science	22
Langston Geuttinger (SOI Qualified)/Willamette CRA	Author, Historic Built Environment Technical Report	B.A. History of Art & Architecture and English Literature	6
Dan Gunderson, PWS/WSP	Author, Ecosystems Technical Report	B.S. Biology	22
Rachel Haukkala (AICP)/WSP	Environmental Technical Team	B.S. Community and Regional Planning; Secondary Major in Environmental Studies	7
Guy Horchy, PE (OR&WA)/Parametrix	Author, Aviation Technical Report, Utilities Technical Report	B.S. Civil Engineering	20
Katie Jensen/Parametrix	Author, Draft SEIS	B.S. Environmental Sciences/Earth Sciences; Master of Urban and Regional Planning/Environmental Planning	19
Jennifer John/Parametrix	Author, Transportation Technical Report	B.S. Economics	30

Name (Registration)/Affiliation	Project Role	Education	Years of Experience
Emma Johnson (AICP) LEED Green Associate/WSP	Environmental Technical Team; Author, Draft SEIS, Cumulative Effects Technical Report	B.S. Urban and Regional Planning; Master of City Planning	11
Paula Johnson (Registered Professional Archaeologist)/Willamette CRA	Author, Archaeology Technical Report	B.A. Anthropology; M.A. Museology	32
Larissa King Rawlins (AICP)/WSP	Environmental Technical Team; Author, Draft SEIS	B.A. Environmental Planning	24
Mara Krinke/Parametrix	Author, Climate Technical Report	B.A. Botany & Economics; M.A. Public Affairs	25
Laura Lamorette/WSP	Graphics, Draft SEIS	B.A. Visual Communications	18
Ryan LeProwse (PE, PTOE)/Parametrix	Traffic Lead; Author, Transportation Technical Report	B.S. Civil Engineering	24
Irina Leschuk/IML Services	Author, Utilities Technical Report	B.S. Civil Engineering; M.S. Hydrogeology/ Engineering	20
Ella Lisac/ WSP	Environmental Technical Team	B.S. Urban Planning (2026)	0
Glen Leverich (Oregon Registered Geologist, Washington Registered Geologist)/Wolf Water Resources	Author, Water Quality and Hydrology Technical Report	B.S. Environmental Sciences; M.S. Applied Geosciences	21
Jillian Martin/Parametrix	Section 4(f) Evaluation	Master of Applied Anthropology	19
Kaylie Matthews (OSHA 40 Hour HAZWOPER; OSHA 30 Hour Construction Health and Safety)/WSP	Environmental Technical Team	B.S. Environmental Science	4
Jodi Mescher (AICP)/WSP	Environmental Technical Team	B.S. Environment and Natural Resources; Master of Urban and Regional Planning	4
Sean McElroy/WSP	Environmental Technical Team; Author, Draft SEIS; Cumulative Effects Technical Report	B.A. Sustainability; M.S. Transportation Technology and Policy	2
Jason Medema (LEED AP)/Parametrix	Author, Land Use Technical Report, Draft SEIS	B.A. International Affairs; M.S. Environmental Studies	17
Becky Mellinger/Parametrix	Editor, Draft SEIS and technical reports	B.A. Geology; M.S. Geosciences	26

Name (Registration)/Affiliation	Project Role	Education	Years of Experience
Eddie Montejo/Parametrix	Author, Environmental Justice Technical Report	B.S. Environmental Studies & Renewable Energy; Master of Urban and Regional Planning	10
Todd Ogle (SOI Qualified, Registered Professional Archaeologist)/Willamette CRA	Author, Historic Built Environment Technical Report	B.A. History and Anthropology; M.A. Anthropology	24
Sadie Mae Palmatier/WSP	Environmental Technical Team	B.A. Environmental Economics and Ecology; Masters in Community and Regional Planning	2
Morgan Quirk (SOI Qualified)/ARG	Section 4(f) Evaluation	B.S. Policy, Planning and Development (Urban Planning); M.S. Historic Preservation	4
Hayli Reff (SOI Qualified)/ODOT	Cultural Resources Program Manager	B.A. Architectural History; M.S. Historic Preservation	10
Chris Regan (MS, CPM)/WSDOT	Environmental Program Manager	B.S. Biology; M.S. Restoration Ecology	30
Kassandra Rippee (SOI Qualified, Oregon & Washington Qualified Archaeologist)/ODOT	Tribal Liaison	B.S. Anthropology; M.A. Anthropology; M.L.S. Indigenous Peoples Law; Geographic Information Systems: Defense and Intelligence	16
Dana Rivera/Parametrix	Author, Draft SEIS	B.A. Communication Studies; M.A. Urban and Regional Planning	1
Grace Roberts/WSP	Author, Draft SEIS, Navigation Impact Report	B.S. Marine Biology; M.A. Science Oceanography	14
Patrick Romero (INCE, Environmental SP)/WSP	Author, Noise & Vibration Technical Report	B.S. Environmental Science; M.S. Environmental Policy and Management	24
Adam Romey (Registered Geologist, OR; Licensed Geologist, WA)/Parametrix	Author, Hazardous Materials Technical Report	B.A. Anthropology; B.S. Biology	20
Noreen Roster/WSP	Environmental Technical Team, Permitting Manager	B.S. Environmental Ecology	30
Sam Rubin (AICP)/WSP	Geographic Information Systems, Draft SEIS	B.S. Community and Regional Planning; Master of Community and Regional Planning	10

Name (Registration)/Affiliation	Project Role	Education	Years of Experience
April Ryckman/WSP	Author, Parks and Recreation Technical Report	B.S. Environmental Science	7
Zahra Sadegh, ENV SP/WSP	Section 4(f) Evaluation	B.A. Environmental Engineering; M.S. Agroecology; M.S. Environmental Science	7
Ethan Spoo (AICP)/WSP	Author, Draft SEIS, Section 4(f) Evaluation	B.A. Economics; Master of Urban Regional Planning - Transportation	22
Lawrence Spurgeon/WSP	NEPA Advisor	B.S. Industrial Engineering; M.S. Civil/Environmental Engineering	30
Rebecca Steiner (AICP)/WSP	Environmental Technical Team	B.A. Environmental Studies; Master of Urban Planning; Graduate Certificate in Historic Preservation	4
Kathleen Stephanick/Parametrix	Author, Draft SEIS	B.A. Geography; M.A. Geography	17
January Tavel (SOI Qualified)/Parametrix	Deputy Cultural Resources Manager	Masters of Historic Preservation	15
Breanne Taylor (SOI Qualified, Registered Professional Archaeologist)/Willamette CRA	Author, Archaeology Technical Report	B.A. Anthropology; M.A. Heritage Resource Management	13
Melissa Uland/WSP	Graphics, Draft SEIS	B.A. Graphic Design	22
Dawn Walters/WSP	Environmental Technical Team	B.S. Theatre and Business Administration; Master of Urban and Regional Planning	1
Bill Warncke/ODOT	Deputy Environmental Manager	B.S. Natural Resource Management; M.S. Fisheries Science	32
Jake Warr/Espousal Strategies LLC	Author, Equity Technical Report	B.S. Sociology; Master of Urban and Regional Planning	10
Essie Weiss-Tisman (SOI Qualified)/Willamette CRA	Author, Historic Built Environment Technical Report	B.A. History; M.A. Preservation Studies	2
Ryan Weston/WSP	Author, Visual Quality Technical Report	B.S. Horticulture; Master of Urban and Regional Planning	10
Brian Woodburn (PE, PTOE)/Parametrix	Author, Transportation Technical Report	B.A. Mathematics & Physics; M.S. Engineering	17

Name (Registration)/Affiliation	Project Role	Education	Years of Experience
Alyssa Worsham/Parametrix	Author, Environmental Justice Technical Report	B.S. Environmental Science	7
Silvia Yanez/WSP	Author, Electromagnetic Fields Technical Report	B.S. Chemical Engineering; M.S. Development and Environment	20
Emily Yokum (ODOT Qualified FAHP Consultant, WSDOT Fish Passage/Stream Design, CESCL)/ Wolf Water Resources	Author, Water Quality and Hydrology Technical Report	B.S. Botany	11
Jenifer Young/Parametrix	Environmental Technical Team; Author, Draft SEIS	B.A. English; MPA Public Administration	34

Appendix G

LIST OF RECIPIENTS

Government Agencies

Federal Agencies

Federal Highway Administration (FHWA)

Federal Transit Administration

National Park Service (NPS)

National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries)

U.S. Army Corps of Engineers

U.S. Coast Guard, Thirteenth District

U.S. Environmental Protection Agency (EPA), Region 10

Federal Aviation Administration (FAA)

U.S. Fish and Wildlife Service

U.S. General Services Administration

Advisory Council on Historic Preservation

Bonneville Power Administration (BPA)

Federal Railroad Administration

U.S. Army, Military Reserves

U.S. Department of the Interior

U.S. Forest Service

FHWA Western Federal Lands Highway Division

NPS, Fort Vancouver National Historic Site

United States Congress

Oregon

Senator Jeff Merkley

Senator Ron Wyden

Representative Andrea Salinas

Representative Cliff Bentz

Representative Earl Blumenauer

Representative Lori Chavez-DeRemer

Representative Suzanne Bonamici

Representative Val Hoyle

Washington

Senator Maria Cantwell

Senator Patty Murray

Representative Adam Smith

Representative Derek Kilmer

Representative Cathy McMorris Rodgers

Representative Dan Newhouse

Representative Kim Schrier

Representative Marie Gluesenkamp Perez

Representative Marilyn Strickland

Representative Pramila Jayapal

Representative Rick Larsen

Representative Suzan DelBene

State Agencies and Commissions

Oregon

Oregon Department of Transportation

Oregon Department of Environmental Quality

Oregon Department of Fish and Wildlife

Oregon Department of Land Conservation and Development

Oregon Department of State Lands

Oregon State Historic Preservation Office

Chief Financial Office

Legislative Fiscal Office

Office of the Governor

Office of the Attorney General

Office of the Treasurer

Oregon Advocacy Commissions Office

Oregon Commission on Asian Affairs

Oregon Commission on Black Affairs

Oregon Commission on Hispanic Affairs

Oregon Commission on Indigenous Affairs

Oregon Commission on Women's Affairs

Oregon Parks and Recreation Department

Oregon Transportation Commission

Washington

Washington State Department of Transportation

Washington State Department of Archaeology and Historic Preservation

Washington State Department of Ecology

Washington State Department of Fish and Wildlife

Washington State Department of Natural Resources

Office of the Attorney General

Office of the Governor

Office of Financial Management

Office of the Treasurer

Washington State Recreation and Conservation Office

Washington State Transportation Commission

State Legislatures

Oregon

Senator Rob Wagner, President of the Senate

Senator Aaron Woods

Senator Brian Boquist

Senator Daniel Bonham

Senator Chris Gorsek

Senator Lew Frederick

Senator Lynn Findley

Senator Kate Lieber

Senator Kathleen Taylor

Representative Julie Fahey, House Speaker

Representative Ben Bowman

Representative Kenin Mannix

Representative Khanh Pham

Representative Maxine Dexter

Representative Nancy Nathanson

Representative Paul Evans

Representative Rob Nosse

Representative Travis Nelson

Representative Shelly Boshart Davis

Representative Susan McLain

Representative Tawna Sanchez

Representative Werner Reschke

Representative Jeff Helfrich

Washington

Senator Ann Rivers

Senator Annette Cleveland

Senator Brad Hawkins

Senator Claire Wilson

Senator Claudia Kauffman

Senator Curtis King

Senator Drew Hansen

Senator Drew MacEwen

Senator Javier Valdez

Senator Jeff Holy

Senator Jeff Wilson

Senator John Lovick

Senator Liz Lovelett

Senator Lynda Wilson

Senator Marko Liias

Senator Mike Padden

Senator Phil Fortunato

Senator Sharon Shewmake

Senator T'wina Nobles

Representative Alex Ramel

Representative Andrew Barkis

Representative Beth Doglio

Representative Bill Ramos

Representative Brandy Donaghy

Representative Dan Bronoske

Representative Dan Griffey

Representative Dave Paul

Representative David Hackney

Representative Davina Duerr

Representative Debra Entenman

Representative Ed Orcutt

Representative Eric Robertson

Representative Greg Cheney

Representative Greg Nance

Representative Jake Fey

Representative Jim Walsh

Representative Joe Timmons

Representative Julio Cortez

Representative Jurado Stonier

Representative Keith Goehner

Representative Kevin Waters

Representative Liz Berry

Representative Mark Klicker

Representative Mike Chapman

Representative Mike Volz

Representative Paul Harris

Representative Sam Low

Representative Sharlett Mena

Representative Sharon Wylie

Representative Spencer Hutchins

Representative Stephanie McClintock

Representative Suzanne Schmidt

Representative Tom Dent

Regional Jurisdictions and Agencies

Oregon

Oregon Metro

Tri-County Metropolitan Transportation District of Oregon (TriMet)

Multnomah County Drainage District

Clackamas County

Home Forward

Multnomah County

Peninsula Drainage District 2

Washington County

Washington

Southwest Regional Transportation Council

Clark County Public Transit Benefit Area Authority (C-TRAN)

Clark County

Clark Public Utilities

Cowlitz County

Skamania County

Southwest Clean Air Agency

Oregon Transportation Commission

Chair Julie Brown

Vice Chair Lee Beyer

Commissioner Sharon Smith

Commissioner Alicia Chapman

Commissioner Jeff Baker

Washington Transportation Commission

Chair Debbie Young

Vice Chair Jim Restucci

Commissioner JC Baldwin

Commissioner Shiv Batra

Commissioner Kelly Fukai

Commissioner Nicole Grant

Commissioner Roy Jennings

Local Jurisdictions and Agencies

Oregon

City of Gresham

City of Portland

Port of Portland

City of Banks

City of Barlow

City of Beaverton

City of Canby

City of Cornelius

City of Durham

City of Estacada

City of Fairview

City of Forest Grove

City of Gaston

City of Gladstone
City of Gresham
City of Happy Valley
City of Hillsboro
City of Johnson City
City of King City
City of Lake Oswego
City of Maywood Park
City of Milwaukie
City of Molalla
City of North Plains
City of Oregon City
City of Rivergrove
City of Sandy
City of Sherwood
City of Tigard
City of Troutdale
City of Tualatin
City of West Linn
City of Wilsonville
City of Wood Village

Washington

City of Vancouver
Port of Vancouver USA
City of Battle Ground
City of Camas
City of Castle Rock
City of Kalama
City of Kelso
City of La Center
City of Longview
City of Ridgefield
City of Washougal
City of Woodland
City of Stevenson
Vancouver Housing Authority

Native American Tribes

Confederated Tribes and Bands of the Yakama Nation
Confederated Tribes of Siletz Indians of Oregon
Confederated Tribes of the Colville Reservation
Confederated Tribes of the Grand Ronde Community of Oregon
Confederated Tribes of the Umatilla Indian Reservation
Confederated Tribes of the Warm Springs Reservation of Oregon
Cowlitz Indian Tribe
Nez Perce Tribe
Nisqually Indian Tribe
Spokane Tribe of the Spokane Reservation (Spokane Tribe of Indians)
Chinook Indian Nation

Community Organizations

Neighborhood Associations

Oregon

Bridgeton
Cathedral Park
East Columbia
Hayden Island Neighborhood Network
Kenton
North Portland Neighborhood Services
Woodlawn

Washington

Arnada
Central Park
Columbia Way
Esther Short
Hudson's Bay
Shumway
Rose Village

Universities, Colleges, and Public Libraries

Oregon

- American College of Healthcare Sciences
- Clackamas Community College
- Lewis and Clark College
- Mt. Hood Community College
- Multnomah County Library
- Multnomah University
- National University of Natural Medicine
- North Portland Library
- Oregon Health and Science University
- Pacific University
- Portland Community College
- Portland State University
- Reed College
- St. Johns Library
- Sumner College
- University of Portland
- Warner Pacific University

Washington

- Clark College
- Fort Vancouver Regional Libraries
- Lower Columbia College
- Washington State University Vancouver

Schools and School Districts

Oregon

- Portland Public Schools

Washington

- Evergreen School District
- Vancouver School District
- Washington State School for the Blind
- Washington School for the Deaf

Community Centers

Oregon

- Matt Dishman Community Center
- Peninsula Park Community Center
- St. Johns Community Center
- University Park Community Center

Washington

- Bridgeview Resource Center
- Firstenburg Community Center
- Luepke Senior Center
- Marshall Community Center

Community and Advocacy Groups

Oregon

- Africa House
- African American Health Coalition
- Albina Ministerial Alliance
- American Association of Retired People
- Arc of Oregon and Southwest Washington
- Asian Pacific American Network of Oregon
- Autism Service Dogs of America
- Because People Matter Action Center
- Bike Loud PDX
- Bike Portland
- Black and Beyond the Binary
- Blazers Boys & Girls Club
- Bridges Oregon, Inc.
- Brown Hope
- Center for Diversity and the Environment
- Coalition of Communities of Color
- Columbia River Inter-Tribal Fish Commission
- Community of Hope
- Dignity Village (JOIN)
- Disability Rights Oregon
- Federation of the Blind – Portland Central Chapter
- Fingers Crossed Interpreting

- Grey Panthers
- Habitat for Humanity – Portland Region
- Hacienda Community Development Corporation (CDC)
- Hispanic Metropolitan Chamber of Commerce
- Human Solutions
- Imagine Black
- Immigrant and Refugee Community Organization
- Impact NW
- Immigrant & Refugee Community Organization (IRCO)
- Janus Youth
- Kenton Women's Village (Catholic Charities of Oregon)
- Latino Built
- Latino Network
- Leading Age Oregon
- League of Oregon Cities
- MS Society of Portland
- Multnomah County Youth Council
- National Association for the Advancement of Colored People Portland (NAACP) Portland
- National Alliance on Mental Illness – Multnomah
- National Federation of the Blind – Oregon State Affiliate
- National Senior Games Association
- Native American Youth and Family Center
- Neighborhood House
- Next Up!
- NW Pilot Project
- Oregon Community Alliance for Tenants
- Oregon Council of the Blind Affiliate
- Oregon Environmental Council
- Oregon Self Advocacy Coalition
- Oregon Walks
- Oregonians for Food & Shelter
- Portland Community Reinvestment Initiative
- Portland Japanese American Citizen League
- Portland United Against Hate
- Ride Connection
- Slavic and Eastern European Center
- Slavic Community Center of NW, Inc
- The Street Trust
- Sunrise PDX
- Transitional Youth – Vida's Ark
- Unite Oregon
- Urban League of Portland
- Vanport Mosaic
- Verde

Washington

- Activate Inclusion
- Alliance for Retired Americans
- Bike Clark County
- Boys & Girls Clubs of Southwest Washington
- Children's Center
- Clark County Food Bank
- Clark County Latino Youth Conference
- Clark County Transportation Alliance
- Clark County Veterans Assistance Center
- Columbia River Mental Health Services
- Community in Motion
- Council for the Homeless
- Deaf Education Advocates Foundation
- Disability Rights Washington
- Educational Opportunities for Children and Families: Administration (EOCF)
- Family Promise of Clark County
- Filipino American Association
- FISH Westside Food Pantry of Vancouver
- Fourth Plain Forward
- Friends of the Carpenter
- Hispanic Disability Support
- Historic Trust
- Innovative Services NW
- Ke KuKui Foundation

Latino Community Resource Group

League of United Latin American Citizens (LULAC) – Southwest Washington Chapter

Lutheran Community Services NW

Martha's Pantry

National Alliance on Mental Illness (NAMI) Southwest Washington

National Association for the Advancement of Colored People (NAACP) Vancouver

National Federation of the Blind – Washington State Affiliate

Native American Parent Association of Southwest Washington

Native Arts and Culture Foundation

Next (Workforce Southwest Washington)

The Noble Foundation

Northwest Association for Blind Athletes

OneLife Food Pantry

Open House Ministries

Outsiders Inn

Pacific Islander Community Association of Washington

Partners in Careers

Police Activities League of Southwest Washington

Queer Youth Resource Center

Ready to Rise

Salvation Army Family Services – Vancouver

Second Step Housing

Share Vancouver

Southwest Washington Accountable Communities of Health

Southwest Washington Area Agency on Aging

Southwest Washington Disability Alliance

St. Vincent de Paul

Support for Early Learning and Families (SELF)

Transportation Choices Coalition

Vancouver Bicycle Club

Washington Advocacy for the Deaf and Hard of Hearing

Washington Center for Deaf & Hard of Hearing Youth

West Vancouver for Youth

YWCA Clark County

Businesses and Business Associations

Oregon

Albany Chamber of Commerce

American Automobile Association – Oregon

American Council of Engineering Companies – Oregon

American Federation of Labor and Congress of Industrial Organizations (AFL-CIO)

American Society of Civil Engineers

Ash Grove Cement Company

Associated General Contractors – Oregon-Columbia Chapter

Associated Oregon Loggers, Inc.

Association of Oregon Counties

Barrett & Company

Beaverton Area Chamber of Commerce

Black Business Association of Oregon

Buena Hayden LLC

Capacity Commercial Group

Chamber of Commerce-Medford/Jackson County

The Chamber of Medford and Jackson County

Clackamas County Business Alliance

Columbia Corridor Association

Daimler Trucks North America

East Metro Economic Alliance

East Portland Chamber of Commerce

Food Northwest

Frank Adams Wholesale Florist

Fred Meyer

Greater Portland Inc.

Heritage Bank

Hispanic Metropolitan Chamber of Commerce

Holt Homes

Home Builders Association of Metropolitan Portland

International Brotherhood of Electrical Workers (IBEW) Local 48, 125, 280, 932

International Right of Way Association

Jantzen Beach Moorage, Inc.

Jubitz

Just Crossing Alliance

Kerr Contractors

Killian Pacific

Kimco

Knife River

Latino Built

Legacy Health

Lower Columbia River Harbor Safety Committee

Maul Foster Alongi

Metro Portland New Car Dealers Association

Moda Health

NAI Elliott

National Association of Minority Contractors – Oregon Chapter

National Federation of Independent Businesses

North Clackamas Chamber of Commerce

Northwest Automotive Trades Association

Northwest Grocery Association

Northwest Industrial Business Association

Northwest Natural Gas

Northwest Pulp & Paper Association

Oregon Association of Minority Entrepreneurs

Oregon Association of Nurseries

Oregon Automobile Dealers Association

Oregon Bankers Association

Oregon Beer & Wine Distributors Association

Oregon Building Trades

Oregon Business & Industry

Oregon Business Council

Oregon Cattlemen's Association

Oregon Concrete and Aggregate Producers Association

Oregon Dairy Farmers Association

Oregon Farm Bureau

Oregon Forest & Industries Council

Oregon Fuels Association

Oregon Home Builders Association

Oregon Jobs through Trade

Oregon Manufacturers and Commerce

Oregon Metropolitan Planning Organization Consortium

Oregon Native American Chamber

Oregon Plumbing-Heating-Cooling Contractors Association

Oregon Power Sports Association

Oregon Public Ports Association

Oregon Realtors

Oregon RV Dealers Association

Oregon State Board of Examiners for Engineering & Land Surveying

Oregon State Chamber of Commerce

Oregon Transportation Forum

Oregon Trucking Associations

Oregon Vehicle Dealer Association

Oregon Women for Agriculture

Pacific Northwest Waterways Association

Pacific Power

Pacific West Bank

Portland Business Alliance

Portland Metropolitan Association of Realtors

Portland Screw Company.

Professional Business Development Group

Professional Engineers of Oregon

Professional Land Surveyors of Oregon

Providence Health and Services

Recology

Schnitzer Steel

Society of American Military Engineers

Sport Oregon

Swan Island Business Association

Technology Association of Oregon

Tigard Chamber of Commerce

Travel Portland

Twietmeyer Properties

URS Electronics Inc.

Washington County Chamber of Commerce

Weber's Wholesale Inc.

Western Wood Preservers Institute

Westside Economic Alliance

WFG National Title Company

Working Waterfront Coalition

Worksystems

Washington

AgForestry Leadership Program

American Automobile Association – Washington

American Council of Engineering Companies – Washington

Associated Builders & Contractors – Western Washington

Associated General Contractors – Washington Chapter

Association of Washington Business

Association of Washington Spirits & Wine Distributors

Biggs Insurance Company

Building Industry Association of Clark County

Building Industry Association of Washington

Catworks Construction

Clark County Realtors Association

Clark County Title

Columbia Machine, Inc.

Columbia River Economic Development Council

Columbia River Pilots

Columbia River Steamship Operators Association

Corwin Beverage Co.

Cowlitz Economic Development Council

Cowlitz-Wahkiakum Central Labor Council

Cowlitz-Wahkiakum Council of Governments

Creative Computer Solutions, Inc.

Davidson & Associates Insurance

Fuller Group

Ginn Group

Greater Vancouver Chamber of Commerce

High, Wide, and Heavy Corridor Coalition

Hilton Vancouver Washington

Identity Clark County

ilani Casino

Iron Workers District Council of the Pacific Northwest

Kaiser Permanente

Kelso-Longivew Chamber of Commerce

Kyocera

League of Women Voters – Clark County

Legacy Health

LSW Architects

McDonald Excavating, Inc.

Military Officers Association of America – Columbia River Chapter

National Active and Retired Federal Employees – Vancouver Chapter

The Neil Jones Food Company

Northwest Carpenters

Opsahl Dawson

Pacific Energy Concepts NW

PeaceHealth

Pearson Field

Prestige Development

Realvest Corporation

Roberston & Olson

RSV Building Solutions

Schwabe, Williamson & Wyatt

Seattle Metropolitan Chamber of Commerce

Shaver Transportation

Silicon Forest Electronics

Skamania County Chamber of Commerce

Skamania Economic Development Council

Southwest Washington Central Labor Council

- Southwest Washington Contractors Association
- Southwest Washington Freight & Commerce Task Force
- Southwest Washington High Technology Council
- Tapani Inc.
- Thompson Metal Fab
- Tidewater Barge Lines
- United Malt Group
- Vancouver Clinic
- Vancouver Downtown Association
- Vesta Hospitality
- Vigor
- Washington Aggregates & Concrete Association
- Washington Association of Realtors
- Washington Beer & Wine Distributors Association
- Washington Beverage Association
- Washington Cattlemen's Association
- Washington Contract Loggers Association
- Washington Council on International Trade
- Washington Highway Users Federation
- Washington Public Ports Association
- Washington State Auto Dealers Association
- Washington State Building & Construction Trades Council
- Washington State Dairy Federation
- Washington State Freight Mobility Strategic Investment Board
- Washington State Labor Council, AFL-CIO
- Washington State Potato Commission
- Washington State Transit Association
- Washington State Tree Fruit Association
- Washington Trucking Association
- Waste Connections
- Weyerhaeuser Co.
- Wollam & Associates Real Estate
- Workforce Southwest Washington
- WW Payment Systems

Appendix H

LIST OF TECHNICAL REPORTS

The following reports are included in the Draft Supplemental Environmental Impact Statement.

- Acquisitions Technical Report
- Air Quality Technical Report
- Archaeology Technical Report
- Aviation Technical Report
- Climate Change Technical Report
- Cumulative Effects Technical Report
- Economics Technical Report
- Ecosystems Technical Report
- Electromagnetic Fields Technical Report
- Energy Technical Report
- Environmental Justice Technical Report
- Equity Technical Report
- Geology and Groundwater Technical Report
- Hazardous Materials Technical Report
- Historic Built Environment Technical Report
- Land Use Technical Report
- Navigation Simulation Study
- Neighborhoods and Populations Technical Report
- Noise and Vibration Technical Report
- Parks and Recreation Technical Report
- Public Services Technical Report
- Transportation Technical Report
- Utilities Technical Report
- Visual Quality Technical Report
- Water Quality and Hydrology Technical Report
- Wetlands and Other Waters Technical Report

Appendix I

GLOSSARY

This appendix provides informal definitions of technical terms used in this Draft Supplemental Environmental Impact Statement (SEIS).

Note: Bold text indicates a term or phrase also defined in the table.

Term	Definition
303(d)	Section 303(d) of the federal Clean Water Act requires each state to monitor and regulate the quality of water in its rivers and streams. If a waterbody does not meet a particular water quality standard, as determined by the state, that waterbody is "303(d) listed." See also **total maximum daily load (TMDL)**.
Active transportation	Human-powered modes of transportation, such as walking, bicycling, or using a wheelchair.
Add/drop lane	See **auxiliary lanes**.
Aggregate (geology)	A rock-like mixture of minerals and rock fragments.
Alignment (transit)	The route that the **high-capacity transit guideway** for light-rail would follow.
Alternative	For the purposes of the IBR Program, an alternative is a specific set of bridge, transit, and highway solutions. The **Modified Locally Preferred Alternative** (LPA) is the **build alternative** that was analyzed as part of the Draft **SEIS** process.
Amended Record of Decision (ROD)	After a **ROD** is signed, new information may be received or generated that could affect implementation of the alternative selected in the ROD or could prompt the reassessment of the selected alternative. This new information is documented in a supplemental **NEPA** document (for example, an **SEIS**) and an Amended ROD may then be signed by the **lead agencies**. The decisions made in the prior ROD remain unaltered except for the supplemental environmental review addressed in the Amended ROD.
Anadromous	Fish species that hatch in fresh water, enter the ocean for a portion of their life cycle, then return to fresh water to spawn. Common anadromous species include but are not limited to salmon, steelhead, lamprey, eulachon (smelt), and shad.
Aquifer	An underground layer of water or layer of permeable material (gravel, sand, silt, some rock) that holds water, from which water can be extracted, usually by means of a well or spring.
Auxiliary lanes	A dedicated lane between highway interchanges—from one on-ramp to the next off-ramp—that provides motorists with more time and extra room to accelerate or decelerate and merge when entering or exiting a highway. These ramp-to-ramp connections allow vehicles to enter and exit the roadway outside of through-traffic lanes. They can improve safety and reduce **congestion** by accommodating cars and trucks entering or exiting the highway or traveling short distances between adjacent interchanges and reduce conflicting movements from merging or changing lanes.
Average (traffic)	The average traffic condition is the vehicle flow on a weekday, usually Tuesday, Wednesday, or Thursday, for a given time period.

Term	Definition
Benthic organisms (benthos)	In freshwater biology, benthic organisms are those organisms living in a waterbody's **benthic zone**. Types of benthic organisms in the IBR Program area include some species of snails, shrimp, and crayfish.
Benthic zone	The ecological zone at the lowest level of a waterbody. The benthic zone includes surface sediment on the bed or floor of the waterbody, as well as some subsurface layers beneath the surface sediment.
Best management practice (BMP)	A method or activity that is generally acknowledged to be the most effective and practical at achieving a given outcome.
Biofiltration swale	A depressed area with mild slopes that treats stormwater runoff through filtration and sorption as stormwater runoff flows through the vegetated surface. These areas are typically dry between storm events and are typically planted with grasses.
Bioslope	Like **filter strips**, a bioslope is a sloped area used to treat stormwater runoff from an adjacent roadway surface. Bioslopes are also known as ecology embankments. The stormwater runoff percolates through a special mixture of materials, which slows down the flow and promotes the filtering of pollutants.
Bi-State Legislative Committee (BSLC)	A panel composed of eight Washington and eight Oregon legislators who provide guidance and feedback on key IBR Program decisions.
Braided ramp	An on-/off-ramp design where an on-ramp passes over an off-ramp, or vice versa. Braided ramps separate merging and diverging traffic by creating a bridge for some traffic to cross over and other traffic to cross under. This improves safety by eliminating lane weaving.
Build alternative	A set of proposed transportation improvements (bridge, transit and highway) that the IBR Program is evaluating in the NEPA document.
Bus rapid transit (BRT)	A type of **high-capacity transit** that uses large buses and makes fewer stops for fast, frequent service. Buses stop at transit stations or platforms. Reliable travel times are ensured when buses operate in a lane dedicated to bus use. BRT buses also have the flexibility to travel in high-occupancy-vehicle lanes, expressways, or ordinary streets.
Climate change	A long-term shift in global or regional climate patterns. Examples of changes in weather, oceans, and ecosystems include changing temperature and precipitation patterns; increases in ocean temperatures, sea level, and acidity; melting of glaciers and sea ice; changes in the frequency, intensity, and duration of extreme weather events; shifts in ecosystem characteristics such as the length of the growing season, timing of flower blooms, water temperatures for fish, and migration of birds.
Climate Framework	The IBR Program's methodology for analyzing the impacts of the **Modified LPA** on **greenhouse gas emissions** and **climate change**.
Cobbles	Pieces of rock between 2.5 and 10 inches in diameter; informally, rock sized between gravel and boulders.
Cofferdam	A temporary, watertight enclosure for excluding water from an area that is normally submerged. Cofferdams are one method of isolating an area within a waterbody for construction or other activities.

Term	Definition
Collector-distributor	A roadway parallel to a larger-capacity roadway. A collector-distributor is designed to remove weaving from a highway mainline and reduce the number of entrances and exits.
Columbia River bridges	The newly constructed bridges that would be built west of the existing **Interstate Bridge**.
Columbia River Crossing (CRC)	A multimodal project conducted by Oregon and Washington, from 2005 to 2014, that studied options for replacing the Interstate Bridge. The CRC project completed the federal environmental review process (**NEPA**) and reached a federal **ROD** in 2011 on a **locally preferred alternative**. The CRC project did not secure adequate state funding for construction and was discontinued in 2014. The IBR Program supplements the prior work from the CRC project's NEPA process.
Columbia River Crossing Locally Preferred Alternative (CRC LPA)	The CRC Selected Alternative identified in the 2011 ROD, as revised by the 2012 and 2013 re-evaluations.
Columbia River Datum (CRD)	The plane of reference from which river stage is measured on the Columbia River from the lower Columbia River up to Bonneville Dam, and on the Willamette River up to Willamette Falls. The datum equals 1.82 feet above mean sea level (equivalent to National Geodetic Vertical Datum [NGVD]) at Vancouver, Washington (USACE 2014).
Community Advisory Group (CAG)	One of three advisory groups formed to guide the IBR Program. The CAG consists of a group of community members from the greater Portland and Vancouver region that provides advice and recommendations to the **Executive Steering Group** and IBR Program administrator on issues of importance to the community.
Community cohesion	The ability of people to communicate and interact with each other in ways that lead to a sense of community as reflected in the neighborhood's ability to function and be recognized as a singular unit.
Community connector	A structure over a highway that helps to maintain or improve connectivity between the two sides of a highway, that provides visual and cultural landscape connectivity, and/or that mitigates for visual impacts of new highway construction. For the IBR Program, the proposed Community Connector, located just south of Evergreen Boulevard, would serve as a pedestrian connection between the communities on the east and west sides of I-5.
Community engagement	The IBR Program's ongoing efforts to hear community concerns, values, and interests; maintain open, two-way communications; and reflect community interests in key Program decisions.
Community resources	Services and gathering places such as educational, religious, health care, cultural, recreational, and commercial institutions.
Community survey	A data-driven public survey of diverse community members and organizations conducted by the IBR Program to assess public concerns and interests related to the region's transportation system.
Community-based organizations (CBO)	Groups representing varied local interests and concerns such as the environment, businesses, labor, social services, affordable housing, recreation, transit, etc.

Term	Definition
Congestion	Congestion occurs when the demand is greater than the transportation system's capacity. For highways, congestion occurs when the average speed along a section falls below a specified speed, generally below 35 miles per hour. Recurring congestion is caused by constant excess volume of vehicles compared to capacity. Nonrecurring congestion is caused by actions such as special events and/or traffic incidents.
Contributing impervious area (CIA)	All impervious surface associated with a project that contributes stormwater, including impervious surface areas within the project limits and impervious surface areas contiguous to the project that discharge stormwater runoff into the project area. Non-highway-related impervious areas (commercial development, residences, agricultural land) and certain non-triggering impervious areas (such as areas where pavement is not replaced to its full depth) are not part of the CIA.
Construction staging	A designated area where vehicles, supplies, and construction equipment are positioned for access to and use on a construction site.
Cooperating agencies	One of three designations of agencies under the **NEPA** environmental review process. A cooperating agency is typically a federal agency, other than a **lead agency**, that has jurisdiction by law (with permitting or land transfer authority) or special expertise with respect to an environmental impact involved in a proposed project or project alternative. A state or local agency of similar qualifications—or when the effects are on lands of tribal interest, a Native American tribe—may, by agreement with the lead agencies, also become a cooperating agency. All cooperating agencies are also considered **participating agencies**.
Crash	A collision, typically between vehicles, but may also involve pedestrians or bicyclists Crashes may be analyzed for a single location such as an intersection, for a specified section of highway, for a particular type of transportation facility (e.g., for interstate highways), or for a specified area such as a region or state. Such analyses help to identify needed safety improvements. Crashes may be analyzed in a number of ways: by frequency, by number of collisions, by number of collisions per mile or per **vehicle miles traveled**, by severity, and by type (rear-end, turning conflict, etc.).
Cultural resources	Collectively refers to historical and archaeological resources. Cultural resources are broadly divided into the historic built environment (buildings, structures and objects), archaeological sites, and defined features or areas that are important to maintaining cultural identity.
Cumulative effect (impact)	An effect on or impact to the environment resulting from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. Cumulative effects can result from individually minor but collectively substantial actions that take place over a period of time.
Deadheading	Trips made by a transit vehicle (bus, light-rail, streetcar, etc.) when the vehicle is out of service and no passengers are on board. This is also referred to as a non-revenue trip, dead mileage, or dead running.
Demand (transportation)	The total number of users attempting to access the transportation system, including those caught in **congestion**.

Term	Definition
Demographics	Statistical data relating to the population and particular groups within it. The IBR Program uses demographic data to understand the general characteristics and geographic locations of communities potentially affected by the Program and to inform community engagement strategies.
Diamond interchange	A common type of interchange used where a highway crosses a minor road. The highway is grade-separated from the minor road, and off-ramps diverge gently from the main highway, intersect directly with the minor road, and beyond the minor road continue as a gently merging on-ramp. The name "diamond" is used because, seen from the air, the pattern of major highway, minor road, and associated on- and off-ramps form a diamond shape.
Direct effects	Effects that are caused by a project action and that occur at the same time and place as the action.
Distinct population segment (DPS)	A population of organisms that is considered distinct from similar organisms for purposes of conservation. In the Pacific Northwest, populations of several species, including steelhead and bull trout, are further subdivided into **Evolutionarily Significant Unit** (ESUs) for purposes of management and recovery.
Diversity	Includes all the ways in which people differ and encompasses all the different characteristics that make one individual or group different from one another.
Easement	The legal right to use property belonging to another person for a stated purpose. An easement may grant the right to use the property surface, the property's subsurface for a given depth range below the surface, or the airspace above the property surface for a given range of elevations.
Ecosystem	A portion of the physical environment that includes both biological and nonbiological elements working together as a stable system. Ecosystems can be defined to be quite small (e.g., a single wetland) or quite large (e.g., an entire forest).
Eminent Domain	In Washington, eminent domain is the right of a government to acquire private property for public purpose following payment of just compensation to the property owner (Washington Constitution article 1 § 16). In Oregon, "an authority may acquire, by the exercise of the power of eminent domain, any real property which it deems necessary for its purposes after adoption by it of a resolution declaring that the acquisition of the real property described therein is necessary for such purposes" (Oregon Revised Statute 456.145).
Endangered species	A species (population of organisms) that is in danger of becoming extinct. Causes of endangerment can include population size, excessive predation, loss of supporting habitat, or other threats.
Endangered Species Act (ESA)	A 1973 federal law designed to protect threatened and **endangered species** of fish, wildlife, and plants.
Environmental Impact Statement (EIS)	A document that outlines the impacts of a proposed action on the surrounding natural and built environments. It also describes potential measures to reduce or mitigate those impacts. See also **Supplemental EIS**.

Term	Definition
Environmental Justice (EJ)	Refers to identifying and addressing disproportionately high and adverse effects of programs, policies, and activities on minority populations and low-income populations to achieve an equitable distribution of benefits and burdens. EJ helps to ensure full and fair participation by including potentially affected communities in the decision-making process.
Equity	When one's identity cannot predict the outcome. The IBR Program further defines equity in terms of both process and outcomes. Together, **process equity** and **outcome equity** contribute to addressing the harmful impacts of and removing longstanding injustices experienced by **historically underserved communities**.
Equity Advisory Group (EAG)	One of three advisory groups formed to guide the IBR Program. The EAG is a diverse group of community members who make recommendations to IBR Program leadership regarding **equity** considerations and processes, policies, and decisions that potentially could affect **equity priority groups** or **historically underserved communities**.
Equity priority communities or **historically underserved communities**	Communities, populations, and individuals who have been historically excluded from transportation decision-making and systematically discriminated against, and who experience social, economic, and health disparities. These groups include: • Black, Indigenous and people of color (BIPOC). • **People living with disabilities.** • Communities with **limited English proficiency.** • Persons with lower income. • Houseless individuals and families. • Immigrants and refugees. • Young people (individuals 24 years old or younger). • Older adults (individuals 65 years old or older).
Ethnicity	The fact or state of belonging to a social group that has a common national or cultural tradition.
Eutrophication	An increase in the concentration of chemical nutrients in an ecosystem to a degree that the primary productivity of the ecosystem is affected. Effects of eutrophication can be beneficial to some species but harmful to others. For example, one chemical nutrient may nourish one species, but in high concentrations may be toxic to other species. In the Pacific Northwest, for example, certain algal blooms—so-called red tides—can cause chemicals harmful to humans to accumulate in shellfish.
Evolutionarily Significant unit (ESU)	A population of organisms that is considered distinct from similar organisms for purposes of conservation. In the Pacific Northwest, species of salmon (Chinook, coho, chum, etc.) are further subdivided into ESUs for purposes of management and recovery. See also **distinct population segment**.
Executive Steering Group (ESG)	One of three advisory groups formed to guide the IBR Program. The ESG is a panel of representatives from regional partner agencies and the **Community Advisory Group** co-chairs. The ESG provides guidance and recommendations on key IBR Program issues.
Express bus	A bus that operates point-to-point service—generally during peak times—that typically connects outlying points to business cores without intermediate stops.

Term	Definition
Extradosed bridge	A bridge type that is a hybrid superstructure that fills the gaps between spans, usually accommodated by girder spans and cable-stayed spans. It supports superimposed loads of the superstructure through a combination of girder action and cable-supported action between pylons. In contract, a cable-stayed bridge supports all of the superimposed load on the superstructure between the pylons through the cable stays.
Federal navigation channel	A U.S. Army Corps of Engineers (USACE) Civil Works project authorized by the U.S. Congress under which USACE is responsible for the establishment and ongoing maintenance of navigation channels in navigable waterbodies.
Filter strip	A vegetated strip of land between a potential source of polluted runoff, such as a highway, and a receiving waterbody. The filter strip is planted with vegetation that slows the runoff and aids in removing sediment or other pollutants before the runoff enters the receiving waterbody.
Finback bridge	A variant of an **extradosed bridge** where the stays are grouped and encased.
Floodplain	A flat or nearly flat area adjacent to a stream or river that is subject to periodic flooding during high stream or river flows.
Flyover ramp	A ramp that crosses over (above) another ramp or portion of a highway.
Gantry	Structures used to support overhead signs. Gantry signs are commonly used on highways and can also be used to hold cameras for toll road entrances or exits.
Geographic information system (GIS)	An electronic (computer) system that stores and displays information linked to a location.
Greenhouse gases (GHG)	Gases that, when released into the atmosphere, contribute to global warming. They generally include six specific gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). GHGs are not the only air pollutants of concern; others include ozone and particulate matter, which can affect human health.
Guideway	A transit right-of-way separated from general purpose vehicle transit. A guideway may have train tracks or separated bus lanes.
Headway	Scheduled time between two transit vehicles passing the same point traveling in the same direction on a given route.
High-capacity transit (HCT)	A public transportation service that operates in a dedicated **guideway** and moves a large number of people at high frequency; examples include **bus rapid transit** and **light-rail transit**.
High-occupancy vehicle (HOV)	Motorized vehicles designed to carry more than a specific minimum number of passengers, mainly buses, vanpools, and carpools, and permitted to use a travel lane reserved for such vehicles.
High-occupancy vehicle (HOV) lanes	One or more lanes of a roadway that have restrictions on use to encourage ridesharing and can reduce **vehicle miles traveled**. Traffic lanes may include restrictions for the number of occupants allowed in the vehicles, and enforcement may vary by time of day.

Term	Definition
Hydrology	The flow of water in and through a given area, including the volume of water, where it drains, and how quickly the flow rate changes in a storm.
Inclusion	Elimination of barriers that prevent the full participation of all people.
Indirect effects	Reasonably foreseeable effects caused by an action, but that are later in time or farther removed in distance. Indirect effects may include induced growth, changes in land use or population patterns, and effects on air, water, and ecosystems.
Induced growth/ development	Population growth or development that results from one or more project actions. For example, building or improving a highway may result in easier access to the area, which may in turn lead to the growth of business or residential uses near the highway.
Interchange Area Management Plan (IAMP)	A joint ODOT and local government long-term land use and transportation plan designed to balance and manage transportation and land use decisions in areas planned for future use as a highway interchange. An IAMP helps to ensure that local land use plans and actions are and remain compatible with the eventual use of the land for transportation purposes.
Interstate 5 (I-5)	The main north-south interstate highway on the West Coast of the United States. I-5 runs largely parallel to the Pacific Coast of the contiguous United States from Mexico to Canada.
Interstate Bridge Replacement (IBR) Program	A joint effort by the states of Oregon and Washington to replace the aging, structurally vulnerable Interstate Bridge over the Columbia River with modern, seismically resilient, multimodal structures that can reliably serve the Portland-Vancouver region into the next century.
Interstate Bridge	The existing I-5 river crossing over the Columbia River that consists of two bridge spans. One of the bridge spans is at least 105 years old and is at risk of collapse in the event of a major earthquake. Both bridge spans no longer serve the needs of commerce and travel.
Jurisdictional waters	Waters under the jurisdiction of the U.S. Army Corps of Engineers as granted by the federal Clean Water Act. Although specific determinations must be made, jurisdictional waters typically include waterways and their associated wetlands.
Lahar	A flow of volcanic material (such as rock debris and gases) and water that travels quickly and can cover great distances. Lahars typically flow downstream of a volcano within a river valley.
Landscape unit	A portion of a given landscape considered separately from the entire landscape for purposes of analysis and comparison.
Lead agency	One of three designations of agencies under the **NEPA** environmental review process. A lead agency is the agency carrying out the federal action and is responsible for complying with the requirements of NEPA. In some cases, such as the IBR Program, more than one federal agency is designated as a federal lead agency. Federal agencies, together with state agencies, local agencies, and/or tribes, may act as joint lead agencies. Lead agencies prepare the environmental documentation for a project and oversee the NEPA process.

Term	Definition
Level of service (LOS)	A qualitative measure of the effectiveness of one or more elements of transportation infrastructure. LOS is most commonly used to describe roadway performance, but it can also be applied to transit, intersections, or other infrastructure elements. The American Association of State Highway and Transportation Officials defines the following levels of service: A Free flow B Reasonably free flow C Stable flow D Approaching unstable flow E Unstable flow F Forced or breakdown flow
Light-rail transit (LRT)	A form of **high-capacity transit** that operates in its own fixed **guideway** and is powered by overhead electrical current. TriMet operates light-rail in the Portland metropolitan area.
Limited English proficiency	Individuals who do not speak English as their primary language and who have a limited ability to read, speak, write, or understand English. Federal laws prohibit discrimination based on national origin. Many individual federal programs, states, and localities also have provisions requiring language services for individuals with limited proficiency in English.
Liquefaction	A phenomenon associated with earthquakes in which sandy to silty, water-saturated soils lose strength and behave like a fluid. As seismic waves pass through saturated soil, the structure of the soil distorts and spaces between soil particles collapse causing ground failure. In general, young, loose sediment and areas with high water tables are the most vulnerable to liquefaction.
Local bus	Operates throughout the day and week with frequent stop spacing.
Locally Preferred Alternative (LPA)	A project alternative chosen by local and regional supporting agencies as the best overall alternative to meet a project's purpose and need. The FTA- and FHWA-preferred alternative is the same as the LPA. Once chosen, the LPA is advanced for more detailed study. Selection of the LPA does not constitute selection or approval by a project's lead agency(ies) or commitment of funding for a project. The decision whether to construct a project and the precise alternative to be constructed are documented in the **ROD** after the Final **EIS** or Final **SEIS** is approved.
Micromobility	A term encompassing alternate modes of transportation including bicycles, electric bicycles, electric scooters, electric skateboards, and shared bicycles.
Mitigation	Actions taken to minimize or compensate for negative or undesirable effects of an action. Mitigation may be required by law for unavoidable effects on the environment or on members of the public who are displaced or disadvantaged by project actions. Environmental mitigation may be conducted at the site of impact or at a different site in the general project area.
Mode	A singular, well-defined method or form of transportation. Common modes are car, truck, bus, light-rail, bicycle, and pedestrian.

Term	Definition
Modified Locally Preferred Alternative (LPA)	Refers to an agreed-upon set of components for further evaluation through the NEPA environmental review process. For the IBR Program, the Modified LPA is not the final design, but it is a key milestone setting the direction to test and evaluate plans for a new multimodal river crossing system.
Moment magnitude scale	A scale that represents the amount of energy released by an earthquake. It has replaced the use of the Richter scale because it measures a wider range of energies. Like the Richter scale, the moment magnitude scale is a logarithmic scale; units are represented as Mw. An increase of 1.0 on the scale represents roughly a 32 times increase in the amount of energy released. Moment magnitude scale measurements are similar to but not precisely equal to Richter scale values.
Multimodal	Refers to a transportation system—in whole or in part—that provides for more than one mode of transportation. For example, the **Modified LPA** would provide infrastructure for several **modes** (single-occupancy vehicles, trucks, light-rail, bus, bicycles, and pedestrians) to cross the Columbia River.
National Environmental Policy Act (NEPA)	Enacted in 1970, NEPA requires federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. To meet this requirement, federal agencies prepare a detailed environmental document, which can be an environmental assessment or **Environmental Impact Statement**.
National Historic Preservation Act (NHPA)	A 1966 federal law designed to protect historic, cultural, and archaeological sites.
National Register of Historic Places (National Register)	This official list of historic places worthy of preservation is part of the National Park Service's program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archaeological resources. The National Register and the efforts of the National Park Service to develop and maintain the register are authorized by the **National Historic Preservation Act** of 1966.
Neighborhood cohesion	The ability of people to communicate and interact with each other in ways that lead to a sense of community as reflected in the neighborhood's ability to function and be recognized as a singular unit.
NEPA re-evaluation	Joint **NEPA** regulations from the FHWA, FTA, and Federal Railroad Administration include a process for re-evaluating environmental documents or decisions to determine whether the original document or decision remains valid or if a supplemental or new analysis (e.g., a **supplemental environmental impact statement**) is required.
No-Build Alternative	The alternative under which no project-related action would be built. The No-Build Alternative is carried through the **NEPA** process and analyzed for effects as a way to formally compare the effects of the proposed **build alternative** with what is likely to happen if the build alternative is not constructed. Note that "no-build" does not mean "do nothing." The No-Build Alternative analysis considers other projects that are already planned and that are reasonably certain to be constructed, as well as other anticipated changes in conditions (e.g., projected population growth).
No-build conditions	Conditions that are predicted to occur if no project-related action is constructed. No-build conditions and conditions predicted to occur under the build alternative(s) are generally compared for a specific time in the future; year 2045 for the IBR Program.

Term	Definition
Notice to supplement (NTS)	A published document, similar to a new **EIS**'s Notice of Intent, informing the public of an upcoming supplemental environmental analysis for a proposed project.
Noxious weeds	Invasive plant species that have been designated by county, state, or national agricultural authorities as injurious to agricultural or horticultural crops, natural habitats, ecosystems, humans, or livestock.
Nuisance species	Non-native species that are invasive and that threaten the diversity or abundance of native species, or that cause adverse effects on human health or use of the environment.
OR	Highway designation in Oregon, e.g., OR 140.
Ordinary high water mark	The water level that a non-tidal waterbody reaches with sufficient frequency to leave visible evidence on the landscape. Typically, this is not the peak water level, but the level that a waterbody reaches twice in a given water year.
Outcome equity	In the context of the IBR Program, the result of successful **process equity** is demonstrated by tangible transportation, community, and economic benefits for **equity priority communities**.
Participating agency or **participating tribe**	One of three designations of agencies under the **NEPA** review process. Participating agencies and tribes are federal, state, and local agencies and tribal governments that have an interest in the Program under review. Each participating agency or tribe has the opportunity to participate in Program meetings, open houses, and workshops, in addition to reviewing and providing comments on various NEPA documents. Non-governmental organizations and private entities cannot serve as participating agencies.
Peak period	Informally known as "rush hour," this term refers to the time of the day when traffic volumes in an urban area are greatest and when travel patterns generate the most traffic, especially in a certain direction.
People living with disabilities	People who have a physical or mental impairment that substantially limits one or more major life activities, people who have a history or record of such an impairment, or a person who is perceived by others as having such an impairment.
Performance standards	Local traffic impacts are measured by impacts to intersection **level of service**, delay, and queuing. WSDOT, ODOT, the City of Vancouver, and the City of Portland have adopted performance standards for intersections. Further description of these standards can be found in the Transportation Technical Report.
Piles	Wooden, concrete, or metal supports that are pushed or driven into the ground to support a permanent or temporary structure. Piles are typically driven deep into the soil until they reach dense soil or bedrock.
Pleistocene age	A period of time in the Earth's history. The Pleistocene age extended from approximately 1.6 million to approximately 11,000 years before the present. During this time an occurrence of one of the earth's ice ages during which ice and glaciers advanced and retreated over a significant portion of the earth's surface
Precast (concrete)	A concrete structure that is cast into shape before being moved into place as a complete unit or as part of a larger structure.

Term	Definition
Primary study area	The 5-mile segment of I-5 from State Route 500 in Vancouver to approximately Columbia Boulevard in Portland.
Process equity	Means that the IBR Program centers and prioritizes access, influence, and decision-making power for **historically underserved communities** throughout the Program in establishing objectives, design, implementation, and evaluation of success.
Purpose and Need	A formal statement adopted by the **lead agencies** that identifies and describes the transportation problems that a program or project is seeking to address. The IBR Program's purpose and need statement, which was developed for the CRC project, identifies six transportation problems: growing travel demand and congestion; impaired freight movement; limited public transportation operation, connectivity, and reliability; safety and vulnerability to incidents; substandard bicycle and pedestrian facilities; and seismic vulnerability.
Queuing	A line of waiting vehicles. Examples of common locations for queues to form include at a **ramp meter**, a traffic signal, or waiting to turn from a left-turn lane.
Ramp meter	A signaling device at a highway on-ramp, usually a red-green stoplight, that regulates the flow of traffic entering the highway. The signaling device is connected to a traffic sensor that registers the volume of traffic on the highway and adjusts the signal timing to allow smooth entry and merging of vehicles onto the highway.
Recognized Environmental Conditions (REC)	Defined by ASTM E1527-21 as, "...the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property."
Record of Decision (ROD)	A formal public document issued by the regulating agency(ies) that constitutes federal approval of an **environmental impact statement** for a proposed highway or transit project under **NEPA**. The ROD is the document that authorizes the relevant state transportation department(s), local jurisdiction(s), or transit agency(ies) to proceed with the design, property acquisition, construction, and transit operation (if applicable) of the project, based on the availability of funding.
Regulatory agencies	Federal, state, and local agencies that can monitor and enforce laws and regulations affecting a capital project.
Reliability	The ability of users to predict the travel times required for particular trips when referring to transportation or transit.
Riparian	The area between a stream or river and the adjoining upland areas. Riparian habitats provide important ecological functions for aquatic and terrestrial species.
River mile (RM)	The measure, in miles, of the distance from the mouth of a river or stream, following the course of the river or stream. The mouth of the river or stream is RM 0.
Screening criteria	A set of metrics used to evaluate and score the effectiveness of various transportation improvement options, usually weighed against a **no-build option**.

Term	Definition
Section 106	Section 106 of the **National Historic Preservation Act** of 1966 requires that federal agencies consider the effects of their undertakings on historic resources. This includes identifying any such resources—historic properties, buildings, structures, etc.—that could be affected by the project, assessing the possible adverse effects of the project on these resources and finding ways to avoid, minimize, or mitigate these adverse effects.
Section 4(f)	Section 4(f) of the U.S. Department of Transportation (USDOT) Act concerns transportation projects that would use or impact any significant public park, recreation area, wildlife or waterfowl refuge, or historic site. Section 4(f) applies to impacts caused by programs and policies undertaken by the USDOT.
Section 6(f)	Section 6(f) of the Land and Water Conservation Fund Act concerns parks and recreational facilities that have received funding through this act. Section 6(f) applies to impacts caused by programs and policies of a federal agency.
Special status species	A species with special regulatory status due, for example, to its rarity, sensitivity, or other factors. Special status species or their habitat may be especially sensitive to development.
Shared-use path	A path that accommodates more than one mode of travel or type of use. In the IBR Program, a shared-use path is typically a path that accommodates walkers, bicyclists, and rollers.
Signal priority	Signal priority refers to traffic signal timing that adjusts red and green lights to give preference to transit vehicles such as buses or light-rail trains and to provide preferential green lights for emergency response vehicles.
Single-point urban interchange (SPUI)	Also called a single-point diamond interchange, this type of highway interchange is similar to a **diamond interchange**, but it allows left turns to proceed simultaneously by compressing the two "diamond" intersections into a single intersection over or under the free-flowing road. The term "single-point" refers to the fact that all through traffic on the minor road and left-turning traffic is to be controlled by a single set of traffic signals.
Sole source aquifer	An underground water supply designated by EPA as the sole or principal source of drinking water for an area.
Species of concern	An informal term referring to species that are considered at risk by agencies concerned with their conservation or survival.
Staging	See **construction staging**.
State Environmental Policy Act (SEPA)	A Washington state law that identifies and assesses environmental impacts associated with private or public construction projects.
State Route (SR)	A Washington state highway designation (e.g., SR 20).
Stormwater	Flowing surface water that results from precipitation events (i.e., rain and snow) or from snowmelt. Stormwater management is a concern of transportation projects and of municipal water systems, as untreated stormwater that flows off of highways, parking lots, or other impervious surfaces can carry pollutants into soils or groundwater.

Term	Definition
Stormwater infiltration	The process by which stormwater sinks into the soil and becomes groundwater that, in turn, feeds rivers, streams, lakes, and underground water sources such as **aquifers**.
Supplemental Environmental Impact Statement (SEIS)	A supplement to a draft or final **EIS** is required when either an agency makes substantial changes to the proposed action that are relevant to its environmental concerns or there are significant new circumstances or information relevant to the environmental concerns that have relevance to the proposed action or its impacts. Following an agency's decision to supplement its **EIS**, it prepares, publishes, and files the supplement in the same fashion as a draft or final **EIS**.
Swale	A marshy or moist land, or a shallow, narrow trough-like depression that carries stormwater runoff or snow melt.
Terminus or termini	The end point of a transit service line. Termini is the plural form.
Thalweg	The deepest part of a river cross section.
Threatened species	A species that is vulnerable to extinction in the near future.
Throughput	The number of users being served at any time by the transportation system.
Title VI	Refers to Title VI of the Civil Rights Act of 1964. This law prohibits the exclusion of anyone from participation or benefit from a federally funded program on the grounds of race, color, or national origin. **Environmental justice** is a component of Title VI.
Tolling	The practice of charging a fee for use of a transportation facility such as a highway. There are several types of tolling: charging a fixed fee; charging a variable fee based on the type of vehicle, time of day, or volume of traffic; tolling a section of highway; and so-called cordon pricing which charges a fee to enter a particular area such as a metropolitan area. Tolling is generally used to help meet the cost of constructing or operating the facility, but it is also as a **transportation demand management** tool.
Total maximum daily load (TMDL)	Under the U.S. Clean Water Act, the maximum amount of a given pollutant that a body of water can receive and still meet published water quality standards.
Transfers	Funds from local or regional sources spent on a project that would otherwise be spent by residents and businesses on other economic activities within the region.
Transit-oriented development (TOD)	Urban development that is designed to provide access to and encourage the use of public transit such as buses or light-rail trains.
Transportation demand management (TDM)	Measures that seek to reduce the number of vehicles using the road system, especially single-occupancy vehicles, while providing alternative options to auto travel.
Transportation system management (TSM)	Measures that attempt to improve the efficiency of existing roadways. These include a variety of techniques focused on keeping drivers informed and moving as safely, efficiently, and reliably as possible.
Troutdale aquifer	An **aquifer** that underlies a portion of the city of Vancouver and Clark County, Washington. The Troutdale aquifer is a critical water resource for this area and, according to EPA, provides approximately 99% of the available drinking water to people in this area. The EPA has designated this resource as a **sole source aquifer** for Clark County. Considered as a geologic feature, this is referred to as the Troutdale Formation.

Term	Definition
Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (as amended) (Uniform Act)	This act provides protections and assistance for people whose real property is acquired or who must move as a result of projects receiving federal funds. The act requires that such people be treated fairly and equitably, and that they receive assistance in moving from the property they occupy.
Vehicle miles traveled (VMT)	The total number of miles that residential vehicles are driven in a specified period of time for a given area or transportation facility.
Viewer sensitivity	Considers the combined effect of the activities a viewer is engaged in, the visual context, and the values, expectations, and interests of the viewer.
Viewshed	The portion of the landscape that can be seen from within a project area and that has views of the project area. The boundaries of a viewshed are determined by the surrounding topography, vegetation, and built environment.
Visual quality	What viewers like and dislike about visual resources that compose the visual character of a particular scene. Different viewers may evaluate specific visual resources differently based on their interests in natural harmony, cultural order, and project coherence. Neighbors and travelers may, in particular, have different opinions on what they like and dislike about a scene.
Volatile organic compound (VOC)	Organic (i.e., carbon-based) compounds that are easily volatilized and that can affect human health or the environment.
Voltage	Voltage is like the “electrical pressure” in an electrical line. It is measured in volts (V) or kilovolts (kV). This pressure produces an electrical field that extends out from the line and is measured in volts per meter (V/m). Current in an active electrical line also produces a magnetic field around the line.
Volume/capacity (V/C) ratio	The ratio of the traffic demand at a given intersection, that is, the number of vehicles attempting to pass through the intersection in an hour, under prevailing conditions, to the number of vehicles that can actually pass through that intersection in an hour. With a V/C ratio of < 0.85, vehicles can generally pass through the intersection without significant delays or queues. But as the V/C ratio nears 1.0, traffic flow slows, and with a V/C ratio > 1.0, traffic flow becomes unstable and vehicles can expect to wait at least one signal cycle to pass through the intersection.
Water column	A conceptual column of water from the surface to the bottom of the waterbody. This concept is useful in analyzing the thermal or chemical strata and mixing in a waterbody.
Water quality	Refers to the characteristics of the water such as its temperature and oxygen levels, how clear it is, and whether it contains pollutants.
Waters of the State/U.S.	Waters determined to be under the jurisdiction of the U.S. Army Corps of Engineers, or of a state regulatory authority. These waters are protected under the Clean Water Act and by various state statutes. They generally include navigable waters, interstate waters, wetlands, and tributaries. Activities that would impact such waters require permitting by the appropriate agency(ies).

Term	Definition
Watershed	An area of land from which all water under or on that area drains to the same place, generally the same waterbody. Watersheds vary in shape and size as determined by topography and geology, and can cross city, county, state, or even national boundaries.
Wetland	An area of land that is inundated or saturated at such a duration that hydric soil conditions form and that hydric vegetation can develop. Specific regulatory criteria must be met for an area to be delineated as a wetland. Wetlands generally include areas such as marshes, bogs, and swamps, and they provide important ecological functions such as groundwater recharge.
Wetland buffer	An area adjacent to a wetland that provides support functions for species that live in and around wetlands and reduces the impacts of human disturbance on the wetland.
Wildlife corridor	An area of habitat that connects wildlife populations separated by human activities or structures.

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Interstate
BRIDGE
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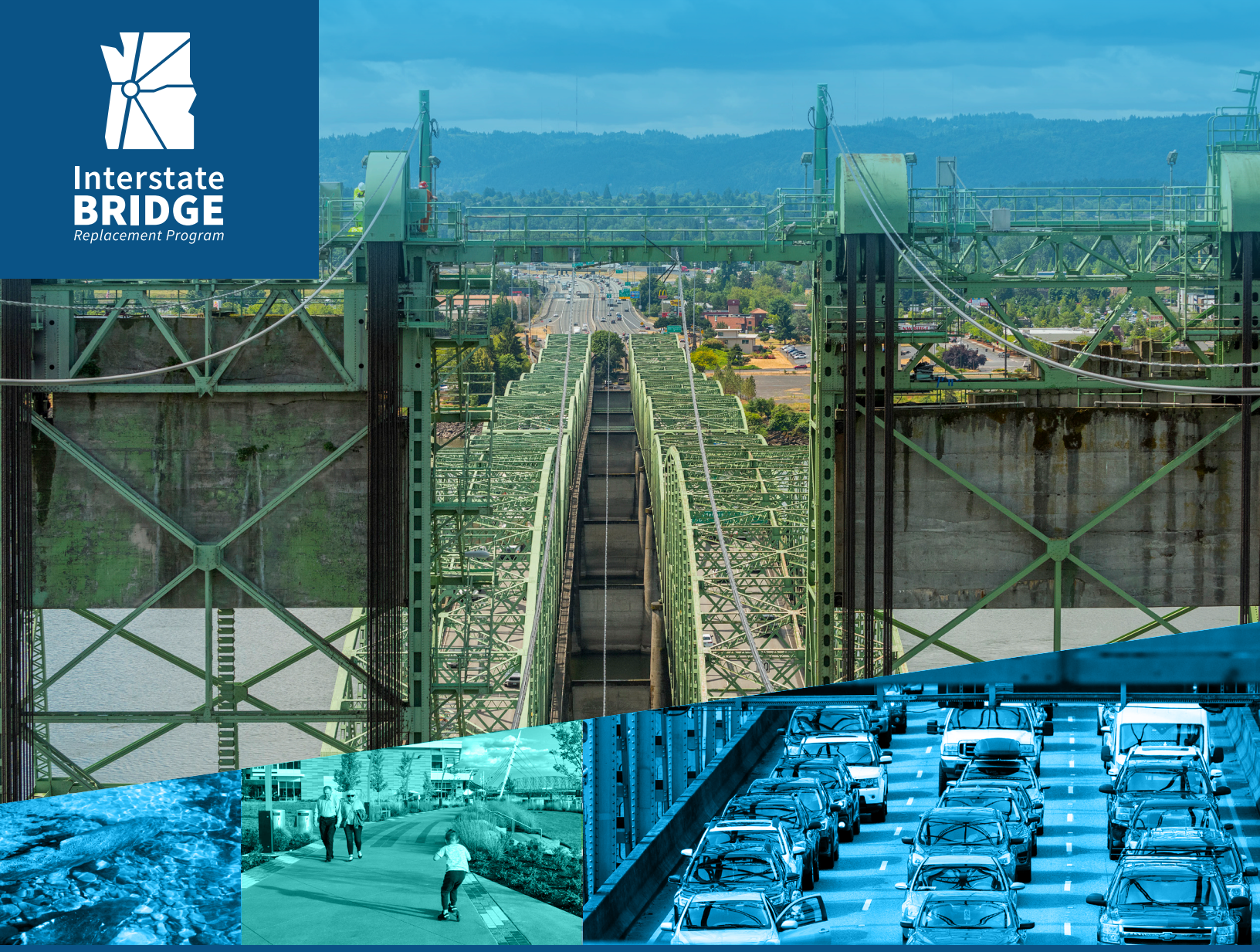

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