ATTACHMENT A

Completed Joint Permit Application (JPA) Form

US Army Corps
Of Engineers (Portland District)

Joint Permit Application Form

DATE STAMP

AGENCIES WILL ASSIGN NUMBERS	
Corps Action ID Number	Oregon Department of State Lands No

SEND ONE SIGNED COPY OF YOUR APPLICATION TO EACH AGENCY

US Army Corps of Engineers: District Engineer ATTN: CENWP-OD-GPPO Box 2946 Portland, OR 97208-2946 503-808-4373	**AND**	DSL - West of the Cascades: State of Oregon Department of State Lands 775 Summer Street, Suite 100 Salem, OR 97301-1279 503-986-5200	**OR**	DSL - East of the Cascades: State of Oregon Department of State Lands 1645 NE Forbes Road, Suite 112 Bend, Oregon 97701 541-388-6112	**AND**	Send DSL Application Fees to: State of Oregon Department of State Lands PO Box 4395, Unit 18 Portland, OR 97208-4395 **(Attach a copy of the first page of the application)**

(1) APPLICANT INFORMATION

Applicant Name and Address	Oregon Department of Transportation & Washington Department of Transportation DBA Columbia River Crossing 700 Washington St., Ste. 300 Vancouver, Washington 98660	Business Phone # Home Phone # Fax # Email	360-816-2199 360-737-0294
Authorized Agent Name and Address Check one Consultant ☐ Contractor ☐	Heather Wills (CRC Environmental Manager) 700 Washington St., Ste. 300 Vancouver, Washington 98660	Business Phone # Home Phone # Fax # Email	360-816-2199 360-737-0294 willsh@columbiarivercrossing.com
Property Owner Name and Address If different from above[1]	In Oregon, the beds and banks of this portion of the Columbia River are managed by Oregon Department of State Lands. In Washington, the beds and banks are managed by Washington Department of Natural Resources. The I-5 corridor is owned by ODOT and WSDOT respectively. A list has been attached of properties within ½ mile of the project area.	Business Phone # Home Phone # Fax # Email	

(2) PROJECT LOCATION

Street, Road or Other Descriptive Location	Legal Description (attach *tax lot map**)			
	Township	Range	Section	Quarter/Quarter
The CRC project includes portions of the I-5 corridor between Victory Boulevard on the north side of Portland, Oregon to SR-500 in Vancouver, Washington. The project includes the replacement of the current I-5 bridge over the mainstem Columbia River and extension of light rail into the City of Vancouver with a terminus at Clark College. [A permit modification request for the North Portland Harbor (NPH) bridges will be submitted subsequently (likely in 2014) and the modified application will request approval for the bridges in the ICP that cross NPH.]	1N	1E	3	NE, SE, NW, SW
	1N	1E	4	NE, SE
	2N	1E	33	NE, SE
	2N	1E	34	NE, NW, SW
	2N	1E	27	NE, SE, NW, SW
	2N	1E	26	NW
	2N	1E	22	SE
	2N	1E	23	SW

[1] If applicant is not the property owner, permission to conduct the work must be attached.

- ***Italicized areas are not required by the Corps for a complete application, but may be necessary prior to final permit decision by the Corps.***

In or near (City or Town)	County	Tax Map # (Oregon only)	Tax Lot #[2]
City of Portland, OR City of Vancouver, WA	Multnomah County, OR Clark County, WA	1N1E03, 1N04A, 1N1E04, 2N1E33, 1N1E04AA, 1N1E03BB, 2N1E34CA, 2N1E34C, 2N1E34, 2N1E33A, 1N1E03B, 1N1E03, 1N1E03C, 1N1E03D, 1N1E03AC, 1N1E03CC	**See Attachment I**
Wetland/Waterway (pick one)	River Mile (if known)	Latitude (in DD.DDDD format)	Longitude (in DD.DDDD format)
Columbia River	RM 106.5	45.6167	-122.6750
Directions to the site	I-5 Corridor from Portland, OR at Victory Boulevard to SR-500 in Vancouver, WA.		

(3) PROPOSED PROJECT INFORMATION

Type: Fill ☒ Excavation (removal) ☒ In-Water Structure ☒ Maintain/Repair an Existing Structure ☐

Brief Description: The CRC project will entail both fill and removal below the OHW line of the Columbia River Mainstem. A new crossing will be constructed over the Columbia River Mainstem. The existing crossing over the Columbia River Mainstem will be demolished and removed after the new structures over the river are complete.

Fill *(See Section 4.2 of Attachment B for further description of activities)*

Riprap ☐ Rock ☐ Gravel ☐ Organics ☐ Sand ☐ Silt ☐ Clay ☐ Other: ☒ Steel/concrete

Wetlands	Permanent (cy)	Temporary (cy)						Total cubic yards for project (including outside OHW/wetlands)	0
	0	0							
	Impact Area in Acres	Dimensions (feet)							
	0	L’	0	W’	0	H’	0		
Waters below OHW	Permanent (cy)	Temporary (cy)						Total cubic yards for project (including outside OHW/wetlands)	520,000
	46,375 in mainstem (+4,111 in NPH)	60,348 in mainstem							
	Impact Area in Acres	Dimensions (feet)							
	1.5554 perm in mainstem (+0.0650 in NPH 0.9471tmp in mainstem (+0.0006 in NPH)	L’	varies	W’	varies	H’	varies		

Removal *(See Section 4.2 of Attachment B for further description of activities)*

Wetlands	Permanent (cy)	Temporary (cy)						Total cubic yards for project (including outside OHW/wetlands)	0
	0	0							
	Impact Area in Acres	Dimensions (feet)							
	0	L’	0	W’	0	H’	0		
Waters below OHW	Permanent (cy)	Temporary (cy)						Total cubic yards for project (including outside OHW/wetlands)	240,000
	43,868 in mainstem (+60 in NPH)	0							
	Impact Area in Acres	Dimensions (feet)							
	0.6384 perm in mainstem (+0.0001 in NPH) (0 temp)	L’	varies	W’	varies	H’	varies		

Total acres of construction related ground disturbance (If 1 acre or more a 1200-C permit may be required from DEQ)	Approx. 345 acres

[2] Attach a copy of all tax maps with the project area highlighted.

- ***Italicized areas are not required by the Corps for a complete application, but may be necessary prior to final permit decision by the Corps.***

Is the disposal area upland? Yes ☒ No ☐ Impervious surface created? <1 acre ☐ >1 acre? ☒

	Yes	No	If yes, please explain in the project description (in block 4)
Are you aware of any state or federally listed species on the project site?	X		**See Section 5.3.3 of Attachment B.**
Are you aware of any Cultural/Historic Resources on the project site?	X		**See Section 5.3.4 of Attachment B.**
Is the project site within a national Wild & Scenic River?		X	
*Is the project site within a State Scenic State Scenic Waterway?**		X	

(4) PROPOSED PROJECT PURPOSE AND DESCRIPTION

Purpose and Need:

*Provide a description of the public, social, economic, or environmental benefits of the project along with any supporting formal actions of a public body (e.g. city or county government), as appropriate.**

See Section 4.1 of Attachment B.

Project Description:

Please describe in detail the proposed removal and fill activities, including the following information:

- Volumes and acreages of all fill and removal activities in waterway or wetland separately
- Permanent and temporary impacts
- Types of materials (e.g., gravel, silt, clay, etc.)
- How the project will be accomplished (i.e., describe construction methods, equipment, site access)
- *Describe any changes that the project may make to the hydraulic and hydrologic characteristics (e.g., general direction of stream and surface water flow, estimated winter and summer flow volumes.) of the waters of the state, and an explanation of measures taken to avoid or minimize any adverse effects of those changes.*
- Is any of the work already complete? Yes ☐ No ☒ If yes, please describe the completed work.

Project Drawings

State the number of project drawing sheets included with this application: 5 (see Attachment C)

A complete application must include a location map, site plan, cross-section drawings and recent aerial photo as follows and as applicable to the project:

- **Location map** (must be legible with street names)
  - Site plan including;
  - Entire project site and activity areas
  - Existing and proposed contours
  - Location of ordinary high water, wetland boundaries or other jurisdictional boundaries
  - Identification of temporary and permanent impact areas within waterways or wetlands
  - Map scale or dimensions and north arrow
  - Location of staging areas
  - Location of construction access
  - Location of cross section(s), as applicable
  - Location of mitigation area, if applicable
- **Cross section drawing**(s) including;
  - Existing and proposed elevations
  - Identification of temporary and permanent impact areas within waterways or wetlands
  - Ordinary high water and/or wetland boundary or other jurisdictional boundaries
  - Map scale or dimensions

Recent Aerial photo (1:200, or if not available for your site, the highest resolution available)

Will any construction debris, runoff, etc., enter a wetland or waterway? Yes ☒ No ☐

If yes, describe the type of discharge and show the discharge location on the site plan.

See Section 4.2 of Attachment B for the Project Description;
Attachment C for Project Plan Sheets

Estimated project start date:	2014	Estimated project completion date:	2022

- ***Italicized areas are not required by the Corps for a complete application, but may be necessary prior to final permit decision by the Corps.***

(5) PROJECT IMPACTS AND ALTERNATIVES

Alternatives Analysis:

Describe alternative sites and project designs that were considered to avoid or minimize impacts to the waterway or wetland. (Include alternative design(s) with less impact and reasons why the alternative(s) were not chosen. Reference OAR 141-085-0565 (1) through (6) for more information).*

See Section 5.1 of Attachment B.

Measures to Minimize Impacts

Describe what measures you will use (before and after construction) to minimize impacts to the waterway or wetland. These may include but are not limited to the following:

- *For projects with ground disturbance include an erosion control plan or description of other best management practices (BMP's) as appropriate. (For more information on erosion control practices see DEQ's Oregon Sediment and Erosion Control Manual)*
- *For work in waterways where fish or flowing water are likely to be present, discuss how the work area will be isolated from the flowing water.*
- *If native migratory fish are present (or were historically present) and you are installing, replacing or abandoning a culvert or other potential obstruction to fish passage, complete and attach a statement of how the Fish Passage Requirements, set by the Oregon Department of Fish and Wildlife will be met.*

See Section 5.2 of Attachment B.

Description of resources in project area

Ocean ☐ Estuary ☒ River ☒ Lake ☐ Stream ☒ Freshwater Wetland ☐

Describe the existing **physical and biological characteristics** of the wetland/waterway site by area and type of resource

(Use separate sheets and photos, if necessary).

For wetlands, include, as applicable:

- *Cowardin and Hydrogeomorphic(HGM) wetland class(s)**
- *Dominant plant species by layer (herb, shrub, tree)**
- Whether the wetland is freshwater or tidal
- *Assessment of the functional attributes of the wetland to be impacted**
- Identify any vernal pools, bogs, fens, mature forested wetland, seasonal mudflats, or native wet prairies in or near the project area.)

For waterways, include a description of, as applicable:

- *Channel and bank conditions**
- *Type and condition of riparian vegetation**
- *Channel morphology (i.e., structure and shape)**
- *Stream substrate**
- Fish and wildlife (type, abundance, period of use, significance of site)
- *General hydrological conditions (e.g. stream flow, seasonal fluctuations)**

See Section 5.3.1 of Attachment B

*Describe the existing **navigation, fishing and recreational** use of the waterway or wetland.**

See Section 5.4 of Attachment B and Section 6 of the Navigation Impact Report (Attachment K) regarding navigation impacts

Site Restoration/Rehabilitation

- *For temporary disturbance of soils and/or vegetation in waterways, wetlands or riparian areas, please discuss how you will restore the site after construction including any monitoring, if necessary**

See Section 4.3 of Attachment B

Mitigation

*Describe the reasonably expected adverse effects of the development of this project and how the effects will be mitigated.**

- *For permanent impact to wetlands, complete and attach a Compensatory Wetland Mitigation (CWM) Plan. (See OAR 141-085-0705 for plan requirements)**
- *For permanent impact to waters other than wetlands, complete and attach a Compensatory Non-Wetland Mitigation (CNWM) plan (See OAR 141-085-0765 for plan requirements)**
- *For permanent impact to estuarine wetlands, you must submit a CWM plan.**

- ***Italicized areas are not required by the Corps for a complete application, but may be necessary prior to final permit decision by the Corps.***

See Section 5.5 of Attachment B

Mitigation Location Information (Fill out only when mitigation is proposed or required)

Proposed mitigation *(Check all that apply):*

- ☐ *Onsite Mitigation*
- ☒ *Offsite Mitigation*
- ☐ *Mitigation Bank*
- ☐ *Payment to Provide*

Type of mitigation:

- ☐ *Wetland Mitigation*
- ☒ *Mitigation for impacts to other waters*
- ☐ *Mitigation for impacts to navigation, fishing, or recreation*

Street, Road or Other Descriptive Location	*Legal Description (attach tax lot map*)*			
	Quarter/Quarter	*Section*	*Township*	*Range*
OR: Located at Dabney State Recreation Area along the Sandy River. WA: Located within a 640-acre privately owned site managed by Wildlands of Washington, Inc. (Wildlands).	OR: NE WA: SE	OR: 6 WA: 2	OR: 1S WA: 4N	OR: 4E WA: 1W

In or near (City or Town)	*County*	*Tax Map # (Oregon only)*	*Tax Lot #*[3]
OR: Troutdale WA: Ridgefield	OR: Multnomah County WA: Clark County	1S4E06A, 1S4E05	OR: R994060490, R994050300, R994050070, R994050600, R994050570, R994050060, R994060960, R994060010 WA: 217593
Wetland/Waterway (pick one)	*River Mile (if known)*	*Latitude (in DD.DDDD format)*	*Longitude (in DD.DDDD format)*
OR: waterway WA: waterway	OR: RM 8.0 WA: RM 0.5	OR: 45.5177 WA: 45.8557	OR: -122.3522 WA: 122.7714

Name of waterway/watershed/HUC	*Name of mitigation bank (if applicable)*
OR: Sandy River, 1708000106 WA: Lewis River, 170800020506	N/A

(6) ADDITIONAL INFORMATION

Adjacent to R-F Site and Physical Mitigation Site Property Owners and Their Address *(if more than 5, attach printed labels*)*

See Attachment I

Has the proposed activity or any related activity received the attention of the Corps of Engineers or the Department of State Lands in the past, e.g., wetland delineation, violation, permit, lease request, etc.?

Yes ☒ No ☐

If yes, what identification number(s) were assigned by the respective agencies:

Corps #	NWP-2008-414	State of Oregon #	DSL #WD 2008-0205 (September 2008)

Has a wetland delineation been completed for this site? *Yes* ☒ *No* ☐

*If yes by whom?**	*Parametrix Inc.*

Has the wetland delineation been approved by DSL or the COE? *Yes* ☒ *No* ☐

*If yes, attach a concurrence letter. **

See Attached DSL Concurrence Letter.

[3] Attach a copy of all tax maps with the project area highlighted.

- *Italicized areas are not required by the Corps for a complete application, but may be necessary prior to final permit decision by the Corps.*

(7) CITY/COUNTY PLANNING DEPARTMENT AFFIDAVIT
*(TO BE COMPLETED BY LOCAL PLANNING OFFICIAL) **

I have reviewed the project outlined in this application and have determined that:

- ☐ This project is not regulated by the comprehensive plan and land use regulations.
- ☐ This project is consistent with the comprehensive plan and land use regulations.
- ☐ This project will be consistent with the comprehensive plan and land use regulations when the following local approval(s) are obtained.
- ☐ Conditional Use Approval
- ☐ Development Permit
- ☐ Other

This project is not consistent with the comprehensive plan. Consistency requires a

- ☐ Plan Amendment
- ☐ Zone Change
- ☐ Other

An application has ☐ has not ☐ been filed for local approvals checked above.

Local planning official name (print)	Signature	Title	City / County	Date

Comments:

Pending

(8) *COASTAL ZONE CERTIFICATION **

NOT APPLICABLE

If the proposed activity described in your permit application is within the Oregon coastal zone, the following certification is required before your application can be processed. A public notice will be issued with the certification statement, which will be forwarded to the Oregon Department of Land Conservation and Development for its concurrence or objection. For additional information on the Oregon Coastal Zone Management Program, contact the department at 635 Capitol Street NE, Suite 150, Salem, Oregon 97301 or call 503-373-0050.

CERTIFICATION STATEMENT

I certify that, to the best of my knowledge and belief, the proposed activity described in this application complies with the approved Oregon Coastal Zone Management Program and will be completed in a manner consistent with the program.

Print /Type Name	Title
Applicant Signature	Date
NOT APPLICABLE	

- ***Italicized areas are not required by the Corps for a complete application, but may be necessary prior to final permit decision by the Corps.***

(9) SIGNATURES FOR JOINT APPLICATION

Application is hereby made for the activities described herein. I certify that I am familiar with the information contained in the application, and, to the best of my knowledge and belief, this information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities. By signing this application I consent to allow Corps or Dept. of State Lands staff to enter into the above-described property to inspect the project location and to determine compliance with an authorization, if granted. I hereby authorize the person identified in the authorized agent block below to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

I understand that the granting of other permits by local, county, state or federal agencies does not release me from the requirement of obtaining the permits requested before commencing the project.

Print /Type Name	Title	Print /Type Name	Title
Applicant Signature	Date: 01·30·2013	**Authorized Agent Signature**	Date: 1/30/13
Kris Strickler	Project Director, Oregon (ODOT)		
Applicant Signature	Date: 1/30/13	Heather Wills	CRC Environmental Manager
Nancy Boyd	Project Director, Washington (WSDOT)		

- *Italicized areas are not required by the Corps for a complete application, but may be necessary prior to final permit decision by the Corps.*

Oregon
Theodore R. Kulongoski, Governor

Department of State Lands
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
(503) 378-3805
FAX (503) 378-4844
www.oregonstatelands.us.

January 2, 2007

MMc06-WD06-0704
OREGON DEPARTMENT OF TRANSPORTATION
ATTN: CLAIRE CARDER
123 NW FLANDERS
PORTLAND, OR 97209

Re: Wetland Delineation #2006-0704
I-5 Victory Boulevard to Lombard
Portland, Multnomah County

Dear Ms. Carder:

The Department of State Lands has reviewed the wetland delineation report prepared by David Evans and Associates, Inc. for the project referenced above. Based on the information presented in the report and my site visit, we concur that the waterway, Schmeer Slough and associated wetland, and Wetlands 1, 2, 3 and 4, as mapped on Sheets 1 and 2 (October 2006) in the report are jurisdictional for purposes of the Oregon Removal-Fill Law. Please note that wetlands are located below and above the ordinary high water line. A state removal-fill permit is required for fill or excavation of 50 cubic yards or more in a wetland or below the ordinary high water line of a waterway. A state removal permit may be required for any removal-fill activity in an Essential Salmonid Habitat waterway.

This concurrence is for purposes of the Oregon Removal-Fill Law only. Federal or local permit requirements may apply as well. The Army Corps of Engineers will review the report and make a determination of jurisdiction for purposes of the Clean Water Act at the time that a permit application is submitted. Please attach a copy of this letter to the permit application.

This concurrence is based on information provided to the agency. The jurisdictional determination is valid for five years from the date of this letter, unless new information necessitates a revision. Circumstances under which the Department may change a determination and procedures for renewal of an expired determination are found in OAR 141-090-0045 (available on our web site or upon request). You may submit a request for reconsideration of this determination in writing within 60 calendar days of the date of this letter. Thank you for your report.

Sincerely,

Michael V. McCabe
ODSL-ODOT Liaison
Wetlands & Waterways Conservation Division

Approved by

Eric D. Metz
Eastern Region Operations Manager
Wetlands & Waterways Conservation Division

David Evans + Assoc

ATTACHMENT B

Supplemental Project Description

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1. APPLICANT INFORMATION

This information is provided in the Joint Permit Application (JPA) Form.

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2. PROJECT LOCATION

Location information is provided on JPA form. A site location figure (Figure 2-1) is included below.

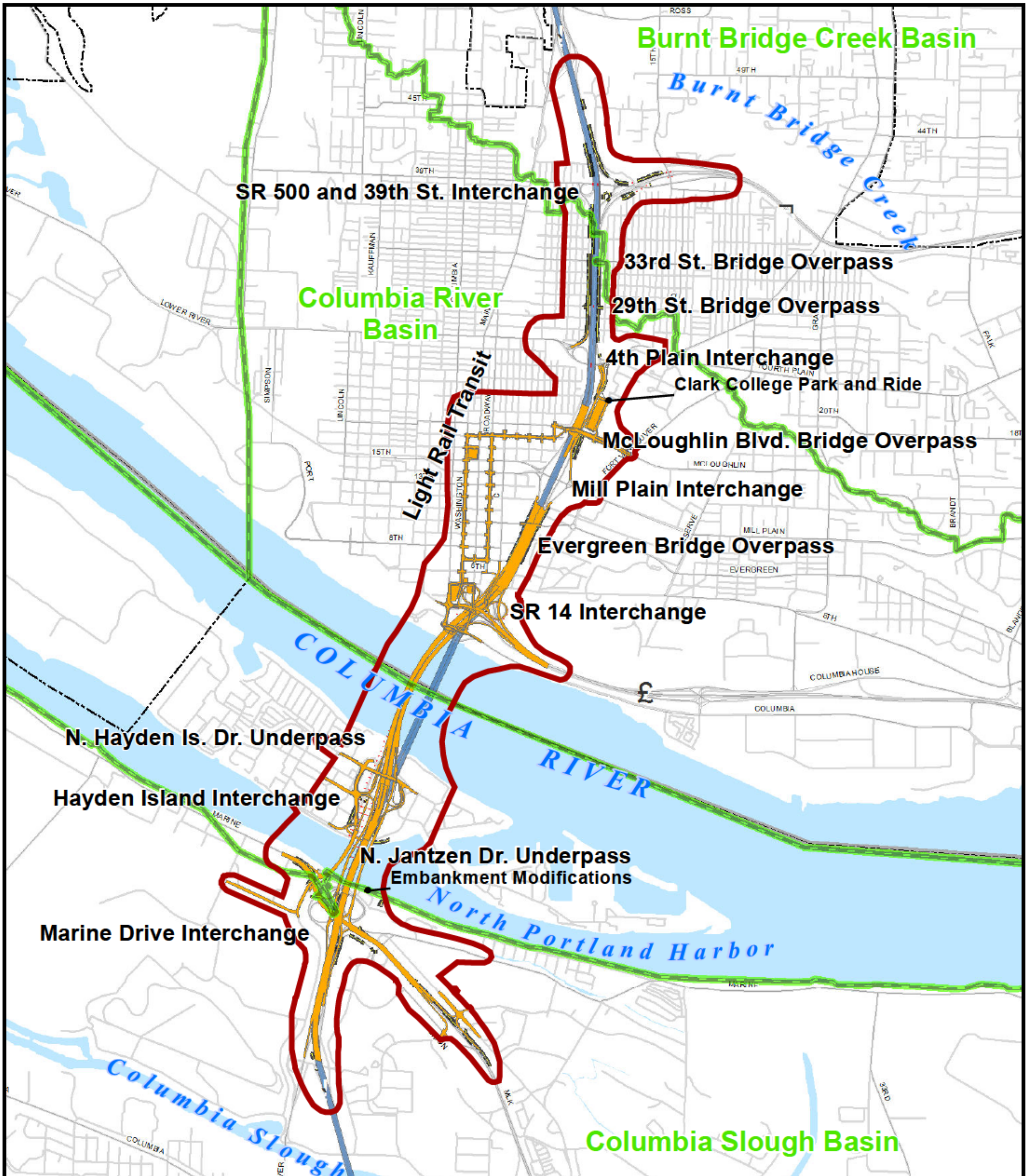

Figure 2-1
Primary Area of Potential Impact and ICP Footprint

Columbia River CROSSING

Date: 11/12/2012 Path: P:\GIS\CRC\GIS\PH_404_Permits\WaterQ_ProjectElements_API.mxd

3. PROPOSED PROJECT INFORMATION

3.1 BACKGROUND

The Columbia River Crossing (CRC) project as described in the Record of Decision includes a suite of transportation improvements over a 5-mile stretch of the Interstate 5 (I-5) corridor known as the locally preferred alternative (LPA). The construction of the LPA will be phased to match available funding while providing significant transportation benefits. The first construction phase is referred to as the Initial Construction Phase (ICP). In this project description, the LPA is described first, and the ICP description follows.

This permit application is requesting approval for the construction of the bridges[1] over the main stem of the Columbia River only. This permit does not request approval for the construction of new bridges over North Portland Harbor (Oregon Slough). A permit modification request for the North Portland Harbor bridges will be submitted subsequently (likely in 2014), and the modified application will request approval for the bridges in the ICP that cross North Portland Harbor.

The LPA includes:

- A new river crossing over the Columbia River and I-5 highway improvements.
- Improvements to seven interchanges, from south to north: Victory Boulevard, Marine Drive, Hayden Island, SR 14, Mill Plain, Fourth Plain and SR 500. Related enhancements to the local street network.
- Three new structures over North Portland Harbor associated with I-5, and one new multimodal bridge carrying light rail transit (LRT), local traffic, pedestrians and bicyclists.
- Removal of the existing Columbia River structures.
- A variety of bicycle and pedestrian improvements throughout the project corridor. A multiuse path connecting to the existing system. The path will allow users to travel from north Portland, over Hayden Island and the Columbia River into downtown Vancouver.
- Extension of LRT from the Expo Center in Portland to Clark College in Vancouver and associated transit improvements. Transit stations will be built on Hayden Island, in downtown Vancouver, and a terminus near Clark College. Three park and rides are to be built, Columbia (near the SR 14 interchange), Mill (in uptown Vancouver) and Central (near Clark College). Improvements will be made to the tracks on the Steel Bridge. Also, bus route changes and the expansion of the Ruby Junction LRT maintenance facility.

---

[1] The proposed new crossing over the main stem of the Columbia River is commonly referred to as the new "bridge" by the public as well as in most project documents. However, the new bridge will actually be constructed as two separate, parallel bridges, and is therefore referred to in this Project Description, as well as in other design-related documents as "bridges". This nomenclature parallels the terminology used for the existing crossing which is publicly known as the "Columbia River Interstate Bridge" but which actually consists of a pair of parallel bridges.

- Transportation demand and system management measures to be implemented with the project, including the use of tolls, subject to the authority of the Washington and Oregon Transportation Commissions.

The first construction phase is referred to as the ICP, and includes the following multimodal elements:

- The new river crossing over the Columbia River and the I-5 highway improvements, including improvements to five interchanges, as well as associated enhancements to the local street network.
- Two new structures over North Portland Harbor associated with I-5, and one new multimodal bridge carrying LRT, local traffic, pedestrians and bicyclists.
- Deconstruction of the existing Columbia River structures.
- Extension of light rail from the Expo Center in Portland to Clark College in Vancouver, and associated transit improvements, including transit stations, park and rides, bus route and station changes, and expansion of a LRT maintenance facility.
- Upgrades and modifications to the Steel Bridge track and signals and transit command center.
- Purchase of 19 light rail vehicles, public art and other transit-related procurements.
- Bicycle and pedestrian improvements throughout the project corridor that connect to the transit system.
- Toll system for the river crossing.
- Transportation demand and system management measures to be implemented with the project.

Aspects of the ICP and later programs associated with in-water work and those activities that might affect jurisdictional waters are discussed in more detail in Section 4 of this attachment.

This United States Coast Guard (USCG) General Bridge permit application requests permission for the portion of the project under the jurisdiction of the USCG, which includes:

- The new river crossing over the Columbia River.
- Deconstruction of the existing Columbia River structures.

4. PROJECT PURPOSE AND DESCRIPTION

4.1 PURPOSE AND NEED

4.1.1 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 CRC Bridge Influence Area (BIA). The BIA extends from approximately Columbia Boulevard in Portland, Oregon to SR 500 in Vancouver, Washington. Relative to the No-Build Alternative, the proposed action is intended to achieve the following objectives:

- Improve travel safety and traffic operations on the I-5 crossing’s bridges and associated interchanges;
- Improve connectivity, reliability, travel times and operations of public transportation modal alternatives in the BIA;
- Improve highway freight mobility and address interstate travel and commerce needs in the BIA; and
- Improve the I-5 river crossing’s structural integrity (seismic stability).

4.1.2 Project Need

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

- **Growing travel demand and congestion:** Existing travel demand exceeds capacity in the I-5 crossing and associated interchanges. This corridor experiences heavy congestion and delay lasting 4 to 6 hours 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 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. The two crossings currently carry over 280,000 trips across the Columbia River daily. Daily traffic demand over the I-5 crossing is projected to increase by more than 35 percent during the next 20 years, with stop-and-go conditions increasing to approximately 15 hours each day 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 project 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 metropolitan area are projected to increase by more than 90 percent 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.

- **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 central Portland and Vancouver and Clark County, trips between north/northeast Portland and Vancouver and Clark County, and trips connecting 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 BIA 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 2 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.
- **Substandard bicycle and pedestrian facilities:** The bike/pedestrian lanes on the existing 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 bicyclists and pedestrians. Direct pedestrian and bicycle connectivity are poor in the BIA.
- **Seismic vulnerability:** The existing I-5 bridges are located in a seismically active zone. They do not meet current seismic standards and are vulnerable to failure in an earthquake.

4.2 PROJECT DESCRIPTION

4.2.1 Project Area

The LPA project area is defined as the area that will be directly impacted by the project, including the footprint of the permanent and temporary structures, widened highway segments, new interchanges, city street realignments, associated road shoulder excavation and fill areas, stormwater facilities, areas contributing runoff to the stormwater facilities, wetland mitigation areas, and staging and access areas, including areas in the Columbia River and North Portland Harbor where work will occur from barges and temporary structures.

The ICP project area is defined as the area that will be directly impacted by the ICP. Along the I-5 corridor, the main portion of the ICP project area extends 3.5 miles from north to south, beginning at the I-5/Fourth Plain Boulevard interchange in Vancouver, Washington, and extending to the I-5/Victory Boulevard interchange in Portland, Oregon. At its northern end, the project area extends west into downtown Vancouver and east to near Clark College to include high-capacity transit alignments, transit stations, park and ride locations, and city road improvements included as part of this project. Heading south along the existing over-water bridge alignments, the ICP project area extends 0.25 mile on either side of the bridges to include the new Columbia River and North Portland Harbor bridges, as well as the adjacent areas where construction and demolition activities will occur. At its southern end, the ICP project area extends east and includes city road improvements along Victory Boulevard.

The LPA project area includes potential construction staging and casting yards at the Port of Vancouver, Alcoa/Evergreen, Sundial, Red Lion at the Quay, and Thunderbird Hotel sites. Along the Sandy River in Oregon and along the Lewis River in Washington, the LPA project area includes compensatory mitigation sites, though the Lewis River site will be covered under a separate permitting process.

The LPA project area described here includes all associated cut and fill slopes and stormwater treatment facilities.

As described above, this permit application is requesting approval for the construction of the bridges over the main stem of the Columbia River only. This permit does not request approval for the construction of new bridges over North Portland Harbor (Oregon Slough). A permit modification request for the North Portland Harbor bridges will be submitted subsequently (likely in 2014), and the modified application will request approval for the bridges in the ICP that cross North Portland Harbor.

4.2.2 Timeline and Sequencing

Construction of the Columbia River bridges sets the sequencing for other project components. The Columbia River bridges and immediately adjacent highway improvements will require the longest construction timelines. In-water construction will begin with the Columbia River bridges, though other elements of the project will be started well before these bridges are finished.

The estimated start date for construction is 2014; the estimated end date is 2022. Funding availability will be a large factor in determining the overall sequencing and construction duration. Contractor schedules, weather, materials, and equipment could also influence construction duration. Table 4-1 summarizes the estimated interchange construction schedule timelines.

Table 4-1. Estimated Interchange Construction Schedule Timelines

	Years		
Interchange	**Partial Interchange Including Southbound Approaches**	**Full Interchange**	**Total Years Interchange Completion**
SR 14	2	2.5	**4.5**
Hayden Island	1.5	1	**2.5**
Marine Drive	N/A	3	**3**
Fourth Plain Boulevard	N/A	2.7	**2.7**

The following provides a brief overview of the major construction sequencing issues. To the extent practicable, the timing of in-water work has been tailored to minimize impacts to aquatic species.

Columbia River Bridges Construction. The project will build two new spans over the Columbia River. The general sequence of bridge construction includes the following steps:

- Initial preparation: Mobilize construction materials, heavy equipment, and crews; prepare staging areas.

- Installation of temporary in-water work structures: Install cofferdams and temporary piles for work bridges and work platforms that will support construction equipment.
- Installation of foundation shafts: Drill and install shafts to support columns and superstructure.
- Shaft caps: Construct and anchor concrete foundations on top of the shafts to support pier columns.
- Pier columns: Construct or install pier columns on the shaft caps.
- Bridge superstructure: Build or install the horizontal structure of the bridge spans across the piers. The superstructure will be steel or reinforced concrete. Concrete will be cast-in-place or precast off site and assembled on site.

North Portland Harbor Bridges Construction. [This permit application is requesting approval for the construction of the bridges over the main stem of the Columbia River only.] The project will build three new spans over North Portland Harbor during the ICP. A fourth bridge (part of the LPA) is proposed to be constructed when funding for it becomes available, likely after the ICP is constructed. The general sequence of bridge construction includes the following steps:

- Initial preparation: Mobilize construction materials, heavy equipment, and crews; prepare staging areas.
- Installation of temporary in-water work structures: Install temporary piles for work bridges and work platforms that will support construction equipment.
- Installation of foundation shafts: Excavate and construct shafts to support structures.
- Bent columns: Construct or install bent columns on the shafts.
- Bridge superstructure: Build or install the horizontal structure of the bridge spans across the bents. The superstructure will be steel or reinforced concrete. Concrete will be cast-in-place or precast off site and assembled on site.

SR 14 and Hayden Island Interchange Construction. Proper sequencing of interchange construction, particularly construction of the SR 14 and Hayden Island interchanges, is critical to maintain traffic flow across the river during the entire project. Interchanges on each side of the bridge must be partially constructed before any traffic can be transferred onto the new structure. For the SR 14 interchange, it will take approximately 2 years to complete the southbound approaches and ramps and to allow traffic onto the new southbound Columbia River Bridge (Table 4-1). Completion of the rest of the interchange will require approximately 2.5 additional years. For the Hayden Island interchange, it will require approximately 1.5 years to complete the southbound approaches needed to allow traffic onto the new southbound Columbia River Bridge and approximately another 1 year to complete the full interchange.

Marine Drive and Victory Boulevard Interchange Construction. Like the SR 14 and Hayden Island interchanges, construction of the Marine Drive interchange will require coordination with construction of the Columbia River bridge southbound lanes. Specifically, the use of the southbound braided ramps requires the work to occur in the same period. Without improvements to Marine Drive, the light rail system cannot be completed as currently designed. The Marine Drive interchange is expected to take 3 years to construct, including work at the Victory Boulevard interchange.

Fourth Plain Boulevard Interchange Construction. These interchange improvements will be constructed concurrently with the improvements at SR14 and the main river crossing to allow for the operation of the Central park and ride.

Removal of Existing Bridges. Removal of the existing river crossing structures is expected to take approximately 1.5 years. It can begin after all traffic is rerouted to the new Columbia River bridges. However, work must be completed at the SR 14 and Hayden Island interchanges before the existing bridge can be removed. The new northbound bridge and the northbound off-ramp to SR 14 must be completed and opened before traffic can be routed to the new bridges.

Light Rail Construction. Light rail construction will require about 4 years for completion. LRT will use the southbound bridge across the Columbia River, and will be on a new, separate multimodal structure over North Portland Harbor. Any bridge structure work will be separate from the actual light rail construction activities and must be completed first. As noted above, there are some staging considerations for the Marine Drive interchange construction.

4.2.3 In-Water and Over-Water Bridge Construction

New bridges will be constructed over the Columbia River and North Portland Harbor. See Section 5.3 for a discussion of existing conditions.

4.2.3.1 Overview

Columbia River Bridges

The existing I-5 structures over the Columbia River consist of two separate, parallel bridges that are functionally obsolete (i.e., the existing configuration does not meet current bridge standards and traffic demand). The existing structures include lift spans that must be raised for certain river traffic and maintenance, and that cause automobile and bicycle/pedestrian traffic delays when lifted. Each bridge has three lanes, substandard shoulders, and a bicycle and pedestrian (bike/ped) sidewalk that does not meet current Americans with Disabilities Act (ADA) accessibility standards.

The new Columbia River crossing will carry traffic on two separate bridges and include a new LRT line and improved bike/ped facilities. Each new bridge will carry three through-travel lanes and two auxiliary lanes for traffic entering and exiting the highway in each direction, as well as full standard safety shoulders. The eastern structure will carry northbound traffic on its upper deck, with bike/ped traffic below; the western structure will carry southbound traffic on its upper deck, with LRT below. Both existing bridges will be removed after the new bridges are constructed and all traffic is routed to the new bridges.

The new bridges will be subject to multiple clearance constraints. Vertical clearances underneath the bridges must accommodate river traffic below. The project team, in consultation with USCG, US Army Corps of Engineers (USACE), and industry representatives will establish a minimum vertical clearance so that the new structure can be built without a lift span. In addition, the bridges must not be so high as to interfere with flights from Portland International Airport (PDX) and Pearson Field, a historic airport just to the east of the project area. Because of these elevation restrictions and the need to construct curved structures to match existing on-land infrastructure, suspension or cable-stay bridge designs are not practicable.

The new structures over the Columbia River are not proposed to include lift spans, allowing for more free-flowing automobile and river traffic movement. In addition, grades on the proposed structure will meet current ADA standards for pedestrian accessibility.

North Portland Harbor Bridges

The project will repurpose the existing I-5 bridge over North Portland Harbor and will add three new bridges adjacent to the existing bridge as part of the ICP. Starting from the east, these structures will carry:

- A two-lane northbound ramp carrying Marine Drive traffic to I-5 north.
- Northbound and southbound I-5 on the repurposed existing bridge across North Portland Harbor with three through lanes and two auxiliary lanes for southbound traffic and three through lanes and one auxiliary lane for northbound traffic.
- A two-lane southbound ramp carrying southbound I-5 traffic to Marine Drive.
- A multimodal local bridge carrying LRT and a two-lane roadway with bike lanes and a sidewalk.

The structures over North Portland Harbor will not include lift spans.

Summary of Bridge Construction Timing

The Oregon Department of Fish and Wildlife (ODFW)- and Washington Department of Fish and Wildlife (WDFW)-published in-water work window for this portion of the Columbia River is November 1 through February 28. Because of the large amount of in-water work involved, limiting in-water construction of the replacement bridges to the published guidelines would extend the construction schedule to more than 10 years. Therefore, the project will request a variance to the published in-water work window guidelines. Some in-water construction activities are proposed to occur year-round, as shown in Table 4-2. Activities taking place outside of the normal in-water work window will occur in coordination with ODFW, WDFW, National Marine Fisheries Service (NMFS), and US Fish and Wildlife Service (USFWS) and in compliance with the terms and conditions of all regulatory permits obtained for this project. Table 4-3 shows the proposed timing of activities that are *not* considered in-water work activities.

Table 4-2. Proposed Timing of In-Water Work in the Columbia River

Activity	Description	Activity Duration (2014-2022)	Timing
1. Install small-diameter piles (≤48") with impact methods.[a]	Small-diameter piles will be used in the construction of temporary work bridges/platforms, tower cranes, and oscillator support platforms.	Up to 1 hour/day (impact hammer operation). Approximately 138 days in the Columbia River.	Only within approved extended in-water work window of September 15 through April 15 each year.
2. Install small-diameter piles (≤48") with non-impact methods.	Small-diameter piles will be used in the construction of temporary work bridges/platforms, barge moorings, tower cranes, and oscillator support platforms.	Length of work day is subject to local noise ordinances, however, could be up to 24 hours/day. Approximately 138 days in the Columbia River.	Year-round provided work does not violate water quality standards.
3. Extract small-diameter piles (≤48") (not including cofferdams).	Removal of small-diameter piles will be done using vibratory equipment or direct pull.	Length of work day is subject to local noise ordinances, however, could be up to 24 hours/day.	Year-round provided work does not violate water quality standards.
4. Install/remove cofferdam for construction of Columbia River bridges.	Used to construct piers nearest to shore in the Columbia River (pier complexes 2 and 7). Steel sheet pile sections to be installed by non-impact means to form a cofferdam. Sheet pile removal can be direct pull or use a vibratory hammer.	Cofferdams could be in place for a maximum of 250 work days each. Installation and dewatering of each cofferdam will not take more than 65 workdays; cofferdam removal will not take more than 25 workdays. Length of work day is subject to local noise ordinances.	Year-round provided work does not violate water quality standards.
5a. Install large-diameter shaft casings (≥72") using vibratory hammer, rotator, or oscillator outside of a cofferdam.	Used to construct piers and bents not immediately adjacent to shore in the Columbia River.	Columbia River: 110 – 120 days/pier	Year-round provided work does not violate water quality standards.
5b. Install large-diameter shaft casings (≥72") using vibratory hammer, rotator, or oscillator inside of a water- or sand-filled cofferdam.	Used to construct piers and bents nearest to shore in the Columbia River.	Columbia River pier complex 2 and pier complex 7: ~84 days/pier.	Year-round provided work does not violate water quality standards.

Activity	Description	Activity Duration (2014-2022)	Timing
6. Clean out shafts and place reinforcing, concrete inside steel casings.	Applies to all piers and shafts. All activities/materials will be contained within the casings and have no contact with the water.	Columbia River: 110 – 120 days/pier.	Year-round provided work does not violate water quality standards.
7a. Perform placement of reinforcement and concrete for a cast-in-place pile cap.	Possible construction method for shaft cap at pier complexes 2 and 7. All activities and materials will be contained within forms and will have no contact with the water. The bottom of the pier caps may sit below the mud line.	Estimate 95 work days per pier.	Year-round. For pier caps nearest shore: year-round if work occurs within a dewatered cofferdam.
7b. Place a prefabricated pile cap, form, pile template, or similar element into the water.	At Columbia River pier complexes 3 to 6. Potentially at pier complexes 2 and 7. Assume contact with the water surface but not with the riverbed.	100 work days per pier.	For deep water piers: year-round provided work does not violate water quality standards. For piers nearest shore: year-round if work occurs within a dewatered cofferdam.
8a. Perform wire saw/diamond wire cutting outside of a cofferdam at or below the water surface.	Used throughout for demolition of existing bridges to cut concrete piers into manageable pieces. These pieces could then be loaded onto barges and transported off site.	Pier cutting and removal to take approximately 7 work days per pier.	Year-round provided work does not violate water quality standards.
8b. Perform wire saw/diamond wire cutting or a hydraulic breaker inside of a cofferdam.	Used for demolition of the existing Columbia River bridges. Used in water to cut concrete piers into manageable pieces. Cofferdam may not be dewatered.	Pier cutting and removal to take approximately 7 work days per pier.	Year-round provided work does not violate water quality standards.
9a. Spot remove debris and riprap from river bed	Guided removal (likely underwater diver assisted) of specific pieces of debris or large riprap only in the location where the shaft will be constructed. In North Portland Harbor only. Will use bucket dredge.	Up to 2 hrs/day. Less than 7 work days.	Year-round provided work does not violate water quality standards.

Note: Proposed timing is contingent upon obtaining an in-water work variance from all relevant regulatory agencies.

a As a minimization measure, temporary piles that are load-bearing will be vibrated to refusal, then driven and proofed with an impact hammer to confirm load-bearing capacity.

Table 4-3. Proposed Timing for Activities Not Considered In-Water Work

Activity	Description	Activity Duration (2014-2020)	Proposed Timing
1. Construction activity above the water surface (not superstructure).	Constructing the pier and pier table includes forming, reinforcing, and placing concrete above the water surface in the Columbia River.	Constructing the pier, pier table, and cantilevers to take approximately 160 work days per pier complex in the Columbia River.	Year-round
2. Superstructure construction – form construction, placement of reinforcing, and concrete placement.	Concrete to be transported to the over-water work sites via barge or work bridges in the Columbia River. Numerous barge trips may be required; alternatively, concrete could be pumped to the work site via temporary work/utility bridges.	In Columbia River: 750 work days.	Year-round
3. Superstructure construction – precast or prefabricated element assembly.	Installation of bridge superstructure (pier tables, cantilevers, decking, etc.). Precast or prefabricated elements will be transported to the over-water work sites via barge or work platform. Numerous barge trips may be required.	In Columbia River: approximately 500 days per pier complex.	Year-round
4. Use of equipment and facilities already installed in the water.	This will include use of in-water structures (work bridges/platforms, tower cranes, cofferdams, oscillator support platforms) previously installed in the water.	In Columbia River: ~750 work days.	Year-round
5. Work on the bridge over the water.	Work on the bridge will cover many activities, including striping, overlays, lighting systems, etc.	In Columbia River: ~750 work days.	Year-round
6. Demolition of concrete over water in the Columbia River.	After installation of containment measures, concrete sections (existing bridge deck or piers) will be cut and removed from the existing structures. Cut sections could be loaded onto barges and transported off-site or trucked off the bridge.	Demolition of concrete bridge deck and piers to take approximately 255 work days.	Year-round
7. Cut off/remove existing timber piles or concrete pier inside of a cofferdam.	Exposed piles from beneath the existing Columbia River bridge piers will be cut off several feet below the mud line.	If applicable, cutting and removal of pile to take approximately 7 work days per pier.	Year-round

Activity	Description	Activity Duration (2014-2020)	Proposed Timing
8. Remove existing Columbia River superstructure over water.	Lifting partitioned truss sections off their piers and loading them onto barges for transport to a dismantling site.	Removal of bridge deck, towers, and all 10 spans to take approximately 255 work days.	Year-round

Notes:

* The determination of activities that are not considered in-water work was made in consultation with ODFW, WDFW, NMFS, and USFWS biologists.

** The in-water work window is a guideline established by ODFW. The guideline was created to assist the public in minimizing potential impacts to important fish, wildlife, and habitat resources. The guidelines are based on ODFW district fish biologist's recommendations. The IWWW can apply to any activity that is subject to the regulatory requirements of the Clean Water Act Section 404 and the State of Oregon's Removal-Fill Law. WDFW administers Chapter 77.55 RCW (Construction projects in state waters). Chapter 77.55 RCW requires anyone wishing to use, divert, obstruct, or change the natural flow or bed of any river or stream to first obtain a Hydraulic Project Approval (HPA) so that potential harm to fish and fish habitat can be avoided or corrected. WDFW has the "Gold and Fish" guide that was written as a guide when gold placer mining can occur during the calendar year, but it can be applied to other projects requiring an HPA. There are some circumstances where it may be appropriate to perform in-water work outside of the preferred work period indicated in the guidelines (i.e., an in-water work window variance). ODFW and WDFW may consider variations in climate, location, and category of work that will allow more specific in-water work iming recommendations on a project by project basis.

4.2.3.2 Columbia River Bridges

The project will construct two new bridges across the Columbia River downstream (to the west) of the existing interstate bridges. Each of the structures will range from approximately 91 to 136 feet wide, with a gap of approximately 15 feet between them. The over-water length of each new mainstem bridge will be approximately 2,700 feet (Table 4-4).

Table 4-4. Columbia River Bridges Over-Water Dimensions

Bridge	Approximate Length Over Water	Approximate Width
I-5 Northbound (eastern structure)	2,700 feet	Varies: 91 to 136 feet
I-5 Southbound (western structure, with LRT)	2,650 feet	Varies: 91 to 136 feet

The proposed crossing design uses two dual-level bridge structures. The eastern replacement structure will accommodate northbound highway traffic on the bridge deck, with a bicycle and pedestrian path underneath; the western structure will carry southbound traffic on the bridge deck, with a two-way light rail guideway below. Each of the new bridges will be wide enough to accommodate three through lanes and 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 top deck of each of the new mid-level bridges will have a maximum elevation of approximately 160 feet above 0 Columbia River Datum (CRD). (Please note that for the purpose of this USCG General Bridge permit application Ordinary Low Water has been defined as 0 CRD. Also, attached plan sets (Attachment C) are in NAVD 88 Datum—0 CRD is equal to +5.28 NAVD 88). The available vertical clearance of the primary channel will be 116 feet above 0 CRD, over a 300-foot width span. To provide a 300-foot navigation clearance between bridge piers requires bridge spans greater than 400 feet. The design includes spans of 465 feet. The new structures will not include lift spans.

Each of the new bridges will be built on six pairs of in-water piers plus two pairs of piers on land. Slender columns will rise from the shaft caps and connect to the superstructure of the bridges.

In-water pier complexes are numbered 2 through 7, beginning on the Oregon side. Pier complex 1 is on land in Oregon, and pier complex 8 is on land in Washington. Portions of pier complex 7 occur in shallow water (less than 20 feet deep). Piers are designed to withstand the design scour without armor-type scour protection (e.g., riprap).

Drawings in Attachment C show the basic configuration of these bridges, the span lengths, and the layout of the bridges relative to the Columbia River shoreline and navigation channels.

At each pier complex, sequencing will occur as listed below. Details of each activity are presented in the following sections.

- Install temporary cofferdam (applies to pier complexes 2 and 7 only).
- Install temporary piles to moor barges and to support temporary work platforms (at pier complexes 3 through 6) and work bridges (at pier complexes 2 and 7).
- Install shafts for each pier complex.

- Remove work platform or work bridge and associated piles.
- Install shaft caps at the water level.
- Remove cofferdam (applies to pier complexes 2 and 7 only).
- Construct columns on the shaft caps.
- Build bridge superstructure spanning the columns.
- Remove barge moorings.

All the activities listed above may occur at more than one pier complex at a time.

All activities will require the use of artificial lights for safety. Temporary over-water lighting sources will include the barges, work platforms/bridges, and cranes. The project will implement measures that minimize the effects of lighting on fish. Measures may include using directional lighting with shielded luminaries to control glare and direct light onto work areas instead of surface waters.

Columbia River Bridge Construction Sequencing

A conceptual construction sequence was developed for building the new Columbia River bridges and removing the existing structures. The sequence was developed to prove constructability of the proposed design and is a viable sequence for construction of the river bridges. Once a construction contract is awarded, the contractor may sequence the construction in a way that may not conform exactly to the proposed schedule but that best utilizes the materials, equipment, and personnel available to perform the work. However, the amount of in-water work that can be conducted at any one time is limited, and is based on three factors:

1. The amount of equipment available to build the project will likely be limited. Based on equipment availability, the CRC engineering team estimated that only two shaft operations would likely occur at a given time.
2. The physical space the equipment requires at each pier will be substantial. The estimated sizes of the work platforms/bridges and associated barges are shown in Attachment C. (This is a conceptual design developed by the CRC project team to provide a maximum area of impact. The actual work platforms will be designed by the contractor; therefore, actual sizes will be determined at a later date). The overlap of work platforms/bridges and barge space limits the amount and type of equipment that can operate at a pier complex at one time.
3. One navigation channel shall be open at all times during construction.

Columbia River Bridge Construction Timeline

Construction is currently estimated to occur between 2014 and 2018. Contractor schedules, weather, materials, and equipment could also influence construction duration.

Temporary Structures

Temporary Cofferdams

Pier complexes 2 and 7 will each require one temporary cofferdam. Cofferdams will consist of interlocking sections of sheet piles to be installed with a vibratory hammer or with press-in methods. Table 4-5 provides an estimate of the dimensions of the cofferdams and Table 4-6 estimates the duration that they will be present in the water. Cofferdams will be removed using a vibratory hammer or direct pull.

Table 4-5. Potential Dimensions of Temporary Cofferdams Used in Columbia River Bridge Construction

Length (ft)	Width (ft)	Height (ft)	Area per Cofferdam (sq ft)	Total Cofferdams	Total Area of Cofferdams (sq ft)
275	75	30	20,625	2	41,250

Table 4-6. Construction Summary for Cofferdams in Columbia River

Location	Duration to Install (days)	Duration of Construction (days)	Duration to Remove (days)
Pier complex 2	20	250[a]	15
Pier complex 7	20	250[a]	15

a Days represent approximate number of calendar days cofferdam are in place. This duration represents approximately 175 working days.

Cofferdams will be installed in a manner that minimizes fish entrapment. Sheet piles will be installed from upstream to downstream, lowering the sheet piles slowly until they contact the substrate. When cofferdams are used, fish salvage must be conducted according to protocol approved by ODFW, WDFW, and NMFS.

Temporary In-Water Work Structures

The project will include numerous temporary in-water structures to support equipment during the course of construction. These structures will include work platforms and work bridges. They will be designed by the contractor after a contract is awarded, but prior to construction.

Temporary bents will be built near upland piers 1 and 8 to facilitate construction of the spans between piers 1 and 2 and piers 7 and 8. These temporary bents will require approximately 16 48-inch piles per bent within the water column, encompassing approximately 202 square feet and 300 cubic yards (cy) per bent.

Work platforms will be constructed at pier complexes 3 through 6. Work platforms are each estimated to be approximately 29,000 square feet in area and will surround the future location of each shaft cap. Work bridges will be installed at pier complexes 2 and 7 so that equipment can access these pier complexes directly from land. Temporary work bridges will be placed only on the landward side of these pier complexes. The bottom of the temporary work platforms and bridges will be a few feet above the water surface. The decks of the temporary work structures will likely be constructed of large, untreated wood beams to accommodate large equipment such as cranes. After shafts and shaft caps have been constructed, the temporary work platforms and their support piles will be removed.

Both battered and vertical steel pipe piles will be used to support the structures. In addition, four temporary piles could surround each of the shafts. Due to the heavy equipment and stresses placed on the support structures, all of these temporary piles will need to be load-bearing. Load-bearing piles will be installed using a vibratory hammer and then proofed with an impact hammer to ensure they meet project specifications demonstrating load-bearing capacity. The number and size of temporary piles for these structures is listed in Table 4-7.

Table 4-7. Summary of Steel Pipe Piles Required for Temporary Overwater Structures During Construction of Columbia River Bridges

Type of Structure	Number of Structures	Pile Diameter	Pile Length	Piles per Structure	Total Number of Piles
Work platforms/bridges	6	24″	70′–90′	90 to 132	720
		48″	120′	48	288
Barge moorings	N/A	24″	70′–90′	Varies	160
Total	**6**	**---**	**---**	**---**	**1168**

Not all of these structures will be in place at the same time. It is estimated that only 150 to 500 steel piles, representing up to 6,300 square feet of temporary piles, will be in the mainstem Columbia River at any one time.

Barges

Barges will be used as platforms to conduct work activities and to haul materials and equipment to and from the work site. Barges will be moored to non-load-bearing steel pipe piles and adjacent to temporary work structures. The approximate dimensions of mooring piles are listed in Table 4-7.

Several types and sizes of barges will be used for bridge construction. The type and size of a barge will depend on how the barge is used. No more than 12 barges are estimated to be moored or moving equipment for Columbia River bridge construction at any one time throughout the construction period. The number and the area of the barges are estimated in Table 4-8.

Area and Duration of Temporary Structures

Table 4-8 summarizes the area of temporary structures required for construction in the Columbia River as well as their duration in the water. The number of temporary platforms or bridges in the Columbia River will vary between zero and four during construction. Up to four work platforms and two work bridges will be required to install shafts and construct shaft caps. Each work platform/bridge will require approximately 20 to 30 work days to install. Each work platform/bridge will be in place for approximately 130 to 300 work days.

Barges will be moored around each pier complex. Approximately 160 mooring piles will be installed over the life of the project, each in place for approximately 120 work days. Up to 12 barges at one time would be on the site over the life of the project. Barges vary in size, but can be up to 30,000 square feet in area. With several barges on the site, the over-water footprint could be up to approximately 100,000 square feet at any one time (estimate based on worst-case scenario of 12 barges).

Table 4-8. Summary of Temporary Structures Required for Construction in the Columbia River

			sq ft			
Type of Structure	**Structures**	**Total Piles (all sizes)**	**Total In-Water Area for Piles**	**Total Over-Water Area/ Footprint**	**Approx. Time to Install (days/platform)[a]**	**Duration Present in Water (days each)**
Work platforms/ bridges	6	1033	6,261	161,370	30–50	150–500
Barge moorings	N/A	160	503	N/A	N/A	120/mooring
Barges (cumulative, at a single time)	Up to 12	N/A	N/A	Up to 100,000[b]	N/A	Varies
Total	**6 to 18**	**1193**	**6,764**	**Up to 261,370**	**---**	**---**

a Assumes two crews.

b Assumes more than one barge.

Installation of Temporary Piles

Temporary piles will be used for mooring barges and to support in-water work structures. Mooring piles will be vibrated into the sediment until refusal. Vibratory installation will take between 15 and 60 minutes per pile.

Load-bearing piles (used for work platforms/bridges and tower cranes) will be vibrated to refusal (approximately 15 to 60 minutes per pile), then driven and proofed with an impact hammer to confirm load-bearing capacity. An average of six temporary piles could be installed per day using vibratory installation to set the piles and up to two impact drivers to proof them. Rates of installation will be determined by the type of installation equipment, substrate, and required load-bearing capacity of each pile. Temporary piles will be installed and removed throughout the construction process. No more than two impact pile drivers will operate at one time. Generally, use of two impact pile drivers will occur at only one pier complex at a time.

In general, temporary piles will extend only into the alluvium to an approximate depth of 70 to 120 feet. Standard pipe lengths are 80 to 90 feet, so some piles may need to be spliced to achieve these depths.

Estimated pile installation specifications[2] are provided in Table 4-9. The number of pile strikes was estimated by WSDOT geotechnical and CRC project engineers based on

[2] Number of piles driven per day, strikes per pile, total strikes per day, and duration of driving per day are estimates rather than maximums. The size and extent of this project requires contractor flexibility while minimizing effects to listed species. The CRC project is proposing performance measures that use these variables, in addition to the amount of attenuation, to calculate “exposure factors” on a weekly basis. The exposure factor uses the variables for daily piles strikes, timing and duration of piles strikes, days of pile driving within a week, size of pile (initial sound levels), fish speed, and fish mass to estimate the potential exposure to fish that are within or pass through the project area. Different combinations of any of these elements (such as pile strikes, duration or

information from past projects and knowledge of site sediment conditions. The actual number of pile strikes will vary depending on the type of hammer, the hammer energy used, and substrate composition. The strike interval of 1.5 seconds (40 strikes per minute) is also estimated from past projects and is based on use of a diesel hammer. This estimate is within the typical range of 35 to 52 strikes per minute for diesel hammers (HammerSteel 2009). It is worth noting that for any one 12-hour daily pile driving period, less than one hour of impact driving is anticipated.

Table 4-9. Pile-Strike Summary for Construction in Columbia River

Pile Size	Estimated Piles Installed per Day	Estimated Strikes per Pile	Estimated Maximum Strikes per Day	Hours of Pile Driving/12-hr Work Day
18–24″	3	200	600	0.25
42–48″	3	400	1,200	0.50
Total	**6**	**--**	**1,800**	**0.75**[a]

a This scenario assumes just one pile being driven at a time. During construction, up to two piles may be driven at the same ime in the Columbia River. If this were to occur, the strike numbers would stay the same, but the actual driving time would decrease.

Impact pile driving could potentially occur any day between September 15 and April 15; however, impact pile driving is more likely to occur in the first 18 months of construction as pier complexes are started. After the first 18 months, most of the pier complexes will be well underway, leaving only the work required to finish a couple of pier complexes and provide bases for superstructure construction.

In accordance with an approved hydroacoustic monitoring plan (see Section 5.2) a noise attenuation device will be used during all impact pile driving, with the exception of during hydroacoustic monitoring when the noise attenuation device will be turned off to measure its effectiveness. A period of up to 7.5 minutes per week with no attenuation device has been allocated in the analyses and hydroacoustic minimization measure (see Section 5.2) to allow for monitoring and for time to shut down activities should an attenuation device fail. If the attenuation device fails, pile driving activities will cease as soon as practicable and resolution of the problem will occur. By incorporating this time into the analysis, the project may still proceed in the event of an equipment failure without exceeding the thresholds listed in the hydroacoustic minimization measure. With the exception of hydroacoustic monitoring, intentional impact pile driving without a noise attenuation device is not proposed nor will it be allowed. In addition, to limit hydroacoustic effects, there will be a consecutive 12-hour period of no impact pile driving for every 24-hour day.

Construction of Permanent Piers

In-water shaft construction consists of installing large diameter steel casing to a specified depth to the top of the competent geological layer known as the Troutdale Formation. The top layer of river substrate is composed of loose to very dense alluvium (primarily sand and some fines), beneath which is approximately 20 feet of dense gravel, underlain by the Troutdale Formation.

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timing of pile strikes, and initial sound levels) will yield different exposure factors. For example, a higher number of pile strikes in a given time period may result in the same exposure factor as a lower number of pile strikes conducted on a pile that has higher initial sound levels. During construction, the contractor will calculate the weekly, maximum yearly, average yearly, and total project exposure factor to ensure that exposure to listed fish are not exceeded in accordance with Section 5.2 of this document.

A vibratory hammer, oscillator, or rotator will be used to advance a steel casing. If casings are installed by a vibratory hammer, installation is estimated to be 2 work days per casing, not including welding of casings. If casings need to be welded together, 1 work day is estimated for each weld. Soil will be removed from inside the casing and transferred onto a barge as the casing is advanced. The soil will be deposited at an approved upland site. Excavation will continue below the casing approximately 10 feet into the Troutdale Formation to a specified tip elevation. After excavating soil from inside the casing, reinforcing steel will be installed into the shaft, and the shaft will be filled with concrete.

During shaft construction, concrete will be placed into water-filled steel casings creating a mix of concrete and water. As the concrete is placed into the casing, it will displace this highly alkaline mixture. The project will implement best management practices (BMPs) to contain the mixture and ensure it does not enter any surface water body. Once contained, the water will be treated to meet state water quality standards and either released to a wastewater treatment facility or discharged to a surface water body. The steel casing may or may not be removed, depending on the installation method.

No contaminated sediments have been documented within the installation areas. Adherence to the terms of water quality certifications and implementation of impact minimization measures will ensure that, should contaminated sediments be encountered, they will be dealt with properly.

Duration of Installation of Permanent Shafts

The total duration of the permanent shaft installation could vary considerably depending on the type of installation equipment used, the quantity of available installation equipment, and actual soil conditions. Installation of each shaft is estimated to take approximately 10 days. With the limited in-water work window for impact pile driving and construction phasing constraints, the total duration of shaft installation will be approximately 30 months.

Shaft Caps

Shaft caps will be placed on top of the drilled shafts. The shaft caps will be fabricated off site at a casting yard and then transported to the site. Installation of the shaft caps will require cranes, work barges, and material barges.

Column Construction

Columns will likely be constructed of cast-in-place reinforced concrete. Column construction is estimated to take 120 days for each pier complex. Construction columns will require cranes, work barges, and material barges in the river year-round.

Superstructure

The superstructure will be constructed of structural steel, cast-in-place concrete, or precast concrete. If used, precast elements will be fabricated at a casting yard (Section 4.2.9). Construction will require cranes, work barges, and material barges in the river year-round.

4.2.3.3 Maintenance of Land and Waterborne Traffic during Construction Activities

The new Columbia River bridges will be built downstream of the existing bridges. All vehicular traffic will continue to use the existing bridges while the new bridges are constructed (for more information on vehicular traffic, see Section 2.3 and 3.1 of the CRC FEIS). Short-term closures for vehicular traffic will occur when the approach roadways are tied into the new bridge.

Current river traffic uses three navigation channels to pass under the existing I-5 bridges as shown in Figure 4-1. They include the existing Interstate Lift Bridge channel (Primary Channel), the Barge Channel (Wide Span Channel) and the Alternate Barge Channel (High Span Channel). During construction, at least one of these channels will remain open at all times, although navigation clearances may be constrained. During construction, should there be occasion that the one open channel has height/width clearance constraints, these periods would be coordinated closely with the USCG District 13 through the weekly Local Notice to Mariners (LNM). The contractor will be required to provide the LNM no less than 2 weeks prior to the week of the event.

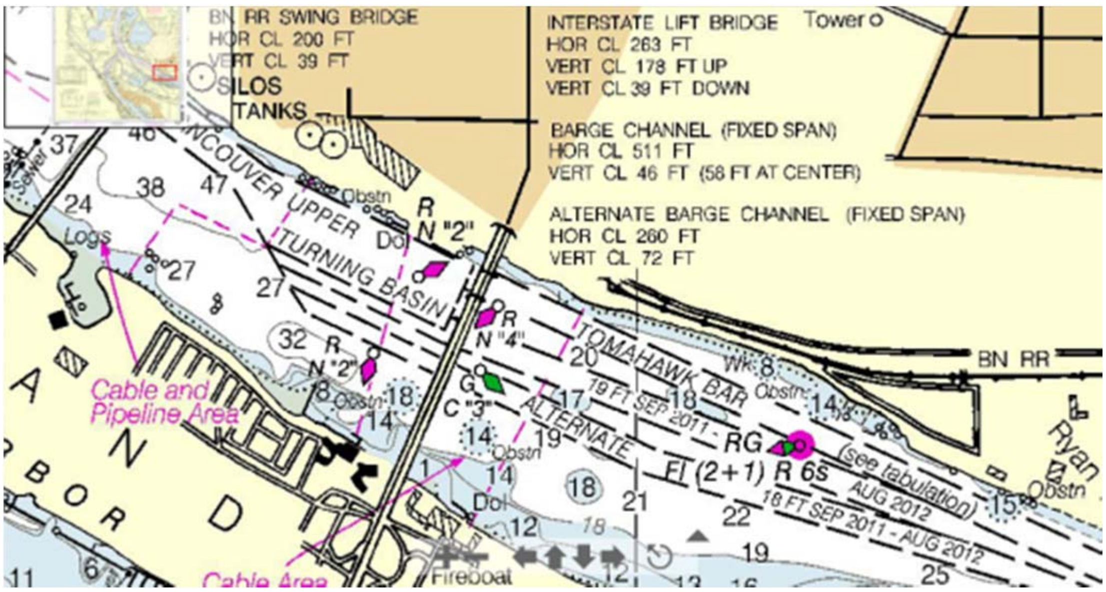


Figure 4-1. Existing Navigation Channels

Source: NOAA Nautical Chart 18525

Existing Interstate Lift Bridge (Primary) Channel

The existing Interstate Lift Bridge Channel (Primary Channel) is located between piers 6 and 7 of the new Columbia River bridges. It will remain open during most of the construction. The exception will be when the center portion of the steel truss in span 6 of each bridge is lifted into place and a work platform is constructed below the bottom soffit of the bridge to protect the navigation channel from falling objects, and during deconstruction of the existing bridges.

It is estimated that the each new bridge structure will require about a 2 to 3 week closure of the Primary Channel to erect the overhead truss. Once the overhead truss is erected the primary channel will be re-opened. Based on the conceptual schedule developed the closures would occur approximately 2 years after construction begins.

In addition, the width of the Primary Channel will be restricted to 150 feet during construction of the adjacent piers (piers 6 and 7). It is estimated that the 150-foot width will begin in the second year and run through the sixth year of construction. (The horizontal clearance of the downstream BNSF railroad bridge is 200 feet.)

Before the steel trusses of the new bridges are erected, the vertical clearance will be controlled by the existing bridges' vertical lift spans (178 feet above 0 CRD). Once the steel trusses are erected the vertical clearance will be reduced temporarily to approximately 98 feet above 0 CRD until the existing bridges are removed and the proposed new I-5 navigation channel is open at its final vertical clearance of 116 feet above 0 CRD.

During deconstruction of the existing bridges, a closure of the Primary Channel will be necessary for approximately 2 to 3 weeks. Based on the conceptual schedule, this closure would occur approximately 5 years after construction begins.

These closure periods, and periods of horizontal or vertical restriction, would be coordinated closely with the USCG District 13 through the weekly LNM. The contractor will be required to provide the LNM no less than 2 weeks prior to the week of the event. During closures vessels needing to transit under the bridge will use the Temporary Alternate Barge Channel (see Attachment C for drawing and definition of Temporary Alternate Barge Channel).

Existing Barge Channel (Wide Span Channel)

Pier 5 of the new Columbia River bridges will be located directly in the middle of the existing Barge Channel (Wide Span Channel). Once construction begins on pier 5 the existing Barge Channel (Wide Span Channel) will be closed to all ship traffic and the existing Alternate Barge Channel (High Span Channel) will be used. Based on the conceptual construction schedule the Existing Barge Channel (Wide Span Channel) will be closed during the first year of construction. This closure will be identified in the weekly LNM. The contractor will be required to provide the LNM no less than 2 weeks prior to the event and will remain on the LNM for the duration of the bridge construction. After the new bridges are completed and the existing bridges are removed, the location of the Existing Barge Channel (Wide Span Channel) will be modified (subject to approval USACE through the Section 408 authorization) to be located under span 6 of the new bridges.

Existing Alternate Barge Channel (High Span Channel)

The existing Alternate Barge Channel (High Span Channel) will remain open for most the construction except during the construction at pier 4. When the foundations (shafts and shaft cap) for pier 4 are being constructed, the existing Alternate Barge Channel (High Span Channel) will be closed. It is estimated that this closure period would be for less than two years, beginning in the first year of construction. This closure period would be coordinated closely with the USCG District 13 through the weekly LNM. The contractor will be required to provide the LNM no less than 2 weeks prior to the week of the event. Upon completion of the foundations a Temporary Alternate Barge Channel will be re-opened. However, the alignment and width of the Temporary Alternate Barge Channel will need to be adjusted to clear pier 4. The channel will be shifted slightly to the north and narrowed to 200 feet from its existing 260 feet. For the duration of construction, the height of the Temporary Alternate Barge Channel will be controlled by the existing bridges' vertical clearance which is 72 feet above 0 CRD.

Proposed Primary I-5 Navigation Channel

The Proposed Primary I-5 Navigation Channel will be located under span 6 of the new bridges. It will open once the existing bridges are removed. The new channel will be 300 feet wide and have a minimum vertical clearance of 116 feet above 0 CRD. At Ordinary High Water (OHW is 16 feet above 0 CRD), the minimum vertical clearance will be 100 feet. The minimum clearance point will be the northwest corner of the navigation channel. See Attachment C for additional water depths and other locations on the channel.

4.2.3.4 North Portland Harbor Bridges

This permit application is requesting approval for the construction of the bridges over the main stem of the Columbia River only. This permit does not request approval for the construction of new bridges over North Portland Harbor (Oregon Slough). A permit modification request for the North Portland Harbor bridges will be submitted subsequently (likely in 2014), and the modified application will request approval for the bridges in the ICP that cross North Portland Harbor. Construction is currently estimated to occur between 2015 and 2020, funding availability will be a large factor in determining the overall sequencing and construction duration.

4.2.3.5 Removal and Fill

The project is proposed to permanently fill with structure approximately 1.5554 acres with 46,375 cy and temporarily fill up to 0.9471 acre with 60,348 cy of jurisdictional waters in the Columbia River main stem in both Oregon and Washington (permanent fill in North Portland Harbor will be approximately 0.0650 acre and 4,111 cy and no temporary). The project proposes to permanently remove 0.6384 acre of and 43,868 cy of existing structures in the Columbia River main stem and no temporary (removal of structure in North Portland Harbor would be 0.0001 acre and 60 cy).

No jurisdictional wetlands will be impacted in Oregon or Washington during construction or operation of the project.

4.2.3.6 Removal of Floating Structures

Acquisition and removal of an existing dock, a docked ship, and wharf within the footprint of the mainstem Columbia River structure will occur prior to completion of construction. An existing dock and long-term docked ship, representing approximately 0.1 acre of floating structure and approximately 38 square feet (0.0008 acre) and 25 cy, near the former Thunderbird Hotel will be removed prior to construction of pier 2. Portions of the wharf associated with the Red Lion at the Quay, representing approximately 600 square feet (0.0138 acre) and 880 cy of piles and 0.8 acre of overwater structure, will be removed prior to construction of pier 7.

Acquisition and relocation of existing floating homes, commercial docks, and boathouses from moorages in North Portland Harbor will occur prior to construction of the North Portland Harbor bridges. Up to 32 floating homes in the Portland Harbor will be displaced. Floating homes will be treated as real property unless it is determined there are sufficient replacement sites to which the floating homes can be economically relocated. If a sufficient number of replacement sites are not available, the floating homes will be purchased at fair market value, and the occupants will be provided relocation assistance that may include payments, if necessary, to acquire decent, safe and sanitary replacement housing. The acquired floating homes will be sold on the condition that they are moved to other locations. The locations could be within North Portland Harbor, but may be in other portions of the lower Columbia River subbasin. Approximately 60 piles, representing approximately 188 square feet (0.0043 acre) and 217 cy of material, associated with the floating homes, docks, and other structures will be removed. The floating structures total approximately 3.0 acres of floating structure.

4.2.4 Removal of Existing Columbia River Bridges

The existing Columbia River bridges will be removed after the new bridges have been constructed and after associated interchanges are operating.

4.2.4.1 Proposed Bridge Removal Methods

The existing Columbia River bridges will be removed in two stages: 1) superstructure deconstruction and 2) substructure deconstruction.

Columbia River Bridges Superstructure Removal

Deconstruction of the superstructure will begin with removal of the counterweights. The lift span will be locked into place, and the counterweights will be cut into pieces and transferred off site via truck or barge. Next, the lift towers will be cut into manageable pieces and loaded onto barges by a crane. Prior to removal of the trusses, the deck will be removed by cutting it into manageable pieces or by using a breaker, in which case the debris will be caught on a barge or other containment system below the work area. The deck debris will be transported by barge or truck. After demolition of the concrete deck, trusses will be lifted off of their bearings and onto barges and transferred to a shoreline dismantling site.

The existing Columbia River bridge structures comprise 11 pairs of steel through-truss spans with reinforced concrete decks, including one pair of movable spans over the primary navigation channel and one pair of 531-foot-long span trusses. The remaining 9 pairs of trusses range from 265 feet to 275 feet in length. In addition to the trusses, there are reinforced concrete approach spans (over land) on either end of the bridges.

Table 4-10 describes the approximate area of the overwater portions of the existing bridges.

Table 4-10. Approximate Area of Existing Columbia River Bridges[a]

	Northbound	Southbound
Steel Trusses	168,096	176,943
Reinforced Concrete Approach Structure	18,250	18,950
Total Structure Area	**186,346**	**195,893**

a Measurements in square feet.

Columbia River Bridge Pier Removal

Nine sets of the 11 existing Columbia River bridge piers are below the OHW level and are supported on a total of approximately 1,800 driven timber piles. Each pier is approximately 3,090 square feet in area and 4,854 cy in volume. Deconstruction methods have not been finalized; however, the final design will consider factors such as pier depth, safety, phasing constraints, and impacts to aquatic species. Demolition of the concrete piers and timber piling foundations is proposed to use the following method:

- A diamond wire/wire saw will be used to cut the piers into manageable chunks that will be loaded onto a barge and transported off site. Cofferdams will not be used. Timber piles that pose a navigation hazard will be extracted or cut off below the mud line.

Although ODOT maintenance personnel regularly inspect the existing bridge, the timber piles located underneath the existing piers are inaccessible and have not been inspected. Therefore, it is unknown whether these timber piles have been treated with creosote, but given their age and intended purpose, it is assumed that they have been treated. Only piles that could pose a navigation hazard will be removed or cut off below mud line. These piles include those that are present in the proposed navigation channels and are at a depth less than 5 feet below the authorized depth of -27.9’ CRD and any that extend above the surface of the river bed. Piles will either be removed (using a vibratory extractor, direct pull, or clam shell dredge) or cut off below the mud line using an underwater saw. The exact number of piles to be removed is unknown, and the likely area and volume of removal cannot be calculated at this time.

Columbia River Bridge Deconstruction Sequencing

A conceptual deconstruction sequence was determined based on the amount of equipment likely available to build the project and the physical space the equipment requires at each pier. The sequence is provided in Section 4.2.2. The actual construction sequence will be determined by the contractor once a construction contract is awarded.

Columbia River Bridge Removal Timeline

Bridge removal will occur after the new Columbia River replacement bridges are built. Removal activities will take approximately 18 months.

Barges

Barges will be used as platforms to perform the demolition and to haul materials and equipment to and from the work site.

Several types and sizes of barges are anticipated to be used for bridge deconstruction. The type and size of each barge will depend on how the barge is used. Up to six stationary or moving barges are expected to be present at any one time during bridge demolition. The number of barges and barge area for each phase of removal are summarized in Table 4-11.

Temporary Pipe Piles

Removal is currently anticipated to occur from barges. Over 300 18- to 24-inch steel pipe piles (each approximately 70 feet long) will be used to anchor and support the work and material barges necessary for demolition. Table 4-11 summarizes temporary pile use during bridge removal.

Table 4-11. Summary of Barges and Temporary Piles Used in Bridge Demolition[a]

Phase	Locations	Barges/ Location	Area of Barges (sq ft)	Piles/ Barge	Piles	Area of Piles (sq ft)	Duration in Water (days/ location)
Span Removal	9	4–6	18,000	4	160	503	30
Pier Demolition	9	4	10,500	4	144	452	30
Total	**---**	**---**	**28,500**	**---**	**304**	**995**	**---**

a Cumulative at any one time.

Installation and Removal of Temporary Pipe Piles

All temporary piles will be installed using a vibratory hammer or push-in method. They will be extracted using vibratory methods or direct pull. Piles will be installed and removed continuously throughout the demolition process.

4.2.4.2 Equipment Necessary for Bridge Deconstruction

Equipment required for bridge removal includes barge-mounted cranes/hammers or hydraulic rams. Vibratory hammers may be used to install and remove sheet piles for cofferdams and pipe piles for barge moorings. New permanent piles will not be required for removal of the Columbia River bridges.

4.2.4.3 Proposed Bridge Construction and Removal Minimization Measures

Throughout construction of the bridges over the Columbia River and North Portland Harbor and removal of the existing Columbia River bridges, impact minimization measures will be used in accordance with regulations, permits, and state department of transportation specifications. These measures include methods to prevent pollutants from entering the water, salvage fish during isolation activities, utilize a noise attenuation device during impact pile driving, and monitor in-water noise, as well as monitoring and shutdown procedures to prevent injury to Steller sea lions during impact pile driving. Section 5.2 of this document presents detailed measures to avoid and/or minimize impacts from bridge construction and removal activities.

4.2.5 Geotechnical Borings

Prior to final design of the Columbia River and North Portland Harbor bridges, approximately six geotechnical boring test events will be conducted. It is assumed that a total of six events will occur starting in 2014 in both the mainstem Columbia River and North Portland Harbor. Borings will extend to a minimum depth of 50 feet into the Troutdale Formation. Before performing the explorations, preparatory work will be required. The geotechnical team will prepare a field exploration work plan including drilling procedures and material containment, testing, and disposal methods as well as BMPs to be used.

The exploration program will involve the use of two barges, each with a truck-mounted drill rig secured to the deck. One barge will likely be approximately 30 feet wide by 115 feet long, and the other will likely be approximately 25 feet wide by 75 feet long. The barges will be equipped with loading ramps which can be raised and lowered. The barges will be pushed to local boat ramps, and the loading ramps lowered to allow the truck rigs to drive aboard. Each barge has a hole in the deck (“moon pool”) through which the boreholes are drilled. In confined areas of North Portland Harbor, borings may also be drilled through a hole in the loading ramp at the front of the barge. The barges will be maneuvered to the borehole locations using a tugboat. A hand-held GPS receiver (correctable to 1 to 3 meters accuracy) will be used to determine location. Once over a drill site, a barge will be secured by spuds (long steel pipe piles which are dropped through holes in the deck and into the river bottom) and an anchor for increased stability. The anchor may or may not be used in North Portland Harbor where the waters are typically calmer.

Borings will be drilled using mud-rotary drilling techniques. Before the drill hole is started, a 5-inch-diameter steel circulation casing is pushed and driven below the mud line to create a seal between the circulating drilling fluids and the river. The casing is pushed using the drill rig hydraulic system. Once the casing is in place, the soil inside of the casing is drilled out and the borehole is advanced with a 4- to 5-inch-diameter tri-cone drill bit. The drill bit is attached to a string of hollow steel rods which are turned by the drill. Drill fluids, consisting of bentonite-water slurry, are pumped down the drill rod, through the bit, back up the hole and into a “mud tub” where cuttings settle out. The fluids are then re-circulated back down the hole. The drill fluids help to keep the hole open, cool the drill bit, and flush cuttings from the bottom of the hole. The dense consistency of the drill fluid as well as the positive pressure from the hydraulic head prevent the hole from caving and prevent adjacent soil loss or flow of groundwater into the open boring. At regular intervals, the drill bit is pulled out of the hole, and the bit is exchanged for a sampling tube. The sampler is lowered to the bottom of the hole, and a soil sample is collected.

Disturbed soil samples will be collected in the borings. The disturbed samples will be collected using a 2-inch outside diameter split-barrel sampler in conjunction with in situ Standard Penetration Testing (SPT) following the procedures prescribed for the Standard Penetration Test (ASTM D1586). If appropriate soils are encountered, a few undisturbed soil samples may also be collected using a 3-inch outside diameter thin-walled Shelby tube sampler. This sampler will be hydraulically pushed into the undisturbed soil at the bottom the boring in general accordance with ASTM D1587. Larger-diameter sampling equipment will be available for use if conventional SPT and thin-walled sampling methods are ineffective. Lithologic characteristics of the samples will be recorded on the boring log by our field representative.

Borehole drilling, sample collection, and the preparation of descriptive geologic logs of the soil and rock materials encountered will be performed by a field geologist. The boring logs will present an interpretation of soil and rock materials encountered in each bore hole, the depths of material changes, and sample collection points.

Pressuremeter tests will be conducted. These tests consist of placing an inflatable cylindrical probe in a predrilled hole and expanding the probe while measuring the changes in volume and pressure in the probe. No material will be removed. The displacement of soils is temporary. The probe is inflated under equal pressure increments (Procedure A) or equal volume increments (Procedure B) and the test is terminated when yielding in the soil becomes disproportionately large. Several pressuremeter tests (PMTs) will be performed during boring events. The PMTs will alternate with geotechnical sampling as the borehole is advanced. PMT depths will depend on the materials encountered in the boring.

OYO (Corp.) shear wave velocity profiling logging techniques will be used to measure shear wave and compression wave velocities in several borings. Shear wave velocity data will be collected at 1.5-foot intervals, from a depth of about 15 feet above the bottom of the borehole up to the bottom of the circulation casing. (The tail end of the instrument must occupy 15 feet of the borehole below where the logging may begin and the circulation casing, which prevents suspension logging, will extend 10 feet or less below the mud line.) At each measurement depth, the recorded data are reviewed and recorded on digital media before moving to the next depth.

As drilling, sampling and in-situ testing of the boreholes are completed, the hole will be abandoned by filling the hole with a high solids sodium bentonite grout. A tremie pipe will be placed in the borehole, and the grout, which will be mixed on the barge deck, will be pumped through the tremie pipe to the bottom of the borehole. The tremie pipe will be pulled back out of the hole in stages as the borehole is filled with grout. Borehole and grout volumes will be calculated to avoid overfilling the borehole. As the borehole is backfilled, the grout will displace drilling mud remaining in the hole. The drilling mud will rise up the circulation casing and into the mud tub where it will then be pumped into 55-gallon drums for disposal. The level of the bentonite backfill will be left a couple of feet more or less below the mud line so that when the casing is pulled the hole will cave closed over the backfill and prevent the bentonite from coming in contact with the river. When backfilling of the hole is complete, the drilling mud remaining in the circulation casing will be pumped out and into 55-gallon drums before the circulation casing is removed.

During each event, it is proposed that no more than 5 square feet and 10 cy of sediment are impacted, for a total of no more than 30 square feet and 60 cy over the life of the project.

4.2.6 Roadway Improvements

The proposed project (ICP) includes improvements to five interchanges along a 3.5-mile segment of I-5 between Victory Boulevard in Portland and Fourth Plain Boulevard in Vancouver. Improvements will be made at the following interchanges: Victory Boulevard, Marine Drive, Hayden Island, SR14, and Fourth Plain. These improvements include some reconfiguration of adjacent local streets to complement the new interchange designs, as well as new facilities for bicyclists and pedestrians.

In addition to interchange improvements, highway safety and mobility will be improved with a series of auxiliary (add/drop) lanes that will be sequentially added and then dropped at strategic locations through the corridor. The add/drop lanes will allow vehicles to travel between adjacent interchanges without merging into mainline interstate traffic and will allow vehicles exiting or entering to minimize conflicts with through traffic. From the south end of the project area, I-5 northbound will add one auxiliary lane starting where the Victory Boulevard on-ramp enters I-5. Another auxiliary lane will be added where the Marine Drive on-ramp enters I-5. An optional third auxiliary lane will be added where Hayden Island traffic enters I-5 over the river. One of these lanes will be dropped at the SR 14 off-ramp, and a second will be dropped at the Mill Plain off-ramp. North of the Mill Plain off-ramp, the improvements will match into the existing facility. Southbound I-5 and the associated interchanges and ramps will have a similar series of add/drop lanes.

Highway and surface roadway construction activities adjacent to each of the five interchanges that will be improved have been integrated into the construction design for each of these interchanges. Each interchange has a proposed construction description and sequence as described in more detail below; however, the general interchange and roadway construction activities are described here.

Typical reconstruction of roadway in the corridor involves a sequence of activities that will be repeated several times at any one particular interchange or roadway section depending on the amount of room a contractor has to work and where traffic must be accommodated.

In most cases, an area to detour mainline traffic will be constructed to clear the area for permanent work. Temporary earthwork, drainage, surfacing, and paving activities will take place to build these features. Prior to this, utilities may need to be relocated, drainage appurtenances put in place, and access to and from the freeway rerouted to accommodate the new mainline location. Once traffic is moved and an area is cleared, or in areas where it is already cleared, permanent work will proceed.

Earthwork equipment will build embankments or excavate earth to a subgrade elevation (the bottom of the eventual pavement section that traffic will drive on). Because of the tight areas, large earthmoving equipment is not envisioned for use in this work. Wheel loaders, excavators, and similar equipment will be used. Dump trucks will be used to transport material to and from the project as the subgrades are constructed. Embankments must be built in layers with thorough compaction to ensure stability. Large rollers will be used for compaction. Once completed, rock will be placed on the subgrade with several lifts of asphalt or concrete pavement following. Rock will be placed by dump trucks and compacted with rollers. Asphalt will be placed with a paving machine that is fed by dump trucks then compacted by rollers. Final drainage fixtures will be placed either before or after the final surfacing operation. Illumination, Intelligent Transportation Systems (ITSs), and signal conduits will generally be placed prior to surfacing. Foundations and the appurtenances will precede or follow the surfacing work. Concrete barriers, guardrails, and other safety devices will follow the surfacing work, as will landscaping of the exposed earthen slopes. Temporary barriers may be used until roadways are fully completed. If deemed necessary through noise analyses, permanent standalone sound walls may be constructed before or after any of this work depending on available room and access to the work sites.

As the various stages are completed, the new roadways will be striped to accommodate the shifting of traffic to allow areas to be cleared for future stages of work. Once all traffic can be placed in its permanent position, a final level of asphalt will be placed and permanent striping and signing installed. This may be preceded by illumination and concrete median barrier being installed between adjacent roadways.

4.2.6.1 Victory Boulevard Interchange

The southern extent of the CRC highway improvements is the Victory Boulevard interchange. Improvements at this interchange will be limited to two of the ramps and widening of the I-5 structure over Victory Boulevard. The I-5 southbound ramp will be reconstructed as a result of the widening on I-5. Similar improvements will be made in the northbound direction. Currently, the existing Denver Avenue on-ramp merges with I-5 mainline northbound traffic; the proposed improvement will bring this ramp on as an add lane, acting as an auxiliary lane within the project limits to provide additional capacity and a safer roadway.

4.2.6.2 Marine Drive Interchange

All movements within this interchange will be reconfigured to reduce congestion and improve safety for trucks and other motorists entering and exiting I-5. The proposed configuration is a single-point urban interchange. With this configuration, the four legs of the interchange will converge at a point on Marine Drive over the I-5 mainline and will provide for more efficient traffic operations than the existing configuration.

Travel safety and mobility between the Marine Drive interchange and Hayden Island will be improved by providing grade-separated crossing connections which eliminate the weaving maneuver from the I-5 mainline. The separated connections will allow traffic entering and/or exiting the freeway at either Marine Drive or Hayden Island to travel on parallel structures over North Portland Harbor. Separating this traffic will prevent potential collisions and reduce congestion that can occur from a high number of conflicting traffic movements.

The new interchange configuration changes the westbound Marine Drive and westbound Vancouver Way connections to Martin Luther King Jr. Boulevard and to northbound I-5. Rather than merging onto Martin Luther King Jr. Boulevard, which then loops to the west side and back to the east side of I-5 before entering northbound I-5, these two streets will instead access westbound Martin Luther King Jr. Boulevard farther east. Martin Luther King Jr. Boulevard will have a new direct connection to I-5 northbound.

In the new configuration, the connections from Vancouver Way and Marine Drive will be served by improving the existing connection to Martin Luther King Jr. Boulevard east of the interchange. The improvements to this ramp will allow traffic to turn right from Vancouver Way, and the acceleration distance will be extended to allow for a safer merge. On the south side of Martin Luther King Jr. Boulevard, the existing loop connection will be replaced with a new connection farther east, touching down to Union Court at the intersection with Hayden Meadows Drive. A new undercrossing of Martin Luther King Jr. Boulevard will replace the existing one at Marine Way.

4.2.6.3 Hayden Island Interchange

The Hayden Island interchange ramps will be reconstructed to improve merging speeds by building longer ramps in a form similar to the existing interchange. The current Hayden

Island interchange off of I-5 contains substandard features, including short on- and off-ramps. The existing short ramps do not provide ample distance for some vehicles, especially trucks, to reach mainline speed before merging onto the mainline lanes, which results in a safety hazard. The combination of short ramps and lack of add/drop lanes requires traffic entering and exiting the highway to accelerate quickly when entering and decelerate quickly when exiting, or to back up along the ramps and mainline. These conditions result in congestion and higher crash rates on the highway and local streets (CRC 2008).

Improvements to N Hayden Island Drive will include additional through, left turn, and right turn lanes.

4.2.6.4 SR 14 Interchange

The basic functions of this interchange will remain largely the same as the existing interchange, but safety will be improved and congestion will be reduced. Direct connections between I-5 and SR 14 will be rebuilt. Access to and from downtown will be provided as it is today, but the connection points will be relocated.

Specific changes to traffic movements at this interchange include:

- Access to I-5 southbound from downtown Vancouver will be made on C Street rather than on Washington Street.
- Downtown connections to and from SR 14 will be made by way of Columbia Street at 4th Street.
- The distance between the northbound I-5 exit to SR 14 and the exit to City Center will be increased to improve safety.
- With the reconfiguration of the SR 14 westbound movement, the lane-drop that occurs between I-5 northbound and SR 14 to C Street will be eliminated.
- The southbound I-5 connection to SR 14 will be made with a structure under I-5 and SR 14.
- The northbound I-5 connection to SR 14 will be a larger radius curve, allowing traffic to travel at a higher speed than on the existing ramp.
- Both northbound and southbound movements between the Mill Plain interchange and the SR 14 interchange will occur separately from the highway on collector-distributor roads, eliminating the substandard weave distances on the I-5 mainline.
- For all connections, acceleration and deceleration distances will adhere to highway design standards to improve safety.
- Raising I-5 at this interchange.
- Extending Main Street from 5th Street south to Columbia Way.

4.2.6.5 Fourth Plain Interchange

The improvements to this interchange are to accommodate access to the park and ride at Clark College. Northbound I-5 traffic exiting to Fourth Plain Boulevard will continue to use the off-ramp near the Mill Plain interchange.

Specific changes to traffic movements at this interchange include:

- The southbound I-5 exit to Fourth Plain will have an additional left turn lane at the intersection.

- The intersection at the east ramp terminal will be modified to accommodate a southbound road which will be added to provide access to the Clark College park and ride from the north. This is for traffic exiting I-5 at Fourth Plain or already on Fourth Plain. Access from the park and ride will also be added to the existing northbound exit ramp.

4.2.6.6 Ground Disturbance, Vegetation, and Landscaping

The roadway improvements described in this section will occur on land and above OHW. Retaining walls will be constructed; the number, height, location, and materials (concrete or steel) are still undetermined. The project will also require upland activities, including pile driving, installation of shafts, ground improvements, and staging. Other work items that will cause ground disturbance include relocation, removal, and replacement of utilities; lighting/illumination structures; signals; signing; and ITS improvements (e.g., installation of variable message signs, traffic sensors and cameras, radio and telecommunications).

In North Portland Harbor and the Columbia River, effects to riparian habitat will be negligible, as there is very little functioning riparian vegetation in the project area. Approximately 12 mature trees will be removed within the riparian zone of the Columbia River and North Portland Harbor. There will be no excavation or removal of trees from the Columbia Slough.

Ground disturbance, clearing, and grubbing related to roadway and transit improvements will permanently impact approximately 0.87 acre of existing vegetation in the Columbia River crossing area. The disturbed vegetation consists mainly of grasses and ground cover, with small portions of shrubs and trees. In addition, approximately 345 acres of total ground disturbance is anticipated as part of the project. Table 4-12 provides a summary of impacts by watershed.

Table 4-12. Summary of Ground Disturbance by Watershed

Watershed Name	Vegetated Acres	Vegetated and Non-Vegetated Acres
Columbia River	0.56	240
Columbia Slough	0.23	105
Total	**0.79**	**345**

Temporarily disturbed areas within DOT right-of-way will be replanted according to the Roadside Classification Plan (WSDOT 2006) on WSDOT right-of-way, and according to the Roadside Development Design Manual (ODOT 2006) on ODOT right-of-way. Site-specific assessments may result in permanent replanting that differs from these roadside classifications plans; this will be determined by a landscape architect. Disturbed areas within transit or local right-of-way will be replanted to local regulation standards.

4.2.7 Park and Ride Facilities

Three new park and ride facilities are proposed as part of this project. They are identified by their general locations at the SR 14 interchange, the Mill District, and Central. The park and ride structures will be built of precast or cast-in-place concrete and will be constructed using nearby staging areas. Construction of the structures will generate concentrated truck traffic that may impact local traffic. These traffic issues will be addressed in the Traffic Management Plan. During excavation and foundation construction, dust and noise will be generated. These will be minimized through implementation of the Spill Prevention, Control, and Countermeasures (SPCC) plan. A Temporary Erosion and Sediment Control (TESC) plan will be implemented during construction to prevent turbid discharges to surface waters.

4.2.8 Light Rail Construction and Operation

LRT generally refers to electric-powered train systems operating on city streets or on separate rail systems. LRT differs from heavy rail in that it carries fewer passengers, operates at slower speeds, is more flexible, and is therefore better able to access more locations in urban centers. Conversely, in comparison to street cars or trams, LRT carries a higher number of passengers and operates at higher speeds.

The proposed project includes construction of LRT guideways, both at-grade and elevated, park and ride facilities, and transit stations; and expansion of TriMet's Ruby Junction Maintenance Facility in Gresham. These components are described below.

4.2.8.1 Portland Expo Center to Vancouver

The new LRT project component will be an extension of the existing MAX Yellow Line. New tracks will be constructed starting just north of the existing platform at the Portland Expo Center Station.

Construction elements include:

- Grading and excavation
- Demolition of the north platform access
- Placement of underground utilities
- Placement and tie-in of signal and Thermal Energy Storage (TES) duct bank
- Construction of systems foundations
- Installation of overhead catenaries
- Concrete surface work
- Landscaping

The track from the Expo Center to north of Marine Drive will be pervious tie and ballast construction. North of Marine Drive, the trackway will be located on an impervious structure to cross over North Portland Harbor and onto Hayden Island. On Hayden Island, the guideway will be located on an impervious surface and constructed on engineered fill. Leaving the island, the transit alignment will be located on structure and will then enter the lower deck of the stacked southbound replacement bridge over the Columbia. The track will then be placed on the bridge structure without ballast. These structures are also considered impervious surfaces. Upon leaving the northern portal of the stacked bridge, the light rail alignment will travel on impervious structure to a touchdown at 5th Street in downtown Vancouver. Total trackway pervious and impervious surfaces from the Expo Center to the touchdown in Vancouver (not including the stacked highway structure) are approximately 25,000 and 160,000 square feet, respectively. The light rail structure across North Portland Harbor will also carry a two-lane roadway with bike lanes and a sidewalk. The construction of elevated guideways over existing streets may impact traffic because of temporary road closures. This and other traffic issues will be addressed in a traffic management plan prepared and approved by the project before construction begins. Clearing and grading activities and demolition of other structures for newly acquired right-of-way will occur where the elevated guideway transitions to at-grade track.

Elevated guideways and stations for light rail will be constructed of steel, reinforced concrete, or combinations of both. Construction will begin with preparation to build foundations that may consist of shallow spread footings, deep driven or augered piles, or shafts. Once foundations are in place, concrete columns and crossbeams will be constructed.

The superstructure of each elevated structure may be built of steel, cast-in-place concrete, or precast concrete. If steel or precast concrete is used, sections can be transported to the site and lifted into place from the street. If cast-in-place concrete is used, then temporary structures will be required to support the superstructure until the cast concrete has gained enough strength (through curing) to support itself.

4.2.8.2 In-Street Construction in Vancouver

The new light rail guideway will be located within existing streets in Vancouver and will not contribute to a net increase in existing impervious surface. Final design of the LRT alignment and integration of automobile, pedestrian, and bicycle traffic facilities will occur in the future.

Roadway construction for the light rail alignment will include restriping or rebuilding the road surface, rebuilding sidewalks, and constructing station platforms. Streetscape improvements will include removing, replacing, or adding vegetation, curb extensions, new signs and signals, and other measures to improve access to, and use of, the transit stations. Stations, park and rides, and new structures could require land-based pile driving and earthwork for clearing and grading these sites.

The roadway along the light rail alignment will need to be rebuilt to support the weight of a two-car train. This will generally require relocation of utilities. At-grade LRT tracks will require clearing, grading, and typically shallow excavations. Clearing may include demolition and removal of pavement, vegetation, and other surface features, and implementation of a TESC plan with BMPs, and a Pollution Control Plan. During the grading phase, the contractors will install culverts or other permanent drainage structures and below-grade light rail infrastructure. This may require temporary steel plates in the roadway and temporary lane closures. Where in-street track is proposed within existing or expanded street right-of-way, grading will generally be minimal, but extensive reconstruction of streets, sidewalks, and other facilities may occur. Shallow, near-surface excavations will be required to construct the subgrade and track and station platform slabs for at-grade segments.

Light rail will also require construction of an overhead catenary system over the guideway to provide electrical power to the trains. Additionally, it will be necessary to seek temporary construction easements or small permanent easements on some properties adjacent to the light rail alignment to allow construction workers to encroach on several feet of a property while rebuilding the sidewalk in front of the property or to place specific elements.

Transit construction will also require staging areas adjacent to or within the guideway to store construction equipment and materials. Many of the staging activities will take advantage of land that is already in the public right-of-way or in public ownership and that is not being used for other purposes, such as vacant lots.

4.2.9 Staging and Casting Areas

Construction will require staging areas to store construction material, load and unload trucks, and conduct other construction support activities. Multiple staging areas will be needed, given the linear nature of the project and that much of it could be under construction at the same time. The existing I-5 right-of-way will accommodate most of the common construction staging requirements. Interchange areas at Marine Drive, SR 14, and Fourth Plain Boulevard have enough room for staging most typical earthwork, drainage, utility, and structure activities. However, some construction staging may be needed outside the existing right-of-way, requiring temporary easements on nearby properties. The equipment will include, but may not be limited to paving equipment, hauling trucks, pile drivers, rotators/oscillators, concrete trucks, bulldozers, track excavators, backhoes, graders, scrapers, dump trucks, cranes, compactors, general use vehicles, and wheel loaders.

In addition, at least one large site will be required to stage larger equipment and materials such as rebar and aggregate, to accommodate construction offices, and possibly to use as a casting yard for fabricating segments of the bridges. Suitable site characteristics for such a staging area include a large, previously developed site suitable for heavy machinery and material storage, proximity to the construction zone, roadway or rail access for landside transportation of materials, and waterfront access for barges (either an existing slip or dock capable of handling heavy equipment and material). The following three previously developed sites are identified as possible major staging areas:

- The Port of Vancouver site: This 52-acre site is located along SR 501 near the Port of Vancouver's Terminal 3 North facility. This site is without river frontage, so materials would be transported over land to the construction site. Most of the property has an asphalt concrete surface, and any improvements will most likely be on top of this surface. Activities will consist of material storage, material fabrication (e.g., concrete and asphalt plants), equipment storage and repair, and temporary buildings. This site is currently used as a staging area for windmill components.
- The Red Lion at the Quay Hotel: This is a 2.6-acre site on the north shore of the Columbia River, immediately downstream of the existing bridge alignment. A portion of this site will be acquired as right-of-way for the new bridge. Construction will require demolition of most of the buildings on the site. It could make an ideal staging area due to its proximity to bridge construction, large size, and access to the river, and because the project may already need to acquire the entire parcel. This site could be used for staging materials and equipment and for fabrication of smaller bridge and roadway components. Temporary buildings, such as trailers or other mobile units, will be built on the site for construction offices.
- Thunderbird Hotel Site: This is a 5.6-acre site on Hayden Island on the south shore of the Columbia River, immediately downstream of the existing bridge alignment. A large portion of the parcel will be acquired as new right-of-way for the new bridge alignment. The site is relatively large and it is adjacent to the river and the construction zone. The same types of activities could occur on this site as on the Red Lion Hotel site.

If precast concrete is used, a casting yard will likely be required for construction of the structure elements. The superstructure segments will be cast, shipped to the bridge construction site, and set in place. A casting yard will require access to the river for barges (either 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 and/or railway for delivery of materials over land. All work to prepare the casting yard will occur in upland areas and will be required to follow the BMPs in a TESC and SPCC plan and will meet all conditions of the site use permits and Biological Opinion. No riparian vegetation will be impacted at these sites.

Two sites have been identified as possible major casting/staging yard areas:

- Alcoa/Evergreen site: This 94.5-acre site on the north shore of the Columbia River at approximately RM 102 (RKm 164) was previously used as an aluminum smelter and is currently undergoing environmental remediation, which should be completed before the anticipated 2014 start date. The western portion of this site, which is best suited for a casting yard, currently contains two large settling ponds that will have to be worked around. In addition, the property will require grading, drainage, and surfacing work to support the materials and equipment needed for a casting yard.

- Sundial site: This 56-acre site lies on the south shore of the Columbia River near RM 120.2 (RKm 193), between Fairview and Troutdale, and just north of the Troutdale Airport, and has direct access to the Columbia River. Currently owned by Knife River, approximately one-third of the property is being used for aggregate storage, stockpile, crushing, and sifting, as well as asphalt recycling. A recently improved landing and barge slip is located on the site.

If the construction contractor intends to use a staging site other than those evaluated in the environmental review process, prior to active use of that site, the contractor will seek and obtain permission from the state departments of transportation or project owner. The project owner will obtain concurrence from the Federal NEPA lead agencies prior to giving concurrence to the contractor and will assist the contractor in permitting the site.

4.2.10 Stormwater

The CRC Project is a bi-state initiative and it is important to note that the implementation of stormwater management goals differs significantly between Oregon and Washington States. The primary differences involve how areas that require pollutant reduction are calculated. These differences, which are described in the following paragraphs, can have an impact on the size of water quality facilities required. This impact is notable for projects like the CRC, which involve large areas of impervious pavement.

Oregon requires runoff from the entire contributing impervious area (CIA) be treated to reduce pollutants regardless of degree to which the surfaces would contribute pollutants to runoff. Using this approach, runoff from highways would be required to be treated in the same manner as runoff from bike-pedestrian paths. In contrast, Washington State focuses on requiring treatment for runoff from the pollutant-generating impervious surfaces (PGIS).

ODOT defines CIA as consisting of all impervious surfaces within the strict project limits, plus impervious surface owned or operated by ODOT outside the project limits that drains to the project via direct flow or discrete conveyance NMFS has expanded this definition to also include impervious areas that are not owned by ODOT but drain onto the project footprint.

WSDOT and Washington State Department of Ecology (Ecology) define PGIS as surfaces that are considered a significant source of pollutants in stormwater runoff including:

- Highways, ramps, and non-vegetated shoulders
- LRT guideway subject to vehicular traffic
- Streets, alleys, and driveways
- Bus layover facilities, surface parking lots, and the top floor of parking structures

The following types of impervious area are considered non-PGIS:

- LRT guideway not subject to vehicular traffic except the occasional use by emergency or maintenance vehicles (referred to as an exclusive guideway)
- LRT stations
- Bicycle and pedestrian paths

Exclusive LRT guideway is considered non-PGIS because light rail vehicles are electric, and other potential sources of pollution such as bearings and gears are sealed to prevent the loss of lubricants. In addition, light rail vehicle braking is almost exclusively accomplished via (power) regenerative braking, which avoids any friction or wear on the vehicle brake pads and resulting generation of pollutants such as particulate copper. In Washington State, NMFS and USFWS concurred with Sound Transit's conclusion that this type of guideway was non-polluting and, as such, the runoff did not require treatment before being discharged to the receiving water body (Sound Transit 1999). In Oregon, runoff from this area would require treatment before being released.

Finally, Washington State differentiates between stormwater runoff treatment requirements for new and rebuilt versus resurfaced pavement while state and local jurisdictions in Oregon do not. In Washington State, water quality treatment is only required for runoff from new and rebuilt PGIS while Oregon does not differentiate; requiring treatment for all impervious surfaces. However, this approach is not consistently applied within Oregon. For example, SLOPES IV (NMFS 2008a), a programmatic biological opinion and incidental take statement for projects undertaken in Oregon by the USACE, states that "actions that merely resurface pavement by placing a new surface, or overlay, directly on top of existing pavement with no intervening base course and no change in the subgrade shoulder points, are not subject to these [pollution reduction and flow control] requirements." Regardless, NMFS has determined that resurfaced pavement within a project cannot be handled differently from rebuilt pavement unless the resurfacing is conducted within a "hydrologically isolated basin" even though the potential impediments to retrofitting water quality facilities for resurfaced pavement are the same whether the resurfacing is a standalone undertaking or within a larger project. These impediments include very limited or non-existent ability to change existing conveyance systems and possible lack of physical space to install a water quality facility.

Since the early stages of development, the overall permanent stormwater management goals for the CRC project are:

1. Provide flow control for new and replaced impervious areas in accordance with state and local requirements. It should be noted that discharges to the Columbia Slough, North Portland Harbor, and Columbia River are exempt from flow control.
2. Select and provide water quality facilities for new and rebuilt existing PGIS in accordance with the most restrictive requirements of the agencies that have authority over the drainage area being considered.
3. Where practical and cost-effective, provide water quality facilities for resurfaced and existing PGIS.

For goals 2 and 3, the CRC project has agreed to adopt the requirements of NMFS for permanent water quality facilities. These requirements are that the project treats runoff from the entire CIA in both Oregon and Washington regardless of whether it is considered pollutant-generating or whether it is new, rebuilt, resurfaced, or existing.

4.3 SITE RESTORATION

In North Portland Harbor and the Columbia River, effects to riparian habitat would be negligible, as there is very little functioning riparian vegetation in the project area. The project would revegetate disturbed shoreline areas, resulting in a net benefit to riparian habitat in the long term.

It has not yet been determined exactly where replanting would take place. However, it is anticipated that replanting would occur on or adjacent to the current sites of the trees where practicable. In any case, the number, type, and size of the replanted trees would be selected to comply with standards outlined in the City of Portland and City of Vancouver tree ordinances.

In Oregon, the project would remove three deciduous trees, all with trunks less than 1 foot in diameter, from the riparian zone on the south bank of the Columbia River. The project would also remove two deciduous ornamental trees from the riparian zone adjacent to North Portland Harbor. These trees are located in a landscaped setting and have trunks of approximately 1 foot in diameter. In Washington, 10 trees with trunks less than 1 foot in diameter would be removed from the riparian zone on the north shore of the Columbia River.

There would be no excavation, vegetation clearing, or removal of trees from the Columbia Slough riparian area. Therefore, the project would have no effect on Columbia Slough riparian habitat.

Site restoration will also consist of removal of non-native plants such as reed canarygrass (*Phalaris arundinacea*), English ivy (*Hedera helix*), and Himalayan blackberry (*Rubus armeniacus*), and the planting of native vegetation. The goal of the restoration is to use a combination of native grass seed and herbaceous and woody plant material to revegetate and stabilize newly graded areas within riparian habitat and those areas disturbed during construction. New plant material will provide shade and physical characteristics that should allow them to establish quickly and improve plant diversity. Mature, certified compost will be used as a slope stabilizer, nutrient source, and to improve moisture retention for new plants and existing soil. Site restoration and rehabilitation will follow ODOT Standard Specifications (2008) for Seeding (01030) and Planting (01040).

5. PROJECT IMPACTS AND ALTERNATIVES

This section describes impacts, alternatives, and mitigation as described for the Joint Permit Application. For a discussion of impacts and alternatives regarding navigation, please see the Vertical Clearance NEPA Re-evaluation (Attachment J) and the Navigation Impact Report (Attachment K).

5.1 ALTERNATIVES ANALYSIS

The project presented in this permit application is a result of efforts to minimize impacts to aquatic species and their habitats through multiple design refinements. The major design changes incorporated into the project description are listed below.

Throughout the development process, the project has made a number of major design changes to minimize environmental impacts including the following:

1. The permanent in-water piers of the Columbia River and North Portland Harbor crossings will be constructed using shafts, rather than with impact pile driving. Originally, the project proposed to drive numerous 96-inch steel piles, involving over 200 days of in-water impact pile driving. Construction of the replacement bridge would have taken 30 months to complete. Analysis found that this would have created noise levels that would far exceed injury thresholds for listed fish throughout large portions of the Columbia River and North Portland Harbor within the action area. The current design significantly reduces the amount of impact pile driving, the size of the piles, and the amount of in-water noise. Shafts have been minimized from 16 shafts per pier in the original design to a maximum of 6 shafts per pier in the current design.

2. Earlier alternatives considered three bridges across the Columbia River: one for I-5 northbound traffic, one for I-5 southbound traffic, and one for LRT and bike/ped traffic. The current design proposes a stacked alignment, with LRT conveyed under the deck of the southbound structure and a bike/ped path beneath the northbound structure. This design reduces the number of in-water piers in the Columbia River by approximately one-third, and greatly reduces both the temporary construction impacts and the permanent effects of in water piers.

3. The project proposes 6 in-water pier complexes for a total of 12 piers for the Columbia River bridges. Earlier designs considered up to 21 in-water piers, but the design has been refined to the minimum number necessary for a safe structure. Piers have been designed to withstand the design scour without armor type scour protection (e.g., riprap).

4. The project provides a high level of stormwater treatment. The project area intersects several jurisdictions, each of which has different standards for stormwater treatment. The CRC project team will employ the most restrictive water quality requirements project-wide, meaning that in many cases, the level of stormwater treatment exceeds that of the local jurisdiction. In addition to treating the new impervious surfaces created by the project, the project has identified approximately 188 acres of existing impervious surfaces that will be retrofitted to meet current stormwater treatment standards. Together, these measures are expected to reduce impacts to the

environmental baseline to a greater degree than by using the standards of the individual jurisdictions.

5.2 MINIMIZATION MEASURES

5.2.1 General Measures and Conditions

- A biologist shall re-evaluate the project for changes in design and evaluation methods not previously employed in the original Endangered Species Act (ESA) consultation to assess potential impacts associated with those changes, as well as the status and location of listed species, every 6 months until project construction is completed. Re-initiation of consultation with the NMFS and USFWS is required if new information reveals project effects that may affect listed species or critical habitat in a manner or to an extent not previously considered. Re-initiation of consultation is also required if the identified action is modified in a manner that causes an effect to species that was not considered in the original biological assessment (BA) or if a new species is listed or critical habitat is designated that may be affected by the action.
- All work shall be performed according to the requirements and conditions of the regulatory permits issued by federal, state, and local governments. Seasonal restrictions, e.g., work windows, will be applied to the project to avoid or minimize potential impacts to listed or proposed species based on agreement with, and the regulatory permits issued by the Oregon Department of State Lands (DSL), WDFW, and USACE in consultation with ODFW, USFWS, and NMFS.
- Shafts will be installed while water is still in the cofferdam. The shaft casing will function to contain and isolate the work. Cofferdams will be installed to minimize fish entrapment. Sheet piles will be installed from upstream to downstream, lowering the sheet piles slowly until contact with the substrate. When cofferdams are used, fish salvage must be conducted according to protocol approved by ODFW, WDFW, and NMFS.
- The contractor shall provide a qualified fishery biologist to conduct and supervise fish capture and release activity as to minimize risk of injury to fish, in accordance with ODOT Standard Specification 00290.31(i) or its equivalent; and/or the 2009 WSDOT Fish Exclusion Protocols and Standards, or its equivalent.
- The contractor shall prepare a Water Quality Sampling Plan for conducting water quality monitoring for all projects occurring in-water in accordance with the specific conditions issued in the Oregon and Washington 401 Water Quality Certifications. The plan shall identify a sampling methodology as well as method of implementation to be reviewed and approved by the engineer. If, in the future, a standard water quality monitoring plan is adopted by ODOT and/or WSDOT, this plan, with the agreement of NMFS and USFWS, may replace the contractor plan.
- The role of the project engineer is to ensure contract and permit requirements are met. ODOT/WSDOT environmental staff will provide guidance and instructions to the on-site inspector to ensure the inspector is aware of permit requirements.
- If in-water dredging is required outside of a cofferdam, a clamshell bucket shall be used. Dredged material shall be disposed of in accordance with relevant permits and approvals.

- Piles that are not in an active construction area and are in place 6 months or longer will have cones or other anti-perching devices installed to discourage perching by piscivorous birds.
- 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 foot 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 foot per second;
    - A round or square screen mesh that is no larger than 2.38 millimeters (mm) (0.094”) in the narrow dimension, or any other shape that is no larger than 1.75 mm (0.069”) in the narrow dimension; and
    - Each fish screen must be installed, operated, and maintained according to NMFS fish screen criteria.

5.2.2 Spill Prevention/Pollution Control

- The contractor shall prepare an SPCC Plan prior to beginning construction. The SPCC Plan shall identify the appropriate spill containment materials as well as the method of implementation. All elements of the SPCC Plan will be available at the project site at all times. For additional detail, consult ODOT Standard Specification 00290.00 to 00290.90 and/or WSDOT Standard Specification 1-07.15(1). For transit construction in Oregon, consult TriMet Standard Specification 01450{1.04}).
- The contractor will designate at least one employee as the erosion and spill control (ESC) lead. The ESC lead will be responsible for the implementation of the SPCC Plan. The contractor shall meet the requirements of and follow the process described in ODOT Standard Specifications 00290.00 through 00290.30 and/or WSDOT Standard Specification 8-01.3(1)B. The ESC lead shall be listed on the Emergency Contact List as part of ODOT Standard Specification 00290.20(g) and/or WSDOT Standard Specification 1-07.15(1).
- All equipment to be used for construction activities shall be cleaned and inspected prior to arriving at the project site to ensure no potentially hazardous materials are exposed, no leaks are present, and the equipment is functioning properly. Identify equipment that will be used below OHW. Outline daily inspection and cleanup procedures that will ensure that identified equipment is free of all external petroleum-based products. Should a leak be detected on heavy equipment used for the project, the equipment shall be immediately removed from the area and not used again until adequately repaired. Where off-site repair is not practicable, the implemented SPCC Plan will 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.
- Operation of construction equipment used for project activities shall occur from on top of floating barge or work decks, existing roads or the streambank (above OHW). Any equipment operating in the water shall use only vegetable-based oils in hydraulic lines.
- All stationary power equipment or storage facilities shall have suitable containment measures outlined in the SPCC Plan to prevent and/or contain accidental spills to

ensure no contaminants escape containment to surface waters and cause a violation of applicable water quality standards.

- Process water generated on site from construction, demolition or washing activities will be contained and treated to meet applicable water quality standards before entering or re-entering surface waters.
- No paving, chip sealing, or stripe painting will occur during periods of rain or wet weather.
- For projects involving concrete, the implemented SPCC Plan shall establish a concrete truck chute cleanout area to properly contain wet concrete as part of ODOT Standard Specification 00290.30(a)1 and/or WSDOT Standard Specification 1-07.15(1).
- For demolition activities, the followings standards will apply:
  - Make fewer cuts and use larger cranes to haul out larger segments to reduce the amount of cutting/concrete disturbed.
  - Use a diamond wire saw to precisely cut the concrete piling underwater to avoid incidental fallback (or spalling) to ensure whole segments can be lifted out of the water and nothing is left behind.
  - Pile segments shall be removed immediately from the water and placed on barges. The pile segments shall not be shaken, hosed off, left hanging to drip, or any other action intended to clean or remove adhering material from the pile.
  - Sampling will occur during saw cutting to ensure the project is in compliance with state surface water quality standards WAC 173-201A (Washington) and OAR 340-041 (Oregon) for pH and turbidity.
  - Ecology and the Oregon Department of Environmental Quality (DEQ) will be immediately notified and the saw cutting will stop if state water quality standards are exceeded.

5.2.3 Site Erosion/Sediment Control

- The contractor shall prepare a Temporary Erosion and Sediment Control (TESC) Plan and a Source Control Plan and implemented for the project requiring clearing, vegetation removal, grading, ditching, filling, embankment compaction, or excavation. The BMPs in the plans will be used to control sediments from all vegetation removal or ground-disturbing activities. The engineer may require additional temporary control measures beyond the approved TESC Plan 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 and/or WSDOT Standard Specification 1-07.15. For transit construction, consult TriMet Standard Specification 02276.
- As part of the TESC Plan, contractor shall 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 will be specified in the field, based upon site conditions and the TESC Plan. For additional silt fence detail, consult ODOT Standard Specification 00280.16(c) and/or WSDOT Standard Specification 8-01.3(9)A.

- The contractor shall identify at least one employee as the ESC lead at preconstruction discussions and in the TESC Plan. The contractor shall meet the requirements of and follow the process described in ODOT Standard Specifications Section 00280.30 and/or WSDOT Standard Specification 8-01.3(1)B. The ESC lead shall be listed on the Emergency Contact List as part of ODOT Standard Specification 00290.20(g) and/or WSDOT Standard Specification 1-05.13(1). The ESC lead will also be responsible for ensuring compliance with all local, state, and federal erosion and sediment control requirements.
- All TESC measures shall be inspected on a weekly basis. Contractor shall follow maintenance and repair as described in ODOT Standard Specifications 00280.60 to 00280.70 and/or WSDOT Standard Specification 8-01.3(15). Inspect erosion control measures immediately after each rainfall, and at least daily during for precipitation events of more than 0.5 inch in a 24-hour period.
- For landward construction and demolition, project staging and material storage areas shall be located 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 the topographic features or other site characteristics allow for site use closer to the edge of surface waters. All surface water flowing towards the excavation shall 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.
- Bank shaping shall be limited to the extent as shown on the approved grading plans. Minor adjustments made in the field will occur only after engineer's review and approval. Bio-degradable erosion control blankets will be installed 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 shall implement erosion control measures as identified in the approved TESC Plan. For additional erosion control blanket detail, consult ODOT Standard Specification 00280.14(e) and/or WSDOT Standard Specification 9-14.5(2)A.
- Erodible materials (material capable of being displaced and transported by rain, wind or surface water runoff) that are temporarily stored or stockpiled for use in project activities shall be covered 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 and/or WSDOT Standard Specification 8-01.3(1).
- All exposed soils will be stabilized as directed in measures prescribed in the TESC Plan. Hydro-seed all bare soil areas following grading activities, and re-vegetate all temporarily disturbed areas with native vegetation indigenous to the location. For additional detail, consult ODOT Standard Specifications 01030.00 to 01030.90 and/or WSDOT Standard Specification 8-01.3(1).
- Where site conditions support vegetative growth, native vegetation indigenous to the location will be planted in areas disturbed by construction activities. Re-vegetation of construction easements and other areas will occur after the project is completed. All disturbed riparian vegetation will be replanted. Trees will be planted when consistent with highway safety standards. Riparian vegetation will be replanted with species native to geographic region. Planted vegetation will be maintained and monitored to meet regulatory permit requirements. For additional detail, consult ODOT Standard

Specifications 01040.00 to 01040.90 and/or WSDOT Standard Specification 8-01.3(2)F.

5.2.4 Work Zone Lighting

- Site work shall follow local, state and federal permit restrictions for allowable work hours. If work occurs at night, temporary lighting should be used in the night work zones. The work area and its approaches shall be lighted to provide better visibility for drivers to travel safely travel through the work zone, and illumination shall be provided wherever workers are present to make them visible.
- During overwater construction, contractor will use directional lighting with shielded luminaires to control glare and direct light onto work area; not surface waters.

5.2.5 Hydroacoustics

5.2.5.1 Minimization Measure 1 – Shafts for Foundations

Permanent foundations for each in-water pier will be installed by means of shafts. This approach significantly reduces the amount of impact pile driving, the size of piles, and amount of in-water noise.

5.2.5.2 Minimization Measure 2 – Piling Installation with Impact Hammers

Installation of piles using impact driving may only occur between September 15 and April 15 of the following year. On an average work day, six piles could be installed using vibratory installation to set the piles; then impact driving to drive the piles to refusal per project specifications to meet load-bearing capacity requirements. This method reduces the number of daily pile strikes over 90 percent. No more than two impact pile drivers may be operated simultaneously within the same waterbody channel.

In waters with depths more than 0.67 meter (2 feet), a bubble curtain or other sound attenuation measure will be implemented for impact driving of pilings. If a bubble curtain or similar measure is used, it will distribute small air bubbles around 100 percent of the piling perimeter for the full depth of the water column. Any other attenuation measure (e.g., temporary noise attenuation pile) must provide 100 percent coverage in the water column for the full depth of the pile.

A performance test of the noise attenuation device in accordance with the approved hydroacoustic monitoring plan shall be conducted prior to any impact pile driving. If a bubble curtain or similar measure is utilized, the performance test shall confirm the calculated pressures and flow rates at each manifold ring.

5.2.5.3 Minimization Measure 3 – Impact Pile Installation Hydroacoustic Performance Measure

Sound pressure levels from an impact hammer will be measured in accordance with the hydroacoustic monitoring plan. Recording and calculation of accumulated sound exposure levels shall be performed. Analysis of the data shall be used to calculate exposure factors as defined in Appendix K of the CRC BA. Exposure factors shall be calculated using the moving fish model, based on a fish of over 2 grams with a movement rate of 0.1 meter per second. Exposure factors shall account for all attenuated and un-attenuated impact pile driving in both the mainstem Columbia River and North Portland Harbor. The accumulated SEL shall be recorded.

The following thresholds must not be exceeded:

1. The maximum weekly exposure factor shall not exceed 0.18649, based on one calendar week. The weekly exposure factor is defined as the proportion of channel affected by impact pile driving as measured by accumulated sound exposure level multiplied by the proportion of a 24-hr day affected multiplied by the proportion of calendar week affected.
2. The maximum yearly (calendar year) total exposure factor shall not exceed 0.202181. The maximum yearly exposure factor is the sum of all weekly exposure factors in one calendar year.
3. The average yearly exposure factor must not exceed 0.120090 per calendar year of construction. The average yearly exposure factor is the mean value of all yearly total exposure factors.
4. A total exposure factor of 0.480359 shall not be exceeded throughout the construction period of the project. The total exposure factor equals the sum of all weekly exposure factors throughout the project.

One 12-hour rest period will occur each work day in which no impact pile driving will occur. In addition, to limit the exposure of migrating fish that may be present in the behavioral disturbance zone, impact striking of piles that produce hydroacoustic levels over 150 dB RMS will not occur for more than 12 hours per work day. Unattenuated pile striking may occur to meet the requirements of the hydroacoustic monitoring plan or account for malfunction of the sound attenuation device, but will not occur for more than 300 impact pile strikes per week in the mainstem Columbia River and no more than 150 impact pile strikes per week in North Portland Harbor. To ensure that this measure is not being exceeded, an approved hydroacoustic monitoring plan will be in place to test a representative number of piles installed during the project (see Minimization Measure 5).

If the predicted accumulated sound exposure level exceeds the levels described above, then the states' fish and wildlife services will be contacted within 24 hours to determine a course of action, so that incidental take estimates are not exceeded. Necessary steps may include modifications to the noise attenuation system or method of implementation.

5.2.5.4 Minimization Measure 4 – Hydroacoustic Monitoring

The project will conduct underwater noise monitoring to test the effectiveness of noise attenuation devices. Testing will occur based on an underwater noise monitoring plan based on the most recent version of the Underwater Noise Monitoring Plan Template. This template has been developed in cooperation with the NMFS, USFWS, and WSDOT, and has been approved by NMFS and USFWS for use in Section 7 consultation for transportation projects in Washington.

Testing will occur according to protocols outlined in an Underwater Noise Monitoring Plan (WSDOT 2008). Underwater noise monitoring will occur as follows:

- Hydroacoustic monitoring will occur for a representative number of piles per structure (minimum of five piles installed with an impact hammer).
- Monitoring will occur for piles driven in water depths that are representative of typical water depths found in the areas where piles will be driven.
- Ambient noise will be measured as outlined in the template in the absence of pile driving.

A report that analyzes the results of the monitoring effort will be submitted to the Services as outlined in the monitoring plan template.

Unattenuated impact pile driving for obtaining baseline sound measurements will be limited to the number of piles necessary to obtain an adequate sample size for the project, as defined in the final Hydroacoustic Monitoring Plan.

5.2.5.5 Minimization Measure 5 – Biological Monitoring

A qualified biologist will be present during all impact pile driving operations to observe and report any indications of dead, injured, or distressed fishes, including direct observations of these fishes or increases in bird foraging activity.

5.2.5.6 Minimization Measure 6 – Temporary Pile Removal

Temporary piles shall be removed with a vibratory hammer and shall never be intentionally broken by twisting or bending. Except when piles are hollow and were placed in clean, sand-dominated substrate, the holes left by the removed pile shall be filled with clean native sediments immediately following removal. No filling of holes shall be required when hollow piles are removed from clean, sand-dominated substrates. At locations where hazardous materials are present or adjacent to utilities, temporary piles may be cut off at the mud line with underwater torches.

5.3 DESCRIPTION OF EXISTING RESOURCES IN PROJECT AREA

5.3.1 Waterways

The project area contains portions of the following water bodies: the lower Columbia River and North Portland Harbor. The Columbia Slough is not within the project area but will receive stormwater runoff from the project area and was investigated as part of the API for the LPA.

5.3.1.1 Columbia Slough

The Columbia Slough (also known as the Slough) is a slow-moving, low-gradient drainage canal running nearly 19 miles from Fairview Lake in the east to the Willamette River in the west. Running roughly parallel to the Columbia River, the Slough is a remnant of the historic system of lakes, wetlands, and channels that dominated the south floodplain of the mainstem Columbia.

Hydrology

The Columbia Slough has undergone profound hydrologic alteration from its original condition. Originally, the Slough was a side channel of the Columbia River. Today, the original inlet is blocked at the upstream end, and it no longer receives flows from the Columbia. The Slough is now intensively managed to provide drainage and flood control with dikes, pumps, weirs, and levees (CH2M Hill 2005). The Columbia Slough Watershed drains approximately 37,741 acres of land in portions of Portland, Troutdale, Fairview, Gresham, Maywood Park, Wood Village, and unincorporated Multnomah County.

The Upper and Middle Sloughs receive water inputs from Fairview Lake, as well as groundwater and stormwater from PDX and other industrial, commercial, and residential sites in the surrounding area. Water levels in the Upper and Middle Sloughs are managed to provide adequate flows for pollution reduction (PDX de-icing) and surface water withdrawals, flood control, and recreation (COP 2009).

The project area crosses the Lower Slough at Slough RM 6.5 (RKm 10.5) (CH2M Hill 2005). The Lower Slough extends from the Peninsula Drainage Canal to the Willamette River, less than 1 mile south of its confluence with the Columbia River. It experiences from 1 to 3 feet of tidal fluctuation in its water surface daily. Water levels are generally unmanaged, but are affected by the management of the dams on the Columbia and Willamette Rivers. The Lower Slough ranges from 2.0 to 4.5 feet NGVD and is generally between 100 and 200 feet wide. The Lower Slough receives water inputs from combined sewer overflows, stormwater, Smith and Bybee Lakes, leachate from the St John’s Landfill, and the Upper Columbia Slough (COP 2009).

I-5 crosses the Slough at RM 6.5 (RKm 10.5) in a highly urbanized area. The predominant land use around the Slough in the project vicinity is light industrial, with some residential. The Slough connects to the Willamette River approximately 6.5 miles west of the project area, within 1 mile of the confluence of the Columbia and Willamette Rivers (COP 2009).

Anadromous fish can access the Lower Columbia Slough up to an impassable levee located near NE 18th Avenue (RM 8.3 [RKm 13.3]). At Smith and Bybee Lakes, a water control structure allows fish passage.

Substrate

Benthic habitat in the Lower Slough is dominated by sand, is extremely low in dissolved oxygen, and contains toxic pollutants. Generally, the benthic community, including 36 taxa, increases in abundance from the Lower to the Upper Slough. This increase in species abundance is correlated to an increase in silt dominance, which increases with the distance upstream in the Slough. Most of the species are adapted to low dissolved oxygen levels and still water conditions. The benthic community in the Slough appears to be similar in species richness and density to similar aquatic habitats in the region (COP 2009).

Physical Habitat Features

Riparian habitat along the Slough has been largely replaced by buildings and pavement. Remaining areas of vegetation generally occur in a narrow band along Slough banks and are dominated by black cottonwood (*Populus trichocarpa*), Oregon ash (*Fraxinus latifolia*), willows (*Salix* spp.), red osier dogwood (*Cornus stolonifera*), Himalayan blackberry (*Rubus discolor*), common snowberry (*Symphoricarpos albus*), and reed canarygrass (*Phalaris arundinacea*). Both Himalayan blackberry and reed canarygrass are aggressive non-native species. The Slough’s riparian area functions are highly impaired; these functions include microclimate and shade, bank stabilization and sediment control, pollution control, stream flow moderation, organic matter input, large woody debris, and contiguous wildlife travel corridors.

Habitat elements that typically support the life stages of listed fish are generally lacking in Columbia Slough. Large woody debris is scarce and because the riparian area is largely devoid of trees, the potential for future large woody debris recruitment is limited. Because the Slough has been intensely managed through dredging and channelization, habitat complexity is limited and habitat structures such as boulders and undercut banks are largely absent. Overbank flow occurs very infrequently and the stream is severed from its original floodplain. Likewise, low energy off-channel areas (such as backwaters, ponds, and oxbows) are also scarce. However, remnant wetlands and restored wetlands do exist in the Slough watershed and provide habitat for wildlife, thermoregulation, nutrient removal, and other important ecosystem functions. Smith and Bybee Lakes, a 2,000-acre complex of wetlands, are the dominant wetland features of the Lower Slough. This wetland complex borders the Lower Slough and connects to the Lower Slough via the North Slough, a mile-long channel running between the St. John's Landfill and the south side of Bybee Lake (COP 2009).

Several restoration efforts are ongoing in the Columbia Slough area. The City of Portland's Watershed Revegetation Program and its community partners are conducting non-native species removal and native plantings in many areas along the Slough. The Multnomah County Drainage District (MCDD) now uses in-channel equipment to perform repairs and maintenance of channel and bank areas. Formerly, MCDD cleared vegetation to access these areas from the shore. Both vegetation enhancement and MCDD's alteration of maintenance practices have resulted in an increase in native plant diversity and cover in the Slough watershed. The City of Portland Bureau of Environmental Services has been involved in revegetation efforts in the Slough watershed since 1996 and has successfully re-established native vegetation along many parts of the Slough (COP 2009).

5.3.1.2 Columbia River and North Portland Harbor

The Columbia River and North Portland Harbor portions of the project areas are part of the Columbia River estuary. The Columbia River estuary is the portion of the Columbia River from the mouth upstream to all tidally influenced areas (that is, to Bonneville Dam). The I-5 bridges are located at RM 106 (RKm 171) of the Columbia River. The portion of the action area that occurs within the Columbia River extends from RM 101 to 118 (RKm 163 to 190). This area is highly altered by human disturbance, and urbanization extends up to the shoreline. There has been extensive removal of streamside forests and wetlands throughout this portion of the action area. Riparian areas have been further degraded by the construction of dikes and levees and the placement of streambank armoring. For several decades, industrial, residential, and upstream agricultural sources have contributed to water quality degradation in the river. Additionally, existing levels of disturbance are high due to heavy barge traffic.

The North Portland Harbor is a large side channel of the Columbia River that flows between the south side of Hayden Island and the Oregon mainland. The channel branches off the Columbia River approximately 2 RMs upstream (east) of the existing bridge site, and flows approximately 5 RMs downstream (west) before rejoining the mainstem Columbia River.

The existing I-5 crossing consists of two separate bridges. Each bridge is approximately 3,500 feet long by 45 feet wide with approximately 284,000 square feet of total deck area located directly above the water surface. The bottom of each deck ranges from 25 to 60 feet above the water surface. Together, these bridges have 11 pairs of bridge piers, 9 of which are located below OHW of the Columbia River. Two pairs (piers 10 and 11) are located in shallow water (that is, less than 20 feet deep). Each pier measures approximately 32 feet wide by 50 feet long at the footing. In total, the in-water piers occupy approximately 27,800 square feet of substrate and represent approximately 44,000 cy of fill below OHW. At the existing structures, maximum water depth is about 40 to 45 feet. At present, all stormwater runoff drains directly from the bridge deck through scuppers into the Columbia River without undergoing water quality treatment. Together, these structures convey approximately 135,000 vehicles per day.

The existing North Portland Harbor bridge conveys I-5 from Hayden Island to the mainland. The structure is approximately 1,325 feet long by 150 feet wide with approximately 144,000 square feet of total deck area located directly above the water surface. The bottom of the deck ranges from 25 to 30 feet above the water surface. This bridge has a total of 10 bents, six of which occur below OHW. Each bent consists of three piers, each measuring approximately

24 by 24 feet at the mud line. In total, the piers occupy 10,368 square feet of substrate below OHW. Water depths at the crossing range from 0 to 20 feet, meaning that all of the piers occur in shallow water. At present, all stormwater runoff drains directly from the bridge deck through scuppers into North Portland Harbor without undergoing water quality treatment. This bridge conveys approximately 137,950 trips per day.

Hydrology

The 12 major dams located in the Columbia Basin are the primary factors affecting flow conditions in the action area. Consequently, the Columbia River, including the action area, is a highly managed water body that resembles a series of slack water lakes rather than its original free-flowing state. Development of the hydropower system on the Columbia River has significantly influenced peak seasonal discharges and the velocity and timing of flows in the river. The Columbia River estuary historically received annual spring freshet flows that were on average 75 to 100 percent higher than current flows (ISAB 2000). Historical winter flows (October through March) also were approximately 35 to 50 percent lower than current flows (ISAB 2000). The second major contributor to stream flow conditions in the action area is tidal influence from the Pacific Ocean. Although the saltwater wedge does not extend into the action area, high tide events affect flow and stage in the Columbia up to Bonneville Dam.

Hydrology in the action area has been profoundly altered from historical conditions. In the action area, natural landforms and constructed landforms (e.g., dikes and levees) are the dominant floodplain constrictions, while bridge footings are the subdominant floodplain constrictions. Nine bridge pier pairs are located below OHW in the mainstem Columbia River, and one bridge pier is located below OHW in North Portland Harbor. A flood control levee runs along the south bank of North Portland Harbor, forming a boundary between the adjacent neighborhoods and the harbor. Numerous upstream dams, levees located along shorelines, and channel modifications (e.g., armoring, reshaping) have restricted habitat-forming processes such as sediment transport and deposition, erosion, and natural flooding. Therefore, habitat complexity is significantly reduced from historical conditions. Shoreline erosion rates are likely slower than they were historically due to flow regulation. The river channel is deeper and narrower than under historical conditions (Bottom et al. 2005).

Reduced flow poses particularly high risks for juvenile anadromous fish. Dramatic reductions in flow compared to the historical spring freshet have increased the travel time of juvenile outmigrants. This increases potential exposure to predation, elevated temperatures, disease, and other environmental stressors (NMFS 2008b; Bottom et al. 2005).

Substrate

In the Columbia River and North Portland Harbor, substrate consists mainly of sand with relatively small percentages of fine sediments and organic material (NMFS 2002; DEA 2006). Little to no gravel or cobble is present in the substrate within the action area. A bathymetric study completed in 2006 found significant scouring on the upstream side of each Columbia River bridge pier and scour channels on the downstream side (DEA 2006). The scouring ranged from approximately 10 to 15 feet deep. Bedload transport patterns were evident in the form of sand waves, a continuously shifting natural feature of the river bottom that indicates the influence of the currents. The sand waves observed in this study were especially distinct on the downstream side of the Columbia River bridges. The sand waves in the middle of the river were regular, while the sand waves on the northern downstream side were larger and more irregular. The northern upstream side of the bridge was relatively smooth and had few to no sand waves, while the southern upstream side had irregular sand waves. Average river depth was approximately 27 feet. Shallow-water habitat (defined as 20 feet deep or less) is present along both banks of the Columbia River, but is more abundant along the Oregon bank.

The substrate in North Portland Harbor within the project area is predominantly composed of sand with relatively small percentages of fine sediments and organic material. A bathymetric study completed in 2006 found deep scouring near the ends of the downstream piers of the existing North Portland Harbor bridge on the north bank, with scour holes approximately 8 to 10 feet deep (DEA 2006). Scouring around the upstream piers was approximately 3 to 7 feet deep. Scouring was more pronounced around the northern piers than the southern piers. A particularly deep area (approximately 21 feet deep) on the south side of the channel downstream of the existing bridge is indicative of a fast-moving current through the harbor. The average depth of the harbor was approximately 14 feet. Shallow-water habitat (defined as 20 feet deep or less) is present throughout the project area in North Portland Harbor.

Dredging and sand and gravel mining regulated by DSL occur in some areas of the Columbia River portion of the action area. For example, the Rose City Yacht Club (approximately 3 miles upstream of the existing I-5 bridges) holds a DSL permit for maintenance dredging of their marina, with subsequent sale of the dredged sand. This work is done in relatively shallow water (less than 20 feet in depth) and therefore may temporarily degrade on-site habitat for migrating salmonids. Columbia River Sand and Gravel and Northwest Aggregates each hold permits for dredging within the navigation channel within the action area between RM 102–106 (RKm 164–171) and RM 117–118 (RKm 188–190), respectively. Such in-channel activity is likely to temporarily and locally elevate turbidity and suspended sediment.

Physical Habitat Features

Within the project area, the Columbia River and North Portland Harbor contain few to no backwaters, ponds, oxbows, and other low-energy off-channel areas. Historic off-channel areas have been filled, rechanneled, diverted, and otherwise developed over the past 150 years. As a result, there is a severe reduction in connectivity between the Columbia River and North Portland Harbor and their historical floodplains. Overbank flows occur only very occasionally. Wetland extent is drastically reduced, and the succession of riparian vegetation has been significantly altered. As a result, the action area provides few refugia for salmonids. North Portland Harbor may provide some of the only off-channel habitat functions (lower energy flows relative to the Columbia River).

The remaining tidal marsh and wetland habitats in the estuary are restricted to a narrow band along the Columbia River and its lower tributaries (NMFS 2004). Some high-quality backwater and side channel habitats have persisted along the lower Columbia River banks and near undeveloped islands (USACE 2001) downstream of the action area, and to some extent, within the action area at Government Island. These habitats contain high-quality wetlands and riparian vegetation, such as emergent plants and low herbaceous shrubs.

The riparian area within the action area is relatively degraded. Tree canopy is generally absent or sparse. As a result, shallow-water habitat has only sparse vegetative cover. Because riparian areas are limited in size and are unlikely to expand in this urban setting, there is little potential for future large wood recruitment. Fish cover elements are generally sparse to absent in the action area, although some boulders and artificial structures (for example, docks and pilings) are present.

Shallow water and nearshore habitat is present in the action area on both the Oregon and Washington sides of the river and is influenced by flow and sediment input from tributaries and the mainstem river that eventually settles to form shoals and shallow flats. This shallow water habitat is used extensively by juvenile and adult salmonids for migrating, feeding, and holding. Phytoplankton, microdetritus, and macroinvertebrates are present in shallow areas and serve as the prey base for salmonids (USACE 2001). Overall, shallow water habitat has been greatly reduced from historical levels throughout the estuary and in the project area. As river stage has declined with the operation of the hydropower system, shallow water habitat has decreased concurrently (Bottom et al. 2005). Dredging, diking, armoring, and other shoreline alterations have exacerbated the problem, such that shallow water habitat is rare in the project area. What little shallow water and nearshore habitat that remains is of low quality. Shoreline armoring has reduced the quality of shallow water habitat areas by providing habitat for predaceous fish, increasing water temperatures, removing resting and holding areas for juvenile fish, and reducing primary productivity. Numerous overwater structures in shallow water habitat areas likely provide habitat for predaceous fish and birds and may cause interference with juvenile migration. North Portland Harbor, in particular, contains a high density of permanently moored floating homes and docks.

5.3.2 Wetlands

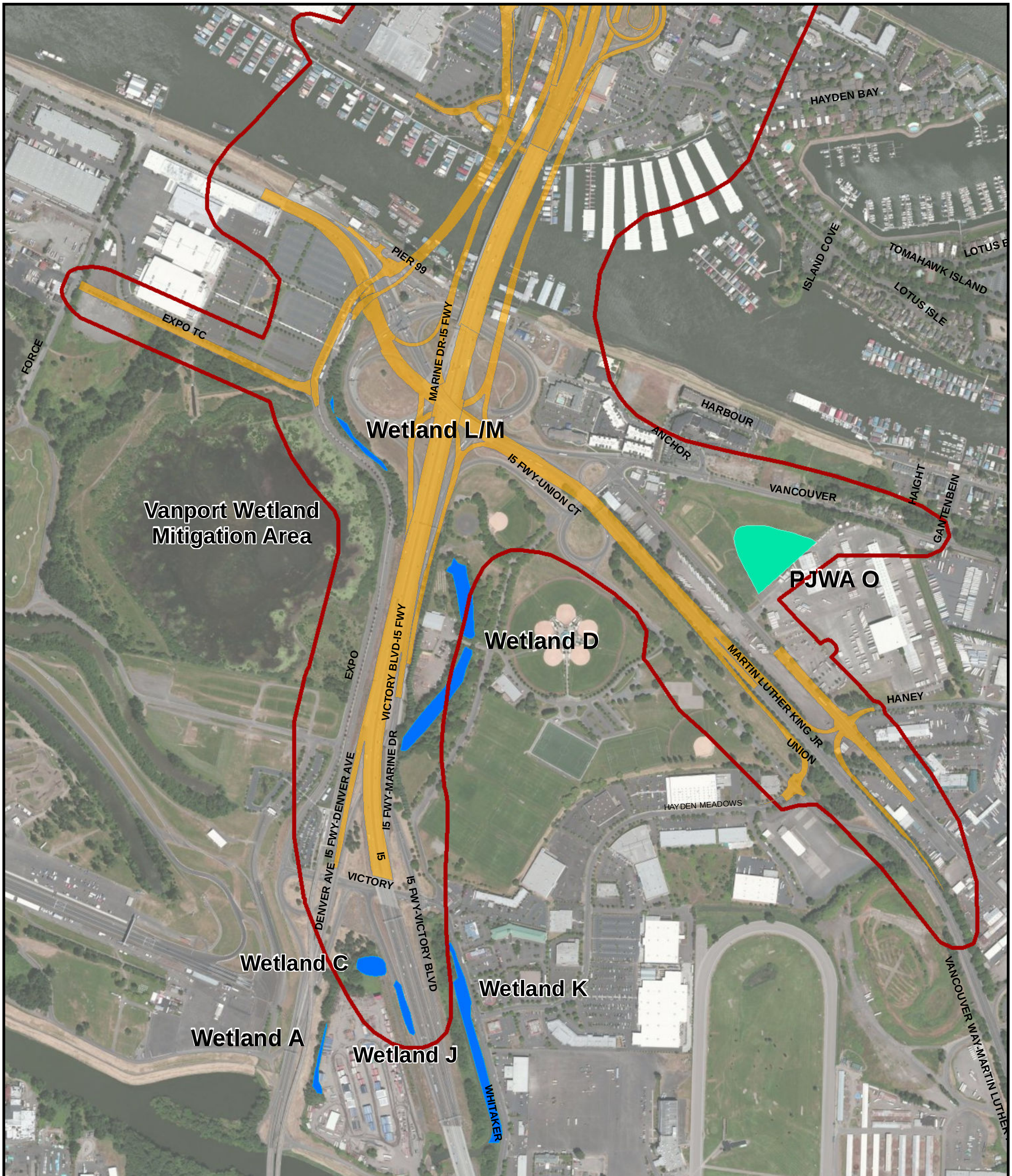
Where possible, wetland surveys were conducted on all unpaved areas within the API for the LPA. However, right of entry permission was not granted for many locations. In these cases, recent aerial photography, soils data, NWI maps, and a visual survey from accessible locations were used to determine the likely presence or absence of wetlands. Parametrix conducted on-site wetland delineations on July 20, August 1, and August 28, August 30, September 22, and September 26, 2006. In addition, three wetlands were previously delineated within the project area by David Evans and Associates.

Two wetlands were delineated by Parametrix within the ICP project area within Oregon (see Figure X below). Wetland D (Figure 5-1) is a PFO/SS/EMHx, depressional wetland approximately 2.668 acres in size. Wetland System L/M is a PFOC, Flats wetland approximately 0.339 acre in size. Potentially Jurisdictional Water Area O has been identified by Parametrix staff as an area that needs further investigation. Further investigation of this area will occur during the early growing season, once property access permission is obtained.

The Vanport Wetlands, a Port of Portland mitigation site, is located within the project area. Information on this area can be obtained through the Port of Portland or DSL. In addition, David Evans and Associates has completed a wetland delineation for three wetlands just south of the project area (Wetlands C, J, and K).

Wetland areas were identified within the LPA API within Washington. Potentially Jurisdictional Water Area I is at the convergence of two steep topographic grades; one associated with the I-5 roadway prism and the other with a natural grade starting at the edge of the Discovery Middle School property. Further coordination with the USACE and/or Ecology for this area is required to determine if it is a jurisdictional feature. Wetland H is a palustrine emergent, temporarily flooded (PEMA) wetland and is approximately 0.122 acre in size. Wetland H is northwest of Leverich Park, on the west side of Burnt Bridge Creek, east of I-5. Wetland B is east of Burnt Bridge Creek in the northeast portion of the project area and is a palustrine, scrub-shrub/emergent, seasonally flooded (PSS/EMC) wetland approximately 0.33 acre.

Concurrence on the delineation from DSL was obtained in 2008. No impacts to jurisdictional wetlands are proposed as part of this project.



ICP Project Footprint
Primary API
Wetland Areas
Potentially Jurisdictional Water Area (PJWA)

Figure 5-1 Wetlands Within Oregon

Columbia River CROSSING

Source: Locally Identified Wetlands = Clark Co. and Metro Project Delineated Wetlands = Columbia River Crossing (Parametrix)

Date: 11/12/2012 Path: P:\GIS\CRC\GIS\PH_404_Permits\Wetlands_404.mxd

5.3.3 Threatened and Endangered Species

Table 5-1 lists the federally threatened and endangered species and critical habitat that may occur within or adjacent to the project area.

Table 5-1. Federally Threatened and Endangered Species Potentially Occurring within the Project Area

ESU/DPS (Where Appropriate)[a] Species Common Name *Species Scientific Name*	Status				In Project Area			
	Federal[b]	OR[c]	WA[d]	Critical Habitat Present	EFH Present[e]	ESH Present[f]	Presence Documented[g]	Habitat Use[h]
Lower Columbia River ESU Chinook salmon *Oncorhynchus tshawytscha*	LT	SC	SC	Yes	Yes	No	Yes	M/R/H
Upper Columbia River-Spring Run Chinook salmon *Oncorhynchus tshawytscha*	LE	N/A	SC	Yes	Yes	No	Yes	M/R/H
Snake River Fall-Run Chinook salmon *Oncorhynchus tshawytscha*	LT	LT	SC	Yes	Yes	No	Yes	M/R/H
Snake River Spring/Summer-Run Chinook salmon *Oncorhynchus tshawytscha*	LT	LT	SC	Yes	Yes	No	Yes	M/R/H
Lower Columbia River DPS Steelhead trout *Oncorhynchus mykiss*	LT	SC	SC	Yes	No	No	Yes	M/R/H
Middle Columbia River Steelhead trout *Oncorhynchus mykiss*	LT	SC	SC	Yes	No	No	Yes	M/R/H
Upper Columbia River Steelhead trout *Oncorhynchus mykiss*	LE	N/A	SC	Yes	No	No	Yes	M/R/H

ESU/DPS (Where Appropriate)[a] Species Common Name *Species Scientific Name*	Status			Critical Habitat Present	In Project Area			
	Federal[b]	OR[c]	WA[d]		EFH Present[e]	ESH Present[f]	Presence Documented[g]	Habitat Use[h]
Snake River Basin Steelhead trout *Oncorhynchus mykiss*	LT	SV	SC	Yes	No	No	Yes	M/R/H
Snake River Sockeye salmon *Oncorhynchus nerka*	LE	None	SC	Yes	No	No	Yes	M/R/H
Lower Columbia River Coho salmon *Oncorhynchus kisutch*	LT	LE	None	N/A	Yes	No	Yes	M/R/H
Columbia River ESU Chum salmon *Oncorhynchus keta*	LT	SC	SC	Yes	No	No	Yes	M/R/H
Columbia River DPS Bull trout *Salvelinus confluentus*	LT	SC	SC	Yes	N/A	No	Yes	Unknown; potentially overwintering and feeding
Southern DPS Eulachon *Thaleichthys pacificus*	LT	None	SC	Yes	N/A	N/A	Yes	M,S
Southern DPS Green sturgeon *Acipenser medirostris*	LT	None	None	No	N/A	N/A	Unlikely	Unknown
Steller sea lion *Eumetopias jubatus*	LT; Proposed for delisting	LT	LT	No	N/A	N/A	Yes	Transiting, Foraging

Source: Columbia River Crossing Biological Assessment 2010 (CRC 2010).

a ESU = Evolutionarily Significant Unit; DPS = Distinct Population Segment.

b Federal status: LT = Listed Threatened, LE = Listed Endangered, P = Proposed, C = Candidate, SOC = Species of Concern, N/A = Not Applicable (USFWS 2012).

c OR State status: LT = Listed Threatened, SC = Sensitive Critical, SV = Sensitive Vulnerable, None = No status designated, N/A = Not Applicable (Oregon Threatened and Endangered Species List).

d WA state status: SC=state candidate, N/A = Not Applicable (WDFW-PHS).

e EFH = Essential Fish Habitat, per the MSFCMA.

f ESH = Essential Salmonid Habitat, per DSL and ODFW.

g Source = StreamNet (2012).

h Habitat uses: S = Spawning, M/R/H = Migration/Limited Rearing/Holding (StreamNet 2012, NMFS 2009).

In addition to species protected by federal and state endangered species regulations, species of interest (SOI) (species which are defined as locally rare or with special habitat requirements) are associated with habitat types in the project area. These include migratory birds, marine mammals, certain terrestrial mammals (e.g., bats), and other species requiring special consideration for habitat and management, but which may not be protected under federal or state statutes. Migratory birds protected under the MBTA use habitat components (e.g., bridge structures, vegetation, riparian habitat) in the project area for nesting, roosting, foraging, and/or dispersing. Table 5-2 lists examples of SOI that may occur in the project area. This list is not meant to be comprehensive but rather presents species groups that require special consideration in the course of the CRC project.

Table 5-2. Examples of Species of Interest Associated with Habitat Types within the Project Area

	Federal Status[a]	OR State Status[b]	WA State Status[c]
Migratory Birds[d]			
Peregrine falcon *(Falco peregrinus anatum)*	Delisted	SV	SS
Purple martin *(Progne subis)*	SOC	SC	C
Streaked horned lark *(Eremophila alpestris strigata)*	C	SC	LE
Osprey *(Pandion haliaetus)*	N/A	N/A	M
Barn owl *(Tyto alba)*	N/A	N/A	N/A
Belted kingfisher *(Ceryle alcyon)*	N/A	N/A	N/A
Cliff swallow *(Petrochelidon pyrrhonota)*	N/A	N/A	N/A
Barn swallow *(Hirundo rustica)*	N/A	N/A	N/A
Willow flycatcher *(Empidonax traillii)*	SOC	SU	N/A
Bullock's oriole *(Icterus bullockii)*	N/A	N/A	N/A
Yellow warbler *(Dendroica petechia)*	N/A	N/A	N/A
White-breasted nuthatch *(Sitta carolinensis)*	N/A	N/A	N/A
Great blue heron *(Ardea herodias)*	N/A	N/A	SM
Loons (*Gavia* spp.)	N/A	N/A	SS (*Gavia immer*)
Mergansers (*Mergus* spp.)	N/A	N/A	N/A
Geese (*Branta* spp.)	N/A	N/A	N/A
Grebes (*Aechmophorus* spp.)	N/A	N/A	N/A
Mammals			
Long-legged myotis *(Myotis volans)*	SOC	SU	M
Fringed myotis *(Myotis thysanodes)*	SOC	SV	M
Long-eared myotis *(Myotis evotis)*	SOC	SU	M
Townsend's big-eared bat *(Corynorhinus townsendii)*	SOC	SC	C
Silver-haired bat *(Lasionycteris noctivagans)*	SOC	SU	N/A

	Federal Status[a]	OR State Status[b]	WA State Status[c]
Harbor seal *(Phoca vitulina)*	Protected under MMPA	N/A	M
California sea lion *(Zalophus californianus)*	Protected under MMPA	N/A	N/A
California myotis *(Myotis californicus)*	N/A	N/A	N/A
Yuma myotis *(Myotis yumanensis)*	N/A	N/A	N/A
Little brown myotis *(Myotis lucifugus)*	N/A	N/A	N/A
Big brown bat *(Eptesicus fuscus)*	N/A	N/A	N/A
Bushy-tailed woodrat *(Neotoma cinerea)*	N/A	N/A	N/A
Reptiles and Amphibians			
Western Pond turtle *(Emys marmorata)*	SOC	SC	LE
Painted turtles *(Chrysemys picta)*	N/A	SC	N/A
Northern red-legged frog *(Rana aurora aurora)*	SOC	SV/SU	N/A
Fish			
Southwestern Washington/Columbia River Coastal cutthroat trout *(Oncorhynchus clarki clarki)*	SOC	SV	N/A
Pacific lamprey *(Lampetra tridentata)*	SOC	SV	N/A
River lamprey *(Lampetra ayresi)*	SOC	N/A	C
Northern DPS Green sturgeon *(Acipenser medirostris)*	SOC	N/A	N/A

a Federal status: C = Candidate, SOC = Species of Concern, N/A = Not Applicable, MMPA = Marine Mammal Protection Act (OBIC 2010a; USFWS 2012).

b Oregon status: LT = Threatened, LE = Endangered, SC = Sensitive Critical, SV = Sensitive Vulnerable, SU = Sensitive Undetermined Status, N/A = Not Applicable (OBIC 2010a; USFWS 2012).

c Washington status: LT = Listed Threatened, LE = Listed Endangered, C = Candidate, SS = State Sensitive, M = State Monitor (WDFW 2008).

d All migratory birds are protected by the Migratory Bird Treaty Act.

Listed plant species, including threatened, endangered, proposed, and candidate species, are not known to occur in the project area (WDNR-NHP 2005). Field visits were conducted on September 1 and September 16, 2005, to survey for potential habitat in the project area. Field surveys for special-status plants (i.e., those not listed but with state designations such as sensitive or vulnerable) occurred between May and September 2006. No listed plants were found (Parametrix 2005, 2006).

Wapato (*Sagittaria latifolia*) and cattail (*Typha latifolia*), herbaceous wetland plants with important cultural significance as traditional food, craft, and medicinal sources for several Native American tribes, occur in wetland areas in the project area, including Schmeer Slough (a J-shaped slough that extends under I-5 and adjacent to North Whitaker Road and Schmeer Road).

Additional information on threatened, endangered, or candidate species can be found in the CRC BA (CRC 2010) and the FEIS (FHWA and FTA 2011). Reinitiation of Section 7 ESA consultation will occur in February 2013 to address project changes from the original BA and formal designation of critical habitat for eulachon after the original consultation was completed.

5.3.4 Archaeological, Cultural, and Historical Resources

The Oregon shore of the project area contains no historic sites from Euroamerican settlement, and no evidence of prehistoric Native American activity. The Washington shore of the project area includes several historic sites. The Hudson's Bay Company's (HBC) Fort Vancouver and Kanaka Village and the U.S. Army's Vancouver Barracks are situated directly east of the I-5 corridor in the Vancouver National Historic Reserve (VNHR). Kanaka Village was a multicultural settlement and included Euroamericans as well as Native Americans. The VNHR encompasses properties owned by the National Park Service (NPS), U.S. Army, and the City of Vancouver. The Historic City of Vancouver, containing the core blocks first platted in the city, lies directly west of the I-5 corridor. No prehistoric archaeological sites have been formally recorded on the north shore of the Columbia River within the CRC project area; however, there is some evidence (e.g., stone tools) to indicate prehistoric activity in the area of the future site of HBC Fort Vancouver, Kanaka Village, and the U.S. Army's Vancouver Barracks.

Eleven tribes were consulted in the NEPA process and the Section 106 consultation. A tribal observer may be present during any ground-disturbing activities during project construction, if they choose.

A detailed description of archaeological, cultural, and historical resources is available in the Archaeology Technical Report for the FEIS (FHWA and FTA 2011).

5.4 EXISTING NAVIGATION, FISHING, AND RECREATIONAL USE OF WATERWAYS

5.4.1 Columbia Slough

The Slough and surrounding area were historically used by Native Americans for fishing, hunting, and gathering food (BES 2006).

Water levels in the Upper and Middle Sloughs are managed to provide adequate flows for pollution reduction (PDX de-icing) and surface water withdrawals, flood control, and recreation (COP 2009). DEQ has listed irrigation, domestic and industrial water supply, livestock watering, anadromous fish passage, salmonid fish rearing, salmonid fish spawning, resident fish and aquatic life, wildlife and hunting, fishing, boating, water contact recreation, aesthetic quality, and hydropower as beneficial uses of the Columbia Slough (COP 2009).

5.4.2 Columbia River and North Portland Harbor

Since the 1800s, USACE has performed dredging throughout the Columbia River estuary in order to maintain the navigation channel (NMFS 2004). The USACE does not dredge the channels at or upstream of the project area because the river is normally 30 to 45 feet deep in these channels. USACE has also realigned the navigation channel and installed hydraulic control structures, such as in water fills, channel constrictions, and pile dikes (NMFS 2004). The DEQ has listed Wildlife and Hunting, Fishing, Boating, Water Contact Recreation, Aesthetic Quality, and Commercial Navigation & Transportation as beneficial uses of the Columbia River main stem from RM 86 to 309.

5.4.2.1 Description of Columbia/Snake River System

The Columbia/Snake River System begins at the mouth of the Columbia River and extends to Lewiston, Idaho, at the confluence of the Snake and Clearwater Rivers, approximately 465 miles upriver from Astoria.

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, provides deep-water 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 plants located in this area. Approximately 40 million metric tons of cargo passed via the mouth of the Columbia River in 2011 (including both inbound and outbound directions).

The shallow-draft navigation system begins just upriver of Vancouver. The BNSF Rail Bridge (RM 105.6) and the Columbia River Bridge (RM 106.5) are located at the beginning of the shallow-draft section of the river. The first section of the shallow-draft system (from Vancouver to The Dalles lock and dam) has a controlling depth of approximately 15 feet. 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 7.0 million metric tons of cargo in 2010. More than 90 percent of this cargo passed through the locks at Bonneville, moving mainly from upriver ports to downriver ports (primarily grain moving downriver and petroleum products moving upriver).

The BNSF bridge at Celilo Falls is located at RM 201.2, which is approximately 10 miles upriver from The Dalles lock and dam (RM 191.5). The BNSF Bridge has a fixed height of 79 feet above the normal pool elevation behind the dam when open and represents the next lowest height restriction in comparison with the options under consideration for the proposed I-5 bridges. This means that the height constraint imposed by the proposed CRC fixed bridge potentially affects river traffic vertical clearance for a distance of approximately 95 miles or 20 percent of the river system. Normal pool elevation is the height in feet above sea level at which a section of the river is to be maintained behind a dam. The water level can vary with river flow, flood control, fisheries management, and power generation requirements.

Plans are currently underway for a fixed height bridge for the SR 35 bridge located at Hood River (RM 169.8). The existing SR 35 bridge has an open height of 148 feet above the normal pool elevation behind the Bonneville dam, while the proposed replacement would be a fixed bridge with a height of 80 feet above normal pool elevation. If this occurs, the length of the river segment with potential vertical clearance effects from the CRC fixed bridge options would consist of 63.3 river miles, about 14 percent of the Columbia/Snake River system.

5.4.2.2 Main Channel of the Columbia River in the Project Area

The I-5 CRC project crosses both the main channel of the Columbia River as well as North Portland Harbor—a side channel of the Columbia that separates Hayden Island from the Oregon mainland. The following discussion identifies the navigational characteristics of these two navigable waters in the immediate project area.

There are three bridges crossing the main channel of the Columbia River in the project area: the northbound and southbound structures of the I-5 bridges and the BNSF Railroad Bridge.

Under the I-5 bridges, vessels pass through one of three channels: the primary channel, the barge channel and 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 above 0 CRD 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 above 0 CRD. 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 (See Figure 5-1).

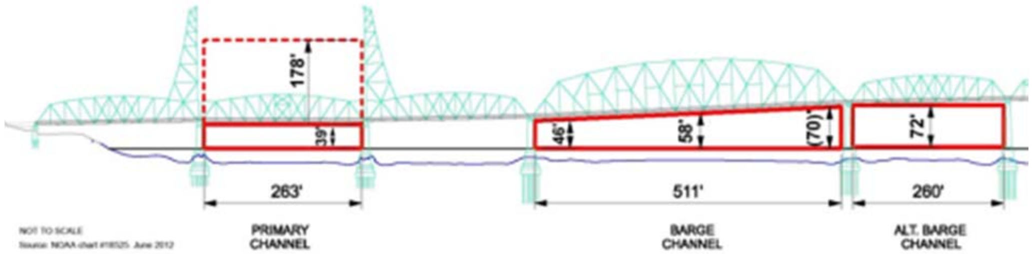


Figure 5-2. Existing I-5 Bridge Navigation Clearance

The third bridge in the project area—the BNSF Railroad Bridge—is located approximately one mile downstream (westerly) from the I-5 bridges and accommodates vessels with heights in excess of 35 feet using a 200-foot-wide movable swing span. The swing span is aligned with the bridges' lift spans.

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. This route, designated the primary channel, is represented in Figure 5-2. Vessels requiring a vertical clearance in excess of 39 feet require the lift span to open. However, bridge lifts are restricted during certain times, which can cause vessel travel delays. The Federal Code of Regulations stipulates that the span need not be raised Monday through Friday from 6:30 a.m. to 9 a.m. and from 2:30 p.m. to 6 p.m.[3]

Vessel operators can avoid bridge lift delays by opting to travel through the I-5 bridges' barge or alternate barge channels as vertical clearance allows. The use of these channels requires a more complex maneuver than does the route through the primary channel and requires the vessel to navigate an "S" curve path between the I-5 bridges and the BNSF Bridge in order to pass through the BNSF swing span. These routes are shown in Figure 5-2 and are designated as the barge channel route and the alternate barge channel route.

[3] 33 CFR 117.869: § 117.869. Columbia River.(a) The draws of the Interstate 5 Bridges, mile 106.5, between Portland, OR, and Vancouver, WA, shall open on signal except that the draws need not be opened for the passage of vessels from 6:30 a m. to 9 a.m. and from 2:30 p m. to 6 p m. Monday through Friday except federal holidays.

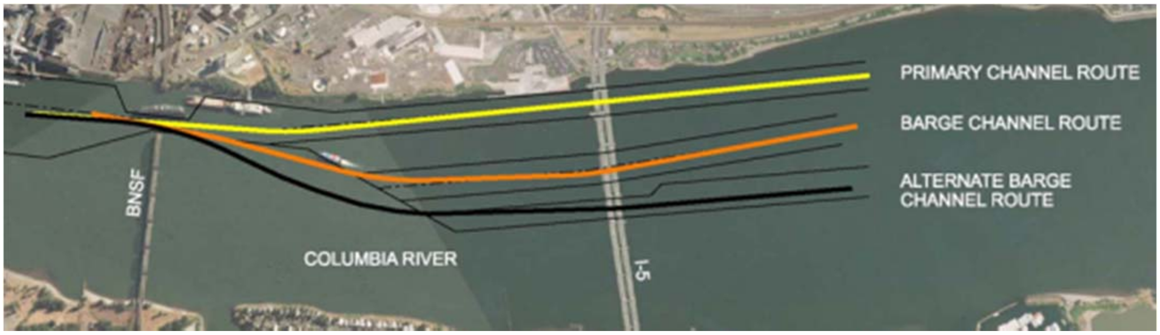
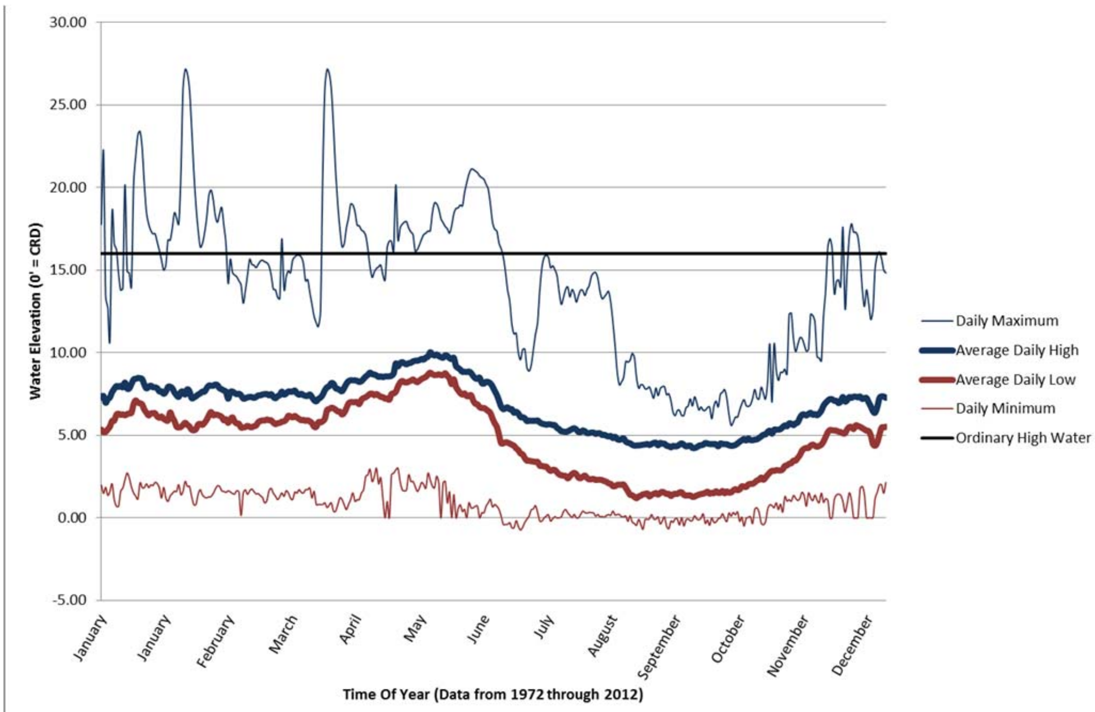


Figure 5-3. Navigation Channels

Information on the number and types of vessel trips through this portion of the Columbia River, as well as historical bridge lift data, can be found in the Navigation Impact Report (NIR).

5.4.2.3 River Water Levels at the I-5 Bridge

In addition to the bridges, multiple other factors affect navigability and navigation safety in the I-5 crossing area. One of the critical factors influencing vertical clearance is river water level, which fluctuates daily and over the course of the year. Figure 5-3 summarizes the variability in water levels for the Columbia River at the I- 5 bridges from 1972 through 2012. Included in Figure 5-3 are daily maximum, daily minimum, average daily high, and average daily low. More information on river water levels can be found in Chapter 5 of the NIR.



Note: The water level went above the ordinary high water mark (16' above CRD) less than 2% of the time (208 days / 14,388 days) between 1972 and 2012.

Figure 5-4. Columbia River Water Elevation at the Interstate Bridges (1972-2012)

In general, the following river water level trends can be observed from the data collected over the past 40 years:

- The highest average daily high is at approximately 10 feet above 0 CRD and occurs in early May.
- The lowest average daily low is at approximately 2 feet above 0 CRD and occurs in early September.
- The ordinary high water level, which is the water level that was exceeded less than 2 percent of the time over the past 40 years, is 16 feet above 0 CRD.

River levels at the I-5 bridges are influenced primarily by variations in runoff. However, the river level is also 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 Nautical 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.

The CRC project team also considered how potential climate change could affect future Columbia River water levels, as described in Chapter 3 of the 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 as a result of climate change. Based on the best available science, the effects of climate change in the project area that could be relevant to future Columbia River water levels and vessel clearance are projected as follows:

- Sea level rise in the Pacific Northwest will vary with regional rates of uplift, but would be similar to the global average increase of 1.6 feet by 2100, with a range of six inches to 3.1 feet.
- Warmer winter temperatures in the Columbia River Basin will result in lowered 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 twentieth century variability; however, there will be a shift in the amount and timing of seasonal precipitation, with a trend towards 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 effects 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 minor increase (a fraction of 1.8 feet—the existing diurnal range of the tide during low river stages) in water levels at the bridge during low runoff periods and little to no effect 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 40 years. Sea level rise could have a minor effect on this during low runoff periods. Given the predictions in seasonal precipitation changes, however, any effect of sea level rise could be counteracted by low flows being even lower in the future. The 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.

5.5 MITIGATION

This section describes mitigation as described for the USACE Joint Permit Application. For a discussion of mitigation regarding navigation, please see the cover letter to this USCG general bridge permit application.

The project is proposed to permanently fill with structure approximately 1.5554 acres with 46,375 cy and temporarily fill up to 0.9471 acre with 60,348 cy of jurisdictional waters in the Columbia River main stem in both Oregon and Washington (permanent fill in North Portland Harbor would be approximately 0.0650 acre and 4,111 cy and no temporary). The project proposes to permanently remove 0.6384 acre of and 43,868 cy of existing structures in the Columbia River main stem and no temporary (removal of structure in North Portland Harbor would be 0.0001 acre and 60 cy).

No jurisdictional wetlands will be impacted in Oregon or Washington during construction or operation of the project, with the possible exception of impacts related to restoration activities at the Sandy River and Lewis River mitigation sites. Additional required mitigation for these types of impacts is not anticipated.

A mitigation site has been identified west of the project on the east bank of the Lewis River at the confluence with the Columbia River. No jurisdictional wetlands will be impacted in Washington during construction or operation of the CRC project, however approximately 7.4 acres of wetland impacts related to enhancement or restoration activities at the Lewis River mitigation site might occur. Additional required mitigation for these types of impacts is not anticipated. Mitigation activities at the Lewis River site will be funded by the CRC project and be constructed by a third party. The Washington mitigation site will go through its own permitting process separate from the CRC permit process.

A mitigation site has been identified along the Sandy River and within Dabney State Recreation Area. No jurisdictional wetlands will be impacted in Oregon during construction or operation of the CRC project; however approximately 3,600 cy of impacts related to enhancement or restoration activities at the Dabney State Recreation Area mitigation site will occur. Additional required mitigation for these types of impacts is not anticipated. Mitigation activities at the Dabney State Recreation Area site will be funded by the CRC project and be constructed under contract by ODOT. The activities associated with this mitigation site are addressed in this permit application.

Conditions of regulatory permits issued by USACE and the States of Oregon and Washington will require compliance monitoring for a minimum of 5 years after completion of the mitigation projects.

In addition, removal of the wharf at the Red Lion at the Quay encompasses approximately 0.8 acre and removal of floating homes, boathouses, and docks encompass another 3.1 acres of area at the water surface. With the removal of these on-water elements (i.e., floating homes, docks, and quay) less water surface will be impacted after the project this is currently impacted. These on-site and near-project area enhancement and restoration activities should result in an increased value for habitats and function in the project area compared to the existing condition.

5.5.1 Washington Compensatory Mitigation: Lewis River Confluence Side Channel Restoration

CRC is proposing off-site compensatory mitigation on the east bank of the Lewis River at its confluence with the Columbia River. The 40.5-acre Mitigation Area is located in the lower Columbia River basin in Clark County, Washington, and is located approximately 0.5 mile east of the City of Saint Helens in Columbia County, Oregon, and 1 mile north of Ridgefield in Clark County, Washington. The City of Vancouver is 10 miles south of the site and the City of Portland is approximately 13 miles south.

This Mitigation Area is part of a larger approximately 699.7-acre Columbia-Lewis Salmon Recovery Project that includes the 40.5-acre Mitigation Area as well as the proposed 659.2-acre Columbia-Lewis Conservation Bank. The Columbia-Lewis Salmon Recovery Project is a salmonid habitat restoration, enhancement, and preservation project.

Restoration and enhancement actions specific to the Mitigation Area will include discontinuing current livestock grazing, invasive species control, establishing and enhancing floodplain forest habitat, and the restoration of historical side channel habitat. Once completed, the Mitigation Area will consist of 27.2 acres of enhanced floodplain forest, 3.8 acres of proposed floodplain forest, 9.4 acres of restored side channel, 6 habitat complexity structures, and 3,000 linear feet of preserved and enhanced Lewis River bank.

The main goal of the Mitigation Area is to restore, enhance, preserve, and protect the aquatic and riparian habitats on site to benefit the numerous salmonid species occurring in the Columbia Basin as well as other native fish including Pacific lamprey and Pacific eulachon. Proposed restoration actions and their benefits include:

- Reconstructing and re-connecting 9.4 acres of Lewis River side channels currently blocked with dredge spoil material in order to provide year-round connectivity to the Lewis River, provide salmon rearing habitat, and reconnect floodplain wetlands.
- Installing approximately 6 habitat complexity structures to provide additional salmon rearing habitat, improve habitat complexity, and re-direct flow into the newly excavated channel inlets and outlets.
- Excluding livestock grazing activities from sensitive areas to encourage native riparian species establishment and improve water quality.
- Planting native riparian species and removing invasive species in order to establish floodplain forest habitat and enhance existing floodplain forested areas.

- Providing legal and financial protection and stewardship so the restored and enhanced habitats are preserved in perpetuity.

The restoration actions described above will restore, enhance, and preserve a variety of aquatic and riparian habitats important to Columbia Basin salmon and steelhead and other native fish including Pacific lamprey and Pacific eulachon. Benefits will be attained through on-site usage by juvenile and adult and through off-site dispersal of salmonid prey items such as insects. The Mitigation Area will be preserved and protected with a conservation easement and managed with funds from a non-wasting, third-party-held endowment. The restored habitats will be held to performance standards, monitoring requirements, and management standards.

Wildlands of Washington, Inc. (Wildlands) will be obtaining permits from USACE, providing a nexus for an independent Section 7 consultation. Wildlands will prepare a separate BA or use an existing programmatic BO for the Conservation Bank.

Construction will entail 7.4 acres of wetland impact but will result in 10.9 acres of wetland creation, restoration, and/or enhancement. During construction, standard BMPs (such as site isolation, fish exclusion, and TESC and SPCC plans) will be implemented to minimize the amount of sediment entering the Lewis or Columbia Rivers during earthwork.

Monitoring of the mitigation site during the establishment period will occur for 5 years after construction to ensure the project has met performance standards for wetland enhancement and stream restoration. Also, long-term monitoring will occur at 10 years after construction and every 10 years following in perpetuity to assess the Mitigation Area’s condition, which includes degree of erosion, invasive plant species colonization and/or other aspects that may warrant management actions.

5.5.2 Oregon Compensatory Mitigation: Dabney State Recreation Area Habitat Restoration

The intent of the Dabney Habitat Restoration project is to create habitat credits and provide habitat uplift, in combination with the Columbia-Lewis Mitigation project, to offset unavoidable impacts to jurisdictional waters from construction and operation of the CRC project, as part of CRC’s conservation measures.

The habitat restoration project area is located entirely within the boundary of Dabney State Recreation Area, which is located on the northern (river right) shoreline of the Sandy River at RM 8.0. The Sandy River flows northwest from the piedmont of Mt. Hood to the Columbia River near Troutdale, Oregon, about 14 miles upstream of CRC. The Sandy River supports coho, spring and fall Chinook, winter steelhead, and eulachon, all of which are federally listed as threatened. In addition, it supports non-listed native fishes such as Pacific lamprey. The Sandy River is a designated National Wild and Scenic River and an Oregon State Scenic Waterway within the project area.

The shoreline of the Sandy River supports two point bars located upstream and downstream of the recreation area’s boat ramp. Seasonal side channels formed by the upstream (primary side channel) and downstream (secondary) features have less than ideal functions for fish habitat due to low- or no-flow conditions during drier portions of the year. Both channels have sediment substrates that would be suitable for spawning and rearing if flow through these features could be increased and sustained for a longer period through the year.

The primary tributary is a perennial stream that emerges from a waterfall on the eastern portion of Dabney then flows west-southwest roughly parallel to the Sandy River for a few thousand feet. At the upper end near the waterfall the channel splits, which results in low flows through two separate channels. The lesser of the two channels flows a short distance south to the Sandy via a seasonal channel. The channel substrate is a mix of fine sands and gravels, with coarse rock and an impermeable subsurface at the waterfall. The primary tributary lacks in-stream wood structures and channel complexity. The channel, however, appears to have access to its floodplain along most of its length. The primary tributary flows through a mixed, early seral, deciduous and evergreen forest to the downstream end of the primary side channel. Riparian vegetation is a mix of native tree, shrub and herbaceous, and non-native invasive species, the latter of which is primarily represented by English Ivy (*Hedera helix*).

Bonnie Brook is a perennial stream that flows northeast to west-southwest through Dabney State Recreation Area. The channel location and dimensions have been modified by roadway crossings and artificial impoundments; riparian vegetation has been altered by landscaping typical to park settings. The downstream-most roadway crossing is via a culvert that acts as a fish barrier during all but major flood events. Two sets of structures intentionally block flow to form relatively small, open-water impoundments. Substrate in Bonnie Brook is a mix of gravels and fines; overstory is dense in some reaches and is absent in others. Floodplain connectivity appears present in upper reaches, but appears limited near its confluence with the primary tributary. As many as four unnamed, seasonal or ephemeral tributaries flow from north to south to contribute flow to Bonnie Brook. These, and Bonnie Brook itself are likely to provide rearing and potentially spawning opportunities for salmonids and other fish species.

Proposed enhancements to fish and riparian habitat at Dabney State Recreation Area feature the following measures:

1. Engineered Log Jam – Primary Side Channel bar
2. Large Wood Placement – Primary Side Channel
3. Engineered Log Jam – lower channel bar
4. Large Wood Placement – Secondary Side Channel
5. Large Wood Placement – Primary Tributary
6. Primary Tributary Low Flow Augmentation
7. Culvert Replacement/Removal – lower Bonnie Brook
8. Culvert Replacement/Removal – mid-reach Bonnie Brook, lower pond
9. Riparian Wetland Development/Pond Modification – lower pond
10. Culvert Replacement/Removal – mid-reach Bonnie Brook, upper pond
11. Riparian Wetland Development/Pond Modification, upper pond
12. Culvert Replacements/Removals – upper Bonnie Brook
13. Large Wood Placement – lower Bonnie Brook
14. Large Wood Placement – upper Bonnie Brook
15. Stormwater Runoff Water Quality Treatment – Dabney State Recreation Area
16. Interpretive Signage – Dabney State Recreation Area

Anticipated benefits from these actions include salmon and eulachon recovery and riparian habitat uplift. Salmon recovery will be achieved through increases in channel rearing, spawning, and refugia opportunities. Salmon and eulachon recovery will be aided further through improved water quality, increases in invertebrate and other ecosystem habitat components, and through greater public awareness of salmon recovery efforts provided by interpretive signage describing the enhancement project.

Approximately 14,000 linear feet of side channel and tributary habitat will be restored or enhanced, with approximately 60 large wood structures placed in-stream and two engineered log jams. Seven culverts along Bonnie Brook will be replaced with those that will allow fish passage.

Proposed restoration activities will involve excavation and fill placement to replace existing culverts, and excavation and fill to allow installation of large wood pieces and key boulders. Final dimensions of large wood pieces and boulders will be determined by availability at the time of construction. Estimates of removal/fill of soils for large wood and boulder installation are expected to be approximately 5 cy per large woody debris structure, and approximately 15 cy for the two engineered log jams. Total temporary work will entail approximately 365 cy of fill and 3,075 cy of removal. Total permanent work will entail 0 cy of fill and approximately 184 cy of removal.

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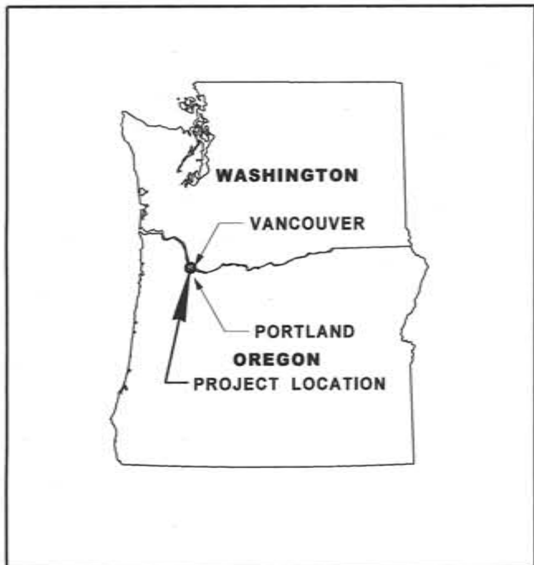
ATTACHMENT C

Columbia River Bridges and Approaches Figures



DATUM
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MATTHEW BERNHARD DEHL
STATE OF WASHINGTON
STRUCTURAL ENGINEER
PROFESSIONAL ENGINEER

STRUCTURAL
REGISTERED PROFESSIONAL ENGINEER
80197PE
OREGON
September 11, 2007
MATTHEW BERNHARD DEHL
RENEWS: 12-31-13

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FEET

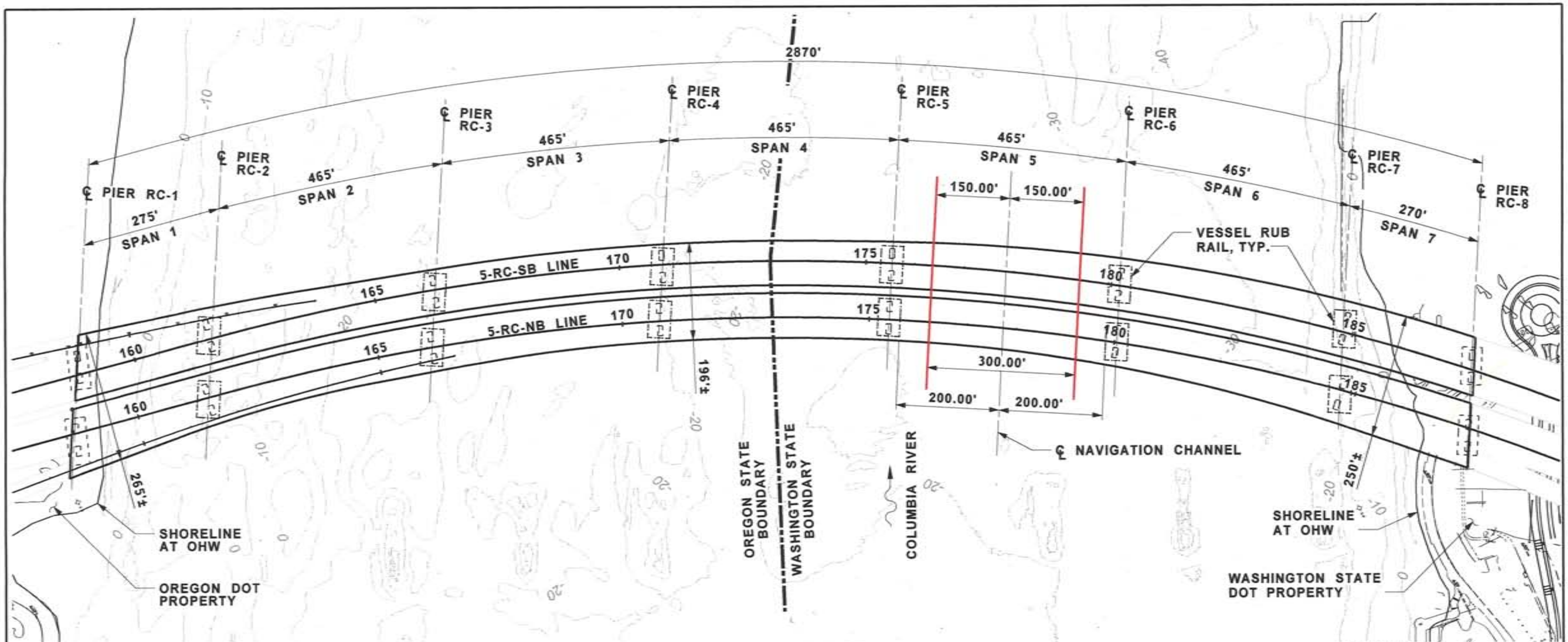
UNITED STATES COAST GUARD BRIDGE PERMIT DRAWINGS

COLUMBIA RIVER CROSSING
INTERSTATE 5 OVER COLUMBIA RIVER, MILE 106.4 AT
VANCOUVER, WA (CLARK COUNTY) & PORTLAND, OR (MULTNOMAH COUNTY)

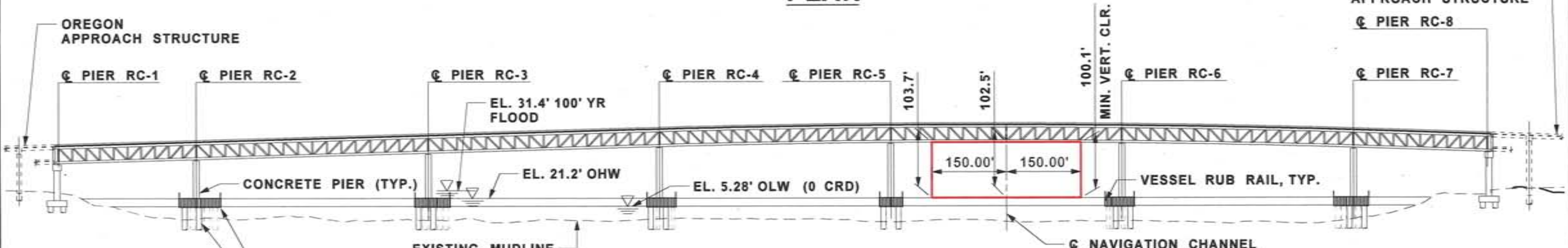
APPLICATION BY: WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
& OREGON DEPARTMENT OF TRANSPORTATION
ROUTE: INTERSTATE 5 **DATE:** JAN. 2013

SHEET 1 OF 6 SHEETS

VICINITY MAP



PLAN



DEVELOPED ELEVATION

NOTES:

1. THE BRIDGE IS BEING DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 6TH EDITION. VESSEL COLLISION IS PER ARTICLE 3.14 WITH AN OPERATIONAL CLASSIFICATION OF "CRITICAL". THE LARGEST DESIGN VESSEL IS A 400-FT x 100-FT OCEAN BARGE WITH A DWT OF 21,500 TONNES.

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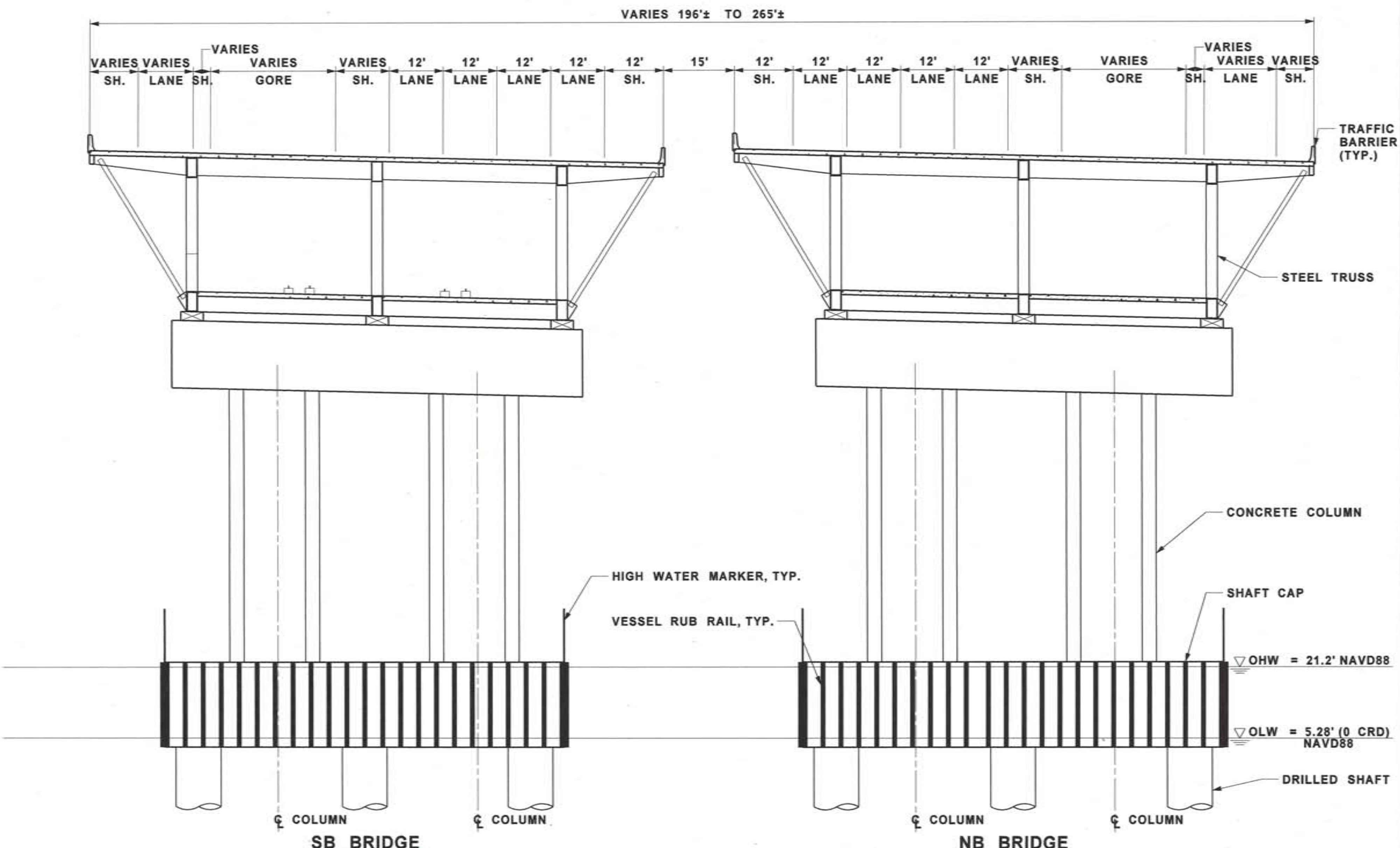
UNITED STATES COAST GUARD BRIDGE PERMIT DRAWINGS

COLUMBIA RIVER CROSSING INTERSTATE 5 OVER COLUMBIA RIVER, MILE 106.4 AT VANCOUVER, WA (CLARK COUNTY) & PORTLAND, OR (MULTNOMAH COUNTY)	
APPLICATION BY: WASHINGTON STATE DEPARTMENT OF TRANSPORTATION & OREGON DEPARTMENT OF TRANSPORTATION **ROUTE:** INTERSTATE 5 **DATE:** JAN. 2013	SHEET 2 OF 6 SHEETS
COLUMBIA RIVER BRIDGE	



TYPICAL SECTION

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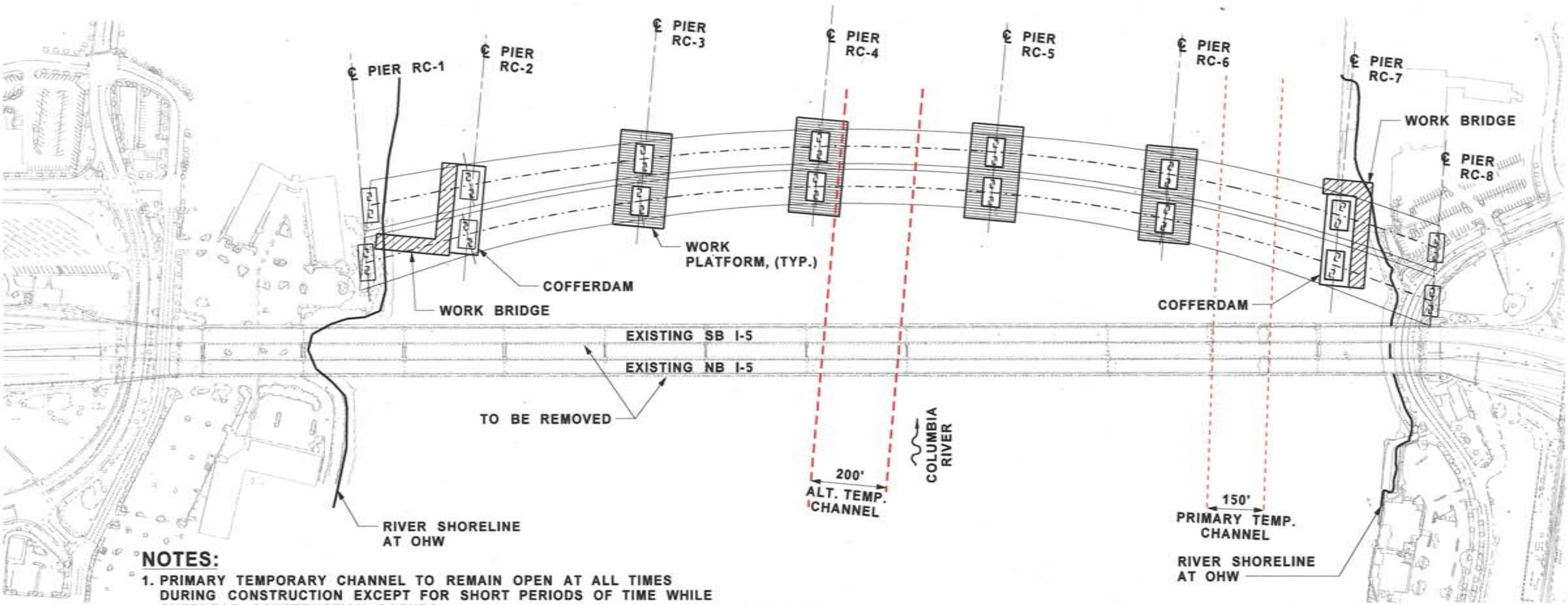
UNITED STATES COAST GUARD BRIDGE PERMIT DRAWINGS

COLUMBIA RIVER CROSSING
INTERSTATE 5 OVER COLUMBIA RIVER, MILE 106.4 AT
VANCOUVER, WA (CLARK COUNTY) & PORTLAND, OR (MULTNOMAH COUNTY)

APPLICATION BY: WASHINGTON STATE DEPARTMENT OF TRANSPORTATION & OREGON DEPARTMENT OF TRANSPORTATION
ROUTE: INTERSTATE 5
DATE: JAN. 2013

SHEET 3 OF 6 SHEETS

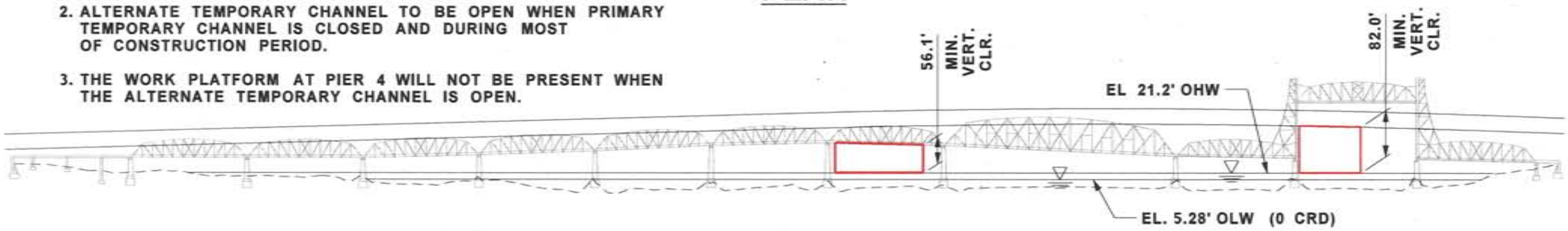
COLUMBIA RIVER BRIDGE - TYPICAL SECTION



NOTES:

1. PRIMARY TEMPORARY CHANNEL TO REMAIN OPEN AT ALL TIMES DURING CONSTRUCTION EXCEPT FOR SHORT PERIODS OF TIME WHILE OVERHEAD CONSTRUCTION OCCURS.
2. ALTERNATE TEMPORARY CHANNEL TO BE OPEN WHEN PRIMARY TEMPORARY CHANNEL IS CLOSED AND DURING MOST OF CONSTRUCTION PERIOD.
3. THE WORK PLATFORM AT PIER 4 WILL NOT BE PRESENT WHEN THE ALTERNATE TEMPORARY CHANNEL IS OPEN.

PLAN



ELEVATION

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MATTHEW BERNHARD DEHL
STATE OF WASHINGTON
43912
REGISTERED PROFESSIONAL ENGINEER
STRUCTURAL
REGISTERED PROFESSIONAL ENGINEER
86197PE
OREGON
September 11, 2007
MATTHEW BERNHARD DEHL
RENEWS: 12-31-13

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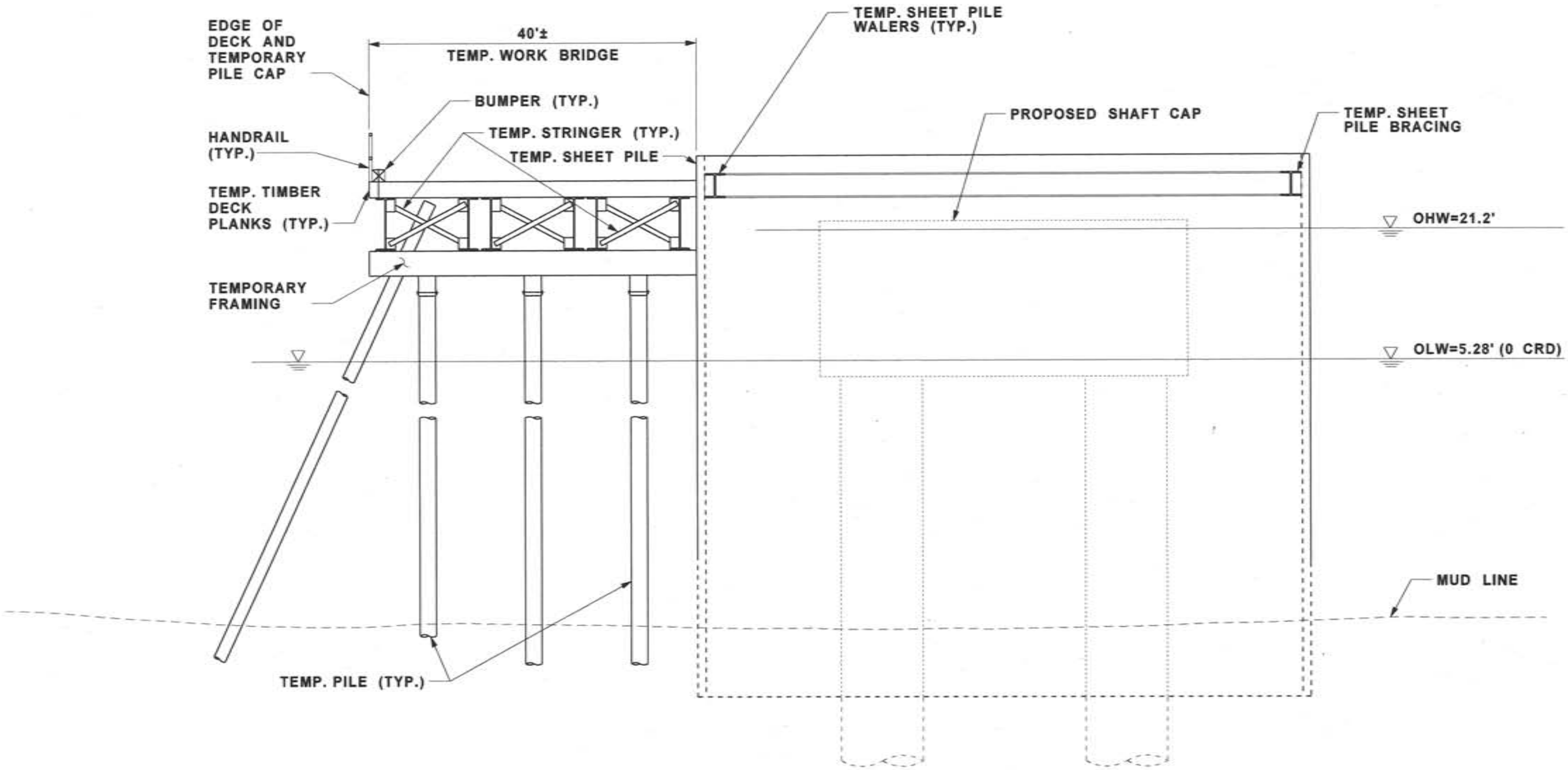
FEET

UNITED STATES COAST GUARD BRIDGE PERMIT DRAWINGS

COLUMBIA RIVER CROSSING INTERSTATE 5 OVER COLUMBIA RIVER, MILE 106.4 AT VANCOUVER, WA (CLARK COUNTY) & PORTLAND, OR (MULTNOMAH COUNTY)	
APPLICATION BY: WASHINGTON STATE DEPARTMENT OF TRANSPORTATION & OREGON DEPARTMENT OF TRANSPORTATION **ROUTE:** INTERSTATE 5 **DATE:** JAN. 2013	SHEET 4 OF 6 SHEETS
TEMPORARY STRUCTURES/FALSEWORK PLAN	



TYPICAL FOUNDATION SECTION ~ PIER RC-2 & RC-7

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RENEWS: 12-31-13

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FEET

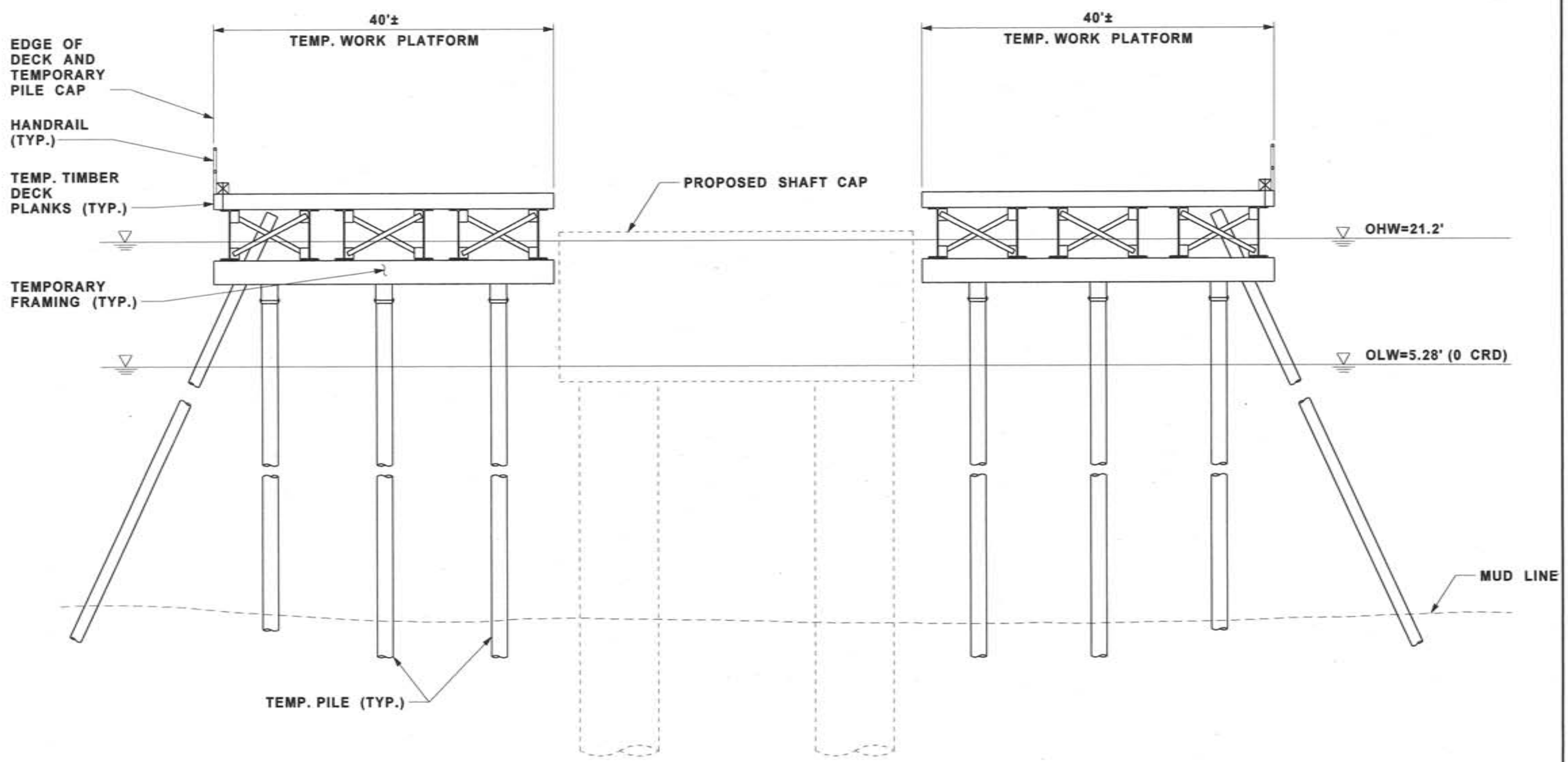
UNITED STATES COAST GUARD BRIDGE PERMIT DRAWINGS

COLUMBIA RIVER CROSSING
INTERSTATE 5 OVER COLUMBIA RIVER, MILE 106.4 AT
VANCOUVER, WA (CLARK COUNTY) & PORTLAND, OR (MULTNOMAH COUNTY)

APPLICATION BY: WASHINGTON STATE DEPARTMENT OF TRANSPORTATION & OREGON DEPARTMENT OF TRANSPORTATION
ROUTE: INTERSTATE 5 **DATE:** JAN. 2013

SHEET 5 OF 6 SHEETS

TEMPORARY STRUCTURES/FALSEWORK DETAILS



TYPICAL FOUNDATION SECTION ~ PIER RC-3 - RC-6

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UNITED STATES COAST GUARD BRIDGE PERMIT DRAWINGS

COLUMBIA RIVER CROSSING
INTERSTATE 5 OVER COLUMBIA RIVER, MILE 106.4 AT
VANCOUVER, WA (CLARK COUNTY) & PORTLAND, OR (MULTNOMAH COUNTY)

APPLICATION BY: WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
& OREGON DEPARTMENT OF TRANSPORTATION
ROUTE: INTERSTATE 5 **DATE:** JAN. 2013

SHEET 6 OF 6 SHEETS

TEMPORARY STRUCTURES/FALSEWORK DETAILS

ATTACHMENT D

Alternative Properties Memo

Columbia River CROSSING

Memorandum

January 23, 2013

TO: Jay Lyman, CRC

FROM: Paul Sorensen

SUBJECT: Alternative Properties

Study Purpose

The construction of the proposed CRC bridge over the Columbia River is expected to impact three metal fabricators with operations at the Columbia Business Center (CBC) located upriver of the proposed bridge. A portion of the CBC operations of these businesses includes constructing and shipping large metal structures that will be too tall to pass under the proposed bridge.

The purpose of this memo is to document an investigation and a literature review of other properties in Washington and Oregon where these tall fabrications could occur – sites that would not be height-constrained by the proposed bridge. This memo does not attempt to determine whether one or more of the three firms with operations at the CBC would relocate all or part of their operations to a new site. Business location decisions will be up to the individual businesses. This memo evaluates the suitability of other sites for these activities, in part to determine whether the conditions at the CBC that accommodate these height constrained fabrication activities are unique or relatively common.

A property search was undertaken during July 2012. In addition, a literature review of other property searches for construction sites and marine terminals was undertaken in December 2012.

Property Search

The property search entailed properties with the following characteristics:

- Approximately 25 acres (or more) of uplands
- Located on navigable waters that have 25 or more feet of water depth
- Reasonable access to rail and road systems
- Zoned for heavy industrial uses or could be rezoned to allow heavy industrial use
- Sale or lease
- Approximate sale or lease price (if available)

The search indicated that there are several properties that meet these characteristics as described below.

Port of Vancouver

Contact: Curtis Schuck, Director of Economic Development & Facilities, phone 360.992.1119

Date 7-16-2012

There is a site that could meet these requirements:

- Property adjacent to Terminal 5
    - located on the Columbia River (water depth 30+ feet)

- 30+ acres
- Access to water, road, rail
- Estimated value ~$5 per foot
- Lease rate range $0.05 per SqFt per month
- Zoned to permit heavy industry

City of Portland

Contact: Steve Kountz, City of Portland Bureau of Planning & Sustainability Senior Economic Planner, phone 503-823-7700

Date 7-16-2012

There are four sites that could meet these requirements:

- Atofina Chemicals
  - located on the Willamette River (water depth 30+ feet)
  - ~61 acres
  - Access to water, road, rail
  - Estimated value unknown
  - Lease rate range unknown
  - Zoned to permit heavy industry
- Time Oil
  - located on the Willamette River (water depth 30+ feet)
  - ~45 acres
  - Access to water, road, rail
  - Estimated value unknown
  - Lease rate range unknown
  - Zoned to permit heavy industry
- McCormick & Baxter Creosoting
  - located on the Willamette River (water depth 30+ feet)
  - ~44 acres
  - Access to water, road, rail
  - Estimated value unknown
  - Lease rate range unknown
  - Zoned to permit heavy industry
- Vigor Industrial, LLC
  - located on the Willamette River (water depth 30+ feet)
  - Newly acquired 960 ft drydock could be used for partial or full fabrication of oil rig assemblies
  - Access to water, road, rail
  - Estimated value unknown
  - Lease rate range unknown
  - Zoned to permit heavy industry

Port of Kalama

Contact: Mark Wilson, Deputy Director | Development Director, phone 360 673-2325

Date 7-10-2012

Port of Kalama North Port property could be a potential site:

- North Port
  - located on the Columbia River (water depth 30+ feet)
  - 30+ acres
  - Access to water, road, rail
  - Estimated value ~ $200,000/acre but would need to make a strong case for sale of property
  - Lease rate range ~ $12,000/acre per year
  - Zoned to permit heavy industry

Port of Woodland

Contact: Nelson Holmberg, Executive Director, phone 360 225-6555

Date 7-10-2012

The Port has nothing available at this time.

Port of Longview

Contact: Ken O'Hollaren, Executive Director, phone 360 425-3305

Date 7-6-2012

The Port has nothing available at the time but a longer term opportunity could be available at Barlow Point.

Longview (Millenium Bulk)

Contact: Peter Bennett, Vice President of Business Development, phone 360 425-2800

Date 7-16-2012

Millenium Bulk has property that could meet these requirements at the terminal site in Longview. Details on price would require additional discussion but Millenium Bulk is a potential site:

- Millenium Bulk Terminal Area
  - located on the Columbia River (water depth 30+ feet)
  - 30+ acres
  - Access to water, road, rail
  - Estimated value ~ to be determined
  - Lease rate range - to be determined
  - Zoned to permit heavy industry

Port of Astoria

Contact: Herb Florer, Deputy Director/Interim Executive Director, phone 503-741-3300

Date 7-10-2012

Tongue point could meet the requirements:

- Tongue Point
    - located on the Columbia River (water depth 30+ feet)
    - 25+ acres
    - Access to water, road, rail
    - Estimated value ~ to be determined; unlikely to sell
    - Lease rate range - to be determined
    - Zoned to permit heavy industry

Port of St Helens

Contact: Paula Miranda, Deputy Executive Director, phone 503-397-2888

Date 7-10-2012

Several properties could meet the requirements, perhaps best opportunity is at:

- Columbia City Industrial Park
    - located on the Columbia River (water depth 30+ feet)
    - 30 to 40 acres
    - Access to water, road, rail
    - Estimated value ~ to be determined; unlikely to sell
    - Lease rate range - to be determined
    - Zoned to permit heavy industry

Port of Grays Harbor

Contact: website search

Date 7-10-2012

Several properties could meet the requirements, perhaps best opportunity is at:

- IDD-1 Riverfront
    - located on the Grays Harbor at the confluence of the Hoquiam and Chehalis rivers
    - 30+ acres
    - Access to water, road, rail
    - Estimated value ~ to be determined
    - Lease rate range - to be determined
    - Zoned to permit heavy industry

WSDOT Construction Site

Contact: website search

Date 12-23-2012

- SR520 Pontoon Construction Site in Aberdeen[1]
    - located on the Grays Harbor at the confluence of the Hoquiam and Chehalis rivers

[1] This site is discussed further in the “Literature Review” section below.

  - 55 acres (including 4 acre casting basin for float construction)
  - Access to water, road, rail
  - Estimated value ~ to be determined
  - Lease rate range - to be determined
  - Zoned to permit heavy industry (currently)

Port of Tacoma

Contact: Jay Stewart, Real Estate, phone: 253-383-5841

Date 7-13-2012

Several properties could meet the requirements:

- Arkema Property
  - located on the Hylebos Waterway(water depth 30+ feet)
  - 40+ acres
  - Access to water, road, rail
  - Estimated value ~ $15 to$20/foot
  - Lease rate range - $0.10 to $0.15 per sq ft per month
  - Zoned to permit heavy industry
- Kaiser Property
  - located on the Hylebos Waterway(water depth 30+ feet)
  - 80 acres
  - Access to water, road, rail
  - Estimated value ~ $15 to$20/foot
  - Lease rate range - $0.10 to $0.15 per sq ft per month.
  - Zoned to permit heavy industry

Everett

Contact: web search

Date 1-9-2013

- Kimberly Clark Property
  - located on Port Gardner Bay (water depth 30+ feet)
  - 55+ acres
  - Access to water, road, rail
  - Estimated value - unknown
  - Lease rate range - unknown
  - Zoned to permit heavy industry

Anacortes

Contact: website search

Date 1-5-2013

- MJB Property

- located in Anacortes on Fidalgo Bay (water depth 30+ feet)
- 36 acres
- Access to water, road, but not rail
- Estimated value unknown
- Lease rate range - unknown
- Zoned to permit heavy industry – currently being used by another fabricator for construction of large tanks for Alaska oil (Exxon-Mobil), term of lease unknown

Bellingham

Contact: Dan Stahl, Maritime Director

Date 1-5-2013

- Bellingham Shipping Terminal
  - located on Bellingham Bay (water depth 30+ feet)
  - ~40 acres (BST has 12 acres of open storage at the terminal but this can be expanded to approximately 40 acres including GP property)
  - Access to water, road, rail
  - Estimated value unknown
  - Lease rate range - unknown
  - Zoned to permit heavy industry – recently used by Greenberry Industrial to reconstruct the Arctic Challenger, an oil spill response barge for use in Alaska by Shell, term of lease unknown

Literature Review

In addition to the above property search, a literature review was conducted of potential sites that could meet the specified requirements.

Hood Canal Bridge Site Selection Report

The Washington State Department of Transportation (WSDOT) conducted a detailed search for sites for a graving dock to support construction of pontoons and anchors for the Hood Canal Bridge. At the end of December 2004, WSDOT received 18 proposals from public and private owners. This section briefly reviews the proposed sites and the criteria for selection. The sites were evaluated according to the criteria identified in Table 1.

Table 1 – Criteria Used for Site Selection for Hood Canal Bridge Construction

Criteria	Poor	Fair	Good
Towing Distance	> 100 miles	35 - 100 miles	< 35 miles
Site Size	< 16 acres	16 - 30 acres	> 30 ares
Waterfront Length	< 900 feet	900 - 1,000 feet	> 1,000 feet
Land & Water Access	Poor	Fair	Good
Existing Marine Facitities	Limited	Needs improvements	Ready for use
Proximity of Other Marine Facilities	> 30 miles	15 - 30 miles	< 15 miles
Tides & Currents	Severe	Moderate	Typical
Wind & Wave Exposure	Severe	Moderate	Minimal
Proximity of Rail	No direct acces	Within haul distance	Adjacent to site
Access to Aggregate	> 15 miles	7 - 15 miles	< 7 miles
Proximity to Concrete Plants	> 30 miles	15 - 30 miles	< 15 miles
Site Utilities	None	Needs improvements	Ready for use
Environmental Risks	High	Moderate	Low
Environmental Process	> 12 months	6 - 12 months	< 6 months
Site Data	Limited	Some exploration	Due diligence completed
Proximity to Trades People	> 60 miles	30 - 60 miles	< 30 miles
Local Support	None	Some	High
Availability for SR 520 Project	No	Maybe	Yes

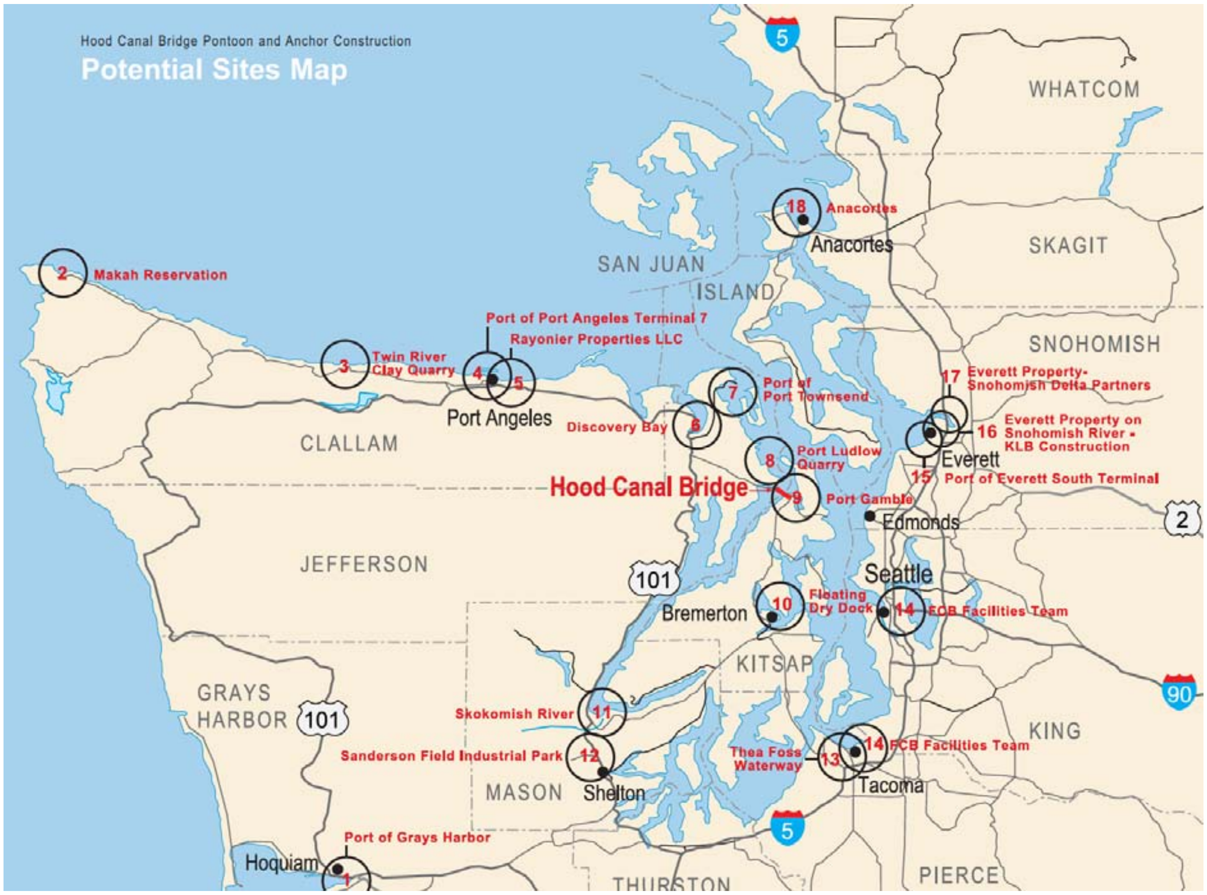
Source: Hood Canal Bridge Site Selection, WSDOT, March 2005, page 2.

The most important of these criteria for constructing large metal fabrications (such as those fabricated at the CBC site on the Columbia River) are: site size, land & water access, existing marine facilities, proximity of other marine facilities, tides & currents, wind & wave exposure, proximity of rail and site utilities. BST Associates ranked the sites according to these criteria and only included sites with 25 or more acres.

The resulting ranked list of potential sites includes the following sites (the number before the site name identifies the location of the site on the map of sites (Figure 1):

- 15 Port of Everett South Terminal
- 5 Rayonier Properties LLC
- 17 Everett Property – Snohomish Delta Partners
- 7 Port of Port Townsend
- 10 Floating Dry Dock
- 16 Everett Property on Snohomish River – KLB Construction
- 9 Port Gamble
- 18 Anacortes
- 8 Port Ludlow Quarry
- 6 Discovery Bay
- 2 Makah Reservation
- 1 Port of Grays Harbor
- 3 Twin River Clay Quarry
- 12 Sanderson Field Industrial Park
- 11 Skokomish River

Figure 1 – Site Selection Map for Construction of Hood Canal Bridge pontoons



Source: Hood Canal Bridge Site Selection, WSDOT, March 2005

Table 2 – Criteria for Selecting Hood Canal Pontoon Construction Site

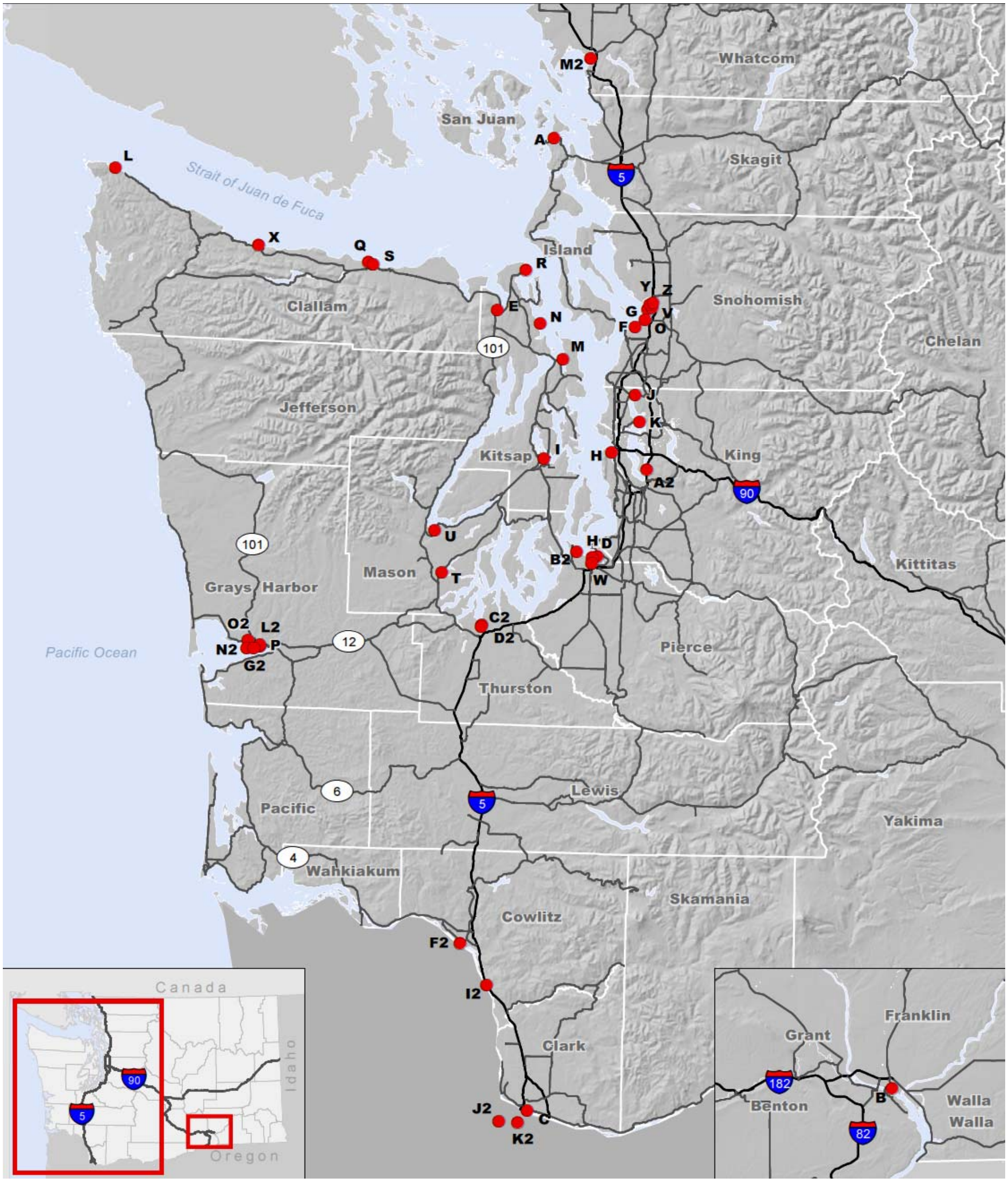
Sites	Towing Distance	Site Size	Waterfront Length	Land & Water Access	Existing Marine Facilities	Proximity of Other Marine Facilities	Tides & Currents	Wind & Wave Exposure	Proximity of Rail	Access to Aggregate	Proximity to Concrete Plants	Site Utilities	Environmental Risks	Environmental Process	Site Data	Proximity to Trades People	Local Support	Availability for SR 520 Project	Ranking for Site Relocation by Fabricators	Location	Acres		Rank for 25+ acre sites
15 Port of Everett South Terminal	3	2	3	3	3	3	3	2	3	3	3	3	2	2	1	3	2	3	22	Everett	26	1	22
5 Rayonier Properties LLC	2	2	3	3	2	3	3	3	1	3	3	3	1	2	3	3	2	3	20	Port Angeles	25	1	20
17 Everett Property – Snohomish Delta Partners	3	3	3	2	2	3	1	3	3	3	3	3	1	2	2	3	3	3	20	Everett	150	1	20
7 Port of Port Townsend	3	3	3	3	2	3	3	2	1	3	3	3	1	2	1	2	2	2	20	Port Townsend	44	1	20
10 Floating Dry Dock	2			3	3	3	2	3	3	2	3	3				3		1	20	Bremerton	?	1	20
16 Everett Property on Snohomish River – KLB Construction	3	2	2	2	2	3	1	3	3	3	3	3	2	2	1	3	3	3	19	Everett	26	1	19
9 Port Gamble	3	2	3	3	2	3	2	2	1	3	3	3	2	1	3	3	3	3	18	Port Gamble	26	1	18
18 Anacortes	2	3	3	2	1	3	2	2	3	2	2	2	2	2	3	3	2		18	Anacortes	36	1	18
8 Port Ludlow Quarry	3	3	3	2	2	1	3	3	1	3	1	2	3	2	3	3	2	3	17	Port Ludlow	60	1	17
6 Discovery Bay	3	3	3	2	2	1	3	3	1	3	3	2	1	1	2	3		3	17	Discovery Bay	100	1	17
2 Makah Reservation	1	3	3	2	1	1	3	2	1	3	2	3	2	2	1	1	3	3	16	Neah Bay	50	1	16
1 Port of Grays Harbor	1	3	3	2	1	1	1	2	1	3	2	3	2	2	1	1	3	3	14	Aberdeen	45	1	14
3 Twin River Clay Quarry	2	3	3	2	2	2	1	1	1	3	2	2	3	2	1	3		3	14	Clallam County	210	1	14
12 Sanderson Field Industrial Park		3	1	1	1	1			1	2	2	3	2	2	1	2			10	Shelton	100	1	10
11 Skokomish River	2			1	1	1		2	1	2	2		1	1	1	2			6	Mason County	?	1	6
14 FCB Facilities Team	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3		3	23	Seattle	20	-	-
4 Port of Port Angeles Terminal 7	2	1	3	3	2	3	3	3	1	3	3	3	1	2	1	3	3	2	19	Port Angeles	15	-	-
13 Thea Foss Waterway	2	1	1	2	3	3		3	2	3	3	3	1	2	1	2		2	17	Tacoma	6	-	-
Important Criteria for CRC Site Assessment		1		1	1	1	1	1	1			1											

In 2010, WSDOT refined the search for candidates sites for construction of the pontoons related to the SR520 Bridge. Approximately 40 sites were considered (see Figure 2 for locations):

- A MJB Properties, Anacortes, WA
- B Big Pasco Industrial Center, Pasco, WA
- C Columbia Industrial Park, Vancouver, WA
- D Concrete Technology Corporation, Hylebos Waterway, Tacoma, WA
- E Discovery Bay, Jefferson County, WA
- F KLB Construction property, Everett, WA
- G Snohomish Delta Partners, Everett, WA
- H FCB Facilities Team (various sites), Seattle and Tacoma, WA
- I Puget Sound Naval Shipyard drydock or other floating Drydocks
- J Glacier Northwest Kenmore Premix Plant, Kenmore, WA
- K Lake Washington (in-lake), Seattle, WA
- L Makah Reservation, Neah Bay, WA
- M Port Gamble Mill Site, Port Gamble, WA
- N Port Ludlow Quarry, Jefferson County, WA
- regulations
- O Port of Everett South Terminal, Everett, WA
- P Port of Grays Harbor IDD #1, Hoquiam, WA
- Q Port of Port Angeles Terminal 7, Port Angeles, WA
- R Port of Port Townsend, Port Townsend, WA
- S Rayonier Properties, Port Angeles, WA
- T Sanderson Field Industrial Park, Shelton, WA
- U Skokomish River, Mason County, WA
- V Snohomish Delta Partners (Miller Shingle Mill), Everett, WA
- W Thea Foss Waterway, Tacoma, WA
- X Twin River Clay Quarry, Clallam County, WA
- Y Port of Everett Riverside Business Park, Everett, WA
- Z Cedar Grove Composting, Snohomish County, WA
- A2 Lake Washington, Renton, WA
- B2 Port of Tacoma, Tacoma, WA
- C2 Washington Department of Natural Resources
- D2 Port of Olympia, Olympia, WA
- E2 Port Gamble, Port Gamble, WA

- F2 Port of Longview, Longview, WA
- G2 Weyerhaeuser (Cosmopolis), Aberdeen, WA
- H2 Port of Anacortes, Anacortes, WA
- I2 Port of Kalama, Kalama, WA
- J2 Northwest Industrial Center, Multnomah County, OR
- K2 Hayden Island, Multnomah County, OR
- M2 Whatcom Waterway, Bellingham, WA
- O2 Port of Grays Harbor Terminal 3, Hoquiam, WA

Figure 2 - Site Selection Map for Construction of SR520 pontoons and anchors



Source: FINAL ENVIRONMENTAL IMPACT STATEMENT, SR 520 BRIDGE REPLACEMENT AND HOV PROGRAM, DECEMBER 2010, SR 520 Pontoon Construction Project, Appendix B, Description of Alternatives and Construction Techniques Discipline Report

Based upon this search, WSDOT narrowed the selection to three sites and ultimately chose the site referred to as the Aberdeen Log Yard.

This site is scheduled for use through 2014, after which a decision will be made regarding its future use. It offers 55 acres of industrial land, with a 4 acre casting basin for float construction, access for ocean barges, direct access to the site by rail and road, and utilities for major construction. It could potentially be used to support metal fabrication or construction projects.

West Hayden Island Marine Cargo Forecasts & Capacity Assessment Final Report[2]

BST Associates conducted a study of alternative port development sites for the Port of Portland in 2010. The report found that there were more than 2,000 acres of land (Table 3) available for near-term and long-term development in the Lower Columbia River from Longview/St Helens to Portland/Vancouver:

> "Including known public and private sites, there are an estimated 2,058 gross acres[3] of potential land for marine terminal development. This is slightly more than the existing supply of marine terminals. It is likely that a substantial portion of this acreage will not be developed due to environmental constraints, market conditions, and financial viability, particularly with respect to required infrastructure and terminal development."

Table 3 - Lower Columbia River Port Expansion Capability for Large Marine Terminals (gross acres)

Location/Type	Expansion Capability	Expansion Capability
Public Ports		
Portland	450	22%
Vancouver	718	35%
Longview	-	0%
Kalama	90	4%
St Helens	200	10%
Subtotal	1,458	71%
Private Sites		
Chinook Ventures	300	15%
Barlow Point	300	15%
Subtotal	600	29%
Total	***2,058***	***100%***

> "Portland - The Port of Portland has limited space available at its existing marine terminals, with approximately 71.5 acres available at three separate locations. If the Port of Portland is to engage in large scale marine terminal development, it needs to have a large site for development. The only site that could be used for this purpose is West Hayden Island, which includes approximately 450 acres. It is unknown how much of this area could be devoted to marine terminals.
>
> Vancouver - The Port of Vancouver has approximately 718 acres for marine terminal development. This includes current development of Terminal 5 and future development of Columbia Gateway.
>
> Longview - In Longview, there are an estimated 600 acres of expansion at private sites (Barlow Point and Chinook Properties). The Port of Longview will essentially be out space after development of the new grain terminal.

2 Source: West Hayden Island Marine Cargo Forecasts & Capacity Assessment Final Report prepared by BST Associates for the Port of Portland, April 2010, pages 44-45

3 A gross acre refers to total developable area, which may include marine terminal, rail and road access and other components of pot development.

> Kalama - The Port of Kalama has approximately 90 acres of expansion at the North Port. However, the Port of Kalama has an expressed interest in cargo generating companies (like the steel mill), and may not compete for marine terminal development opportunities.
>
> St Helens - The Port of St Helens has approximately 200 acres available for development that could serve marine terminals. Much of the waterfront frontage at the Port Westward site has been utilized for development of an ethanol plant and a power plant."

Several of these sites could meet the criteria for constructing height-constrained metal fabrications.

Portland Harbor: Industrial Land Supply Analysis

The purpose of this study was to assess the availability of sites in Portland that could be utilized as port development sites. Two sites were identified:

> "The Atofina site is a collection of parcels under several ownerships, which total approximately 114 acres (59 acres in the four main Atofina parcels, and an additional 55 acres in adjacent parcels across Front Ave.). The parcels are zoned heavy industrial (IH), and are bordered by industrial uses. The site is adjacent to SR 30 and fronts the Willamette River within the Portland Harbor.
>
> The Time Oil site includes several separately owned parcels totaling approximately 84.2 acres. The subject parcels are adjacent to the Willamette River within the Portland Harbor and are zoned heavy industrial (IH) with a 'River' overlay designation. The site is bordered by industrial uses and also an area governed by a soon-to-expire natural resource management plan."

These sites would meet the requirements for constructing height-constrained metal fabrications.

Survey and Characterization of Potential Offshore Wave Energy Sites in Oregon

The purpose of the study was to assess the viability of coastal sites in Oregon to support off-shore energy production. Seven candidate sites were evaluated, including:

- Clatsop County — Astoria
- Tillamook County — Garibaldi
- Lincoln County — Newport
- Lane County — Cushman
- Douglas County — Reedsport
- Coos County — Coos Bay
- Curry County — Brookings

In recent news, OPAC has reduced the number of candidate sites.

> "That leaves on the list REFSSAs offshore of Camp Rilea, in Clatsop County, Gold Beach, in Curry County, two near Reedsport, in Douglas County, and one near Newport, in Lincoln County. All are near deepwater ports – Astoria, Newport, and Coos Bay – considered important for maintaining the offshore facilities. One of the sites near Reedsport already has a permit from the Federal Energy Regulatory Commission (FERC), issued before the state of Oregon began Territorial Sea Plan revisions four years ago."[4]

The ports of Astoria, Newport and Coos Bay have sites that could be used for constructing height-constrained metal fabrications. Astoria's Tongue Point has 25+ acres of potential land for development with rail access, suitable water depth for ocean barge transit and no height constraints. Newport's recently constructed Newport International Terminal has approximately 17 acres, which is under the

[4] Source: OPAC rejects Pacific City, Netarts wave-energy sites, The News Guard, January 8th, 2013 by Joe Wrabek

required site size. Coos Bay has sites available on the North Spit that could meet the requirements for constructing height-constrained metal fabrications, including access by road, rail and ocean barge.

Summary

The preliminary search revealed that there are several properties that could meet the requirements for constructing the metal fabrications that would be height-constrained by the proposed CRC bridge, and that at least one of these sites has already been used for height-constrained fabrication. There is also substantial interest from local communities in assisting economic development that creates and/or retains well paying family wage jobs, such as the jobs in the metal fabrication industry.

This search was a brief assessment of the availability of potential sites. It is likely that a more exhaustive search could reveal additional sites that could meet the proposed site requirements.

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ATTACHMENT E

Land Use Analysis Summary and Maps

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1. INTRODUCTION

The Navigation Impact Report (November 2012) included findings on how the reduced vertical clearance of the proposed I-5 replacement bridge could affect future land use and development upriver from the proposed I-5 replacement bridge. Chapter 7 and Appendix A of the NIR provide a lengthy and detailed presentation of the analysis and findings. That analysis identified 13 focus areas upriver from the proposed bridge where such development could potentially occur, and provided focused analysis of each of those areas.

Since the publication of the NIR, the USCG has requested a list of all contacts made with the jurisdictions that plan and regulate land use on the potentially affected properties, and more detailed maps, showing parcel boundaries, of those properties. This report:

- Summarizes the key findings from the future land use analysis,
- Provides more detailed maps showing the parcels of land that were investigated in detail, and
- Lists the sources of information consulted for the land use analysis.

2. LAND USE PLANNING IN WASHINGTON AND OREGON

In Washington, most cities and counties are required to prepare comprehensive plans addressing a framework of state goals and specific requirements under Washington's Growth Management Act (GMA). Depending upon population and growth characteristics (see following sentence), some counties are considered to be "partially planning" counties, and are mandated to prepare comprehensive plans addressing a limited range of requirements primarily addressing agricultural, forest and mineral resource lands, and critical areas. Other counties or cities with a population of 50,000 or more or a 17% increase in population within the past 10 years are considered to be "fully planning" counties and cities, and are mandated to prepare plans addressing a broader set of requirements. Of the three Washington state counties that were evaluated through the future land use analysis documented in the NIR, only Clark County is considered a "fully planning" county. Skamania and Klickitat Counties are considered "partially planning" jurisdictions. All three jurisdictions and the cities within them have comprehensive plans prepared under the requirements of the GMA. In Washington, there is no state or other agency that approves or certifies local comprehensive plans, but there are three regional hearings boards that hear and rule on petitions of non-compliance. Comprehensive plans must be submitted to the Washington Department of Community Trade and Economic Development (CTED), which may offer comments on them. CTED does not have the authority to accept or reject the plans.

In Oregon all counties and cities are required to prepare comprehensive plans addressing a framework of state goals and specific requirements – all jurisdictions must comply with the same statewide planning requirements. Plans are reviewed for such consistency by the state´s Land Conservation and Development Commission (LCDC). When LCDC officially approves a local government´s plan, the plan is said to be acknowledged. It then becomes the controlling document for land use in the area covered by that plan. Oregon´s planning laws also apply to special districts and state agencies. The laws strongly emphasize coordination - keeping plans and programs consistent with each other, with the goals, and with acknowledged local plans.

Comprehensive Plans in both Oregon and Washington for much of the project analysis area upriver from the Portland-Vancouver Metropolitan area must implement and be in compliance with the Columbia Gorge National Scenic Area (NSA). The NSA 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 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 Scenic Area, while encouraging growth within existing urban areas of the Scenic Area and allowing development outside urban areas consistent with resource protection. The Columbia River Gorge Commission has adopted and is administering a Columbia River Gorge Management Plan pursuant to the requirements of the National Scenic Area Act. Within the Columbia River Gorge National Scenic Area, future residential and commercial development is encouraged to occur in the Urban Areas, but there is allowance for some residential development outside the urban areas. The NSA does not allow industrial development outside of the Urban Areas. The Scenic Area promotes public access to recreation and water-dependent recreation in the NSA.

In Washington, in addition to a Comprehensive Plan, local jurisdictions in Washington must comply with Washington's Shoreline Management Act (SMA) (adopted in 1972). The goal of the Act is "to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines." The SMA applies to the Washington counties within the project area as they have "shorelines of the state." "Preferred" uses with respect to the SMA 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 (RCW 90.58.020). The SMA supports the use of the Columbia River shoreline for water-dependent industrial uses. However, development must meet the SMA "no net loss of shoreline ecological function" basis and therefore intensive uses could become impact-prohibitive or cost-prohibitive due to mitigation requirements (http://nsgl.gso.uri.edu/riu/riuc04001/pdffiles/papers/20825.pdf).

County and city zoning regulations state what types of land uses can be located in each zoning area. Some uses are allowed "by right," which means they can be allowed 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 development may have to meet regardless of whether it is permitted outright, typically include dimensional regulations, including height and setbacks. Zoning overlays are additional designations that may further restrict the uses or development, such as addressing standards and potential mitigation requirements 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.

2.1 LAND USE AND ZONING ALONG THE WATERWAY UPRIVER OF THE I-5 BRIDGES

The potential for future river users to generate shipments or vessels that could be impaired by the proposed replacement bridges was evaluated and documented in the 2012 NIR (see Chapter 7 and Appendix A of the NIR). This analysis considered the potential for future development on all tax lots within 300 feet of the Columbia River from the proposed I-5 CRC bridge upriver 95 miles to the BNSF Bridge at Celilo Falls, which has a height restriction that is lower than the vertical clearance of the proposed I-5 replacement bridge. The BNSF railroad bridge at Celilo Falls has a vertical clearance of 79 feet in the raised position.

Existing zoning information was overlaid on tax lots to determine which areas are currently developed or might be developable with water dependent uses. The majority of the land along this section of the Columbia River is zoned as National Scenic Area (NSA), which, except within incorporated areas, restricts industrial, commercial and most other uses. For these reasons, tax lots with the NSA zoning were removed from consideration because they would not generate water dependent industrial or commercial uses. The GIS analysis further refined the study by identifying the tax lots within incorporated areas and outside of the NSA with industrial, recreation, and commercial zoning designations that have the potential to develop with water dependent uses. The project team then contacted each city and county planning department (see Section 4 below) to identify specific plans[1] for these areas, the potential for development, and whether or not the tax lots identified within their jurisdiction are likely to develop with a water dependent use or another development pattern. The GIS screening and personal communication with local officials identified 13 focus areas (see figures 1 through 14 below) which were then studied in greater detail to determine the potential effects of the proposed CRC bridge.

Figure 1 identifies the 13 focus areas. Each area is shown in greater detail, including parcel boundaries, in Figures 2 through 14. The brief descriptions below provide an overview of the potentially important future land uses in these focus areas. Detailed information and analysis for each area is provided in Chapter 7 and Appendix A of the NIR.

2.1.1 Focus Area 1, Portland and 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, Oregon Iron Works and Greenberry Industrial; and JT Marine, a marine contractor) and recreational moorage at Steamboat Landing Marina. This is the primary location within the City upriver of the I-5 bridge, where such uses can occur. There is additional land for waterfront industrial development within the city limits downstream of the bridge. The Columbia Business Center (CBC) is the site of the only existing uses that generate shipments that would be height-constrained by the proposed bridge. While there are no known plans for redeveloping the site, the zoning designation allows for redevelopment with other types of uses. The CBC is discussed further in Section 7 of the GBP application cover letter.

On the Portland side of the river, far less industrial land is available. Based on communication with the City's Bureau of Planning and Sustainability: "...the majority of our Columbia riverfront industrial land is located downstream of the CRC project... There is some industrial frontage, both on Hayden Island and along the Columbia in the vicinity of 33rd Avenue that could support a future industrial use that created marine traffic. However, the location of NE Marine Drive may make it difficult to develop a facility for marine manufacturing. In addition, much of this land has some form of development on it already, and so would have to be redeveloped.[2]"

[1] The relevant sections of each city and county plan are included in Appendix A of the NIR.

[2] Source: Personal communication with Phill Nameny, Planner, City of Portland Bureau of Planning and Sustainability, 01/25/2013.

2.1.2 Focus Area 2, Fairview and Troutdale

Industrial uses within this focus area include the Troutdale Reynolds Industrial Park and a handful of water dependent uses including Sundial Marine Tug and Barge Works. None of these uses generates height constrained vessels or cargo. Input from the City of Fairview Public Works Director[3] indicates that they do not anticipate any future development would require more vertical clearance than the existing uses.

2.1.3 Focus Area 3, Camas and Washougal

There are two existing water-dependent sites within the jurisdiction of the City of Camas: the Georgia Pacific Camas Mill and the City of Camas Boat Ramp. The City of Camas leases a portion of the shoreline to Mark Marine Service. The waterfront industrial property in Washougal has been rezoned to commercial and is undergoing a process of waterfront revitalization.

2.1.4 Focus Areas 4, 5 and 6, Cascade Locks and Stevenson

Cascade Locks is positioning itself as a sailboat racing destination. The sailboats using this area are smaller and not height constrained by the proposed bridges. There are undeveloped industrial lots along the river. However, these lots have been identified for development that would not generate marine traffic (e.g. business parks, entertainment and recreational uses). 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. 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.

2.1.5 Focus Area 7, Carson

High Cascade Veneer began operating out of the former Stevenson Co-Ply peeler plant in the 1990s. The mill is still active but has been used sporadically in recent years due to market conditions. Future shipments generated by the forest products industry (log rafts or barges carrying logs, chips or other forest products) will easily pass under the proposed I-5 bridge.

2.1.6 Focus Area 8, Hood River

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. However, there is no direct access to the riverfront for barge or other terminals. The Port’s Marina offers moorage for over 150 vessels and has a short-term transient dock available for travelers. The boats home ported or calling on a transient basis are typically less than 40 feet long and would not be height constrained by the proposed bridge.

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[3] Source: Personal communication between Anneke Van der Mast, David Evans and Associates, Inc. and Allan Berry, Public Works Director. 01/25/2013.

2.1.7 Focus Area 9, White Salmon and Bingen

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, but it does not have direct access to the waterfront.

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. In addition, the site is used by the tug and barge operations of SDS, which includes a mooring area, and approximately 30 acres of upland area for storage/staging of products. SDS has a construction fleet network with cranes up to 150 ton capacity. SDS has never generated a height constrained shipment in the past. However, they have projected that they might generate a load with 100 feet of air draft in the future. This is discussed in Chapter 8 of the GBP application cover letter. There are no known plans to redevelop this site.

The White Salmon City Administrator[4] indicated that within White Salmon city limits, sites are constrained by railroad tracks along the river. None of the waterfront property within the city would be expected to generate height constrained vessels or cargo.

2.1.8 Focus Areas 10, 11, and 12, Wasco County, City of The Dalles and Dallesport

The Port of The Dalles Marina has space for 62 boathouses and approximately 30 open moorage slips. The Dalles Yacht Club is located at the marina. No height constrained vessels are expected from the marina.

Bernert Barge Lines maintains a maintenance and fabrication facility in The Dalles that has a dock, crane, and shop with capabilities for marine repairs and general metalworking. The company owns three towing vessels; and the largest air draft for these vessels is 52 feet. There is no indication that they would generate height constrained vessels or shipments in the future.

Mid Columbia Producers is a farmer-owned cooperative serving the grain producers of the mid-Columbia region. Their offices and grain elevators on the riverfront load barges with wheat, primarily for export. These are not height constrained shipments.

The Port sold all of its developable land, with the exception of one 85 acre tract adjacent to the Columbia River with barge access. The Port would like to see water-dependent development on this parcel but basalt outcroppings make development challenging.

The Northwest Aluminum smelter ceased operations in 2000. The 120 acre site is planned for commercial and industrial development, but is not located on the river.

2.1.9 Focus Area 13, Wishram

As seen in Figure 14, there are no industrial lands or uses in or near Wishram.

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[4] Source: Personal communication between Anneke Van der Mast, David Evans and Associates, Inc. and Patrick Munyan, City Administrator, White Salmon. 01/10/2013.

3. CONCLUSION ON FUTURE LAND USE

In the potentially affected area, there are undeveloped and potentially re-developable sites along the Columbia River that are zoned for industrial and other uses that will generate marine traffic. However, there are no known planned developments that would increase the height-constrained activities in the affected area. Information from the cities and counties with land use jurisdiction along the river identified no expectations that future changes would result in new upriver uses that would generate new height constrained vessels or cargo. Most of the land use plans for upriver counties support reuse of 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.

Based on the analysis summarized in Section 7 of the GBP application cover letter, and detailed in the NIR Chapter 7 and Appendix A, the 116-foot vertical clearance bridge is not expected to adversely impact planned commercial/industrial development.

4. SOURCES OF INFORMATION ON FUTURE LAND USES

The land use assessment used the following information:

1. Geographical Information Systems (GIS) maps and data; City and County comprehensive plans and zoning codes; Assessor data.
2. Interviews with city and county planning departments
3. Interviews with commercial river users.
4. Interviews with port authorities.

Information from the river user interviews, including dates and the names of the contacts, are in the NIR. Below are the dates and contact names for each of the ports, cities and counties that were contacted for information on future uses and land uses.

4.1 PORTS CONTACTED

Port of Astoria

Interviewee: Herb Florer, Deputy Director/Interim Executive Director

Dates: March 5, 2012, July 10, 2012

Port of St. Helens

Interviewee: Paula Miranda, Deputy Director

Dates: February 14, 2012; April 2, 2012; and July 10, 2012

Port of Longview

Interviewee: Rocky Fisher, Senior Superintendent of Operations

Date: March 8, 2012

Interviewee: Ken O’Hollaren, Executive Director

Date: July 6, 2012

Longview (Millennium Bulk)

Interviewee: Peter Bennett, Vice President of Business Development

Date: July 16, 2012

Port of Kalama

Interviewee: Mark Wilson, Deputy Director | Development Director

Dates: March 12, 2012 and July 10, 2012

Port of Vancouver

Interviewee: Katy Brooks, Community Planning and Outreach Manager

Date: March 13, 2012

Interviewee: Curtis Shuck, Director of Economic Development & Facilities

Date: July 16, 2012

Port of Woodland

Interviewee: Nelson Holmberg, Executive Director

Date: July 10, 2012

Port of Camas-Washougal

Interviewee: Dave Ripp, Executive Director

Date: September 11, 2012

Port of Skamania County

Interviewee: Julie Mayfield, Executive Assistant

Date: February 16, 2012

Interviewee: John McSherry, Executive Director

Date: September 25, 2012

Port of Cascade Locks

Interviewee: Chuck Daughtry, General Manager

Date: February 13, 2012

Port of Hood River

Interviewee: Laurie Borton, Operations Manager

Dates: February 14, 2012 and March 14, 2012

Interviewee: Brian Shortt, Commissioner

Date: September 4, 2012

Port of The Dalles

Interviewee: Andrea Klaas, Executive Director

Dates: February 13, 2012 and March 19, 2012

Port of Klickitat County

Interviewees: Margie Ziegler, Administrative Assistant and Port Auditor and Marc Thornsbury, Executive Director

Date: February 16, 2012

Interviewee: Marc Thornsbury, Executive Director

Date: September 25, 2012

Port of Arlington

Interviewee: Denise Ball, Administrative Assistant

Date: February 13, 2012

Port of Morrow

Interviewee: Lisa Mittelsdorf, Director Economic Development

Dates: February 14, 2012 and March 16, 2012

Port of Umatilla

Interviewee: Kim Puzey, General Manager

Dates: February 14, 2012 and March 16, 2012

Port of Pasco

Interviewee: Jim Toomey, Executive Director

Date: February 16, 2012

Port of Benton County

Interviewee: John Haakenson, Director of Airports and Operations

Date: February 17, 2012

Port of Walla Walla

Interviewee: Jim Kuntz, Executive Director

Date: March 7, 2012

Port of Garfield

Interviewee: Diana Ruchert, Assistant Manager

Date: February 16, 2012

Port of Whitman County

Interviewee: Debbie Snell, Properties and Development Manager

Date: February 16, 2012

Port of Clarkston

Interviewee: Jennifer Bly, Port Auditor

Date: February 16, 2012

Port of Lewiston

Interviewee: David Doeringsfeld, Port Manager

Date: February 14, 2012

4.2 CITIES AND COUNTIES

City of Bingen

Interviewee: Jan Brending, City Administrator

Date: January 10, 2013

City of Camas

Left message for Kathy Marlowe, Planner

Date: September 6, 2012 and September 26, 2012

Interviewee: Eric Levison, Director of Public Works

Date: September 24, 2012

Clark County

Interviewee: Marilee McCall Administrative Assistant, Clark County Community Planning (note: Marilee conversed with Gordy Euler, Sr. Planner and forwarded his comments)

Date: January 10, 2013

City of Cascade Locks

Left message in voice mailbox for contract Planner

Date: September 6, 2012 & September 26, 2012

City of The Dalles

Interviewee: Dan Durrow, Director of Community Development

Date: September 5, 2012

City of Fairview

Interviewee: Allan Berry, Public Works Director

Date: January 25, 2013

City of Hood River

Left message for Kevin Liburdy

Date: September 26, 2012 and September 27, 2012

Date: 01/10/2013

Email Exchange with Kevin Liburdy, Senior Planner, City of Hood River

Hood River County

Left message in voice mailbox for Planner

Date: September 6, 2012

Date: 01/17/2013

Email Exchange between with Mike Benedict, Director, Hood River County Community Development Department

Klickitat County Planning Department

Interviewee: Mo-Chi Lindblad, Senior Planner

Date: September 26, 2012

Multnomah County

Interviewee: Adam Barber, Sr. Planner

Date: 01/15/2013

City of Portland

Interviewee: Steve Kountz, Bureau of Planning & Sustainability Senior Economic Planner

Date: July 16, 2012

Interviewee: Joe Mollusky, Port of Portland Real Estate Property Manager

Date: September 11, 2012 and left message for Bureau of Development Services

Date: January 25, 2013

Email Exchange with Phil Nameny, Planner, City of Portland Bureau of Planning and Sustainability

Skamania County

Date: Januray 24, 2013

Email Exchange with Jessica Davenport, Planning Manager, Skamania County Community Development

City of Troutdale

Interviewee: Elizabeth McCullum, Economic Development Senior Planner

Date: September 13, 2012

City of Vancouver

Interviewee: Jon Wagner, Senior Planner

Date: September 27, 2012

Dates of In-person Meeting and correspondence: January 14-17, 2013

Correspondence with Jon Wagner, City of Vancouver Senior Planner, Matt Ransom, City of Vancouver Long Range Planning Division Manager; Greg Turner, City of Vancouver Land Use Manager.

Wasco County

Interviewee: Joey Sheaer, Sr. Planner

Date: January 10, 2013

City of Washougal

Interviewee: Mitch Kneipp, Interim Community Development Director

Date: September 5, 2012

City of White Salmon

Interviewee: Patrick Munyan, City Administrator

Date: January 10, 2013

5. MAPS OF LAND USE STUDY FOCUS AREAS

The 14 maps on the following pages show specific areas upriver of the I-5 bridges that were evaluated for their potential to result in future development or uses that could generate vessels or cargo that could be restricted by the proposed vertical clearance of the downriver I-5 bridges. Figure 1 shows the location of all the study areas along the river. Figures 2 through 14 provide a more detailed view of the parcel boundaries and zoning in each focus area, as well as notations regarding the specific parcels or sites that were studied in detail. As noted above, the detailed analysis of future land use is in Section 7 and Appendix A of the NIR. That analysis is organized according to these focus areas and the specific sites that are noted in the maps below.

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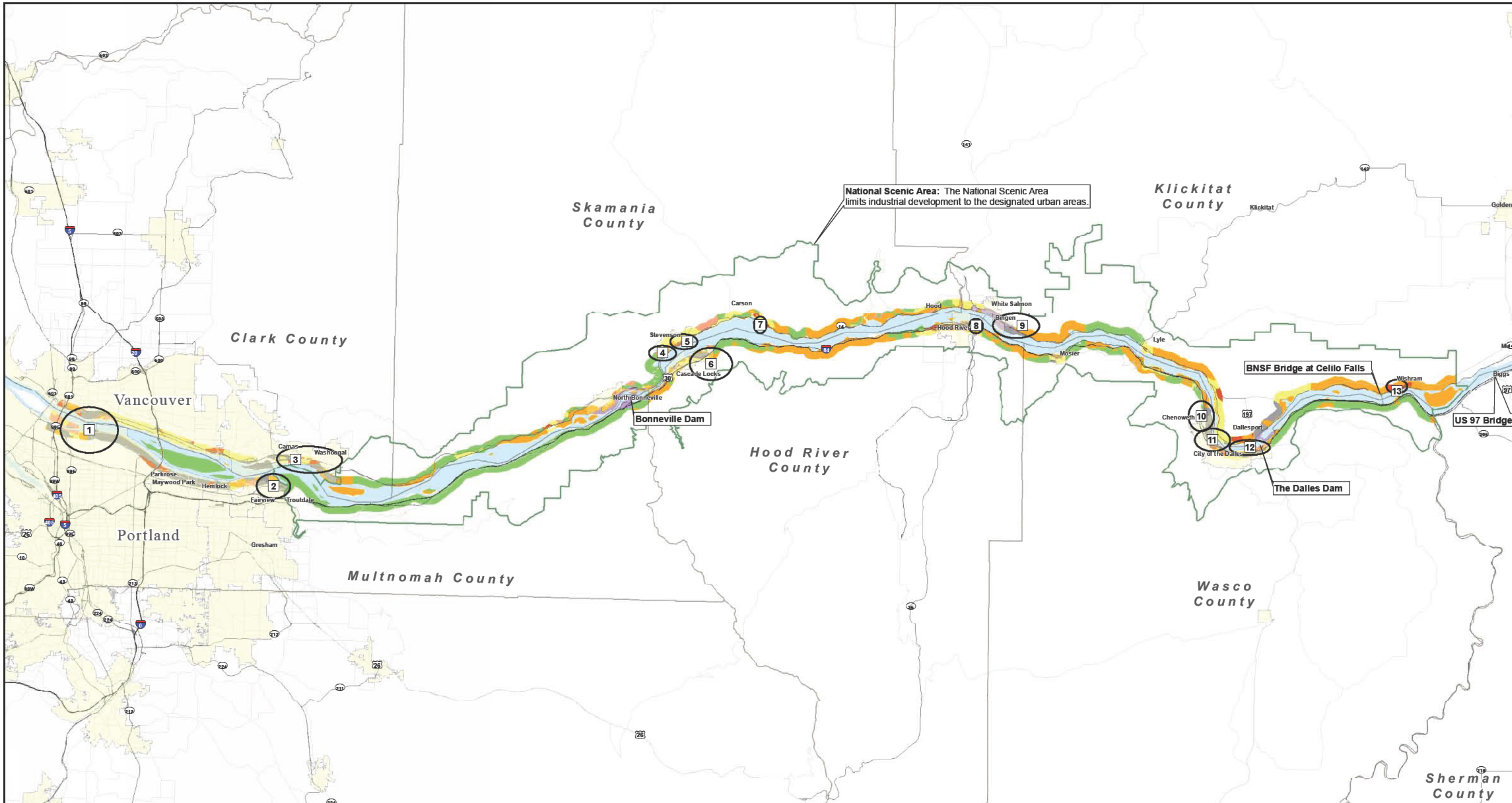

Potential Sites for Future Marine Navigation-Related Development

Focus Areas

National Scenic Area
County Boundary
OR City Limits
Railroad

Generalized Zoning
- Commercial
- Other Commercial
- Forest/Agriculture
- Industrial
- Public/Recreation
- Residential
- Urban

Figure 1
13 Focus Area of Future Land Use Analysis

0 2 4 8
SCALE IN MILES

N

Columbia River CROSSING

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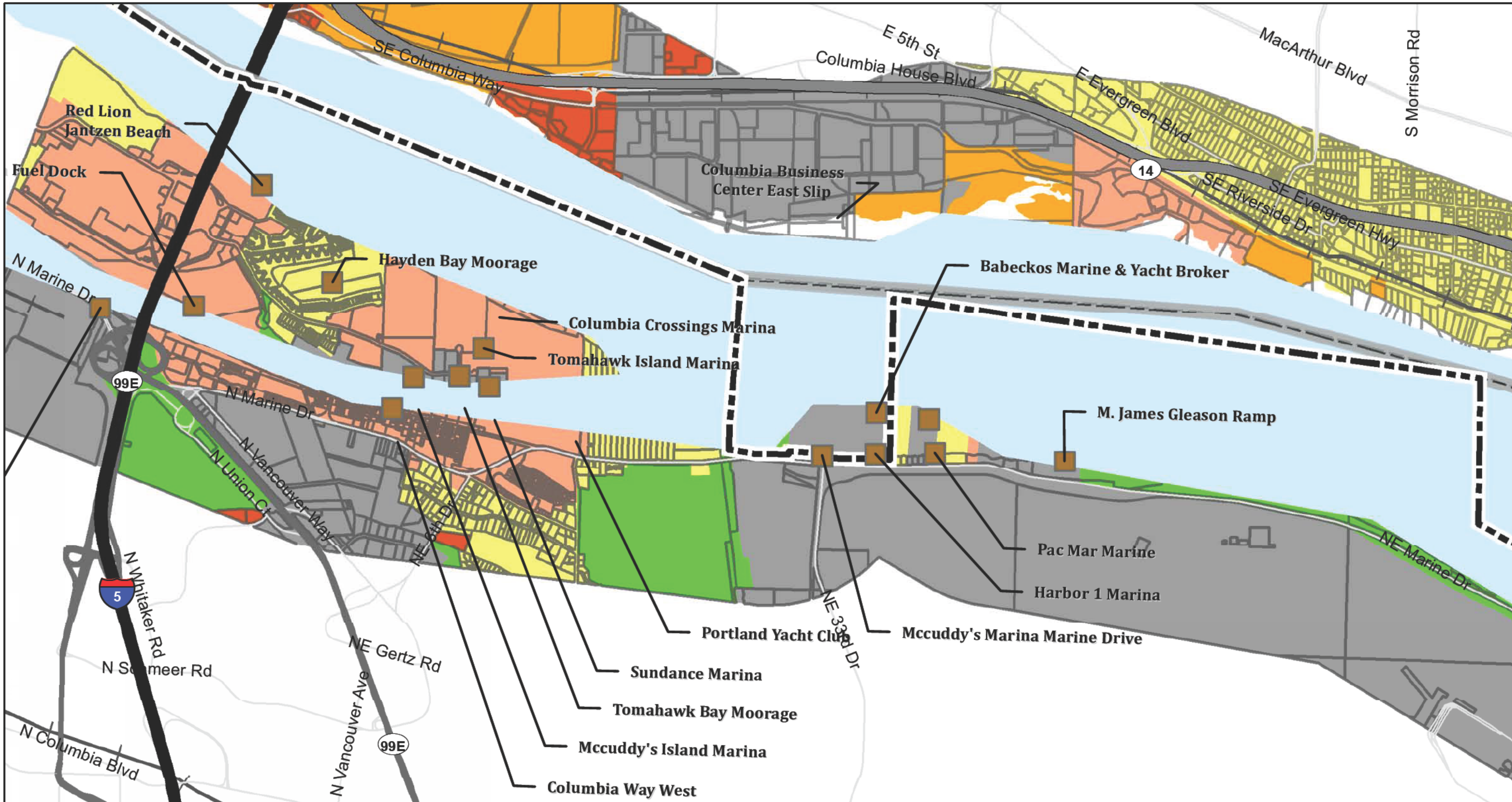
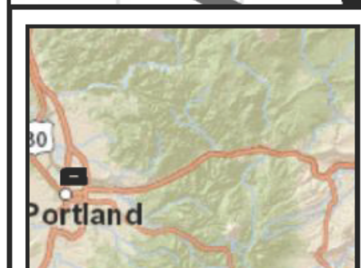




Zoning

within a half mile of the waterway

Page 1 of 13

	National Scenic Area
	City Limits
	County Boundary
	Taxlots
	Facility

USA Major Roads

- Freeway or Other Major Road
- Major Road Less Important than a Freeway
- Other Major Road
- Secondary Road
- Local Road
- Railroad

Generalized Zoning

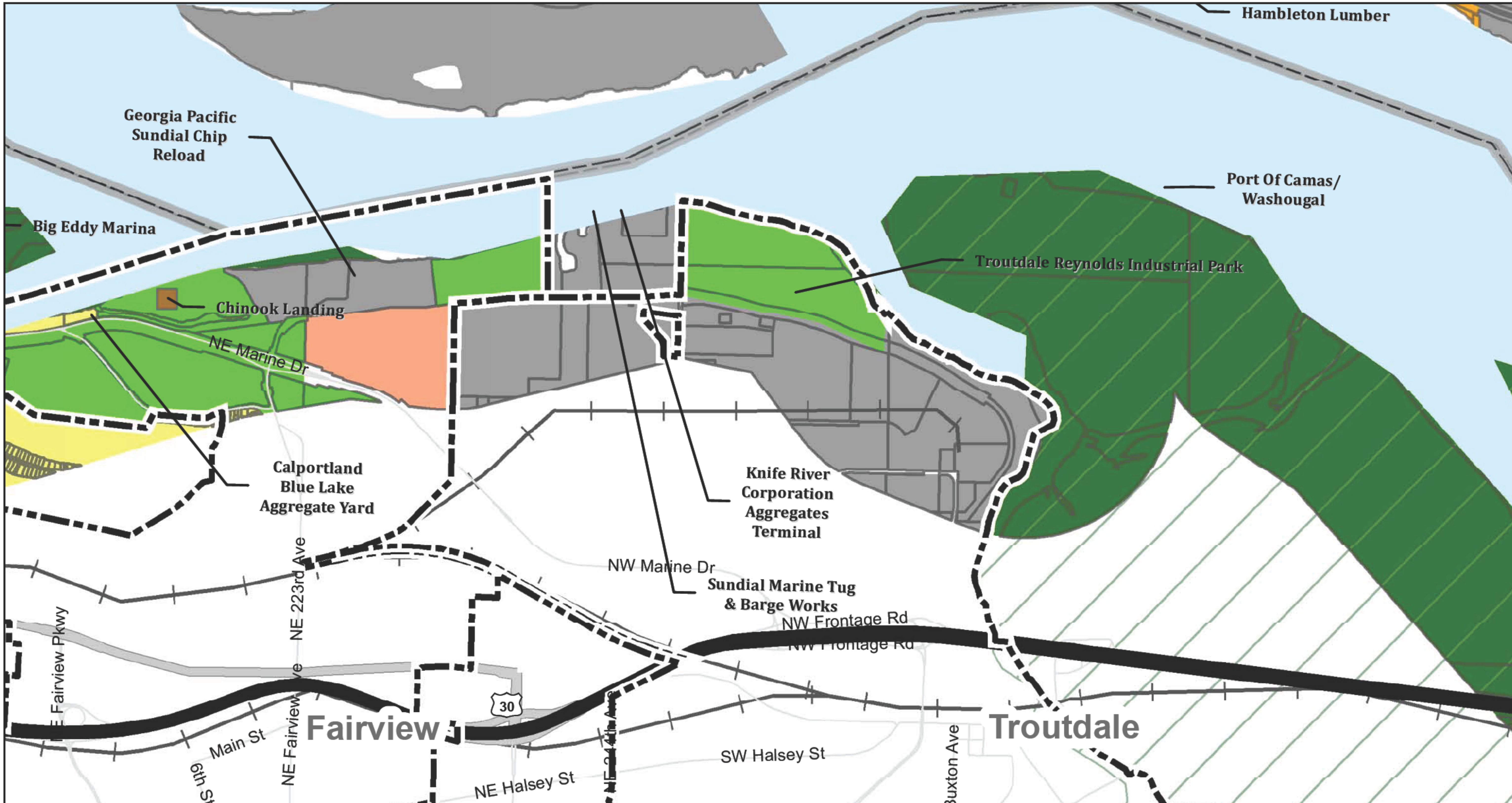
- Commercial
- Other Commercial
- Forest/Agriculture
- Industrial
- Public/Recreation
- Residential
- Urban

Figure 2
Area 1 - Portland and Vancouver

0 0.1 0.2 0.4
SCALE IN MILES

N

Columbia River CROSSING



Zoning

within a half mile of the waterway

Page 2 of 13

National Scenic Area
City Limits
County Boundary
Taxlots
Facility

USA Major Roads
Freeway or Other Major Road
Major Road Less Important than a Freeway
Other Major Road
Secondary Road
Local Road
Railroad

Generalized Zoning
Commercial
Other Commercial
Forest/Agriculture
Industrial
Public/Recreation
Residential
Urban

Figure 3
Area 2 - Fairview and Troutdale

0 0.1 0.2 0.4
SCALE IN MILES

N

Columbia River CROSSING

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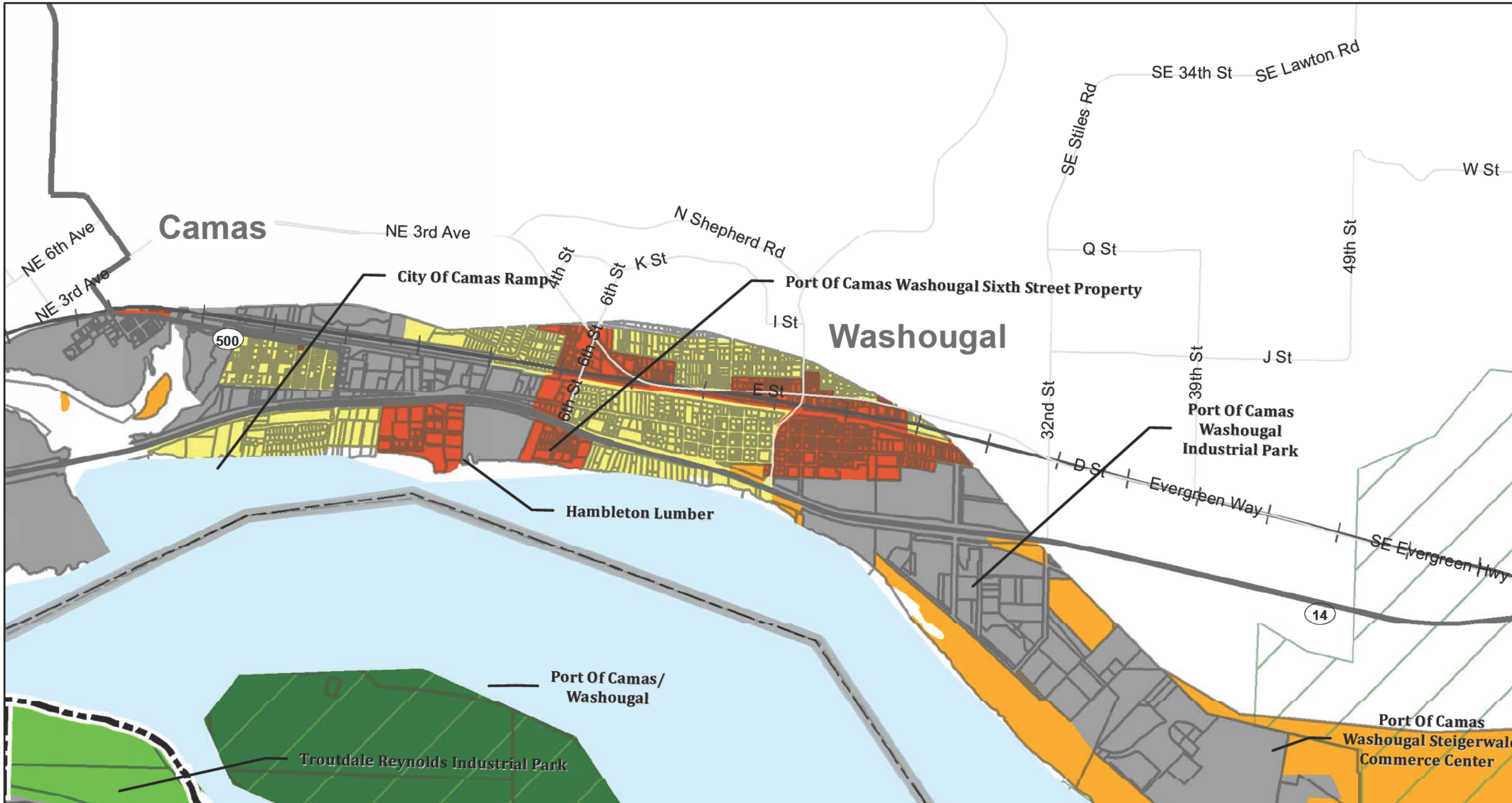


Zoning
within a half mile of the waterway

Page 3 of 13

National Scenic Area
City Limits
County Boundary
Taxlots
Facility

USA Major Roads
Freeway or Other Major Road
Major Road Less Important than a Freeway
Other Major Road
Secondary Road
Local Road
Railroad

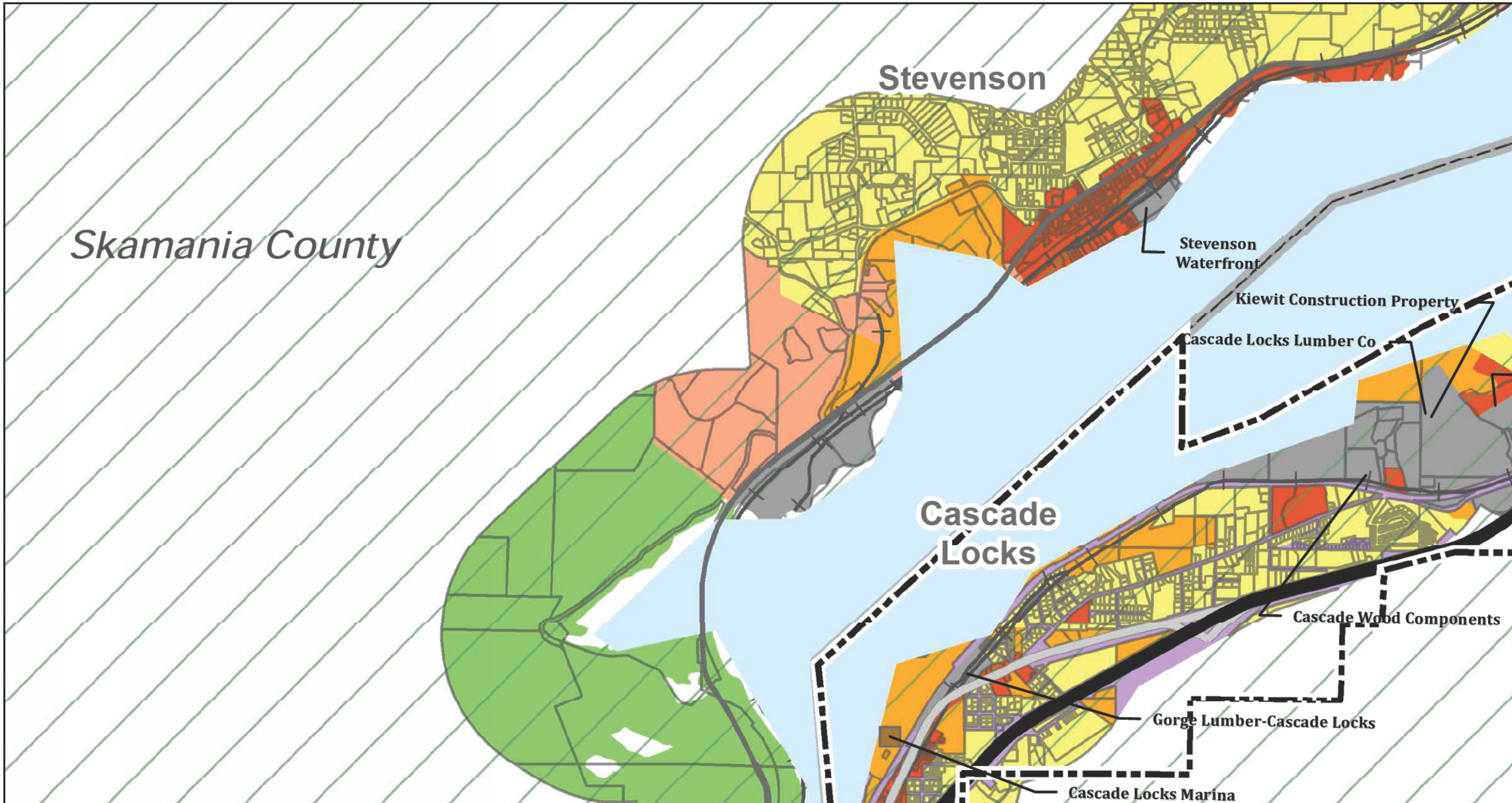
Generalized Zoning
Commercial
Other Commercial
Forest/Agriculture
Industrial
Public/Recreation
Residen ial
Urban

Figure 4
Area 3 - Camas and Washougal

0 0.1 0.2 0.4
SCALE IN MILES

N

Columbia River CROSSING



Zoning
within a half mile of the waterway

Page 4 of 13

Na ional Scenic Area
City Limits
County Boundary
Taxlots
Facility

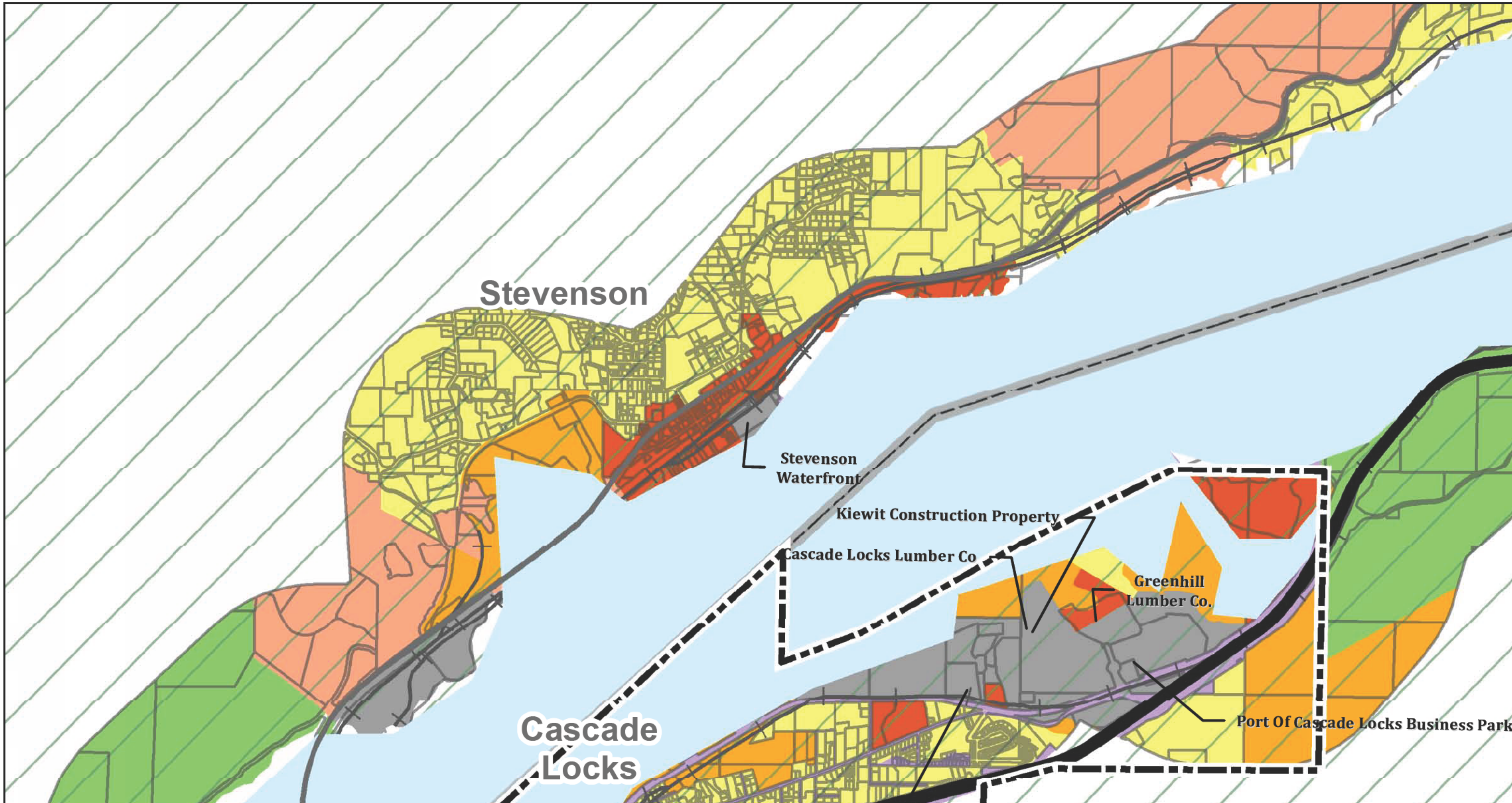
USA Major Roads
Freeway or Other Major Road
Major Road Less Important than a Freeway
Other Major Road
Secondary Road
Local Road
Railroad

Generalized Zoning
Commercial
Other Commercial
Forest/Agriculture
Industrial
Public/Recreation
Residential
Urban

Figure 5
Area 4 - Cascade Locks West

0 0.1 0.2 0.4
SCALE IN MILES
N

Columbia River CROSSING



Zoning
within a half mile of the waterway

National Scenic Area
City Limits
County Boundary
Taxlots
Facility

USA Major Roads
- Freeway or Other Major Road
- Major Road Less Important han a Freeway
- Other Major Road
- Secondary Road
- Local Road
- Railroad

Generalized Zoning
- Commercial
- Other Commercial
- Forest/Agriculture
- Industrial
- Public/Recreation
- Residential
- Urban

Figure 6
Area 5 - Stevenson Waterfront

0 0.1 0.2 0.4
SCALE IN MILES
N

Columbia River CROSSING

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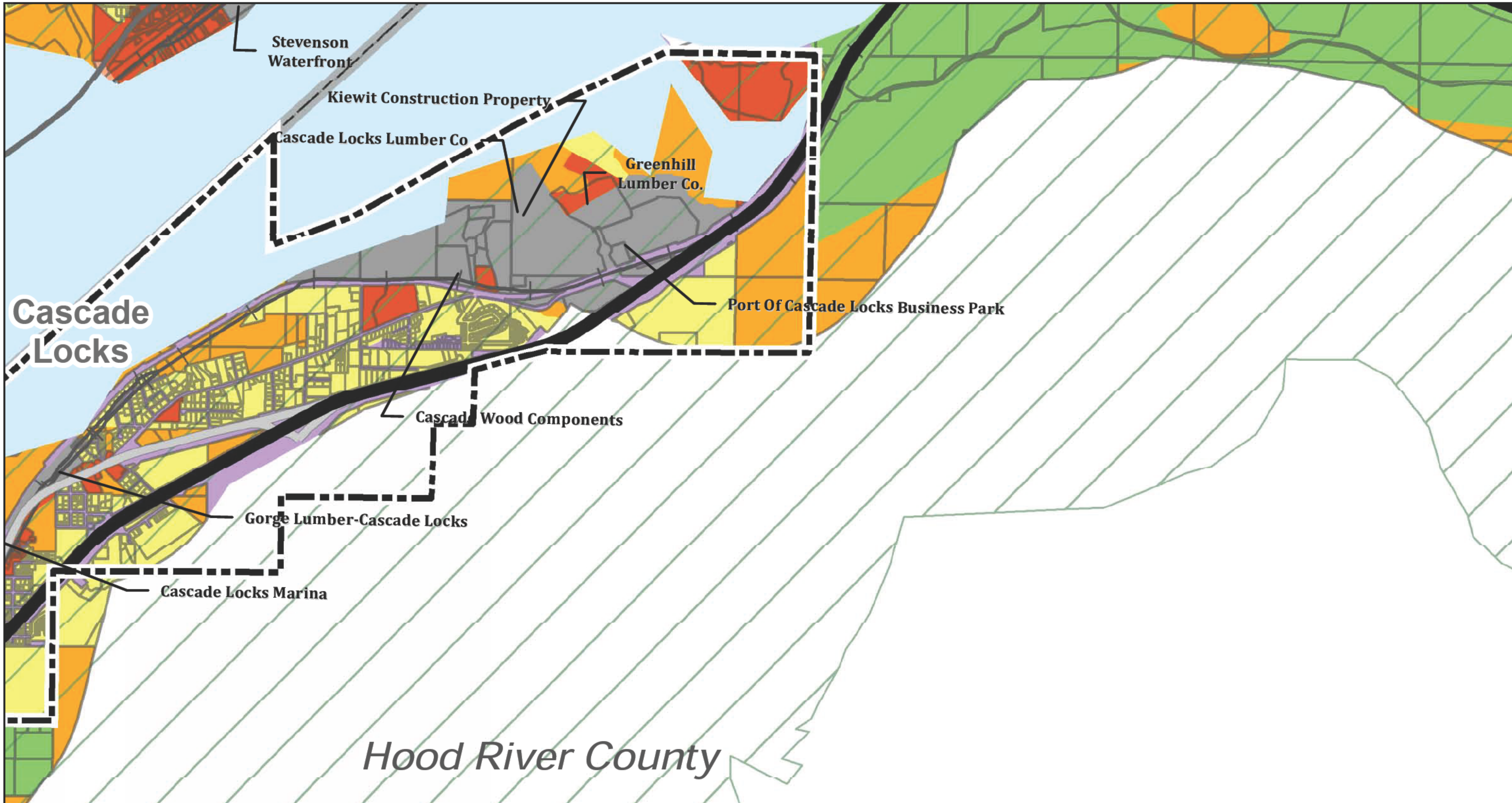

Zoning
within a half mile of the waterway

National Scenic Area
City Limits
County Boundary
Taxlots
Facility

USA Major Roads
Freeway or Other Major Road
Major Road Less Important than a Freeway
Other Major Road
Secondary Road
Local Road
Railroad

Generalized Zoning
Commercial
Other Commercial
Forest/Agriculture
Industrial
Public/Recreation
Residential
Urban

Figure 7
Area 6 - Cascade Locks East

0 0.1 0.2 0.4
SCALE IN MILES

N

Columbia River CROSSING

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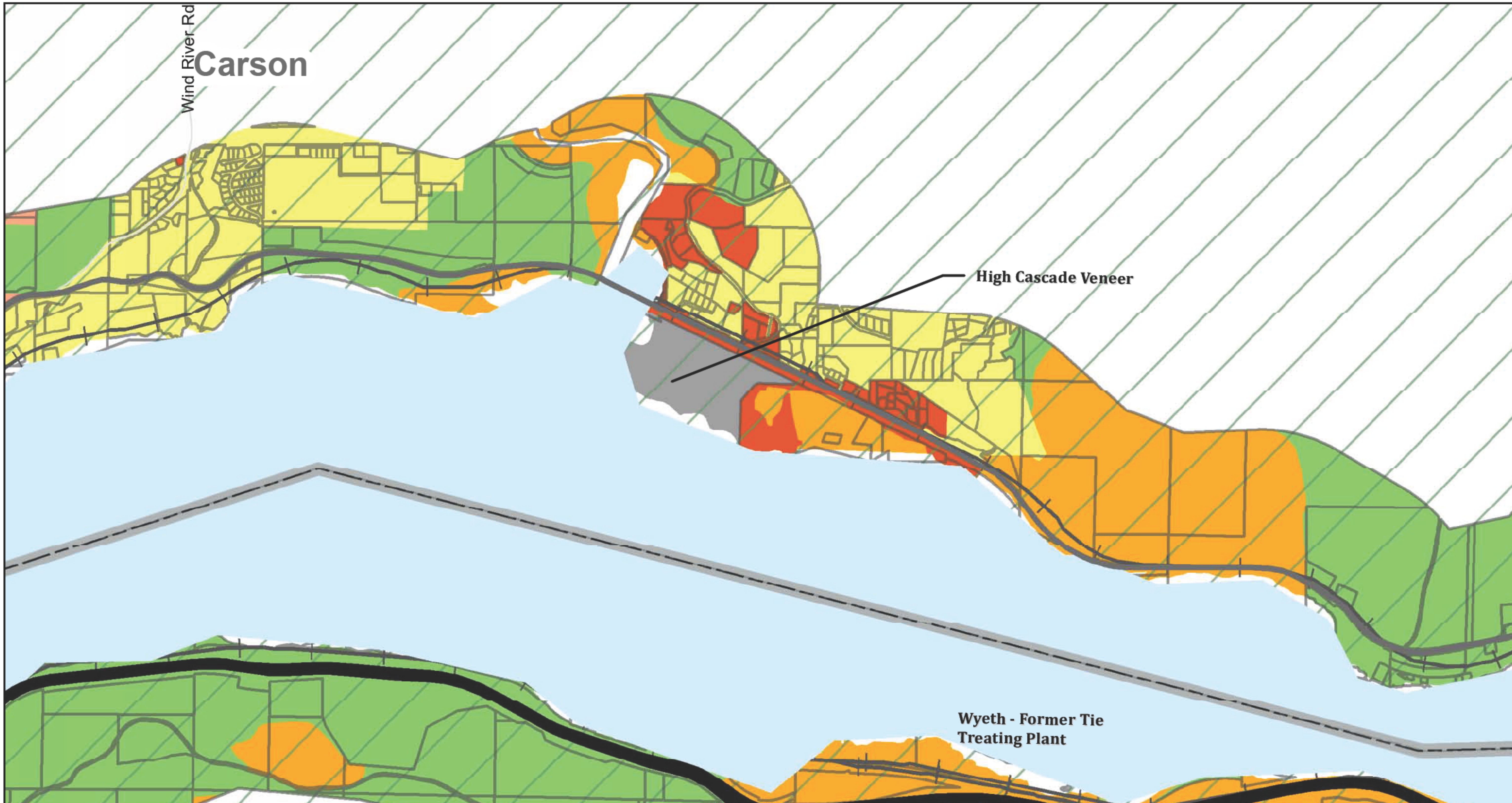

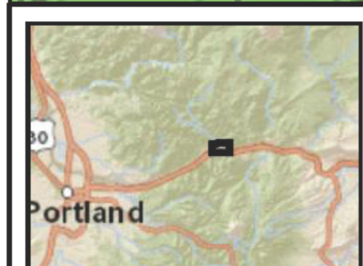

Zoning

within a half mile of the waterway

National Scenic Area
City Limits
County Boundary
Taxlots
Facility

USA Major Roads

Freeway or Other Major Road
Major Road Less Important than a Freeway
Other Major Road
Secondary Road
Local Road
Railroad

Generalized Zoning

Commercial
Other Commercial
Forest/Agriculture
Industrial
Public/Recreation
Residential
Urban

Figure 8
Area 7 - Carson

0 0.1 0.2 0.4
SCALE IN MILES

N

Columbia River CROSSING

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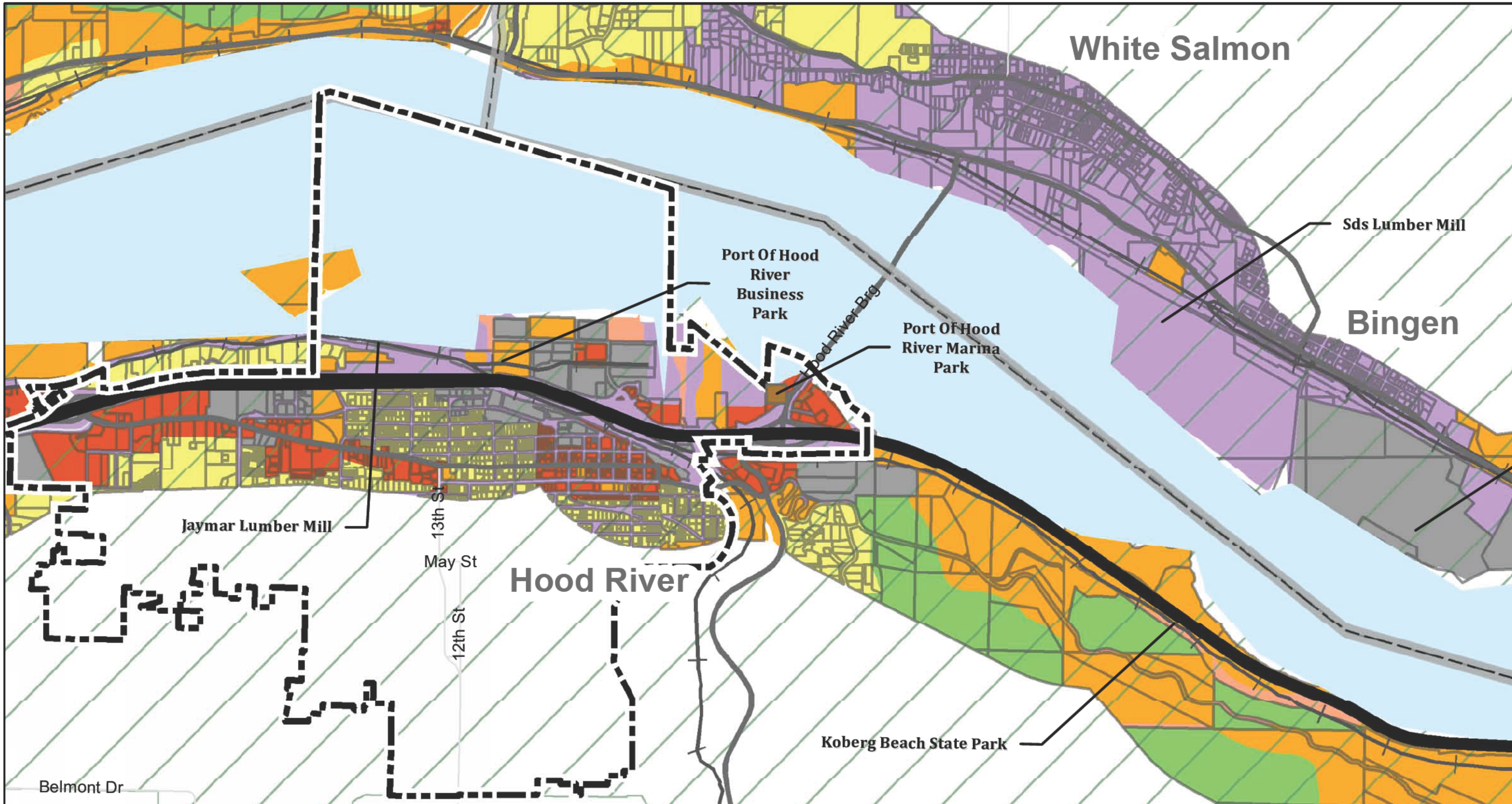

Zoning
within a half mile of the waterway

National Scenic Area
City Limits
County Boundary
Taxlots
Facility

USA Major Roads
Freeway or Other Major Road
Major Road Less Important than a Freeway
Other Major Road
Secondary Road
Local Road
Railroad

Generalized Zoning
Commercial
Other Commercial
Forest/Agriculture
Industrial
Public/Recreation
Residen ial
Urban

Figure 9
Area 8 - Hood River

0 0.1 0.2 0.4
SCALE IN MILES
N

Columbia River CROSSING

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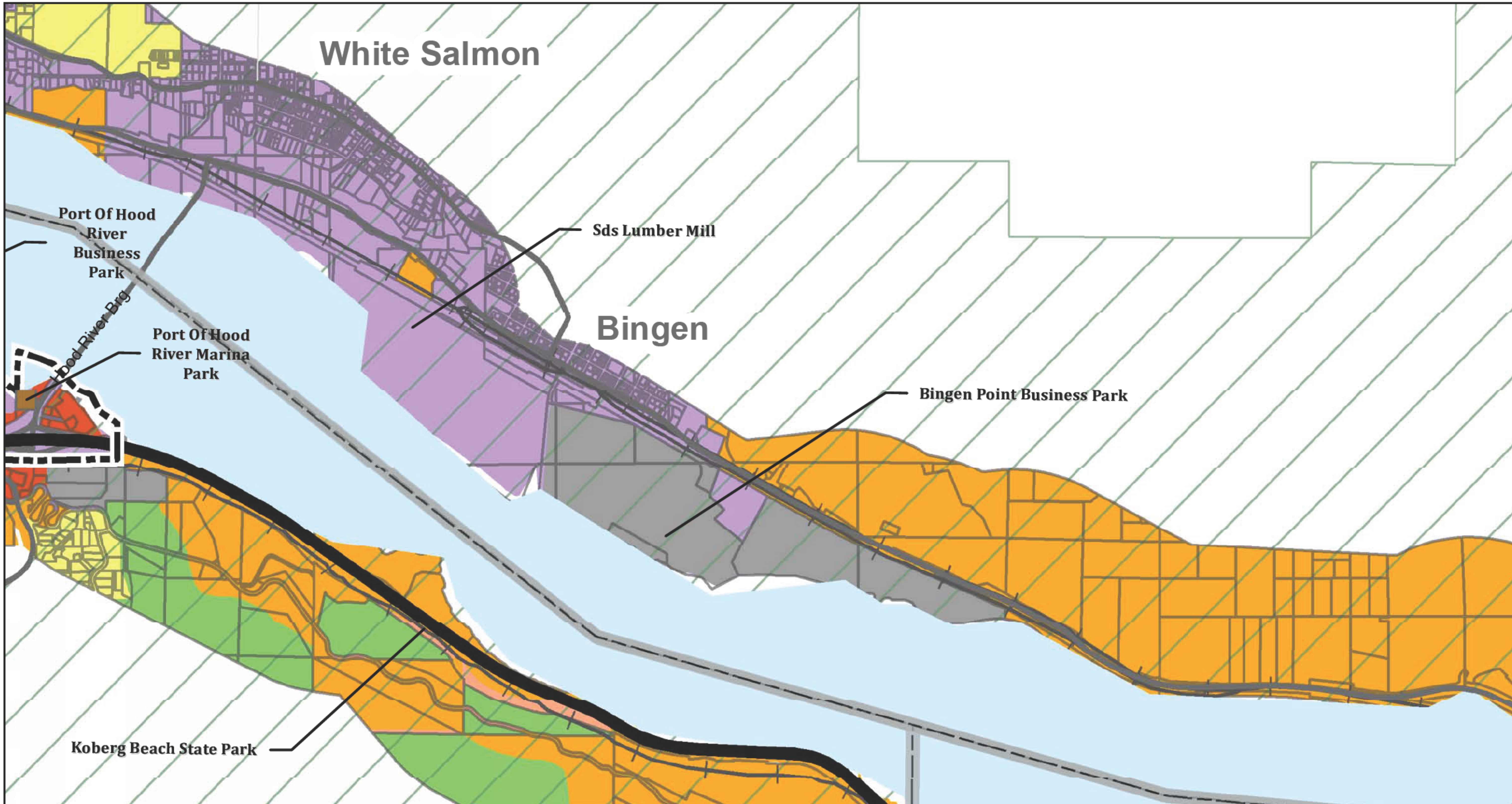

Zoning

within a half mile of the waterway

National Scenic Area
City Limits
County Boundary
Taxlots
Facility

USA Major Roads
- Freeway or Other Major Road
- Major Road Less Important than a Freeway
- Other Major Road
- Secondary Road
- Local Road
- Railroad

Generalized Zoning
- Commercial
- Other Commercial
- Forest/Agriculture
- Industrial
- Public/Recreation
- Residential
- Urban

Figure 10
Area 9 - White Salmon and Bingen

0 0.1 0.2 0.4
SCALE IN MILES

N

Columbia River CROSSING

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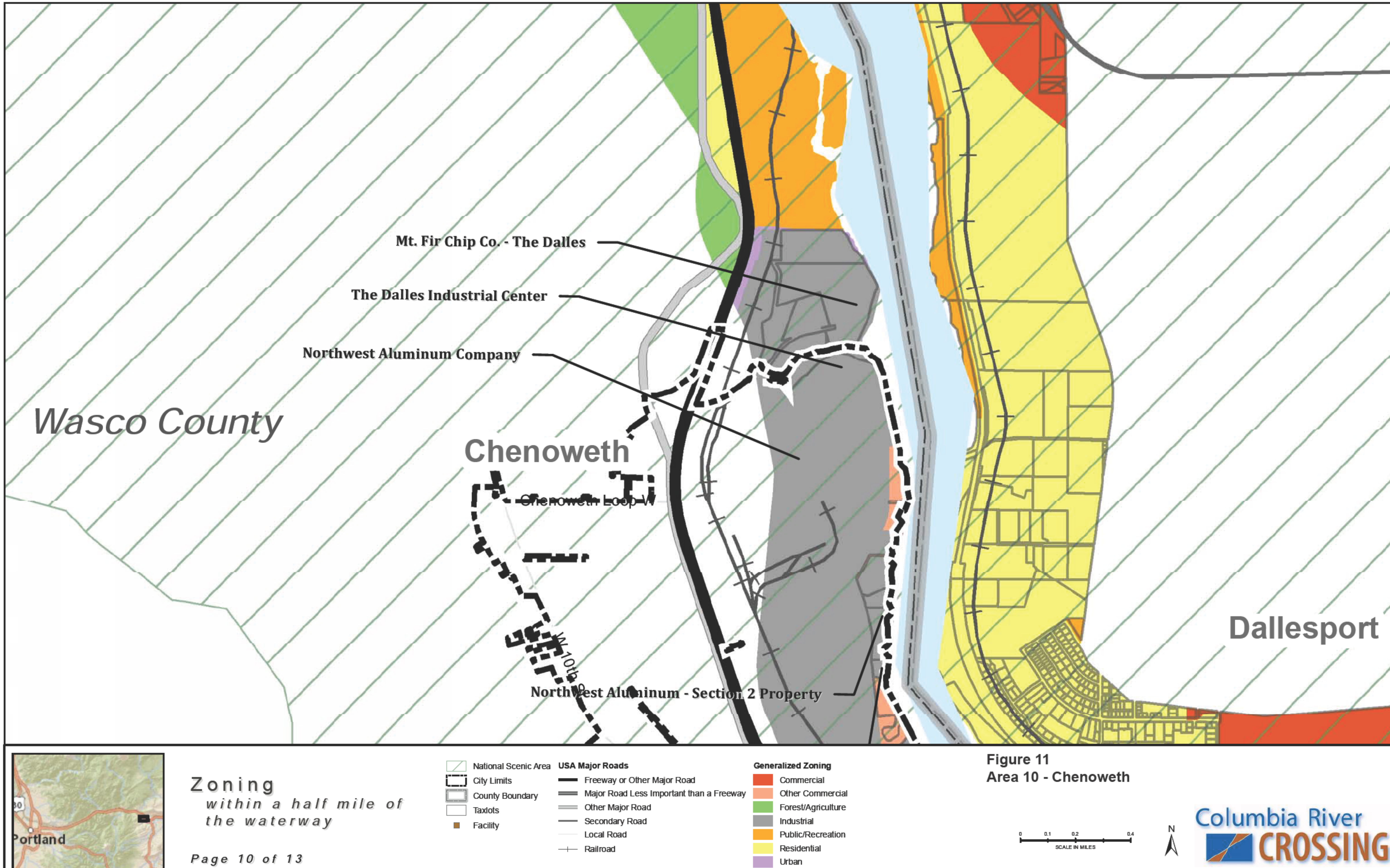

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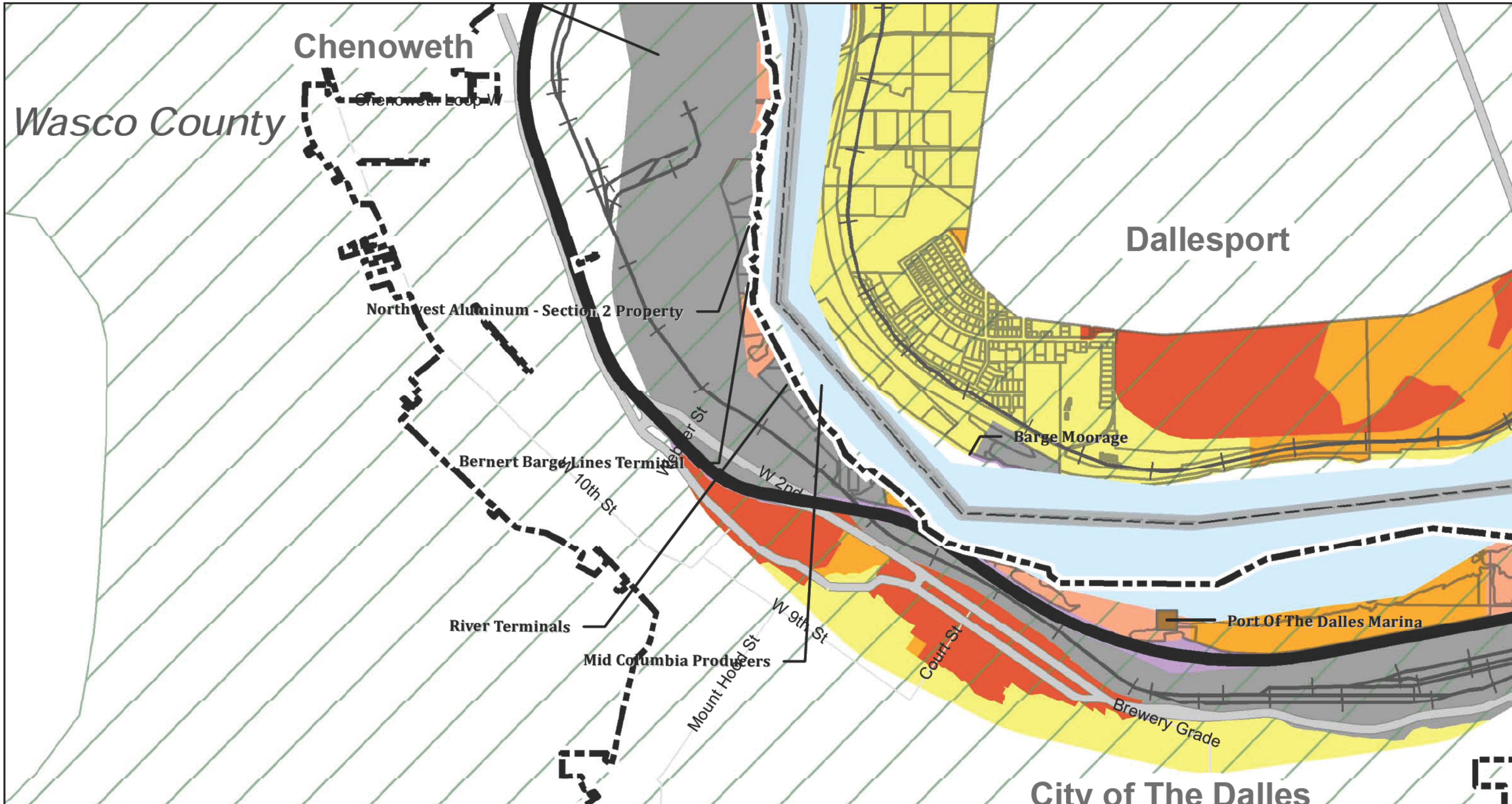

Zoning
within a half mile of the waterway

Page 11 of 13

	National Scenic Area
	City Limits
	County Boundary
	Taxlots
	Facility

USA Major Roads
- Freeway or Other Major Road
- Major Road Less Important than a Freeway
- Other Major Road
- Secondary Road
- Local Road
- Railroad

Generalized Zoning
- Commercial
- Other Commercial
- Forest/Agriculture
- Industrial
- Public/Recreation
- Residential
- Urban

Figure 12
Area 11 - City of The Dalles, Area 12 - Dallesport

0 0.1 0.2 0.4
SCALE IN MILES

N

Columbia River CROSSING

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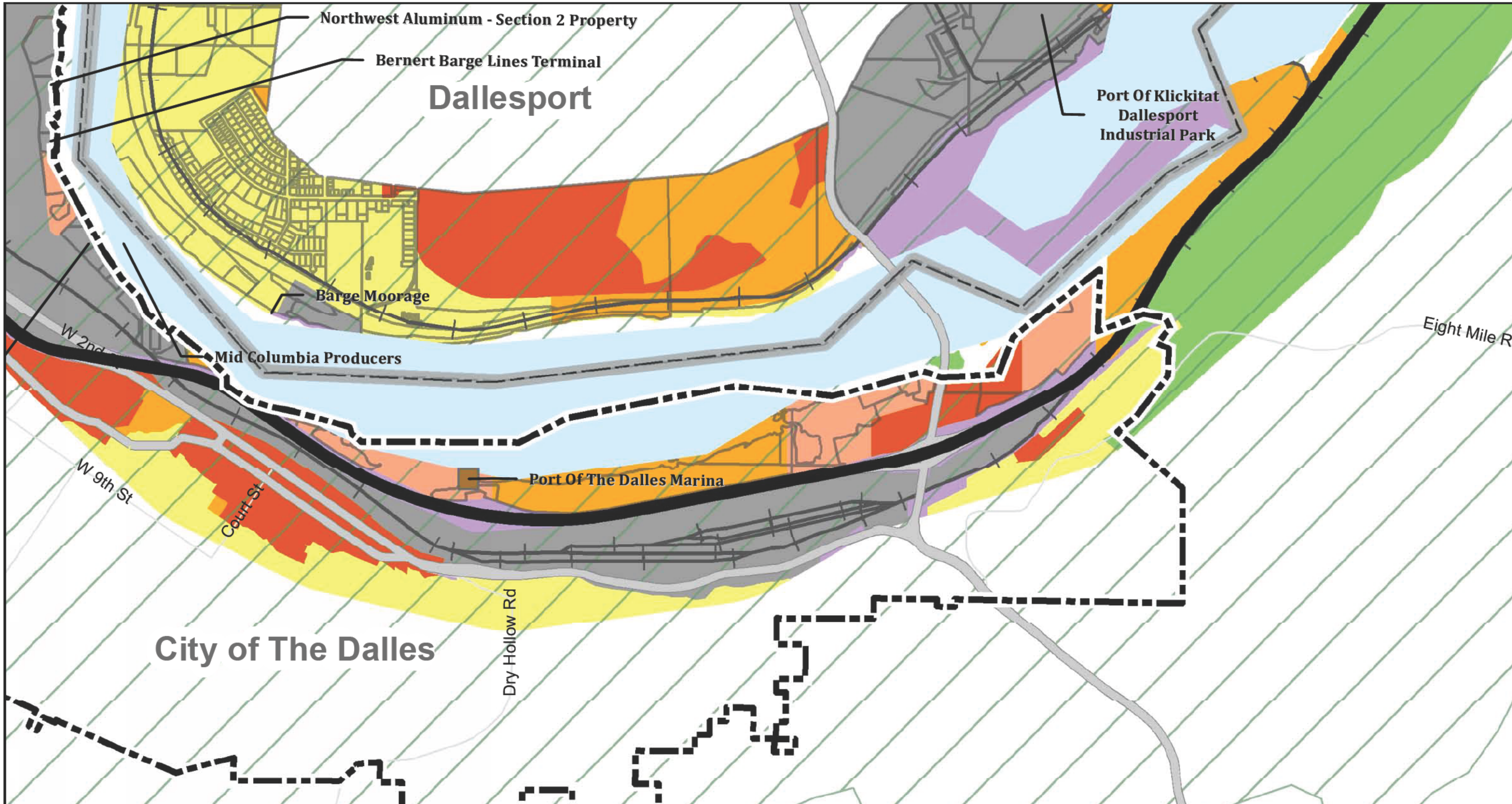

Zoning
within a half mile of the waterway

National Scenic Area
City Limits
County Boundary
Taxlots
Facility

USA Major Roads
- Freeway or O her Major Road
- Major Road Less Important than a Freeway
- Other Major Road
- Secondary Road
- Local Road
- Railroad

Generalized Zoning
- Commercial
- Other Commercial
- Forest/Agriculture
- Industrial
- Public/Recreation
- Residential
- Urban

Figure 13
Area 11 - City of The Dalles, Area 12 - Dallesport

0 0.1 0.2 0.4
SCALE IN MILES

N

Columbia River CROSSING

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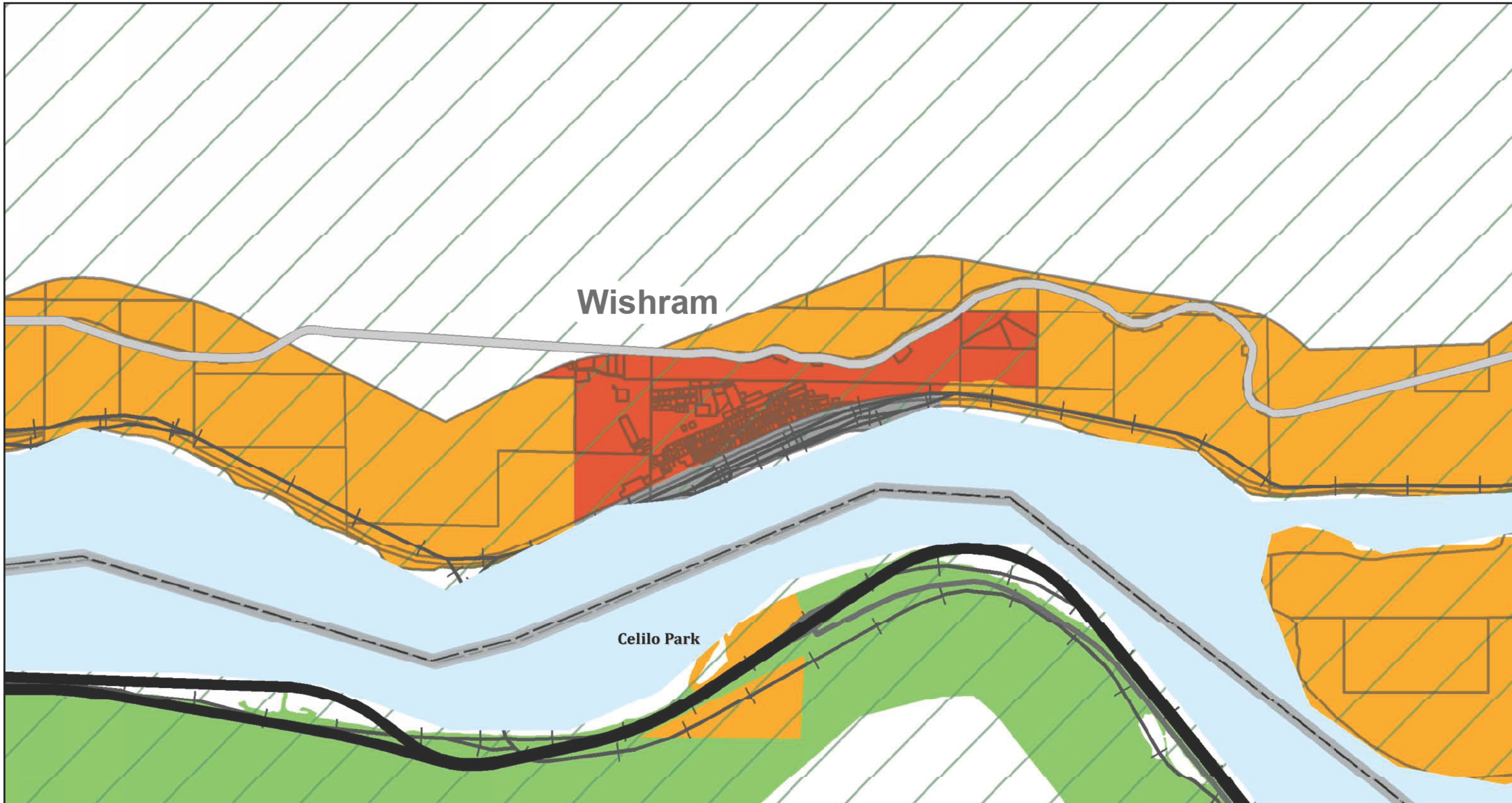

Zoning

within a half mile of the waterway

Figure 14
Area 13 - Wishram

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ATTACHMENT F

NEPA Record of Decision

NEPA Record of Decision files are accessible from the Columbia River Crossing website at:

http://columbiarivercrossing.org/ProjectInformation/ResearchAndResults/ROD.aspx

ATTACHMENT G

NEPA Final Environmental Impact Statement

NEPA Final Environmental Impact Statement files are accessible from the Columbia River Crossing website at:

http://columbiarivercrossing.org/ProjectInformation/ResearchAndResults/FinalEIS.aspx

ATTACHMENT H

Biological Opinion

Biological Opinion files are accessible from the Columbia River Crossing website at:

http://columbiarivercrossing.org/Library/Type.aspx?CategoryID=34

ATTACHMENT I

Public Notice Mailing List

Select parcels within 0.5 mile of bridge design

Columbia River CROSSING

Analysis by J Koloszar; Analysis Date 25 Jan 2013; File Name J \Transfer120612\USACEGenPermitl 012513 mxd

ATTACHMENT J

Columbia River Bridge Vertical Clearance
NEPA Re-evaluation

COLUMBIA RIVER BRIDGE VERTICAL CLEARANCE NEPA RE-EVALUATION

December 2012

CITATION

CRC. 2012. Columbia River Bridge Vertical Clearance NEPA Re-evaluation. December 2012.

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Attachments

Atachment A. Re-evaluation Form

Attachment B. Airspace Analysis

Attachment C. Navigation Impact Report – see separate .pdf

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1. Executive Summary

1.1 Background

The Record of Decision (ROD) for the Columbia River Crossing project (CRC or the "Project"), issued by the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) in December 2011, included replacing the existing low-level, lift span bridges over the Columbia River with new, mid-level fixed-span bridges. The impacts described in the ROD were based on an assumed vertical clearance under the new bridges of 95 feet above zero Columbia River Datum (CRD). The ROD found that most river users and vessels would be able to pass under the proposed mid-level bridges, but three known vessels/users would be adversely impacted. After the ROD, as the project entered the final design and permitting phase, the Project conducted an updated and more detailed survey of river users and vessels, and evaluated options for a mid-level bridge with higher than 95 feet above zero CRD of vertical clearance.[1] The updated information and analysis were conducted in response to a request from the United States Coast Guard (USCG), in order to support the development of an application for a USCG General Bridge Permit.

In November 2012, the Project published this updated data and analysis in the Navigation Impact Report (NIR).[2] The NIR provided detailed evaluation of mid-level bridge design refinement options with vertical clearances ranging from 95 to 125 feet above zero CRD. Based on this analysis, and to further reduce navigational impacts, the project decided to refine the bridge design and increase the bridge height to allow a vertical clearance in the primary channel of 116 feet above zero CRD (referred to in this document as the "116-foot bridge"). The 116-foot bridge analyzed in this re-evaluation is a variation of the 110-foot option studied in the NIR. The design of the 110-foot option was refined to allow the additional vertical clearance while not adding substantially to the landside impacts or construction costs.

1.2 What is the purpose of this NEPA Re-evaluation?

Design refinements are common after a project's National Environmental Policy Act (NEPA) process is completed and a project moves into permitting and final design. The purpose of a NEPA re-evaluation is to consider whether any new information or design changes would result in new significant adverse impacts not included in the project's previous NEPA analysis and documentation.FTA and FHWA have a specific regulation related to the re-evaluation process. [23 CFR Section 771.129(c)]

The bridge that was analyzed in the FEIS and selected in the ROD provided a vertical clearance in the primary channel of 95 feet above zero CRD (referred to in this document as

---

[1]The USCG will be undertaking a NEPA review and issuing a ROD to satisfy NEPA requirements for their decision on the CRC General Bridge Permit application. The CRC project will submit a General Bridge Permit application to the USCG in January 2013—this re-evaluation describes any environmental and navigational impacts for the USCG to use in their permit decision.

[2] The Navigation Impact Report has been finalized and is included as an appendix to this document. However, the USCG identified additional information that is needed for the bridge permit application. This information will be submitted as part of the bridge permit application, but is not relevant to this NEPA re-evaluation.

the “95-foot bridge”). This re-evaluation is used to determine whether refining the bridge’s proposed vertical clearance to 116 feet above zero CRD, and the updated information on river users and vessels, would result in any new significant adverse environmental impacts that were not evaluated in the previous NEPA process. If a re-evaluation identifies any new significant impacts, the Federal lead agencies need to determine what additional NEPA documentation and process may be required. If there are no new significant impacts, then the re-evaluation becomes part of the NEPA record and no additional NEPA documentation or processes are required.

1.3 Why is the bridge’s vertical clearance proposed to be 116 feet?

The NIR evaluated the navigation impacts, costs, and environmental and landside impacts of mid-level bridges ranging from 95 to 125 feet above zero CRD. Bridges higher than 125 feet above zero CRD were not brought forward from the alternatives screening process for CRC and therefore are not within the range of reasonable alternatives, nor are they considered “mid-level” bridges (A description of the elimination of high-level bridges can be found in FEIS Chapter 2.7). Based on the analysis conducted in the NIR, the project is proposing to construct a bridge with a vertical clearance of 116 feet above zero CRD because that design balances the needs of navigation and surface transportation, while minimizing additional landside and environmental impacts, as discussed in this re-evaluation. A 116-foot bridge 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 above zero CRD would provide only minimal reductions in navigation impacts, but would add construction costs and increase environmental and landside impacts:

- A 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.
- A 120-foot or 125-foot bridge would have higher landside and environmental impacts than a 116-foot bridge (as discussed in the NIR) and higher construction costs.

A bridge lower than 116 feet would have lower construction costs, but would have greater impacts on navigation:

- A bridge with 115 feet or less of vertical clearance would not meet the vertical clearance requested by the U.S. Army Corps of Engineers (USACE) for their dredge vessel Yaquina.
- A bridge with 110 feet of vertical clearance would reduce the construction cost, but would potentially impact up to seven additional vessels (as discussed in the NIR).
- A bridge with 105 feet of vertical clearance would reduce the construction cost, but would potentially impact up to fourteen additional vessels (as discussed in the NIR).

Based on the analysis of navigation and other impacts from the various vertical clearances evaluated in the NIR, a bridge with a vertical clearance of 116 feet balances the needs of navigation and surface transportation, while minimizing additional landside impacts (for more information on the various vertical clearances, see the NIR).

1.4 How do the impacts of the 116-foot bridge compare to the impacts of the 95-foot bridge as evaluated in the EIS and ROD?

The 2011 ROD disclosed that three known users/vessels would be impacted by the proposed bridge evaluated in the EIS. With the updated 2012 vessel survey, as described in the NIR, and the refinements in the bridge design, a bridge with 116 feet (above zero CRD) of vertical clearance would impact four known vessels/users,[3] one more than was disclosed in the 2011 ROD.

Three of the four vessels/users that would be impacted represent the tallest past or projected future shipments of three marine fabricators. The fourth is the tallest crane barge of a marine contractor. All of these impacts would be mitigated, as discussed in Section 6.

As discussed in this re-evaluation (Section 5) and in the checklist and matrix attached to this re-evaluation, there is no meaningful change in navigation or environmental impacts from the 116-foot bridge and the updated vessel survey, compared to those impacts discussed in the EIS and ROD for the 95-foot bridge. Accordingly, there are no new significant impacts and no need for a supplemental environmental impact statement (see 23 CFR 771.130).

[3] In addition to the four impacted vessels/users, one existing vessel and one poss ble future vessel have a remote chance of being impacted. Impacts to them cannot be confirmed at this time. They include a marine contractor crane barge that has never transited and may never transit under the I-5 bridge. In addition, a downstream boat builder anticipates constructing a sailboat in the future that would be too tall to pass under the 116-foot bridge. If these vessel owners can demonstrate that they would be substantially impacted, mitigation would be provided, as discussed in Section 6.

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2. Introduction

2.1 Purpose of this Document

The Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) completed their NEPA requirements for the Columbia River Crossing Project with a Final Environmental Statement (FEIS)[4] in September 2011 and a Record of Decision (ROD)[5] in December 2011.

23 CFR 771.129(c) allows FHWA and FTA to re-evaluate project changes and new information to confirm there are no new significant environmental impacts from the previous NEPA documents. The regulation states:

> (c) After approval of the ROD, FONSI, or CE designation, the applicant shall consult with the Administration prior to requesting any major approvals or grants to establish whether or not the approved environmental document or CE designation remains valid for the requested Administration action. These consultations will be documented when determined necessary by the Administration.

To determine whether or not the designation remains valid, 23 CFR § 771.130 describes how to determine whether a supplemental EIS is required if there are new significant environmental impacts. The regulation states:

> (a) A draft EIS, final EIS, or supplemental EIS may be supplemented at any time. An EIS shall be supplemented whenever the Administration determines that: (1) Changes to the proposed action would result in significant environmental impacts that were not evaluated in the EIS; or (2) New information or circumstances relevant to environmental concerns and bearing on the proposed action or its impacts would result in significant environmental impacts not evaluated in the EIS. (b) However, a supplemental EIS will not be necessary where: (1) The changes to the proposed action, new information, or new circumstances result in a lessening of adverse environmental impacts evaluated in the EIS without causing other environmental impacts that are significant and were not evaluated in the EIS; or (2) The Administration decides to approve an alternative fully evaluated in an approved final EIS but not identified as the preferred alternative. In such a case, a revised ROD shall be prepared and circulated in accordance with § 771.127(b).

The purpose of this re-evaluation is to evaluate:

1. Updated and more detailed navigation and river user/vessel information that has been gathered for the United States Coast Guard (USCG) General Bridge Permit application. This more detailed information has been evaluated to determine if there are any new significant environmental impacts that were not disclosed in

[4] The CRC FEIS can be found at http://columbiarivercrossing.org/L brary/Type.aspx?CategoryID=35
[5] The CRC ROD can be found at http://columbiarivercrossing.org/L brary/Type.aspx?CategoryID=37

the previous NEPA documents requiring a supplemental NEPA document (Section 3).

2. The project design refinements, based on final design and permitting activities, that led to the decision to increase the assumed vertical clearance of the Columbia River Bridges from 95 feet above zero CRD to 116 feet above zero CRD. This refined design has been evaluated to determine if there are any new significant environmental impacts that were not disclosed in the previous NEPA documents requiring a supplemental NEPA document (Section 4).
3. Additionally, this report goes beyond the FHWA and FTA's traditional NEPA re-evaluation purpose and provides the USCG the information necessary for their NEPA decision as expressed in their December 7, 2011, letter to the U.S. Department of Transportation (USDOT). A NEPA decision will be required by the USCG prior to approval of the General Bridge Permit application to be submitted by the Columbia River Crossing (CRC) project (Section 5).
4. The potential mitigation measures for navigational impacts to meet USCG General Bridge Permit requirements for the 116-foot bridge (Section 6).

The ROD in December 2011 included a mid-level replacement bridge (two parallel structures) over the Columbia River. The impacts described in the ROD were based on an assumed vertical clearance under the bridge of 95 feet above 0 CRD in the primary channel (these assumptions are referred to in this document as the "95-foot bridge"). The ROD found that three current river users/vessels would be adversely impacted by a mid-level bridge. After the Record of Decision, the project began developing information for the USCG General Bridge Permit application. The USCG had requested that the project conduct an updated and more detailed survey of river users and vessels, and consider raising the vertical clearance of the bridge.[6] The project conducted a updated and detailed vessel survey, published the 2012 Navigation Impact Report (NIR). From these data, the project evaluated in detail how various bridge vertical clearance options would affect existing and anticipated future river users and vessels. This information, as well as the likely impacts of the different bridge height options on environmental and community resources, were also documented in the NIR.

As a result of this analysis, the project sponsors have determined that the bridge height be refined to allow a vertical clearance for navigation of up to 116 feet above zero CRD in the primary channel to meet the standards for the bridge permit. (This height is referred to in this document as the "116-foot bridge" and is within what the project considers a "mid-level" bridge as identified in the NEPA documents) In accordance with the bridge permit standards and the ROD,[7] the project will also include commitments for specific mitigation measures for impacted vessels. The proposed vertical clearance and mitigation would allow the project to avoid or minimize impacts to vessels transiting the Columbia River, as identified here. A

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[6]The USCG will be undertaking a NEPA review and issuing a ROD to satisfy NEPA requirements for their decision on the CRC General Bridge Permit application. The CRC project will submit a General Bridge Permit application to the USCG in January 2013—this document describes any environmental and navigational impacts for the USCG to use in their permit decision.

[7] Mitigation commitments in the ROD stated that the CRC project would "Complete a boat survey and comply with Section 9 permit terms and conditions. More detailed information will be gathered as part of the section 9 permit process regarding users that cannot pass through the proposed 95-foot vertical clearance without partial disassembly of their cargo. Mitigation will be evaluated based on the information obtained."

bridge with a vertical clearance of 116 feet (above zero CRD) balances the needs of navigation and surface transportation, while minimizing additional landside and environmental impacts. The report found that a bridge with a vertical clearance above 116 feet would raise construction costs and landside and environmental impacts without any appreciable difference in river vessel accommodation. Design refinements, such as this, are common after the NEPA process is completed and a project moves into permitting and final design.

To determine whether this design refinement would produce new significant environmental impacts that were not previously considered in the FEIS, the project is conducting this NEPA re-evaluation. If there are "new significant impacts" then the federal leads will determine what additional NEPA documentation may be required. If there are "no new significant impacts" the re-evaluation will become part of the overall NEPA record along with the other new information to form the basis for the USCG General Bridge permitting process.

2.2 Background

Through the Portland-Vancouver metropolitan area, the Columbia River is crossed by three bridges, including the Interstate 5 (I-5) crossing, the Interstate 205 (I-205) crossing, and the BNSF Vancouver railroad bridge. 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 United States 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 CRC is a multimodal project to improve I-5 corridor mobility by addressing present and future travel demand and mobility needs in the vicinity of the river. It proposes to extend light rail transit across the river, improve interchanges in Washington and Oregon and replace the existing I-5 lift span bridges over the Columbia River with new, mid-level fixed span bridges.

Major transportation improvements in the project area have been studied for over a decade. In 2001, the Washington and Oregon governors appointed a bi-state task force, called the I-5 Trade and Transportation Task Force, to address concerns about congestion on I-5 between Portland and Vancouver. The task force adopted a final strategic plan on June 18th, 2002. The plan made recommendations for transportation improvements between the Interstate 405 (I-405) interchange in Portland and the Interstate 205 (I-205) interchange north of Vancouver. The recommendations included:

- Expand I-5 to include three through lanes in each direction, including the area through Delta Park.
- Introduce a phased light rail loop in Clark County in the vicinity of the I-5, SR 500/Fourth Plain, and I-205 corridors.
- Provide an additional bridge or a replacement crossing for the I-5 crossing of the Columbia River, with up to two additional lanes in each direction for merging traffic and two light rail tracks.
- Improve interchanges and add merging lanes between SR 500 in Vancouver and Columbia Boulevard in Portland, including a full interchange at Columbia Boulevard.

- Improve capacity for freight rail.
- Encourage bi-state coordination of land use and transportation issues to reduce highway demand and protect corridor investments.
- Involve communities along the corridor to ensure that the final project outcomes are equitable.

The Columbia River Crossing project was developed to further study, develop and implement solutions to several of these recommendations.

2.3 Economic Benefits of Project

This re-evaluation considers the impacts of the proposed design refinement and new navigation information on river users and vessels, as discussed in Section 5. To put this into a larger context, this section summarizes the broader economic effects of the proposed project, including the project's effects on economic costs and benefits associated with the marine industry.

The selection of the Columbia River Crossing (CRC) preferred alternative in the ROD is the result of extensive analyses considering how to meet the project's Purpose and Need while balancing the sometimes competing needs of various user groups (including auto, truck and bus highway users, light rail transit users, freight rail, marine transportation, aviation and bicyclists and pedestrians) and environmental and community benefits and impacts. For example, alternatives that lower the bridge height reduce potential impacts to aircraft but increase the number of potentially impacted river users. In considering those trade-offs between users, it is important to also consider the very significant economic benefits of the project to the region, the West Coast, and the United States. Those benefits derive from reduced congestion and decreased travel times, improved safety for motorists, and improved safety and efficiency for marine navigation. Those direct benefits to transportation system users in turn would result in economic benefits to the region by improving access to job opportunities throughout the region, reducing business costs, and improving access to goods and services both domestically and internationally. This section provides a brief overview of those benefits. It is worth noting that this analysis estimates the economic impacts associated with the project's operational benefits for all users, whereas the FEIS included estimates of economic impacts that would result from construction-related activities.

2.3.1 Methodology

The economic benefits of the CRC project have been estimated by utilizing the Transportation Economic Development Impact System (TREDIS) model to provide the overall economic benefits of the preferred alternative versus the No-Build Alternative. The TREDIS model has been widely and successfully used in many previous Portland regional, Oregon state and national studies. Inputs to the model were derived from information in the CRC FEIS documents. The TREDIS model estimates traveler benefits and any added benefits from the impacts of investments on improved market access and improved connectivity. It has been used to compare what happens to the future economies of the region, the rest of Washington, the rest of Oregon, and California under the preferred alternative versus the No-Build Alternative. Its findings can be found as an appendix to the Economic Benefits Report, published October 31, 2012 and is available on the CRC website.

2.3.2 Summary of Project Economic Benefits

Project-related economic benefits are a summary of landside traveler savings, marine navigation savings, and the economic effects of improved market access and connectivity. The net present value to the economy of the preferred alternative versus the No-Build Alternative is estimated in the TREDIS model by comparing the time streams of costs and benefits for each option, using a discount rate for future years.

The most general measure of economic benefits is the net change that a project brings about in the overall magnitude of the economy, which is expressed in terms of gross regional product (or for the nation as gross national product).The discounted net present value of the greater net gross regional product for the Portland-Vancouver region plus the rest of the West Coast with the preferred alternative versus the No-Build Alternative is highly positive, indicating that the preferred alternative is a very desirable long-term investment. Net added gross regional product to 2050 would be over $4 billion if a 5 percent discount rate is used and over $6 billion if a 3 percent discount rate is used. In terms of a benefit to cost ratio for the project, this added gross regional product from the preferred alternative is equivalent to a more than 2 to 1 to an almost 3 to 1 ratio of benefits to costs. The preferred alternative also has highly positive impacts on other economic measures such as jobs and wages, as discussed below. The preferred alternative is thus a highly justified investment in terms of its economic results.

TREDIS also produces additional economic measures for future years. The combined net economic impacts of the traveler savings and the market access and connectivity impacts of the preferred alternative would also result in the addition of 4,200 jobs and $231 million in additional wages in 2030 under the preferred alternative compared to the No-Build Alternative. All net benefits are the net total increases after taking into account the costs of the project itself.

Traveler savings and market access impacts are described in more detail in the following paragraphs. In addition, the benefits derived from reducing a risk of catastrophic loss of a bridge are also discussed.

2.3.3 Landside Traveler Savings

By 2030, the estimated annual traveler landside savings due to the preferred alternative versus the No-Build Alternative would exceed $435 million per year. These savings accrue to highway, transit, and marine users.

Landside transportation benefits include substantial savings in highway travel times and transit travel times, with about 6.8 million hours per year in auto and truck delay savings on the facility itself for automobile and truck users for the preferred alternative versus the No-Build Alternative, both from less congestion delay during peak periods and due to fewer bridge closures during off-peak periods. There is also substantially less daily congestion on other highway facilities. The diversion of travelers to transit with the much better transit service under the preferred alternative also provides substantial portions of these savings.

Landside transportation benefits also include the savings in accident costs which would be achieved by the preferred alternative compared with the No-Build Alternative, with 510 to 540 fewer crashes per year, with resulting dollar savings in accident costs. Landside transportation benefits also include lower vehicle miles traveled and lower vehicle operating costs for autos and trucks.

2.3.4 Marine Navigation Benefits and Costs

Transportation benefits to the marine industry also accrue because elimination of bridge closures would provide greater flexibility for marine traffic to achieve future efficiencies due to the removal of constraints on daytime travel. Currently, the alternate barge channel offers 72 feet of vertical clearance (above zero CRD) and the primary channel allows for 39 feet of vertical clearance (above zero CRD) in the closed position and 178 feet (above zero CRD) in the raised position. River users that require greater than 72 feet of vertical clearance (above zero CRD), or users that require over 39 feet of vertical clearance (above zero CRD) that desire to use the primary channel to avoid navigating the “S” curve maneuver, must request a bridge lift. The Federal Code of Regulations stipulates that the span need not be raised Monday through Friday from 6:30 am to 9 am and from 2:30 pm to 6 pm.[8] An increase in vertical clearance to 116 feet (above zero CRD) allows river users that can pass under the bridge to transit without waiting for or requesting a bridge lift. Although closures are relatively few, marine productivity savings could be achieved and are estimated very conservatively at about $137,000 per year.

2.3.5 Economic Benefits due to Improved Market Access

In addition to the direct transportation benefits, there are further significant benefits resulting from the impacts of the preferred alternative on freight and personal travel access and connectivity.

Because the daily duration of congestion decreases with the project, the number of trucks operating during periods of congestion would drop very substantially under the preferred alternative, by 60 percent or more, preserving and enhancing the key freight industries, such as lumber and wood, food and farm products, distribution, transportation and equipment, and high-tech products, which are highly dependent on the level of service on the CRC.

Person throughput (the number of people that can cross the bridge over a specified time period) would be enhanced. Person throughput for the corridor would be enhanced by one-third during the AM peak period and by 40 percent during the PM peak period, due largely to the greater multimodal person capacity. This enhanced throughput would also enhance the economic competitiveness of the region and the states by enhancing market access and connectivity.

The preferred alternative improves labor and business market access and improves connections, stimulating additional economic activity. Matching employees and their unique skills to employer needs, enhancing supplier connections, supply chain coordination, and

[8] 33 CFR 117.869: § 117.869. Columbia River.(a) The draws of the Interstate 5 Bridges, mile 106.5, between Portland, OR, and Vancouver, WA, shall open on signal except that the draws need not be opened for the passage of vessels from 6:30 a.m. to 9 a.m. and from 2:30 p.m. to 6 p.m. Monday through Friday except federal holidays.

overall knowledge sharing are the results of improved market access and connectivity. These market access and connectivity benefits under the preferred alternative generate 1,700 (out of 4,200) additional jobs and $111 million (out of $231 million) in added wages in 2030, with the Portland Metro area receiving the majority of these benefits.

2.3.6 Eliminating the Risk of Catastrophic Loss of the Existing Bridges

An equally important potential economic benefit of the preferred alternative is that its implementation would avoid the risk of an economic catastrophe. The two current structures are nearly 100 years old and nearly 60 years old and are not designed to meet current seismic standards. In a major earthquake, one or both structures could be rendered inoperable. The failure of one or both I-5 structures would have disastrous economic consequences until replacement facilities could be built on an emergency basis. Other regions have chosen not to take these risks.

The No-Build Alternative includes the probability that the project would have to be implemented on an emergency basis at some time. Under those circumstances, it would be implemented in a manner that avoided the future risk of structural or seismic failure meaning that something similar to or identical to the preferred alternative would be implemented. The No-Build Alternative thus includes the risk of a very major economic disaster lasting at least several years until emergency construction could be completed, followed by a similar but later future with the preferred alternative finally being implemented.

2.4 Purpose and Need

As described in the DEIS[9] and FEIS, the Purpose and Need statement is provided below.

2.4.1 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 CRC Bridge Influence Area (BIA). The BIA 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 crossing’s bridges and associated interchanges; b) improve connectivity, reliability, travel times, and operations of public transportation modal alternatives in the BIA; c) improve highway freight mobility and address interstate travel and commerce needs in the BIA; and d) improve the I-5 river crossing’s structural integrity (seismic stability).

2.4.2 Project Need

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

- **Growing travel demand and congestion:** Existing travel demand exceeds capacity in the I-5 Columbia River crossing and associated interchanges. This corridor experiences heavy congestion and delay lasting 4 to 6 hours daily during the morning and afternoon peak travel periods and when traffic accidents, vehicle breakdowns, or

[9] The CRC DEIS can be found at http://columbiarivercrossing.org/L brary/Type.aspx?CategoryID=26

bridge lifts occur. Due to excess travel demand and congestion in the I-5 bridge 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 I-5 and I-205 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 percent 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 project 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 percent 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.
- **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 BIA 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 2 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.
- **Substandard bicycle and pedestrian facilities:** The bike/pedestrian lanes on the I-5 Columbia River 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 BIA.

- **Seismic vulnerability:** The existing I-5 bridges are located in a seismically active zone. They do not meet current seismic standards and are vulnerable to failure in an earthquake.

2.5 NEPA Process

2.5.1 Main Span Bridge Heights Considered during CRC 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[10] produced an evaluation of multiple highway, transit, and river crossing improvements in this corridor and other parts of I-5. This process gathered public and stakeholder input on issues and potential solutions for transportation problems in the I-5 corridor, and recommended that the region move forward with a number of specific projects, including the I-5 Columbia River Crossing.

After FTA and FHWA issued a Notice of Intent to prepare an EIS in September 2005, the project again began working closely with the public, stakeholders, and local jurisdictions to develop the project's Purpose and Need. Following the adoption of the project Purpose and Need, the project developed an Evaluation Framework[11] 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 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 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 then analyzed how well each alternative would address the criteria from the Evaluation Framework. In January 2007, the project 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 project's early NEPA analysis and community outreach, a variety of bridge types and heights were considered. Bridge heights were evaluated in relationship to impacts on river users; traffic safety; airspace; transit; downtown Vancouver, Washington; Hayden Island, Oregon; and to the overall footprint. Local communities and the 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:[12]

- Improved navigational safety and access
- Observing Federal Aviation Administration standards that obstructions should be avoided for the safe operation of aircraft

[10] Source: Portland-Vancouver (City of Portland, Oregon and City of Vancouver, Washington). 2002. Portland-Vancouver I-5 Transportation and Trade Partnership. Final Strategic Plan. Portland OR and Vancouver, WA. June 2002.
[11] Source: CRC (Columbia River Crossing). 2006a. Evaluation Framework. Task Force. Available at <http://www.columbiarivercrossing.org/FileLibrary/GeneralProjectDocs/ScreeningEvaluationFramework.pdf>. Accessed May 20, 2011.
[12] Source: With the exception of "local land use plans" all of the considerations were included in the Step A Screening Report. The local land use aspect was considered in the Step B Screening Report. Both are included in attachments to the Development of Range of Alternatives memo. CRC. 2007a. Development of the Range of Alternatives (Technical Memorandum). June 2007.

- Replacement of substandard features and improved sightlines for safety on the interstate
- Improved interstate traffic and freight mobility
- Grades that would accommodate transit
- Bridge landings that are compatible with local land use and community plans
- Improved bicycle and pedestrian access
- 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 above zero CRD vertical clearance), mid-level, and high (around 130 feet above zero CRD vertical clearance). Based on study results and input, the bi-state task force recommended the following:[13]

1. Removing the low level, movable span bridge components from consideration due to negative effects 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 Airfield 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 the majority of 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.[14] At the September 2006 USCG public hearing, 17 people testified: one construction barge owner (marine contractor) requested a bridge with a "high" level of navigation clearance and one fabricator requested 100 feet.[15]

During this same period, the Federal Aviation Administration (FAA) reported it had "no objections" to the mid-level bridge height provided for the agency's consideration.[16]

The bi-state task force moved the mid-level bridge component forward within different multimodal alternatives for technical analysis in the draft EIS (DEIS). About 1,600 public and agency comments were received on the DEIS in 2008. Of the comments stating a

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[13] Low-level moveable spans were recommended to be removed from further consideration in a June 7, 2006 Memo from CRC staff to the CRC Task Force (it can be found here: http://columbiarivercrossing.org/FileL brary/MeetingMaterials/TaskForce/2006/June/061406_TF_MeetingMaterials.pdf). High level bridges were recommended to be removed from further consideration in the Step A Screening Report, March 22, 2006 (it can be found here: http://www.columbiarivercrossing.org/FileLibrary/TechnicalReports/StepAScreeningReport.pdf). Mid-level spans were recommended for advancement in the Alternative Packaging Report , June 7, 2006 (it can be found here: http://columbiarivercrossing.org/FileL brary/MeetingMaterials/TaskForce/2006/June/061406_TF_MeetingMaterials.pdf)
[14] Also accepting cooperating agency status was USACE. Other cooperating agencies can be found in the FEIS Appendix A.
[15] Source: Notes from USCG CRC Preliminary Hearing, September 21, 2006.
[16] Source: Letter dated June 14, 2005 to Lynn Rust from Don Larson, Airport Planner, FAA.

preference on the bridge element, the majority favored a replacement (mid-level bridge) as compared to no action or a supplemental bridge. Of the 1024 comments expressing an opinion on the replacement bridge, 66 percent were favorable and 34 percent were unfavorable. Only 346 comments expressed an opinion on the supplemental bridge, with 48 percent favorable and 52 percent unfavorable.

Based on the technical analysis in the DEIS and public and agency comment, 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 3-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 provided comments 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.

In the Draft and Final EIS, the project analyzed the impacts of a mid-level bridge. As mentioned in Section 1, three representative bridge heights were evaluated during alternatives screening: low with a movable span (around 65 feet above zero CRD vertical clearance), mid (95 to 110 feet above zero CRD vertical clearance), and high (around 130 feet above zero CRD vertical clearance). The mid-level bridge was not clearly defined, however it is implied that it would be between the low level and the high level. A 116-foot bridge would fall within that range.

For the purpose of the evaluation of impacts, the project chose to analyze a bridge with 95 feet over zero CRD of vertical clearance because it was high enough to allow the vast majority of river users to pass under the bridge, while meeting highway and transit functionality, and minimizing potential aviation impacts. The selection of 95 feet was the result of extensive analyses considering how to meet the project's Purpose and Need while balancing the sometimes competing needs of various user groups (including auto, truck and bus highway users, light rail transit users, freight rail, marine transportation, aviation and bicyclists and pedestrians) and environmental and community benefits and impacts. For example, alternatives that lowered the bridge height reduced potential impacts to aircraft but increased the number of potentially impacted river users.

2.6 Data in FEIS and ROD

The 2008 Navigation Technical Report,[17] FEIS, and ROD included an analysis of impacts to navigation based on information on bridge lifts, river water levels, and a survey of river users (Boat Survey). Data was obtained from the Boat Survey conducted in 2004 (Parsons Brinckerhoff Inc. 2004), Boat Survey validation meetings, and telephone calls conducted by

[17] The 2008 Navigation Technical Report, along with a minor update, was re-issued in 2011 along with the FEIS. http://columbiarivercrossing.org/FileL brary/FINAL%20EIS%20PDFs/CRCTechnicalReports/Navigation/CRC_Navigation_Technical_Report.pdf

the agencies with key stakeholders, such as vessel operators and the USCG, and verified through a series of one-on-one interviews with vessel operators.

A list of vessels traveling this river section was assembled, analyzed, and summarized in the 2006 Boat Survey Technical Memorandum. This study provided valuable information on the types of vessels traveling the Columbia River, their clearance requirements, and was used as a basis for determining vertical clearances for the new bridges.

Data on bridge lifts, river users and river water levels was reported in the FEIS and can be found in the 2008 Navigation Technical Report.

3. Updated Information Since Issuance of the ROD

In preparation for the USCG General Bridge Permit, and in response to an additional information request, as articulated in the USCG December 7th, 2011 letter to USDOT, the project obtained updated and detailed information and considered refinements to the bridge's vertical clearance. The letter requested updated information in four areas:

a) Updated number of vessels that would be affected by a 95-foot bridge

b) More specific analysis of impacts and mitigation to specific vessels/users

c) Whether there are critical infrastructure manufacturing assets jeopardized by the 95-foot bridge

d) Evaluation of impacts to future users and land use impacted with a 95-foot bridge, and with other mid-level vertical clearance options.

All of these items are addressed in detail in the NIR. This information was used to inform the design refinement to 116 feet of vertical clearance. The NIR is considered part of this re-evaluation and is incorporated by reference herein and included as an appendix to this document.[18] The NIR includes a vessel survey conducted in 2012 in order to obtain updated and more detailed information on river users in the project area. The NIR includes results of the vessel survey, a study of potential future river users, and analysis of vessel and user impacts related to various mid-level bridge heights. In additional to data on the vessels themselves, the NIR included updated data on 25 years of bridge lifts, 40 years of river water level data, current and future land use, and potential mitigation measures.

The information presented below is updated data from 2012 included in the NIR. The relevant affect of this updated data on navigation impacts is in Section 5 of this document.Data on river users was collected and presented as follows:

1. An overview of the types and numbers of vessels that transit under the I-5 bridge and an analysis of anticipated future river users.
2. An analysis of data collected on bridge lifts.
3. An analysis of potential future changes in land use that could affect navigation.
4. An analysis of river water levels at the I-5 bridges.

3.1 Types and Numbers of Vessels

Known Columbia River users who transit under the I-5 bridges were contacted in 2012 and polled about the navigation and dimensional characteristics of their vessels, equipment, or fabrications/shipments. Additional users were sought through placement of announcements in the USCG *Local Notice to Mariners* and numerous publications. Target mailings were sent

[18] The Navigation Impact Report has been finalized and is included as an appendix to this document. However, the USCG identified additional information that is needed for the bridge permit application. This information will be submitted as part of the bridge permit application, but is not relevant to this NEPA re-evaluation.

out. Of particular interest were the height, breadth, and air gap (clearance) requirements to pass underneath a bridge. All of the information received was self-reported. Some of the taller vessel air drafts were then verified by measuring their heights with surveying equipment.

The main channel was identified as being the primary route of transit for the majority of the respondents. Very few respondents provided information on Oregon Slough transits.

Commercial tugs and tows have the greatest frequency of usage on the river and transit year round. Air drafts for tugs and tows ranged from 28 to 61 feet.

Recreational sailboats and powerboats typically use the river more frequently between April and October. The sailboats ranged in air draft from 50 to 90 feet. The powerboats ranged from 20 to 25 feet of air draft and were the only users that reported transiting the Oregon Slough.

Marine contractors reported they use the river on an as-needed basis year round. Air drafts ranged from 20 feet to 131 feet (excluding two Manson Construction cranes that are not expected to work on the Columbia River). The Port of Portland's Dredge *Oregon* has an air draft of 103 feet.

The federal government users include USACE Hopper Dredge *Yaquina* with an air draft of 92 feet and Puget Sound Naval Shipyard nuclear transporters that include barges and escorts. The largest transport barge is *Barge 40* with an air draft of 51 feet, and the largest escort is the *YTT 10 Battle Point* with an air draft of 74 feet.

Marine industries and fabricators ship products or have vessels transiting under the I-5 bridges on an as-needed basis all months of the year. The air drafts ranged from 60 feet to 141 feet.

Passenger cruise vessels transit the river year round, but more frequently in the summer months. The upriver motor vessels have air drafts that range from 42 to 65 feet. The Grays Harbor Historical Seaport Authority has two sailing vessels with air drafts of 74 and 85 feet that take passengers upstream typically once in May and June, and twice in October.

Most air gap (clearance) requested by users ranged from 1 foot to 10 feet. A few users desired larger air gaps up to 20 feet. These air gaps are in addition to the air draft.

Additional information on river user data can be found in Chapter 6 of the NIR. Summary tables, sorted by group, listing vessel owner, vessel name, vessel type, length overall, beam, draft, air draft, and frequency of passage, as well as additional information on existing users, are included in Appendices B, C and J of the NIR.

3.2 Bridge Lift Trends

In order to provide a context for the share of marine traffic currently requiring bridge lift span openings, the NIR summarized the navigation traffic trends of the existing I-5 bridge. 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. CRC staff transcribed approximately 25 years of data into a spreadsheet, providing information on lifts from January 1, 1987, to December 17, 2011.

The project 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)
- Dredges (USACE dredge Yaquina and other privately owned dredges)
- Government vessels (U.S. Navy [Navy], U.S. Coast Guard [USCG] and the Astoria Job Corps, etc.)
- Tall ships (Lady Washington, Hawaiian Chief, and other visiting tall ships)
- Other (vessels that had no name or designation)

Each opening was classified as an event in the analysis. Some vessels were called out specifically by name and type (sailboats, tugs without barges, cruise/passenger boats, government vessels, dredges and tall ships) in the logbook. In these cases, each vessel was considered an event in the spreadsheet. In other cases, vessels were called out as a group (tugboat was named and was accompanied by one or more barges) in the logbook. Each of these instances was also considered an event in the spreadsheet.

The number of bridge opening events (excluding openings for bridge maintenance, in which no vessel transited) ranged from a low of 70 events (2004) to a high of 863 events (1997) with an average of 289 events per year. High water occurred in 1995, 1996, 1997, 2001 and 2011, which resulted in an increase in the number of bridge opening events in those years. Exhibit 3-1 illustrates the number of bridge opening events from 1987-2011.

Exhibit 3-1. Bridge Opening Trends (from the NIR)

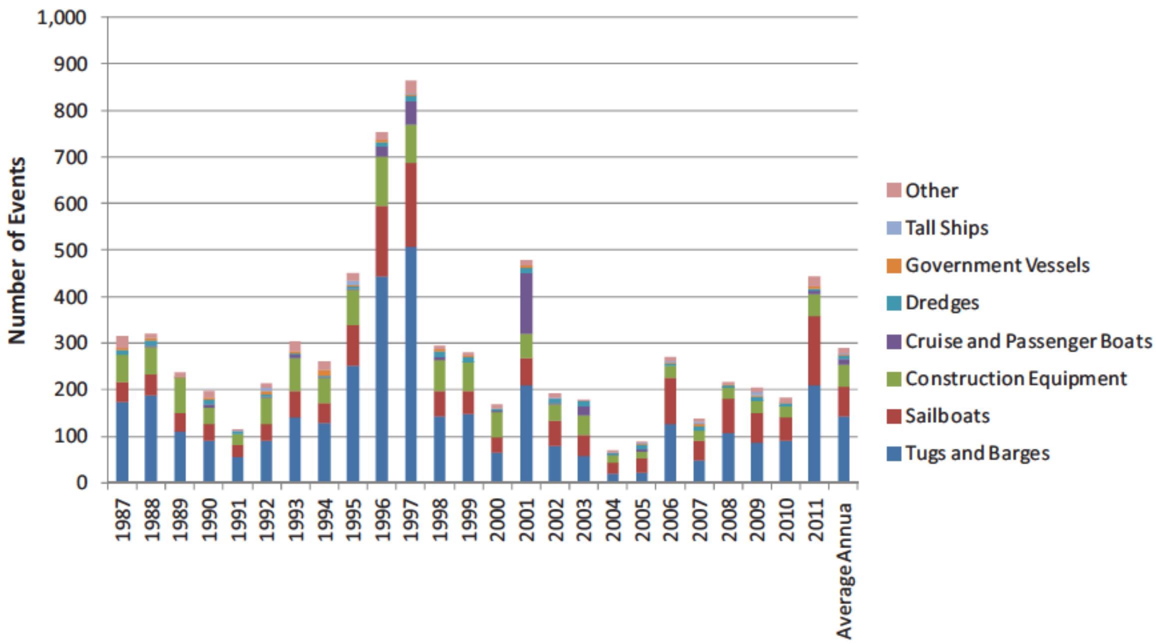
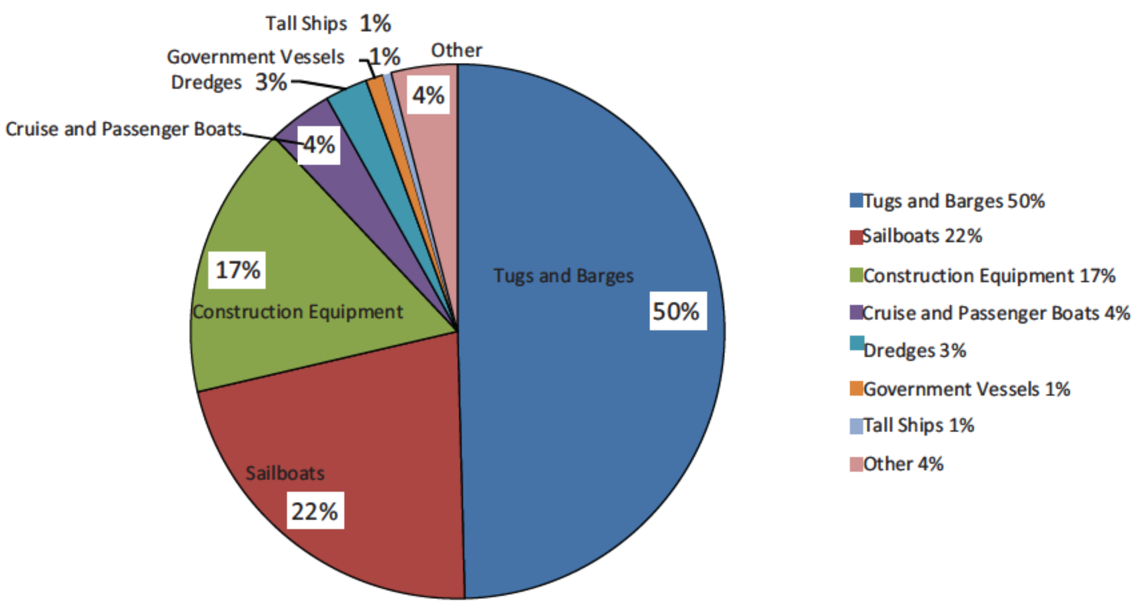


Exhibit 3-2 summarizes the share of bridge opening events by type of vessel over a 25-year time period: Tugs and barges accounted for half of all openings, followed by sailboats at 22 percent and construction equipment at 17 percent. Each of the remaining vessel types accounted for between one and four percent.

Exhibit 3-2. Average Share of Bridge Openings by Type of Vessel from 1987 to 2011 (From the NIR)



Source: Navigation Impact Report

More information on bridge openings can be found in Chapter 6 of the NIR.

3.3 Future Changes in Land Use that Could Affect Navigation

3.3.1 Introduction

Chapter 7 of the NIR assessed water-dependent land uses along the Columbia River, and the potential for water-dependent development to help inform whether the bridge heights being studied (95 to 125 feet above zero CRD vertical clearance) for the proposed bridges could adversely affect future development of water-dependent sites upriver from the bridge.

Water-dependent land uses are generally defined as those uses that can be carried out only on, in, or adjacent to a body of water, because they require access to the water for transportation or recreation and which, by their nature, can be built only on, in, or over water.

The BNSF railroad bridge at Celilo Falls, located 95 miles above the I-5 bridge, has a vertical clearance of 79 feet in the raised position. Because this vertical clearance is notably less than that proposed for the Columbia River Crossing, no marine-related activities upstream of the Celilo bridge would be affected by the construction of the proposed I-5 bridges with a mid-level vertical clearance. Therefore, the area studied for this report includes that stretch of the Columbia River between the Columbia River Crossing and the BNSF Celilo Bridge.

All sites with the potential for water-dependent development were examined, and owners or controlling agencies were contacted to determine future plans. A summary of the key findings for each of the jurisdictions within the project area is described in Chapter 7 of the NIR.

3.3.2 Issues Affecting Riverfront Development

Some key overarching findings related to the development along the Columbia River in the project extent are summarized in this section.

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 Columbia River Gorge National Scenic Area.

An important component of the overall context of the study area is the National Scenic Area, which severely limits industrial development within the project area outside of existing incorporated communities and the Portland-Vancouver Metropolitan Area. This creates an “island” effect for industrial uses, which often support each other. However, the Scenic Area protects the natural beauty of the Gorge, making it desirable for recreationalists and tourists, including those who access the Gorge by boat.

3.3.2.1 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. This includes properties at Cascade Locks, The Dalles, and Stevenson.

3.3.2.2 Other Freight Options

Rail lines and highways run parallel to the river on both sides and provide options for freight cargo. For example, the Nestlé Corporation has shown interest in developing riverfront property in Cascade Locks; however, Nestlé's plan is to move freight by truck instead of by barge.

In addition to providing alternative means of transportation, the highways and rail lines also constrain development along the waterfront, as described below.

3.3.2.3 Existing Site Constraints

In many cases the linear rights-of-way of State Route 14 (SR14), Interstate 84 (I-84), and Union Pacific Railroad (UPRR), 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.

3.3.2.4 Public Access to Waterfront

Many jurisdictions along the river have goals to increase public access and use of the shoreline for river recreation, potentially limiting other types of uses. For example, Cascade Locks has been planning for a new marina. The Dalles just added space to its marina, which is within walking distance of its downtown center, making it ideal for tourists to come to The Dalles by boat. New facilities, the growth in wine tourism, and the beauty of the Gorge are likely to increase tourism to the area, including tourists who may travel by boat. This could generate higher volumes of recreational boats in the area, including recreational power boats (including sailboats) and commercial cruise boats.

3.3.2.5 Riverfront Trails

Many jurisdictions (such as Hood River, The Dalles, and Vancouver) have recreation trails and plans for future recreation trails along the river. Such trails can create a barrier to other marine-dependent uses of the Columbia River shoreline.

3.3.2.6 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.

3.3.3 Summary of Redevelopment Opportunities

Within the project 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. There are sites that have existing marine infrastructure, such as lumber mills, which could also redevelop with different water dependent uses in the future and that could use the existing marine infrastructure. These sites are primarily located within incorporated jurisdictions. Chapter 7.4 of the NIR provides a summary of the findings by subarea.

There are no known planned developments that would significantly increase the height-constrained activities in the affected area. 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.

As discussed in greater detail below, ocean barges, which are used to transport large fabricated structures, cannot pass through the Bonneville Lock. This constraint limits the ability to pursue metal fabrication uses in Skamania, Klickitat, Hood River and Wasco Counties. There are a few sites that could be used for metal fabrication in Clark and Multnomah Counties but future users would likely also consider available Columbia River sites that are located downriver of the I-5 bridge as well as locations in other parts of Oregon and Washington. There are no known planned developments for additional metal fabricators in the impacted area.

There are several boatyards and shipyards in the affected area (JT Marine, Sundial Tug & Barge Works, Christianson Shipyard, Legendary Yachts, etc.) Most of the projects undertaken in these yards are not height constrained but there are a few exceptions, including potential future manufacture and/or repair of large sailboats and marine construction equipment. Sundial is currently idle because it was underutilized. It could be reactivated as a boatyard or for another use. There are numerous other yards located downriver of the I-5 bridge in the Columbia River (for example, Vigor Industrial's Swan Island shipyard, Schooner Creek Boat Works, Foss Shipyard in Rainier, etc.) as well as other facilities in Oregon and Washington. There are no known planned developments for additional boatyards or shipyards in the impacted area.

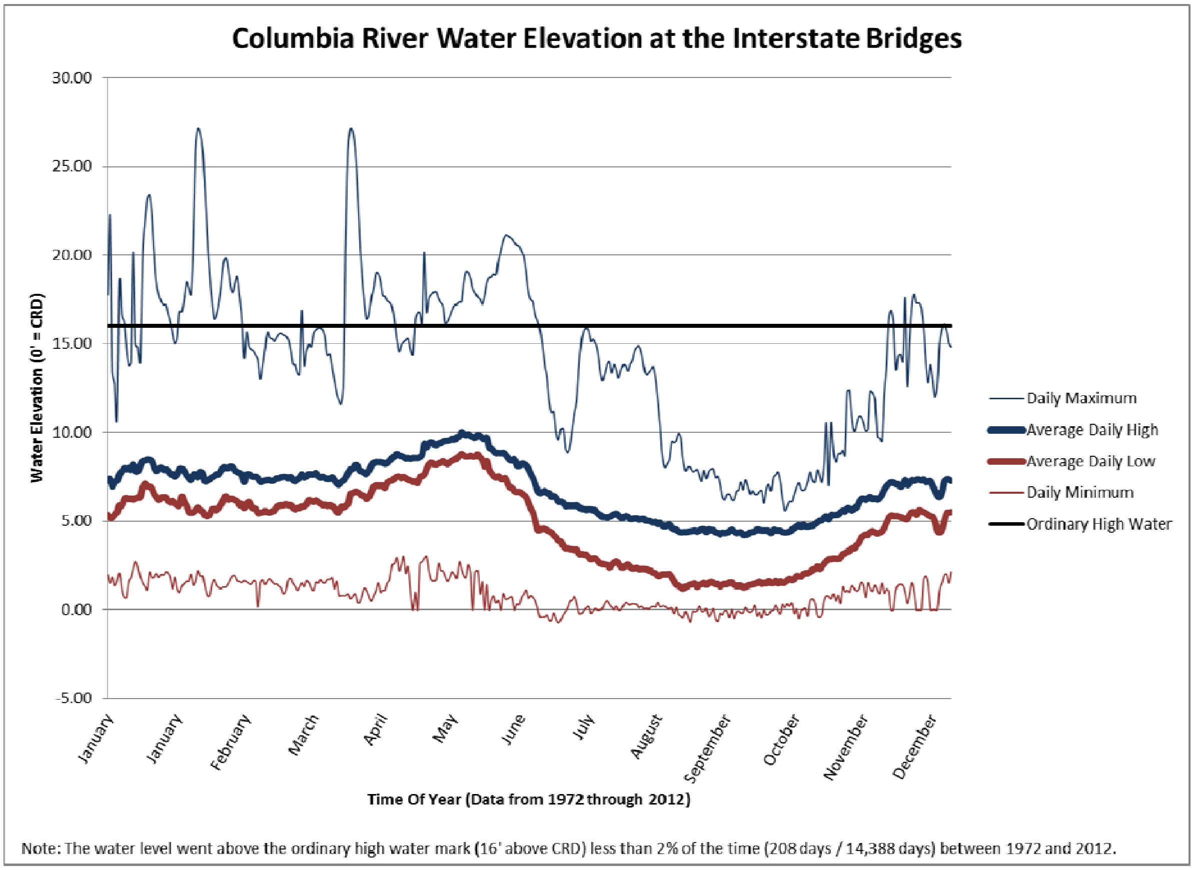
In conclusion, there are no reasonably foreseeable impacts to up-river future commercial land use development opportunities that would be constrained by the proposed 116-foot bridge.

3.4 River Water Levels at the I-5 Bridge

One of the critical factors influencing vertical clearance is river water level, as it fluctuates daily and over the course of the year and therefore changes the distance between the river and the bottom of the bridge. Forty years of river water level data was analyzed, based on water levels at the I-5 bridges.

Exhibit 3-3 summarizes the variability in water levels for the Columbia River at the I- 5 bridges from 1972 through 2012. Included in the exhibit are daily maximum, daily minimum, average daily high, and average daily low.

Exhibit 3-3. Columbia River Water Elevation at the Interstate Bridges (1972-2012) (From the NIR)



In general, the following river water level trends can be observed from the data collected over the past 40 years:

- The highest average daily high is at approximately 10 feet above zero CRD and occurs in early May.
- The lowest average daily low is at approximately 2 feet above zero CRD and occurs in early September.
- The ordinary high water level, which is the water level that was exceeded less than 2 percent of the time over the past 40 years, is 16 feet above zero CRD.

River levels at the I-5 bridges are influenced primarily by variations in runoff. However, the river level is also 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 National Oceanic and Atmospheric Administration (NOAA) Nautical Chart 18526, the daily range of the tide during low river stages is 1.8 feet at Vancouver. This range becomes progressively smaller with higher stages of the river.

The CRC project team also considered how potential climate change could affect future Columbia River water levels, as described in Chapter 3 of the FEIS.

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 40 years. Sea level rise could have a minor effect on this during low runoff periods. Given the predictions in seasonal precipitation changes, however, any effect of sea level rise could be counteracted by low flows being even lower in the future. The 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.

4. Project Design Changes

The currently proposed bridge design with 116 feet above zero CRD is taller than the bridge proposed in the FEIS at 95 feet above zero CRD. The specific changes in design as a result of increasing the overall height of the bridge are described in more detail below:

- The top of the bridge deck is higher than analyzed in the FEIS. The maximum height of the top of bridge deck is approximately 160 feet above zero CRD. The maximum height of the bridge deck as reported in the FEIS was 140 feet above zero CRD.
- The bottom of the bridge truss (vertical clearance beneath the bridge) is higher than what was analyzed in the FEIS, increasing navigational vertical clearance from 95 feet above zero CRD to 116 feet above zero CRD.
- In Oregon, the mainline grade of I-5 increases from 2.8 percent to 3.7 percent.
- In Washington, the mainline grade of I-5 increases from 3.4 percent to 4.0 percent.
- The height of the I-5 North to Vancouver City Center exit to C Street ramp increases from approximately 90 feet to approximately 100 feet at the point closest to Vancouver National Historic Reserve.
- The height of the SR 14 West to I-5 South ramp increases from approximately 68 feet to 72 feet at the point closest to the Evergreen Inn.
- For a 95-foot bridge, the transit grade approaching the BNSF railway in Washington would be at 6 percent for 465 feet. For the 116-foot bridge, the transit grade would be at 6 percent for an additional length of 130 feet.
- The approaches to the bridge are lengthened by varying lengths, which requires more bridge structure rather than fill. This design change increases cost, but does not have a noteworthy change in environmental impacts.
- The bike/pedestrian route is lengthened by 700 feet. Grades in some locations are increased, but are still within Americans with Disabilities Act standards.

The following assumptions were used when analyzing changes in project design:

1. Vertical navigation clearance is 116 feet. Horizontal navigation clearance is 300-foot minimum.
2. The landside impacts are similar to the 110-foot bridge analyzed in the NIR, except there would be a 2-foot object height (regarding sight distance) on the vertical curve instead of 6 inches. The object height refers to the height of an object that a driver can see over a vertical curve and be able to stop. A 2-foot object height allows for an additional 6 feet of vertical clearance while keeping the foundations and approaches similar to the 110-foot bridge. The impacts on land would be similar to the 110-foot bridge but the impacts to aviation and navigation would be similar to the 115-foot bridge.
3. The horizontal alignment and project footprint would not change from the 95-foot bridge based on the increase in height.

4. The vertical depth of the bridge structure is the same as the LPA, approximately 35.5 feet.
5. The piers and foundations are smaller than those analyzed in the FEIS, therefore in-water impacts, both temporary and permanent, would be within the range analyzed in the FEIS.[19]

[19] The FEIS and the BA evaluated bridge pier and foundation footprint larger than required for the 95-foot bridge, or even a 116-foot bridge, in order to allow for flex bility during final design and construction.

5. Changes in Environmental and Navigation Impacts

As described in the Environmental Re-evaluation Form attached to this document, an increase in bridge height to 116 feet above zero CRD would have minimal to no change in impacts to all environmental elements. Changes to navigation impacts are addressed in Section 5.1 below.

This section of the document analyzes the change in navigation impacts based on the following:

1. Updated and more detailed information that was obtained about river users in preparation of the USCG General Bridge Permit and presented in Section 3 of this document.
2. Design refinements from an increase in vertical clearance of the Columbia River Bridges from 95 feet above zero CRD to 116 feet above zero CRD and presented in Section 4 of this document.

5.1 Navigation Impacts

Navigation impacts were studied in the FEIS and updated navigation information was gathered through the bridge permitting process, as described in Section 3. In presenting the navigation impacts, this section:

- Summarizes the broader context of marine cargo activity on the river relative to the marine cargo impacts of the proposed bridge;
- Describes how this study determined “potential” vertical clearance impacts;
- Describes how this study further considered vessel/user operational characteristics to determine the specific impacts to each user/vessel;
- Describes the impacts to river users/vessels as disclosed in the FEIS and ROD;
- Describes the impacts to river users/vessels based on the updated information and refined design; and
- Compares how the impacts have changed.

5.1.1 Impacts on Marine Commerce

As requested by the USCG for their General Bridge Permit application, CRC gathered additional information on economic activity related to Columbia River navigation. While CRC is engaged in confidential discussions with the specific marine-related businesses that would be affected, those discussions involve proprietary information that cannot be disclosed in this public document. However, publicly available information regarding the total value of cargo transiting on the Columbia River, and the contributions of different sectors to that overall value, provide an overview and perspective that help provide context to the project’s navigation-related economic effects.

As shown in Table 5-1, approximately 40.6 million tons of marine cargo flowed through the mouth of the Columbia River in 2010, which is the last year of data available for domestic cargo operations. In addition, approximately 3.3 million tons of cargo moved internally[20] in the river system and was consumed or used in local markets.

Foreign trade accounts for the greatest share of traffic. Exports accounted for 32.4 million tons valued at $10.4 billion in 2010. A significant share of these exports consists of products that are grown or produced in the Pacific Northwest and then exported to world markets. This includes agricultural exports (wheat, potatoes, legumes, fruit, animal feeds and a wide variety of other products), forest products (logs, pulp, paper, lumber, structural building components and other products), and a variety of other products (petroleum coke, et al).

Imports accounted for 5.2 million tons valued at $9.6 billion in 2010. Imports include consumer products as well as inputs to local production. Examples of the consumer goods include footwear, apparel, electronic equipment and fully assembled automobiles et al. which are destined for both local and national retail outlets. The inputs to production include fertilizers used by regional farmers, chemicals used by forest products and other manufacturers, steel coil and slabs at the steel mills and a variety of other products.

Domestic trade accounts for the rest of the traffic, accounting for approximately 14 percent of the tonnage and 22 percent of the value. USACE does not provide dollar estimates of domestic cargo. BST Associates applied appropriate values per ton from international trade to provide estimates of the value of domestic cargo.

Coastwise receipts, which include cargo that originates in other areas of the U.S. and terminates in the Columbia River, accounted for 2.6 million tons valued at an estimated $1.8 billion. This includes petroleum products that come from U.S. West Coast refineries for use in the Columbia River, logs and other products bound for mills and markets in the region.

Coastwise shipments, which refers to cargo originating in the Columbia River that is destined for other areas of the U.S., accounted for 372,000 tons valued at an estimated $284 million. This includes forest products manufactured in the Pacific Northwest that are transported to California and Hawaii, among other products.

Coastwise shipments also include the metal structures that are fabricated upriver of the I-5 bridge at the Columbia Business Center (CBC) that are destined for Alaska, California and other parts of the U.S. In 2010, fabricated metal products produced upriver of the I-5 Bridge were reported as 7,300 tons and valued at approximately $134 million. These shipments were a subset of coastwise shipments, and are itemized separately in the table below.

Internal traffic, which refers to products that move from one location in the river system to another, accounted for 3.3 million tons and was valued at an estimated $3.3 billion. This included commodities such as wood chips, logs and aggregates that are transported from various locations to mills, distribution centers and construction sites.

[20] Steps were taken to eliminate double counting of commodities. As an example, cargo that was barged from upriver sources and was ultimately exported (e.g., wheat and other similar products) was excluded from the estimates. In addition, since internal shipments also represented internal receipts in the river system, the estimated values attributed to these commodities only included one direction of the movement.

Table 5-1. Value of Marine Cargo Traffic on Columbia/Snake River System (2010)

Cargo Designation	Metric Tons (1,000s)	% of Total	Value of Cargo ($Mils)	% of Total
Foreign Imports	5,220.2	12	$9,620.7	38
Foreign Exports	32,400.4	74	$10,402.4	41
Coastwise Receipts	2,609.1	6	$1,876.6	7
Coastwise Shipments*	372.9	1	$284.3	1
Sub-total	40,602.6	92	$22,183.9	87
Internal	3,345.3	8	$3,330.1	13
Total	**43,947.9**	**100**	**$25,514.1**	**100**
***Fabricated Metals**	7.3	0.02	$134.3	0.53

Source: WISER Trade, USACE, BST Associates

Of the vessels/users that would be affected by the proposed new bridge, all but one is included in the Fabricated Metals group shown in the above table. In 2010, this group accounted for 0.02 percent of the tonnage and 0.53 percent of the value of waterborne trade in the Columbia/Snake River system. It needs to be noted that this is based on just one year of data and therefore does not necessarily represent an average year and does not indicate either the past or anticipated future commercial activity of individual businesses. The project is addressing the details of past and future commercial activities of individual businesses, as described above, through confidential discussions with the specific businesses that would be affected, in order to determine the specific economic impacts to each business and the appropriate mitigation. This is further discussed in Section 6.

5.1.2 Definition of Vertical Clearance Impacts.

Bridges can impact navigation in multiple ways. The primary impact of concern for the proposed change in bridge height is how it would affect vertical clearance beneath the bridge. The vertical clearance impact of a fixed span bridge on a given vessel depends largely on four factors: 1) the height of the bridge above the water, 2) the height of the vessel or its cargo above water (air draft), 3) the necessary safety air gap (the amount of vertical buffer the vessel needs between the highest point of the vessel and the lowest point of the bridge, and 4) the river water level.

The water level varies over the year and is influenced primarily by rainfall and snowmelt and secondarily by the dam system. 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 in June coinciding with peaks in spring snowmelt and rainfall.

Since the water level varies over the course of each day and each year, the vertical clearance beneath the bridge also varies. As described below, the EIS evaluated impacts based on different assumptions about water levels than were assumed for this re-evaluation.

The safety air gap can also vary. Vessel owners reported their desired air gap, which ranged from 1 foot to over 10 feet. Again, the EIS evaluated impacts based on different assumptions about the needed safety air gap than were assumed for this re-evaluation. Those differences are discussed below. The EIS reported on available vertical clearance and did not specifically report on an assumed air gap.

The EIS reported on both vertical clearance requirements of vessels (air draft), and the average monthly minimum and maximum water levels over a 20-year sampling (see Exhibits 5-1 and 5-2 below that were taken from the Navigation Technical Report) to define available vertical clearance. Seasonal fluctuations in water levels were compared to the frequency and timing of the vessel's passage. If a vessel type required more vertical clearance than was provided by the bridge, that vessel type was determined to be impacted in the EIS. In the EIS, the vessel type vertical clearance requirement (air draft) was combined with the water level to determine total available vertical clearance for river users by time of year (illustrated in Exhibit 5-3 below—from the Navigation Technical Report). The EIS stated that "the green zone represents vertical clearances available at the average maximum water level. The red zones indicate that the clearance is not available and the yellow band indicates the range of what may or may not be available due to variation in water elevation."

Exhibit 5-2. USACE Columbia River at Vancouver Water Level Data (1987-2006) (from the Navigation Technical Report)

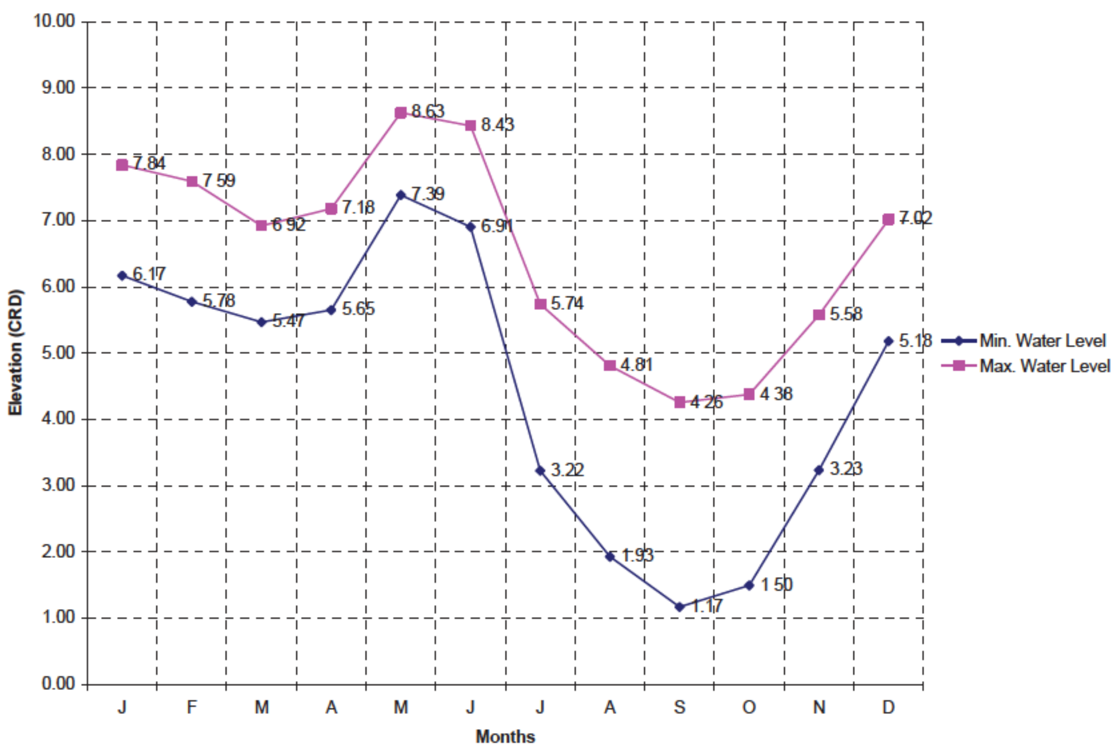
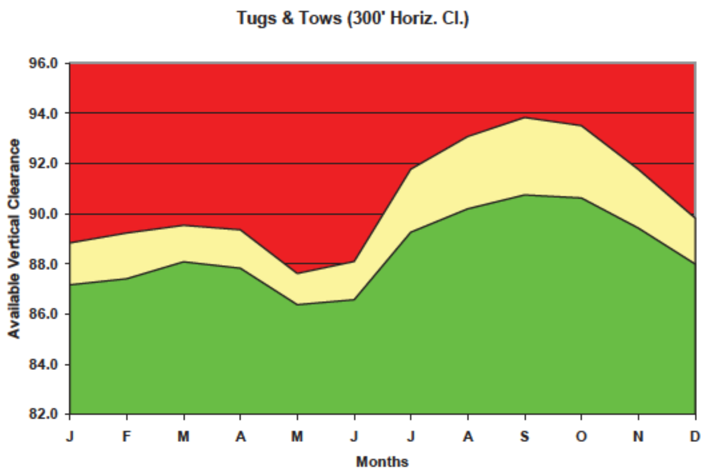


Exhibit 5-3. Existing Columbia River Navigation Channels (from the Navigation Technical Report)

Vessel Type	Clearance Requirement	Approximate Annual Frequency
Tugs and Tows	49 feet to 58 feet	> 500 trips
Sailboats/Recreation	76 feet to 88 feet	24 trips
Marine Contractors	100 feet to 110 feet	Infrequent
Marine Industrial	65 feet	6 trips
Cruise/Passenger	50 feet to 60 feet	25 trips

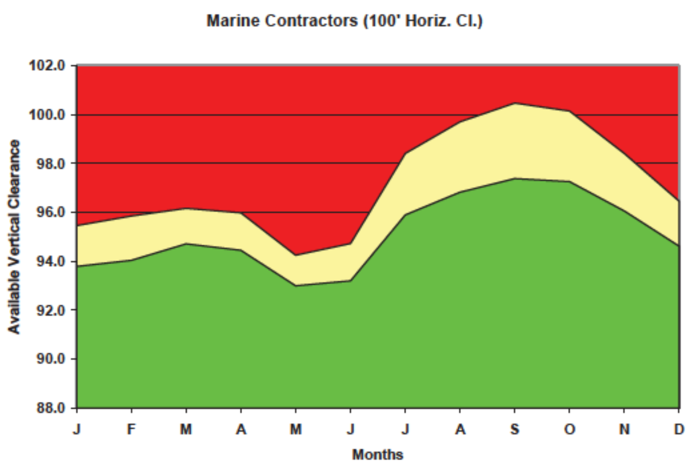
Exhibit 5-4. Proposed Replacement Alignment Clearances for 300-foot width (top), 100-foot width (center), and 50-foot width (bottom) (from the Navigation Technical Report)

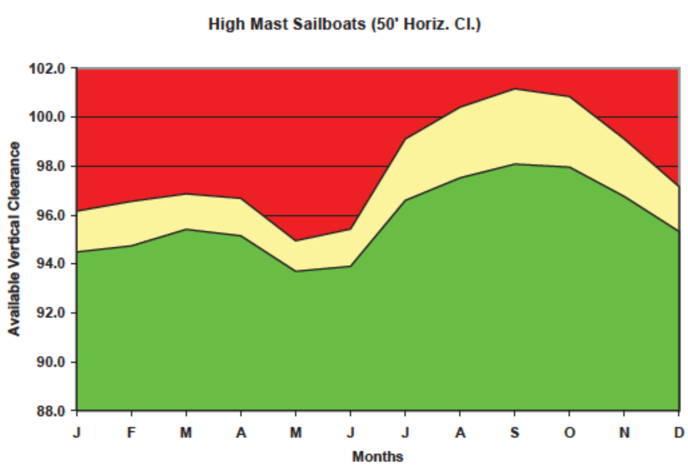


Green--vertical clearances available at the average maximum water level

Red-- clearance is not available

Yellow--the range of what may be available due to variation in water elevation





5.1.3 Changes in Navigation Impacts Evaluated in this Document

As stated above, this document evaluates the updated and more detailed information obtained since publication of the ROD, including:

1. The updated information on river users that the project obtained by completing an updated vessel survey in preparation for the USCG General Bridge Permit application.
2. The increase in the bridge’s vertical clearance from 95 feet to 116 feet above zero CRD.

5.1.4 Impacts of 95-foot Bridge as Initially Disclosed in the FEIS and ROD

The EIS and ROD included an analysis of impacts to navigation based on information on bridge lifts, river water levels, and a survey of river users. Data was based on a Boat Survey that was conducted in 2004 (Parsons Brinckerhoff Inc. 2004), Boat Survey validation meetings, and telephone calls conducted by the agencies with key stakeholders, such as vessel operators and the USCG.

A list of vessels traveling this river section was assembled, analyzed, and summarized in the 2006 Boat Survey Technical Memorandum. This study provided valuable information on the types of vessels traveling the Columbia River, their clearance requirements, and was used as a basis for determining vertical clearances for the new bridges. The data in the 2008 Navigation Technical Report was verified through a series of one-on-one interviews with vessel operators.

Data on bridge lifts, river users and river water levels was reported in the EIS and can be found in the Navigation Technical Report.

The FEIS reported impacts to navigation based on a 95-foot bridge, as described below.

5.1.4.1 Long-term Impacts

The FEIS stated that the 95-foot bridge would reduce the maximum vertical clearance under the bridge from 179 feet to 95 feet. The horizontal clearance would be at least 300 feet. The “S-curve,” which is a relatively complex navigational maneuver, would be eliminated and the total number of piers would be reduced.

The FEIS reported that only marine contractors, which travel this portion of the river infrequently, may have vertical height requirements greater than the available clearance. The FEIS reported that interviews with some marine contractors suggest there is a possibility they can disassemble their equipment, at a cost, in order to meet the proposed vertical clearance of 95 feet above zero CRD. The Navigation Technical Report stated that other marine contractors have said that they cannot dismantle their loads.

Exhibit 5-4 below is from the FEIS, and summarizes the vertical clearance requirements and frequency of use by vessel type.

Exhibit 5-4. Summary of Vertical Clearance Requirements and Frequency of Use (from FEIS)

Vessel Type	Vertical Clearance Requirement	Approximate Annual Frequency
Tugs and Tows	49 feet to 58 feet	> 500 trips
Sailboats/Recreation	76 feet to 88 feet	24 trips
Marine Contractors	100 feet to 110 feet	Infrequent
Marine Industrial	65 feet	6 trips
Cruise/Passenger	50 feet to 60 feet	25 trips

The EIS reported that "limitations to marine contractors would be offset by substantially improved navigational safety and elimination of river traffic delays. Tall loads would need to partially disassemble for those infrequent trips upriver of the LPA."

The ROD reported that the 95-foot bridge would constrain a small portion of river use by three known river users. Much of this impact could be offset by partially disassembling the infrequent tall loads or masts.

5.1.5 Impacts of 116-foot Bridge Based on Vessel Survey

5.1.5.1 Potential Long-term Impacts

The 116-foot bridge would provide the same improvements to horizontal clearance and the "S-curve" maneuver as the 95-foot bridge.

The definition of "potential impacts" for this section of the re-evaluation is based upon the methodology agreed-upon by FHWA, FTA, ODOT, WSDOT, and the USCG, using conservative assumptions of air gap and river water level. Under these assumptions, a vessel was determined to be "potentially impacted" if it could not pass under the bridge 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 above zero CRD. The 16-foot river stage is known as the Ordinary High Water level and represents a near worst case analysis. The river level is lower than 16 feet above zero CRD 98 percent of the time. Said differently, with these assumptions, a vessel/user was considered potentially impacted if its passage would be restricted two percent or more of the days per year.

Since the river level fluctuates daily as well as seasonally, a vessel that could not pass when the river is at 16 feet above zero CRD, could actually pass most of the days of the year. 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.

With a 116-foot bridge, the following 11 vessels/users would be unable to pass with a 10-foot air gap when the river level is at 16 feet above zero CRD:

- The tallest future shipments of two fabricators (Greenberry Industrial and Oregon Iron Works)
- Five marine contractor vessels in their current configurations (Diversified Marine *DB Freedom*, J.T. Marine *DB Taylo*r, Port of Portland dredge *Oregon*, Advanced American Construction *DB 4100*, and General Construction *DB General*)

- The tallest reported past shipment by a fabricator (Thompson Metal Fab)
- One possible future sailboat (Schooner Creek Boat Works)
- One federal vessel (USACE dredge *Yaquina*)
- One possible future shipment by a marine contractor (SDS Lumber barge)

5.1.5.2 Individual Vessel Impact Analysis

The conservative assumptions of air gap and river water level described above were used to identify the above list of 11 vessels/users potentially impacted by the 116-foot bridge. The conservative assumptions assumed a vessel/user to be potentially impacted if, with a 10-foot air gap, their passage would be restricted more than two percent of the days per year. The next step in the analysis is to evaluate the specific operating requirements of each of the 11 vessels/users identified as potentially affected.

Based on the specific vessel operating requirements, and allowing less than a 10-foot air gap, the following five vessels/users could pass under the 116-foot bridge during a substantial portion of the year:

- Advanced American Construction’s *DB 4100*
- General Construction’s *DB General*
- The Port of Portland’s Dredge *Oregon*
- The USACE’s dredge *Yaquina*
- A future possible shipment on an SDS barge

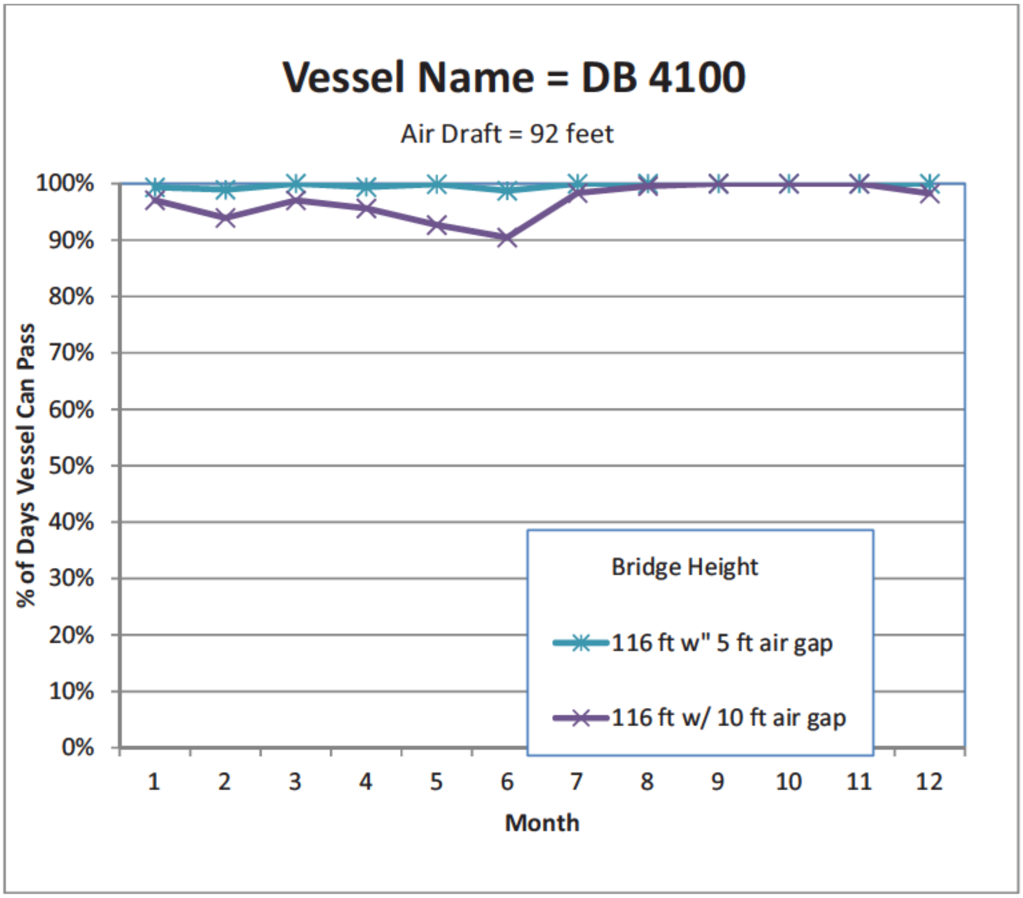
The charts and narrative below show the percent of days per month that each of these vessels could pass under a 116-foot bridge, based on both a 5-foot air gap and a 10-foot air gap. Based on their specific operating requirements, the navigation needs of each of these five vessels/users would not be substantially impacted. These charts show that:

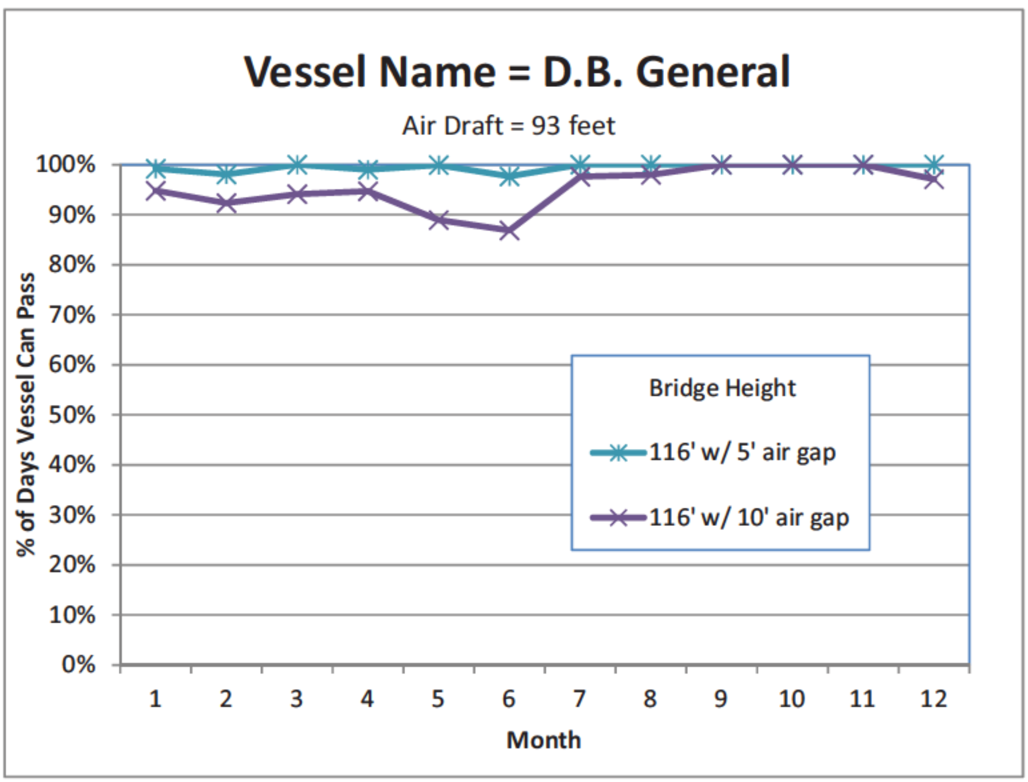
- Advanced American Construction’s *DB 4100* would be minimally restricted, able to pass at least 90 percent of the days of each month of the year with a 10-foot air gap, and greater than 98 percent of days in all months of the year with a 5-foot air gap. Accordingly, for the purposes of this analysis, there is no substantial impact.
- General Construction’s *DB General* would be minimally restricted with a 5-foot air gap, and only slightly restricted with a 10-foot air gap. It could pass with a 10-foot air gap over 90 percent of the days each month except in the higher water months of May and June when it could pass just slightly under 90 percent of the days each month. The *DB* General can pass under the bridge with a 5-foot air gap in greater than 98 percent of days in all months of the year. Accordingly, for the purposes of this analysis, there is no substantial impact.
- The Port of Portland’s Dredge *Oregon* would be severely restricted if a 10-foot air gap is required but would be only partially restricted with a 5-foot air gap. It could pass under a 116-foot bridge with a 5-foot air gap between 60 and 100 percent of the days per month, except in the highest water months of May and June when it could pass slightly fewer than 50 percent of the days per month.

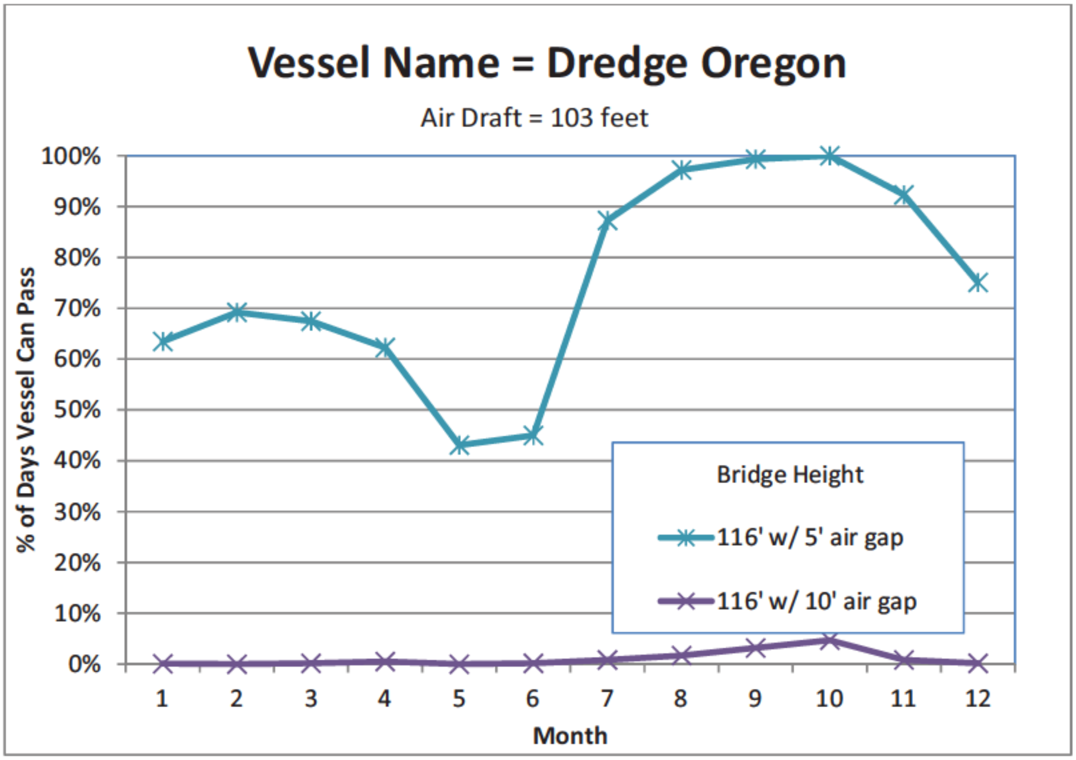
The Dredge *Oregon* is used by the Port of Portland under contract to USACE for channel deepening and maintenance projects on the lower Columbia River. This dredge has worked upriver of the Columbia River Bridge 6 times in the last 30 years and anticipates working upriver rarely in the future. The highest elements of the *Oregon* are the raised spuds. A spud is a moveable vertical pile that is lowered when working and raised when in transit.

For a 116-foot bridge, the Port has suggested that an acceptable solution would be to lower their spuds for passage under the bridge. At ordinary high water (16 feet above zero CRD) and a 5-foot air gap, the spuds can be lowered by 8 feet to transit under the bridge. With this procedure as proposed by the owner, for the purposes of this analysis there is no impact.

- The USACE's dredge *Yaquina* would be minimally restricted by a 10-foot air gap (able to pass more than 90 percent of the days of each month of the year), and would be essentially unaffected if only a 5-foot air gap is required (it could pass between 98 and 100 percent of the days for each month). As specified in their February 2012 letter, 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 for more than 98 percent of the days each month of the year. Accordingly, for the purposes of this analysis, there is no substantial impact.
- A future possible shipment on an SDS barge with a 100-foot air draft would be moderately restricted if a 10-foot air gap is required. With a 10-foot air gap, it could pass under a 116-foot bridge between 55 and 95 percent of days per month for 5 months of the year (July through November), between 25 and 37 percent of the days per month for 5 months of the year (December through April), and between 12 and 22 percent of the days in May and June. With a 5-foot air gap, it could pass more than 88 percent of the days each month except in May and June when it could pass between 72 and 78 percent of the days per month. The future load is speculative, and is not based on past history or a specific future market. Accordingly, for the purposes of this analysis, there is no substantial impact.


Vessel Name = DB 4100
Air Draft = 92 feet
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
% of Days Vessel Can Pass
1
2
3
4
5
6
7
8
9
10
11
12
Month
Bridge Height
116 ft w" 5 ft air gap
116 ft w/ 10 ft air gap


Vessel Name = D.B. General
Air Draft = 93 feet
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
% of Days Vessel Can Pass
1
2
3
4
5
6
7
8
9
10
11
12
Month
Bridge Height
116' w/ 5' air gap
116' w/ 10' air gap


Vessel Name = Dredge Oregon
Air Draft = 103 feet
% of Days Vessel Can Pass
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1
2
3
4
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6
7
8
9
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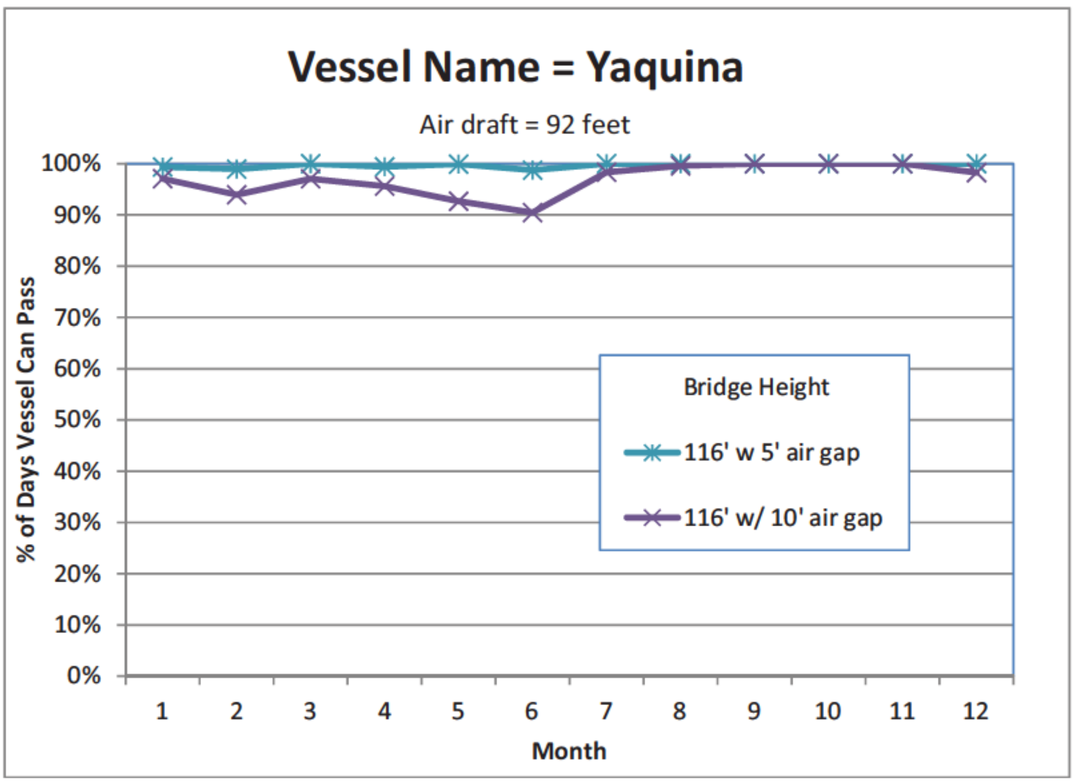
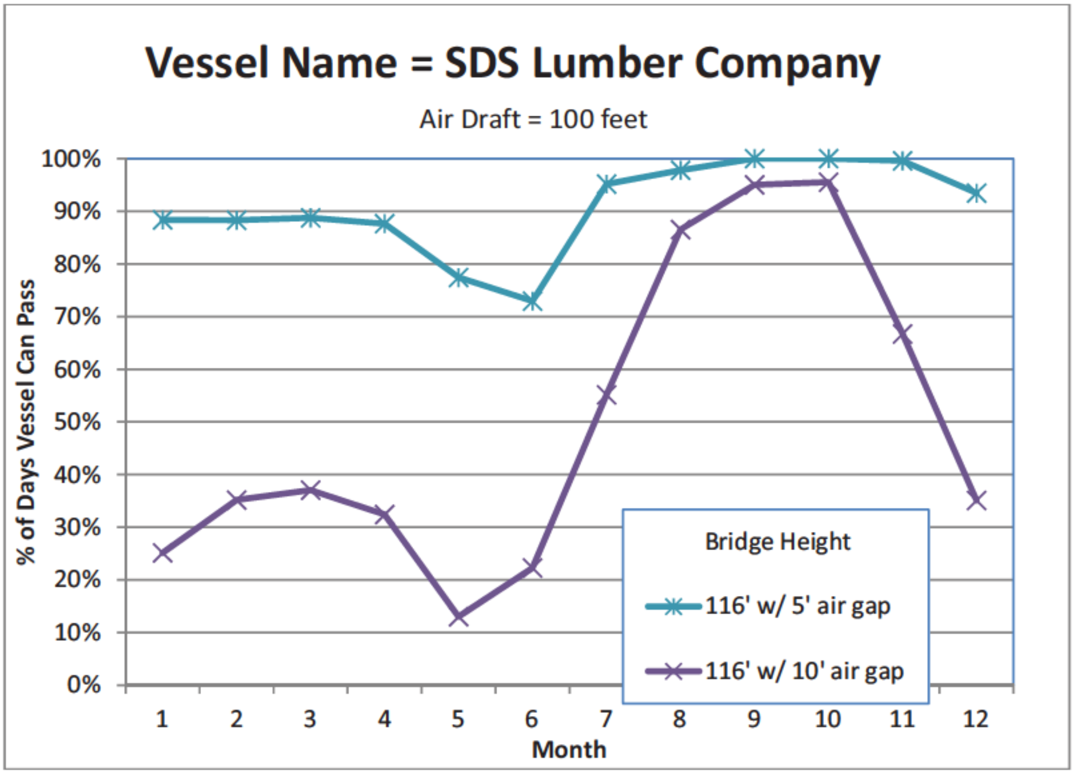
11
12
Month
Bridge Height
116' w/ 5' air gap
116' w/ 10' air gap


Vessel Name = Yaquina
Air draft = 92 feet
% of Days Vessel Can Pass
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1
2
3
4
5
6
7
8
9
10
11
12
Month
Bridge Height
116' w 5' air gap
116' w/ 10' air gap



The remaining six vessels/users would be too tall to pass under the 116-foot bridge at any time, including:

- The tallest future shipments of two fabricators (Greenberry Industrial and Oregon Iron Works)
- Two marine contractor vessels in their current configurations (Diversified Marine *DB Freedom*, J.T. Marine *DB Taylor*)
- The tallest reported past shipment by a fabricator (Thompson Metal Fab)
- A possible future sailboat (Schooner Creek Boat Works)

Of these six vessels/users, two vessels have only a remote chance of being impacted:

- Diversified Marine's DB Freedom has never transited this stretch of river and may never transit it. The need for mitigation will be determined based on operating requirements and potential future activity upstream of the bridge.
- Schooner Creek Boat Works' possible future sailboat would be constructed downriver of the bridge and it is unknown if it would ever need to transit under the bridge. The size of the Schooner Creek Boat Works vessel is typical of ocean-going sailboats and would be unprecedented for recreational sailboats on the river. It is unknown and speculative at this time when this boat will be constructed and if it would be used upriver.

5.1.5.3 Summary of Vessel Impacts after Consideration of Specific Operating Needs

If the operational requirements of a vessel/user can be accommodated with a 116-foot bridge then they are not considered to be an impacted user for this analysis. Additionally, these vessels/users would not require mitigation. Of the 11 potentially impacted vessels/users, the following five will be able to pass a substantial number of the days in every month of the year (as described in the charts above) and therefore are not considered substantially impacted:

- Advanced American Construction's *DB 4100*
- General Construction's *DB General*
- The Port of Portland's Dredge *Oregon*
- The USACE's dredge *Yaquina*
- A future possible shipment on an SDS barge

Of the remaining six vessels/users, two vessels have only a remote chance of being impacted:

- Diversified Marine's *DB Freedom*
- Schooner Creek Boat Works' possible future sailboat

In conclusion, there are four vessels/users that would be impacted:

- The tallest future shipment of Greenberry Industrial
- The tallest future shipment of Oregon Iron Works
- One marine contractor vessel in its current configuration (J.T. Marine *DB Taylor*)
- The tallest reported past shipment by a fabricator (Thompson Metal Fab)

5.1.6 Change in Impacts

5.1.6.1 Long-term Impacts

The ROD estimated that three known vessels/users would be restricted by the new bridge. This was based on less conservative assumptions regarding necessary air gap and on a river user survey that had been conducted during the EIS process.

Based on the updated and more detailed information that was obtained through the updated vessel survey conducted in preparation for the USCG General Bridge Permit application, there would be four[21] vessels/users impacted by the 116-foot bridge instead of three as stated in the ROD. Two are possible future shipments by fabricators, one is the tallest past shipment of a fabricator, and one is a marine contractor crane barge.

With mitigation for the USCG General Bridge Permit discussed in Section 6, all of these impacts would be avoided or minimized.

[21] In addition to the four impacted vessels/users, one existing vessel and one possible future vessel have a remote chance of being impacted. Impacts to them cannot be confirmed at this time. They include a marine contractor crane barge that has never transited and may never transit under the I-5 bridge. In addition, a downstream boat builder anticipates constructing a sailboat in the future that would be too tall to pass under the 116-foot bridge. If these vessel owners can demonstrate that they would be substantially impacted, mitigation would be provided, as discussed in Section 6.

The vertical and horizontal clearances for the proposed bridges over North Portland Harbor meet or exceed the clearance of the existing North Portland Harbor Bridge, therefore there is no change in impacts.

5.1.6.2 Temporary Impacts

The change in vertical clearance from 95 to 116 feet above zero CRD makes no difference in the project's temporary impacts to navigation during construction.

6. Proposed Mitigation for the USCG General Bridge Permit

6.1 Navigation

6.1.1 Introduction

The mitigation or compensation measures that are described in this section are included to address potential economic impacts to navigation-dependent businesses that travel under the Columbia River bridges. While economic impacts to specific businesses are not normally considered impacts under NEPA, the mitigation or compensation measures are described below as they will be used for the USCG in their review of the CRC General Bridge Permit application.

This section identifies mitigation that is being considered to further minimize vessel transit impacts to four vessels that would result from a 116-foot high bridge. It also includes potential mitigation measures for the two vessels that have a remote chance of being impacted. The project will provide mitigation for these two vessels contingent on the vessel owners demonstrating that they would be impacted. Mitigation discussions with impacted river users are occurring as of publication of this re-evaluation. Below is the status of the mitigation measures that are being considered by the impacted users and the CRC project. Conversations to finalize mitigation with the impacted users will continue until agreement is obtained, prior to a decision on the USCG General Bridge Permit.

6.1.1.1 Avoidance and Minimization Overview

Avoidance and minimization measures typically precede the consideration or at least commitment of mitigation measures. Increasing the vertical clearance of the bridge to 116 feet above zero CRD would avoid and minimize impacts to many vessels that would be impacted by a bridge with a vertical clearance of 95 feet above zero CRD.

6.1.1.2 Mitigation Timeline and Overview

This section discusses potential mitigation measures that could be used to further reduce vessel impacts. For some users, mitigation discussions have advanced further than others. A current snapshot of mitigation options for each impacted user is described in the following section. The CRC project is in the process of further exploring the mitigation measures with affected vessel owners and developing commitments. Mitigation discussions with affected owners and commitments to mitigation will advance through the permitting processes. For each impacted vessel owner, 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/user. No final decision can be made at this time as to who would be responsible for executing the mitigation since negotiations with impacted businesses are still underway and mitigation is an integral component of the USCG General Bridge Permit process.

The mitigation described below is for impacts associated with vessel transit on the main channel under the proposed I-5 bridges. No mitigation was developed for the proposed North Portland Harbor bridges as no impacts were identified, or concerns raised, by river users regarding these bridges.

6.1.2 Mitigation for Long-term Impacts

6.1.2.1 JT Marine *DB Taylor*

JT Marine operates from moorage and upland facilities just upstream of the I-5 bridge in the Columbia Business Center. Virtually all of their project work occurs downstream of the bridge. Regular and frequent passage under the bridge is required.

The project will provide compensation to JT Marine to retrofit the crane gantry on the *DB Taylor* to allow the boom to be lowered sufficiently to transit under the bridge 98 percent of the year. Working with a naval architect, the project and JT Marine are jointly developing plans for compensation to reconfigure the crane to ensure it can pass under the proposed bridge while retaining the same lifting capacity and reach.

6.1.2.2 Thompson Metal Fab[22]

Currently, CRC is working closely with Thompson Metal Fab to identify appropriate mitigation strategies to allow them to continue to pursue current and future anticipated markets following construction of the bridge. These discussions are being conducted pursuant to confidentiality agreements for the purposes of preserving proprietary company financial information. At the time of submittal of the application for the General Bridge permit, a description of the proposed mitigation, timeline for completion of the mitigation, and commitments by the project and the fabricator will be presented. Work is underway to evaluate potential business losses resulting from lost market opportunities, and also to consider opportunities and potential costs for relocation of their operations.

The anticipated mitigation agreement will result in project payment to Thompson Metal Fab. Once the payment is made, how Thompson Metal Fab decides to use the funds will be under their business direction and control. One potential outcome would be a decision by Thompson Metal Fab to relocate downstream of the bridge to a site of their choosing.

[22] These fabricators work in the Columbia Business Center (CBC) and any relocation has the potential to impact the business operations of CBC. The project is currently discussing with CBC potential strategies to transition the property use to uses that would not generate height constrained shipments.

Through work completed to date, Thompson Metal Fab has determined that there are sites downstream of the bridge that meet their manufacturing requirements.

6.1.2.3 Oregon Iron Works[23]

Oregon Iron Works is not interested in pursuing relocation. Accordingly, the anticipated mitigation agreement is that the project will provide compensation for loss of profits resulting from lost market opportunities. Once the payment is made, how Oregon Iron Works decides to use the funds will be under their direction and control. The degree of the impact to the business is proprietary and cannot be publically disclosed at this time.

6.1.2.4 Greenberry Industrial[23]

Currently, CRC is working closely with Greenberry Industrial to identify appropriate mitigation strategies to allow them to continue to pursue current and future anticipated markets following construction of the bridge. These discussions are being conducted pursuant to confidentiality agreements. At the time of submittal of the application for the General Bridge permit, a description of the proposed mitigation, timeline for completion of the mitigation, and commitments by the project and the fabricator will be presented. Work is underway to evaluate potential business losses resulting from lost market opportunities, and also to consider opportunities and potential costs for relocation of their operations.

The anticipated mitigation agreement will result in a project payment to Greenberry Industrial. Once the payment is made, how Greenberry decides to use the funds will be under their business direction and control. One potential outcome would be a decision by Greenberry Industrial to relocate downstream of the bridge to a site of their choosing. Greenberry Industrial is evaluating sites downstream of the bridge to determine if they meet their manufacturing requirements.

6.1.2.5 Columbia Business Center

Additionally, the three fabricators listed above all work in the Columbia Business Center (CBC) and any relocation of these fabricators has the potential to impact the business operations of CBC. The project is currently discussing with CBC potential strategies to transition the property use to uses that would not generate height constrained shipments that would not be impacted by a 116-foot bridge.

6.1.3 Contingent Mitigation for Long-term Impacts

The potential for impacts to these two vessels below is considered remote, as a result, there are no plans for mitigation at this time. However, should the vessel owners demonstrate impacts, mitigation will be considered, as discussed below.

6.1.3.1 Schooner Creek Boat Works

Schooner Creek Boat Works, a manufacturer of recreational sailboats, is located west (downstream) of the planned bridge. They have reported plans to build a sailboat that would

[23] These fabricators work in the Columbia Business Center (CBC) and any relocation has the potential to impact the business operations of CBC. The project is currently discussing with CBC potential strategies to transition the property use to uses that would not generate height constrained shipments.

be too tall (139-foot air draft) to transit under the 116-foot bridge at any time. That size of vessel is typically designed for ocean-going and use for recreational sailing on the river is unprecedented. It is unknown at this time when this boat will be constructed and if built, whether this boat will be used upriver. Currently, there are no plans for mitigation.

Given the speculative nature of the single vessel being manufactured in the future, if a need for upriver travel is demonstrated, possible mitigation options could include:

- Transport the sailing vessel over land or water to the other side of the bridge. The proposed new sailboat would be built at a boat yard located downstream from the I-5 bridges, and it is not known if the vessel would need to transit upriver or not. If transiting underneath the new bridges is necessary, then a means to get to the other side of the bridge would be to haul the vessel out of the water and onto land, lower the mast, transport the vessel over land to the other side of the bridge, raise the mast, and then place the vessel back in the water. Alternately, the vessel could be transported over water without the mast. This option is only feasible when the need to get to the other side of the bridge is infrequent and it would realistically only be implemented for sailing trips that will result in the vessel remaining on the other side of the bridge for an extended period of time.
- Permanently relocate the vessel to the preferred side of the bridge. Sailing vessels that remain on one side of the bridge or the other and do not need or desire to transit under the bridge may be permanently berthed on that side of the bridge. If this proposed vessel is not already on the preferred side of the bridge, the vessel could be relocated.

6.1.3.2 Diversified Marine *DB Freedom*

Diversified Marine Industries acquired the *DB Freedom* in 2010 and uses it primarily to support their boat-building operations located in the Portland Harbor just downstream of the I-5 bridge. They use it periodically (when boat-building schedules permit) to bid on projects requiring a large crane. To date they have not had occasion to work on projects upstream of the I-5 bridge. Their normal setup for transporting the *Freedom* 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.

The project is currently working with Diversified Marine to evaluate the addition of a portable cradle for the boom, to allow it to transit more securely when placed alongside the tug. The need for the boom cradle will be determined based on operating requirements and potential future activity upstream of the bridge. The project will commit to building the boom cradle if a future need is demonstrated.

6.1.4 Mitigation for Unavoidable Short-term Effects

As noted previously, the refined vertical clearance would not change the temporary impacts to navigation, and therefore it would not change the mitigation as described in the ROD.

7. Conclusions

As shown in this re-evaluation, the impacts associated with the updated vessel information and the design refinement from a 95-foot bridge to a 116-foot bridge are similar and within the range of impacts reported in the FEIS and ROD and are therefore not new significant environmental impacts.

The refinement in bridge vertical clearance would result in only minimal changes in impacts, as addressed in this document and the matrix of impacts in the attached re-evaluation form.

In the ROD, there were three impacted known river users/vessels at a 95-foot vertical clearance. With the updated and more detailed vessel survey described in the NIR, and the refinement in vertical clearance to 116 feet[24] above zero CRD, four known users/vessels[25] would be impacted. Impacting one additional vessel/user is not significant given the context and intensity of river use. Additionally, as shown in Section 6, all of the impacts to the four impacted users will be mitigated for the USCG General Bridge Permit.

The changes in information and impacts do not affect any regulatory approvals already received. The changes will be incorporated into the on-going permitting and documentation for compliance with other environmental regulations.

Based on the foregoing information and independent review and evaluation by FTA and FHWA, the determination is made that the impacts presented herein and the refinement in design of vertical clearance from 95 feet to 116 feet, do not present new significant environmental impacts under NEPA which were not evaluated in the project NEPA documents and ROD and, therefore, pursuant to 23 CFR Section 771.130, no additional NEPA documentation is required.

[24] The 116-foot bridge is within the mid-level bridge range evaluated in the FEIS.

[25] In addition to the four impacted vessels/users, one existing vessel and one possible future vessel have a remote chance of being impacted. Impacts to them cannot be confirmed at this time. They include a marine contractor crane barge that has never transited and may never transit under the I-5 bridge. In addition, a downstream boat builder anticipates constructing a sailboat in the future that would be too tall to pass under the 116-foot bridge. If these vessel owners can demonstrate that they would be substantially impacted, mitigation would be provided, as discussed in Section 6.

Date: 12/28/12

By: R. F. Krochalis, Regional Administrator
Federal Transit Administration, Region 10

Date: 12/28/2012

By: Phillip Ditzler, Division Administrator
Federal Highway Administration Oregon Division

Date: 12/28/2012

By: Daniel Mathis, Division Administrator
Federal Highway Administration Washington Division

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ATTACHMENT A

Re-evaluation Form

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ENVIRONMENTAL RE-EVALUATION CONSULTATION

Note: The purpose of this worksheet is to assist sponsoring agencies in gathering and organizing materials for re-evaluations required under the National Environmental Policy Act (NEPA). It is designed to provide FTA and FHWA with information needed to do a re-evaluation. In lieu of the worksheet, the sponsoring agency may submit the same information in a different format. Submission of the worksheet by itself does not meet NEPA requirements. <u>FTA and FHWA must concur in writing</u> with its determination and/or the sponsoring agency's NEPA recommendation. Contact the FTA Region 10 office at (206) 220-7954 or FHWA CRC Project Manager at (360) 619-7591 if you have any questions regarding this worksheet. We strongly encourage you to contact us to discuss your project changes before you fill out this worksheet.

For Agency Use *Date Received:*	
Recommendation by FTA Planner or Engineer: ☐ *Accept* ☐ *Return for Revisions* ☐ *Not Eligible* *Recommendation by FHWA Planner or Engineer:* ☐ *Accept* ☐ *Return for Revisions* ☐ *Not Eligible*	*Reviewed By:* *Date:* *Reviewed By:* *Date:*
Comments:	
Concurrence by FTA Counsel: ☐ *Accept Recommendation* ☐ *Return with Comments* *Concurrence by FHWA Counsel:* ☐ *Accept Recommendation* ☐ *Return with Comments*	*Reviewed By:* *Date:* *Reviewed By:* *Date:*
Comments:	
Concurrence by Approving Officials: *FTA:* *FHWA:*	*Reviewed By:* *Date:* *Reviewed By:* *Date:*

<u>Please answer the following questions, fill out the impact chart and attach project area and site maps.</u> Using a site map from the previously approved NEPA document, show project changes using a different color. Include additional site maps to help reviewer understand project changes.

PROJECT TITLE Interstate 5 Columbia River Crossing Project (refined bridge vertical clearance and updated navigation information)

LIST CURRENT, APPROVED ENVIRONMENTAL DOCUMENTS (e.g. EIS/ROD, EA/FONSI, BA, RE-EVALUATION, etc.) If Re-evaluation, briefly describe.
Title: Record of Decision (ROD) **Date:** December 2011 **Type and Date of Last Federal Action:** Published by FHWA and FTA in December 2011
Title: Final Environmental Impact Statement (FEIS) **Date:** September 2011

Type and Date of Last Federal Action: Published by FHWA and FTA in September 2011

Title: NEPA Determinations: 17th Street Transit, Composite Deck Truss Bridge Type, and Environmental
Date: 17th Street (March 2010), Composite Deck Truss (March 2011), Environmental (May 2011)
Type and Date of Last Federal Action: Evaluated by FHWA and FTA on the above dates

Title: Draft Environmental Impact Statement (DEIS)
Date: May 2008
Type and Date of Last Federal Action: Published by FHWA and FTA in May 2008

Title: Biological Opinion (BO)
Date: January 2011
Type and Date of Last Federal Action: Published by NMFS in January 2011

Title:
Date:
Type and Date of Last Federal Action:

HAS THE MOST CURRENT AND OTHER PERTINENT APPROVED ENVIRONMENTAL DOCUMENTS BEEN _RE-READ_ TO COMPARE PROPOSED PROJECT CHANGES?

☐ **NO (STOP! The most current approved environmental document MUST be re-read prior to completing a re-evaluation.)**

☒ **YES NAME: Seth English-Young, Jeff Heilman DATE: November 2012**

IS THE PROJECT CURRENTLY UNDER ☒ DESIGN OR ☐ CONSTRUCTION?

REASON FOR RE-EVALUATION
See Columbia River Bridge Vertical Clearance NEPA Re-evaluation

DESCRIPTION OF PROJECT CHANGES OR NEW INFORMATION
See Columbia River Bridge Vertical Clearance NEPA Re-evaluation

HAVE ANY NEW OR REVISED LAWS OR REGULATIONS BEEN ISSUED SINCE APPROVAL OF THE LAST ENVIRONMENTAL DOCUMENT THAT AFFECTS THIS PROJECT? If yes, please explain.

☐ **NO**
☒ **YES**
The surface transportation reauthorization, Moving Ahead for Progress in the 21st Century (MAP-21), was signed into law on July 6, 2012.

IS THE LIST OF THREATENED AND ENDANGERED SPECIES (NMFS AND USFWS) MORE THAN 6 MONTHS OLD?

☐ **NO**
☒ **YES (STOP! Endangered Species lists and analysis MUST be updated.)**
Eulachon critical habitat has been designated, and the project is currently reinitiating with NMFS.

WILL THE NEW INFORMATION HAVE THE POTENTIAL TO CAUSE A CHANGE IN THE DETERMINATION OF IMPACTS FROM WHAT WAS DESCRIBED IN THE ORIGINAL ENVIRONMENTAL DOCUMENT FOR ANY OF THE AREAS LISTED BELOW? For each impact category, please indicate whether there will be a change in impacts. For all categories with a change, continue to the table at the end of this worksheet and provide detailed descriptions of the impacts as initially disclosed, new impacts and a discussion of the changes. The change in impact may be beneficial or adverse.

Transportation	☒ **Yes**	☐ **No**
Land Use and Economics	☒ **Yes**	☐ **No**
Acquisitions, Displacements, & Relocations	☐ **Yes**	☒ **No**
Neighborhoods & Populations (Social)	☐ **Yes**	☒ **No**
Visual Resources & Aesthetics	☒ **Yes**	☐ **No**
Air Quality	☒ **Yes**	☐ **No**
Noise & Vibration	☒ **Yes**	☐ **No**
Ecosystems (Vegetation & Wildlife)	☒ **Yes**	☐ **No**
Water Resources	☒ **Yes**	☐ **No**
Energy & Natural Resources	☒ **Yes**	☐ **No**
Geology & Soils	☐ **Yes**	☒ **No**
Hazardous Materials	☐ **Yes**	☒ **No**
Public Services	☐ **Yes**	☒ **No**
Utilities	☐ **Yes**	☒ **No**

Historic, Cultural & Archaeological Resources	☒ **Yes**	☐ **No**
Parklands & Recreation	☒ **Yes**	☐ **No**
Construction	☐ **Yes**	☒ **No**
Secondary and Cumulative	☒ **Yes**	☐ **No**
Aviation	☒ **Yes**	☐ **No**

Will the changed conditions or new information result in revised documentation or determination under the following federal regulations?

Endangered Species Act	☒ **Yes**	☐ **No**
Magnuson-Stevens Act	☐ **Yes**	☒ **No**
Farmland Preservation Act	☐ **Yes**	☒ **No**
Section 404-Clean Water Act	☐ **Yes**	☒ **No**
Floodplain Management Act	☐ **Yes**	☒ **No**
CERCLA (Hazardous Materials)	☐ **Yes**	☒ **No**
Section 106 National Historic Preservation Act	☐ **Yes**	☒ **No**
Uniform Relocation Act	☐ **Yes**	☒ **No**
Section 4(f) Lands	☐ **Yes**	☒ **No**
Section 6(f) Lands	☐ **Yes**	☒ **No**
Wild & Scenic Rivers	☐ **Yes**	☒ **No**
Coastal Barriers	☐ **Yes**	☒ **No**
Coastal Zone	☐ **Yes**	☒ **No**

Sole Source Aquifer ☐ **Yes** ☒ **No**

National Scenic Byways ☐ **Yes** ☒ **No**

Other Marine Mammal Protection Act ☐ **Yes** ☒ **No**

If you checked yes to any of these, describe how the changes impact compliance and any actions needed to ensure compliance of the new project: The Project will notify regulatory agencies of the change in bridge vertical clearance, but this change will not require any revisions to determinations for any of the above federal regulations.

Eulachon critical habitat has been designated since issuance of the ROD, and the project is currently reinitiating with NMFS.

Will these changes or new information likely result in substantial public controversy?

☐ **Yes** ☒ **No**

Comments: The changes covered in this re-evaluation do not add new controversy. Changes were made specifically to address public and agency concerns and reduce controversy.

CONCLUSIONS AND RECOMMENDATIONS:

See attached Vertical Clearance NEPA Re-evaluation

LIST OF ATTACHMENTS:

- Navigation Impact Report—November 2012[1]
- FAA Aeronautical Study—December 2012
- (This checklist is an attachment to the Bridge Height Vertical Clearance NEPA Re-evaluation)

SUBMITTED BY:

By signing this, I certify that to the best of my knowledge this document is complete and accurate.

Name Title	Date

Submit two paper copies of this form, attachments, and a transmittal letter recommending a NEPA finding to the address below. Or you may submit one electronic version to fta.tro10mail@dot.gov. Submit

[1] The Navigation Impact Report has been finalized and is included as an appendix to this document. However, the USCG identified additional information that is needed for the bridge permit application. This information will be submitted as part of the bridge permit application, but is not relevant to this NEPA re-evaluation.

an electronic version to your area FTA Community Planner and FHWA Project Manager. Contact FTA or FHWA at the number below if you are unsure who this is or if you need the email address. When the document is approved, FTA and FHWA may request additional copies.

Federal Transit Administration, Region 10 915 2nd Avenue, Suite 3142 Seattle, WA 98174-1002	phone: (206) 220-7954 fax: (206) 220-7959
Federal Highway Administration Oregon Division 530 Center Street NE., Suite 100 Salem, OR 97301	phone: (503) 399-5749 fax: (503) 399-583
Federal Highway Administration Washington Division 711 S. Capitol Way, Suite 501 Olympia, WA 98501	phone: (360) 753-9480 fax: (360) 753-9889

Impact Category	Impacts as Initially Disclosed	New Impacts	Change in Impacts
Transportation	**Long-term impacts** *Traffic* As identified in the FEIS and ROD. *Transit* As identified in the FEIS and ROD. *Bike/Pedestrian* The FEIS described a range of impacts based on the no-build, supplemental, and replacement bridges. The no-build kept the existing facilities which have portions with very narrow pathways, at-grade crossings, steep grades, and exposure to traffic noise, exhaust and debris. The 95-ft replacement bridge improved the facilities substantially, widening the pathways, eliminating at-grade crossings, reducing grades, and separating users from traffic noise, exhaust and debris. The supplemental bridge would provide improvements, but would have at-grade crossings on Hayden Island.	**Long-term impacts** *Traffic* The freeway operations analysis using the new bridge height and freeway/ramp profiles results in traffic speeds and operations that are similar to the analysis conducted on the LPA. Therefore, the new bridge height and increased grades (from 2.8% to 3.7% in Oregon and from 3.4% to 4.0% in Washington) does not result in any new transportation related impacts when compared with the LPA bridge height. *Transit* While the grade of the vertical travel will increase under the 116-ft bridge, analysis conducted indicates that the increase of an additional 130 feet that the transit grade will be at 6% grade will have no impacts to transit operations, including the new light rail, as initially disclosed in the FEIS and ROD. *Bike/Pedestrian* The 116-ft bridge will increase pathway width, eliminate at-grade crossing, reduce grades and separate users from traffic noise, exhaust and debris.	**Long-term impacts** *Traffic* There are no changes in transportation impacts for the new bridge height and increased grades compared to the bridge of the height and grade analyzed in the FEIS. *Transit* No changes to the identified transit impacts have been identified. *Bike/Pedestrian* The 116-ft bridge is within the range of impacts described in the FEIS. It has steeper grades and more out-of-direction travel –estimated to be approximately 700 feet -- than the 95-ft replacement bridge, but it still improves facilities compared to the no-build, and all existing movements are still available. **Temporary Impacts** There would be no change in temporary impacts.
Land Use and Economics (This presentation excludes the principal discussion of impacts that may result due	**Land Use** Most land use impacts will not change. The FEIS stated that the higher	**Land Use** The 116-ft bridge will have higher clearance than the 95-ft bridge at the Vancouver waterfront.	**Land Use** Since the project footprint and acquisitions will not change, the land use impacts will not change from what was

Impact Category	Impacts as Initially Disclosed	New Impacts	Change in Impacts
to navigation changes. That discussion is contained in the main re-evaluation document.)	bridge clearance provided by the LPA would give a more open feel along the Vancouver waterfront for the park that currently passes under the relatively low clearance of the existing I-5 crossing. **Economics** The FEIS described the economic impacts from the project from displaced businesses, property tax, parking, access/circulation, and travel patterns/volumes.	**Economics** No change relative to the impacts that the FEIS described.	reported in the FEIS. The 116-ft bridge will give a slightly more open feel along the Vancouver waterfront than the 95-ft bridge. Indirect impacts to land use are addressed in the "Secondary and Cumulative" section below. **Economics** Compared to the 95-ft bridge, the 116-ft bridge would not have any change in economic impacts from those that were analyzed in the FEIS. A taller bridge could have slightly increased marine freight operations, in that taller vessels/loads could pass under a 116-ft bridge compared to a 95-ft bridge. This is covered in the "Secondary and Cumulative" section.
Acquisitions, Displacements, and Relocations	As identified in the FEIS and ROD	No new impacts	With no new impacts under the 116-ft bridge, there is no change.
Neighborhoods & Populations (Social)	As identified in the FEIS and ROD	No new impacts	With no new impacts under the 116-ft bridge, there is no change.
Visual Resources & Aesthetics	The FEIS stated the following impacts: • Increased prominence and vividness of new higher bridges across Columbia River • Potential improvements associated with new replacement river-crossing design, based on removal of visually complex trusses	Impacts from 116-ft bridge compared to 95-ft bridge: • The tallest point of the bridge structure will increase approximately 20 feet in height. Certain ramps will increase approximately 10 feet for the ramp most affected. • Increased visual prominence of I-5 North to C Street loop	• Increased height of ramp near the Village will increase the prominence of this structure in some views from the east end of the Village/ west end of the Fort area. However, the increase in prominence of the structure due to the relatively slight height increase will not have any significantly different impact from what was discussed in the

Impact Category	Impacts as Initially Disclosed	New Impacts	Change in Impacts
	and lifts of existing bridges • Adverse effects to Vancouver National Historic Reserve (VNHR) resulting from encroachment and increased prominence of structures near Village and Hospital	near VNHR Village	FEIS.
Air Quality	The FEIS reported on regional and subarea by reporting Mobile Source Air Toxics (MSAT) emissions, and intersection level air quality impacts by performing hot spot analysis. Temporary impacts were also reported in the FEIS.	The freeway operations analysis was conducted of traffic speeds, vehicle mix (cars, medium trucks, heavy trucks) and operations using the new bridge height and freeway/ramp profiles. Results indicate similar impacts to those shown from the analysis conducted on the LPA.	**Long-term** A steeper grade with the new bridge height would require a slight increase in vehicle acceleration and deceleration while traversing the bridge. However, changes in emissions from the grade change are expected to be very small and, while these small changes cannot be captured by the tools (e.g., WASIST, Mobile 6.2) used to model emissions in the FEIS, technical evaluation of these changes to air quality indicated little, if any, measurable change in air quality. Therefore, no changes to operational air quality impacts are expected compared to the bridge height analyzed in the LPA. **Temporary** No significant changes are expected for the means, methods, or construction schedule with the new bridge height. Therefore, no changes in temporary construction air quality impacts are expected compared to the bridge height analyzed in the LPA.
Noise & Vibration	As identified in the FEIS and ROD	Technical evaluation conducted on a 116-ft bridge shows the following: • Traffic volumes, speeds and mixture will be the same as in	The following assumptions, based on technical evaluation conducted on a 116-ft bridge, were used in the noise and vibration review:

Impact Category	Impacts as Initially Disclosed	New Impacts	Change in Impacts
		the FEIS • Light rail operations, including schedule and speeds, are essentially the same as in the FEIS • All bridge structure will be equipped with safety barriers like those considered in the FEIS • The general alignment of the light rail access to the downtown Vancouver corridor will not change • The noise projections in the FEIS are still valid, and no new noise impacts would be projected. Furthermore, the severity of any impacts identified in the FEIS would not be increased. There is a potential, however, for some locations to see a slight reduction in noise levels due to the increased structural shielding afforded by the higher structure, although any reduction in noise levels would be predicted to be less than 1 to 2 dBA, an amount not normally perceptible to the human ear. No changes in noise abatement are anticipated due to the added elevations, although it is possible that some walls may be slightly lower and still	In summary, the revised bridge heights are not predicted to add any new noise impacts or increase the severity of any identified impacts. Furthermore, the abatement proposed in the FEIS is not expected to be affected by the change in the bridge height. Most receivers with noise abatement are located far enough from the bridge, such that any changes to the bridge will not affect the noise levels at those locations. No additional noise analysis is required for the height modification to the proposed bridge.

Impact Category	Impacts as Initially Disclosed	New Impacts	Change in Impacts
		achieve the same level of noise reduction. A review of wall heights will be performed during final design.	
Ecosystems (Vegetation & Wildlife)	The FEIS reported impacts on the following aquatic resources: • Aquatic Habitat and Species • Shading • Size of piers in water (permanent) • Number/size of piers in water (temporary) • In-water work	Impacts to the resources identified above from an increased bridge height, are the same or substantively similar to those impact addressed in the FEIS, ROD, and associated material. In-water work and temporary and permanent structures will be the same as presented in the FEIS, ROD, and associated material.	Any changes in the impacts to ecosystem likely to occur as a result of the increased bridge height would be very minor.
Water Resources	The FEIS reported on impacts to water resources: • Pollutant load estimates • Impervious surfaces • Size of piers in water (permanent) • In-water work o Number/size of piers in water (temporary)	Technical review indicates that there will be some slight increase in impervious surface area with an increased bridge height. While definitive engineering calculations have not been performed, any increase would be only by a nominal amount that would not likely change the results of any pollutant loading analysis. Further, any additional new impervious surface areas would be treated to standards committed to in the FEIS, ROD, and biological assessment and biological opinion.	Any changes in the impacts to water resource likely to occur as a result of the increased bridge height would be very minor, and likely associated mainly with a slight increase in impervious areas.
Energy and Natural Resources	The FEIS reported on long-term energy use: • Macro scale • Micro scale • Temporary effects (by applying a multiplier to construction cost estimates)	Regional travel demand model does not account for grades, so there are no new macro scale impacts from increased grades. The overall traffic operations for the 116-ft bridge is in the same range as the 95-ft bridge (minimal enough	There would be no long-term change in energy use on the macro or micro scale. There would be 1.0% more energy use for construction, based in the higher construction cost.

Impact Category	Impacts as Initially Disclosed	New Impacts	Change in Impacts
		change in speeds to be no difference when averaging speeds across all lanes) so there is no effect on energy on a micro scale. The overall cost of building a 116-ft bridge would be approximately $30 million higher. This additional cost would yield 1.0% higher energy use for construction.	
Geology & Soils	As identified in the FEIS and ROD	No new impacts	With no new impacts under the 116-ft bridge, there is no change.
Hazardous Materials	As identified in the FEIS and ROD	No new impacts	With no new impacts under the 116-ft bridge, there is no change.
Public Services	As identified in the FEIS and ROD	No new impacts	With no new impacts under the 116-ft bridge, there is no change.
Utilities	As identified in the FEIS and ROD	No new impacts	With no new impacts under the 116-ft bridge, there is no change.
Historic, Cultural & Archaeological Resources	**Historic & Cultural** The FEIS stated that the replacement bridges would have effects on views from historic buildings in downtown Vancouver and from the VNHR: • Increased prominence and vividness of new higher bridges across Columbia River • Potential improvements associated with new replacement river-crossing design, based on removal of visually complex trusses and lifts of existing bridges • Adverse effects to VNHR resulting from	**Historic & Cultural** Impacts from 116-ft bridge compared to 95-ft bridge: • Increased height of structures across river and for certain ramps • Increased visual prominence of I-5 North to C Street loop near VNHR Village. • Minimal (less than 4 ft.) change in height of ramps near Evergreen Inn • No change to proximity of roadway to Barracks Hospital. **Archaeological** As a result of the increase in vertical navigation clearance to 116 feet, the	**Historic & Cultural** • Increased height of ramp near Village will increase prominence of this structure in some views from the east end of the Village/ west end of the Fort area. **Archaeological** There will be no change in impacts to known archaeological resources based on the increase in height of the bridge and approaches.

Impact Category	Impacts as Initially Disclosed	New Impacts	Change in Impacts
	encroachment and increased prominence of structures near Village and Hospital **Archaeological** As the project was described in the FEIS, 32 known significant archaeological sites within the CRC's Area of Potential Effect (APE) would potentially be impacted by project activities.	height of the bridge and the approaches has been increased. However, the project impacts remain within the original archaeological APE and will not impact any additional known archaeological resources.	
Parklands & Recreation	The FEIS reported impacts to Waterfront Park and Waterfront Trail: • 0.4 acres of Waterfront Park permanently impacted • Up to 450 feet of Waterfront Trail realigned	No new impacts	There would be no change in impacts to Waterfront Park and Waterfront Trail, except the 116-ft bridge will give a slightly more open feel along the Vancouver waterfront than the 95-ft bridge.
Construction	As identified in the FEIS and ROD	No new impacts	Construction-related impacts are discussed separately for each element of the environment. See the other sections of this matrix.
Secondary and Cumulative	**Secondary** The FEIS did not analyze the indirect effects of a bridge with a lower maximum vertical clearance on potential future water-dependent land uses upriver of the bridge. **Cumulative** The FEIS analyzed cumulative effects on environmental resources, of which climate change is relevant to bridge height because it could affect future river levels. The FEIS reported that warmer winter temperatures will result in	**Secondary** Restricting the height of vessels that can pass under the Columbia River I-5 bridge could have an indirect effect on the future development and use of water-dependent properties upriver of the project area. This has been analyzed in detail and is documented in the Navigation Impacts Report, which concluded that a mid-level bridge would not meaningfully constrain up-river future commercial land use development opportunities. **Cumulative**	**Secondary** Neither bridge height would meaningfully constrain upriver future commercial land use development opportunities. **Cumulative** The 116-ft bridge would be better able to accommodate projected climate-change induced rise in water level than a 95-ft bridge.

Impact Category	Impacts as Initially Disclosed	New Impacts	Change in Impacts
	lowered snowpack and higher winter base flows. Lower base flows are expected in the spring and summer months. Sea level rise would likely be an average of 1.3 feet by 2100. The FEIS stated that the LPA bridge design will accommodate projected climate-change induced rise in the Columbia River's high water levels.	The 116-ft bridge would be better able to accommodate projected climate-change induced rise in water level than a 95-ft bridge.	
Aviation Impacts	**Long-term Impacts** With a 95-foot replacement bridge, the new bridge designs will not include lift towers. The bridges would be located slightly farther from the airfield, and so would intrude less into Pearson Field airspace than the no-build. The FEIS stated that the LPA is not expected to have long-term effects on Portland International Airport (PDX). **Temporary Impacts** As identified in the FEIS and ROD	**Long-term Impacts** A 116-foot bridge will result in the top surface of the bridge to penetrate Pearson Fields Obstacle Clearance Surface and to be approximately 21 feet below Pearson Field's Part 77 Imaginary Surfaces. Luminaires, sign bridges, toll gantries or similar elements attached to the bridge may penetrate the Pearson Part 77 Imaginary Surfaces. Minimization measures could include requirements to use low-profile overhead elements or light the elements to augment visibility. In the section of the bridge where overhead elements could penetrate the Part 77 Surfaces, a requirement to design and use low-profile overhead elements could be placed on the construction contractor to minimize intrusion. The 116-foot bridge is not expected to have long-term impacts to PDX. **Temporary Impacts** Cranes used to construct the 116-foot bridge would be taller than what	**Long-term Impacts** Overhead elements would be more likely to penetrate, or would penetrate farther into Pearson Field's Part 77 Imaginary Surfaces, with a 116-foot bridge compared to a 95-foot bridge. This will likely result in the increase in the required climb gradient for aircraft departing from Pearson Field. However, the new climb gradient would likely be less than 500 ft/Nautical Mile, which is the threshold for needing special consideration from the Flight Standards Service. **Temporary Impacts** Temporary impacts from construction of the 116-foot bridge would likely be greater than the 95-foot bridge due to the need for taller cranes, but the type of impacts will be the same as described in the FEIS.

Impact Category	Impacts as Initially Disclosed	New Impacts	Change in Impacts
		would be required for a 95-foot bridge. These cranes would likely present a hazard to aviation. The contractor will submit to FAA a 7460-1 permit application that includes all temporary cranes and other construction related equipment. FAA will review to determine potential effects. The greatest temporary obstruction would likely be due to activities associated with the removal of the existing bridges' lift span towers. The 116-foot bridge is not expected to have temporary impacts to PDX.	

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ATTACHMENT B

Airspace Analysis

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U.S. Department
of Transportation
Federal Aviation Administration

Northwest Mountain Region
Seattle Airports District Office
1601 Lind Avenue S.W., Suite 250
Renton, Washington 98057-3356

December 5, 2012

Heather Wills
Environmental Manager
Columbia River Crossing Project
700 Washington St
Suite 300
Vancouver, WA 98660

Dear Ms. Wills:

Portland, Oregon - Vancouver, Washington
Airspace Analysis Results for Feasibility Studies
Columbia River Crossing Project

The Federal Aviation Administration (FAA) has completed its review, per FAA Order 7400.2J Paragraph 6-1-6, of your request for feasibility studies on 116 individual cases for a conceptual new bridge design near Pearson Field (VUO), Vancouver, Washington.

The cases were evaluated based on what was submitted electronically to us on November 5, 2012 through the Obstruction Evaluation / Airport Airspace Analysis (OE/AAA) system. This was a feasibility study only and a final 7460 submittal needs to be submitted in order to receive a final determination on the proposed construction. Each case was evaluated at the submitted locations and heights. If any information should change, a new study will need to be submitted to evaluate those changes.

The applicable comments from all responding lines of business for all 116 airspace studies have been consolidated into one spreadsheet for clarity, which is attached.

Should you have questions or comments, please contact me at (425) 227-2655.

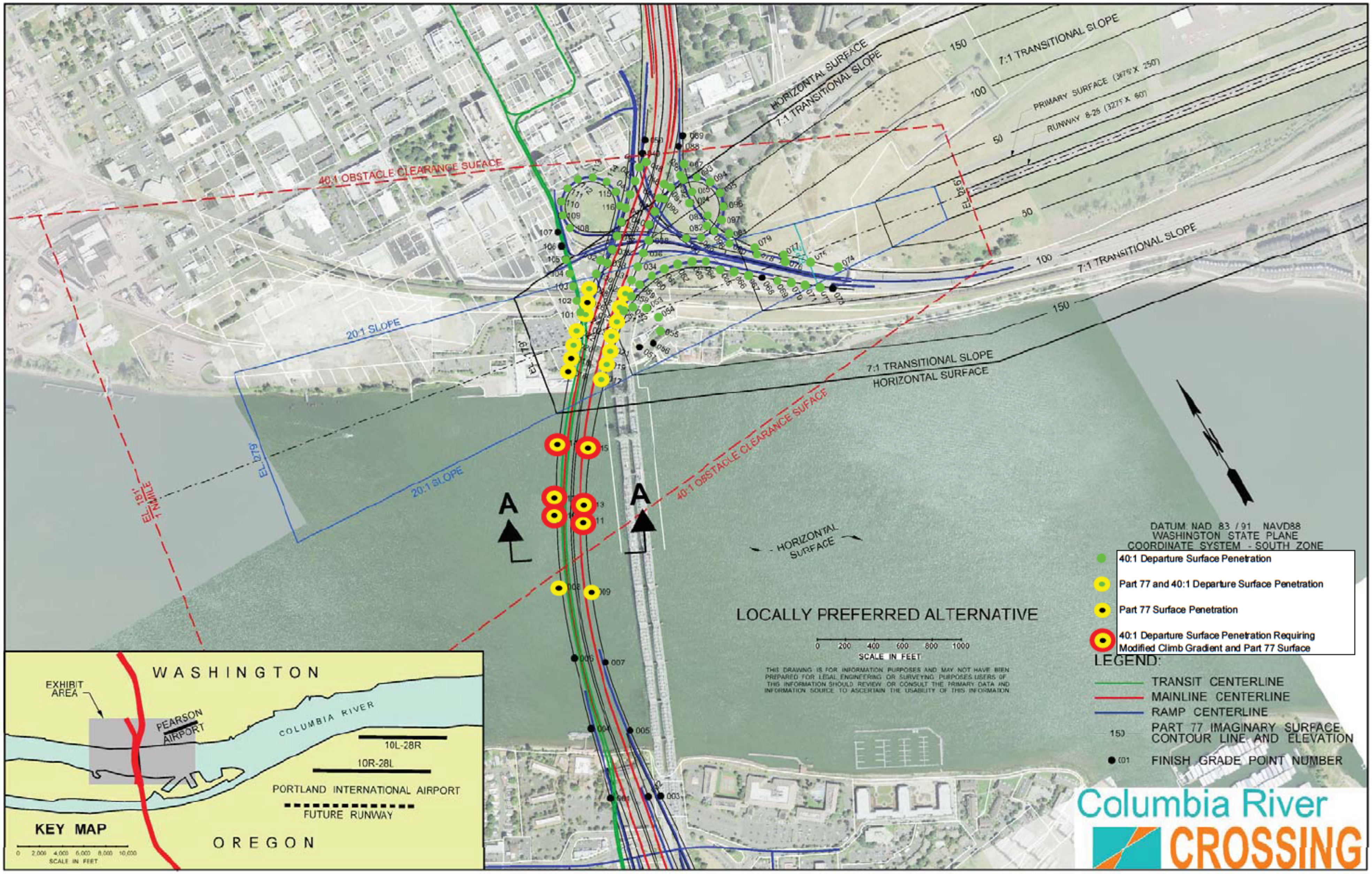
Sincerely,

Jason Ritchie
Seattle ADO

								AIRPORTS		FLIGHT PROCEDURES				TECH OPS	FLIGHT STANDARDS	AIR TRAFFIC OBSTRUCTION EVALUATION GROUP
Airspace Study No.	POINT NAME	LATITUDE	LONGITUDE	*CRB FINISHED GRADE ELEV.	**ADD'L HT ABOVE FG	OVERALL HEIGHT	OBSTACLE TYPE	Part 77 Penetration (ft)	Part 77 Surface Penetrated	40:1 Departure Surface Penetration (ft)	No Effect Height (MSL)	20:1 Visual Surface Penetration (ft)	Comments	PAPI OCS Not to Exceed Ground Elevation for No Impact to PDX PAPIs (AGL)		
2012-ANM- 1244 -NRA	001	45°36' 51.46" N	122°40' 45.13" W	97.53	35	133	SIGNS AND ILLUMINATION							535	Comment: One-Engine-Inoperative surface (62.5:1) analysis was conducted for PDX Runways 28R and 28L. It was de ermined that none of the proposed l ght poles nor the exis ing bridge's high rise tower (Case #2003 ANM 1031 OE) (draw bridge) penetrate the 62.5:1 surface for e ther Runway 28R or 28L. One add tional hypothetical case was constructed for the more southern bridge area that affects the extended center ine for Runway 28L (no data was subm tted for the bridge area south of the main Columb a River channel) and found not to penetrate. This hypothet cal case used the h ghest/closest MSL alt tude submitted for ight poles within the Runway 28L 62.5 1 surface area. Addit ona ly, a VFR analysis was done for the approach/departure end of Runway 8 at Pearson Airpark (VUO). Normal procedures at Pearson Airpark now ca l for a right turn north for all departures VFR and the proposed pole he ghts are reasonably close o existing structures to the point that their construct on wi l have l ttle impact on operations at VUO. Therefore Flight Standards has no objection for the light pole array affecting the west end of VUO.	No objection providing that the part of the structure that penetrates any PART 77 surface is obstruction lighted in accordance with FAA Advisory Circular 70/7460-1K, Obstruction Marking and Lighting, Chapters 4, 5 and 12 (red lights). The AC is ava lable for viewing at http://oeaaa.faa.gov. When the design is finalized, this project must be processed as Off Airport (OE) for the final determination. When that is done, the elevations need to be accurate. The SE elevation is the surface of the ground or water at each location and the AGL elevation is the highest point of the structure at that location.
2012-ANM- 1245 -NRA	002	45°36' 50.33" N	122°40' 41.89" W	98.97	35	134	SIGNS AND ILLUMINATION							527	"	"
2012-ANM- 1246 -NRA	003	45°36' 49.95" N	122°40' 40.78" W	96.25	35	131	SIGNS AND ILLUMINATION							509	"	"
2012-ANM- 1247 -NRA	004	45°36' 56.27" N	122°40' 43.51" W	120.94	35	156	SIGNS AND ILLUMINATION							550	"	"
2012-ANM- 1248 -NRA	005	45°36' 54.88" N	122°40' 40.31" W	115.79	35	151	SIGNS AND ILLUMINATION							527	"	"
2012-ANM- 1249 -NRA	006	45°37' 01.02" N	122°40' 41.65" W	139.33	35	174	SIGNS AND ILLUMINATION							527	"	"
2012-ANM- 1356 -NRA	007	45°36' 59.75" N	122°40' 39.20" W	134.44	35	169	SIGNS AND ILLUMINATION							527	"	"
2012-ANM- 1250 -NRA	008	45°37' 05.69" N	122°40' 39.35" W	152.53	35	188	SIGNS AND ILLUMINATION	10.00	Horizontal					527	"	"
2012-ANM- 1251 -NRA	009	45°37' 04.44" N	122°40' 37.07" W	148.20	35	183	SIGNS AND ILLUMINATION	5.00	Horizontal					527	"	"
2012-ANM- 1252 -NRA	010	45°37' 10.14" N	122°40' 36.32" W	156.93	35	192	SIGNS AND ILLUMINATION	14.00	Horizontal	77.27	114		Required c imb gradient 380' per nm to 300	527	"	"
2012-ANM- 1253 -NRA	011	45°37' 08.93" N	122°40' 34.16" W	152.85	35	188	SIGNS AND ILLUMINATION	10.00	Horizontal	77.51	110		Required c imb gradient 390' per nm to 300	527	"	"
2012-ANM- 1254 -NRA	012	45°37' 11.17" N	122°40' 35.55" W	156.82	35	192	SIGNS AND ILLUMINATION	14.00	Horizontal	78.25	113		Required c imb gradient 384 per nm to 300	527	"	"
2012-ANM- 1255 -NRA	013	45°37' 09.87" N	122°40' 33.42" W	152.64	35	188	SIGNS AND ILLUMINATION	10.00	Horizontal	78.47	109		Required c imb gradient 394' per nm to 300	527	"	"
2012-ANM- 1256 -NRA	014	45°37' 14.40" N	122°40' 32.78" W	153.06	35	188	SIGNS AND ILLUMINATION	10.00	Horizontal	77.96	110	6.57	Required c imb gradient 392' per nm to 300	527	"	"
2012-ANM- 1257 -NRA	015	45°37' 13.09" N	122°40' 30.39" W	148.01	35	183	SIGNS AND ILLUMINATION	5.00	Horizontal	77.64	105		Required c imb gradient 403 per nm to 300	527	"	"
2012-ANM- 1258 -NRA	016	45°37' 18.32" N	122°40' 28.51" W	140.24	35	175	SIGNS AND ILLUMINATION	6.00	Approach					527	"	"
2012-ANM- 1259 -NRA	017	45°37' 16.84" N	122°40' 25.83" W	133.58	35	169	SIGNS AND ILLUMINATION	11.00	Approach	70.33		10.26	Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1260 -NRA	018	45°37' 19.07" N	122°40' 27.60" W	136.65	35	172	SIGNS AND ILLUMINATION	6.00	Approach					527	"	"
2012-ANM- 1261 -NRA	019	45°37' 17.54" N	122°40' 24.84" W	129.59	35	165	SIGNS AND ILLUMINATION	10.00	Approach	67.82		9.23	Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1262 -NRA	020	45°37' 19.80" N	122°40' 26.65" W	132.85	35	168	SIGNS AND ILLUMINATION	5.00	Approach	66.83		4.24	Departure note for "low, close-in obstacle" required	527	"	"
2012-ANM- 1263 -NRA	021	45°37' 18.23" N	122°40' 23.83" W	125.37	35	160	SIGNS AND ILLUMINATION	8.00	Approach	64.35		7.29	Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1264 -NRA	022	45°37' 20.54" N	122°40' 25.72" W	129.17	35	164	SIGNS AND ILLUMINATION	4.00	Approach	64.19		2.98	Departure note for low, close- n obstacle" required	527	"	"
2012-ANM- 1265 -NRA	023	45°37' 19.22" N	122°40' 23.25" W	122.95	35	158	SIGNS AND ILLUMINATION	7.00	Approach	63.01		6.61	Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1266 -NRA	024	45°37' 21.25" N	122°40' 24.74" W	125.41	35	160	SIGNS AND ILLUMINATION	2.00	Approach	61.66		1.91	Departure note for low, close- n obstacle" required	527	"	"
2012-ANM- 1267 -NRA	025	45°37' 19.92" N	122°40' 22.23" W	118.92	35	154	SIGNS AND ILLUMINATION	6.00	Approach	60.55		5.7	Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1268 -NRA	026	45°37' 21.93" N	122°40' 23.73" W	121.44	35	156	SIGNS AND ILLUMINATION	2.00	Approach					527	"	"
2012-ANM- 1269 -NRA	027	45°37' 20.56" N	122°40' 21.17" W	115.00	35	150	SIGNS AND ILLUMINATION	6.00	Approach	58.19		4.96	Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1270 -NRA	028	45°37' 22.61" N	122°40' 22.70" W	116.86	35	152	SIGNS AND ILLUMINATION	1.00	Approach	56.76		0.11	Departure note for low, close- n obstacle" required	527	"	"
2012-ANM- 1271 -NRA	029	45°37' 21.17" N	122°40' 20.05" W	111.12	35	146	SIGNS AND ILLUMINATION	5.00	Approach	55.94		4.46	Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1272 -NRA	030	45°37' 23.27" N	122°40' 21.66" W	111.97	35	147	SIGNS AND ILLUMINATION			53.35			Departure note for low, close- n obstacle" required	527	"	"
2012-ANM- 1355 -NRA	031	45°37' 21.77" N	122°40' 18.93" W	107.79	35	143	SIGNS AND ILLUMINATION			54.69		4.97	Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1273 -NRA	032	45°37' 23.94" N	122°40' 20.62" W	107.16	35	142	SIGNS AND ILLUMINATION			49.93			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1274 -NRA	033	45°37' 23.59" N	122°40' 20.19" W	106.99	35	142	SIGNS AND ILLUMINATION			50.82			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1275 -NRA	034	45°37' 22.37" N	122°40' 17.82" W	104.38	35	139	SIGNS AND ILLUMINATION	5.00	Approach	52.42		4.44	Departure note for low, close- n obstacle" required	712	"	"

2012-ANM- 1276 -NRA	035	45°37' 24.25" N	122°40' 19.13" W	102.67	35	138	SIGNS AND ILLUMINATION			48.44			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1277 -NRA	036	45°37' 22.97" N	122°40' 16.70" W	101.12	35	136	SIGNS AND ILLUMINATION			51.18		4.94	Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1278 -NRA	037	45°37' 24.90" N	122°40' 18.08" W	98.45	35	133	SIGNS AND ILLUMINATION			45.02			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1279 -NRA	038	45°37' 23.57" N	122°40' 15.58" W	97.76	35	133	SIGNS AND ILLUMINATION			49.93		5.45	Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1280 -NRA	039	45°37' 25.58" N	122°40' 17.07" W	94.00	35	129	SIGNS AND ILLUMINATION			42.46			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1281 -NRA	040	45°37' 24.50" N	122°40' 14.83" W	93.26	35	128	SIGNS AND ILLUMINATION			45.88			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1282 -NRA	041	45°37' 26.27" N	122°40' 16.05" W	89.45	35	124	SIGNS AND ILLUMINATION			38.83			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1283 -NRA	042	45°37' 25.12" N	122°40' 13.74" W	89.96	35	125	SIGNS AND ILLUMINATION			44.48			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1284 -NRA	043	45°37' 26.93" N	122°40' 15.01" W	84.83	35	120	SIGNS AND ILLUMINATION			36.17			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1285 -NRA	044	45°37' 25.76" N	122°40' 12.66" W	86.67	35	122	SIGNS AND ILLUMINATION			42.98			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1286 -NRA	045	45°37' 27.60" N	122°40' 13.98" W	80.42	35	115	SIGNS AND ILLUMINATION			32.41			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1287 -NRA	046	45°37' 26.42" N	122°40' 11.63" W	83.19	35	118	SIGNS AND ILLUMINATION			40.29			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1288 -NRA	047	45°37' 28.31" N	122°40' 12.99" W	76.41	35	111	SIGNS AND ILLUMINATION			29.46			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1289 -NRA	048	45°37' 28.39" N	122°40' 12.12" W	79.92	35	115	SIGNS AND ILLUMINATION			34.82			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1290 -NRA	049	45°37' 29.04" N	122°40' 12.07" W	72.37	35	107	SIGNS AND ILLUMINATION							712	"	"
2012-ANM- 1291 -NRA	050	45°37' 29.76" N	122°40' 11.24" W	68.47	35	103	SIGNS AND ILLUMINATION							712	"	"
2012-ANM- 1292 -NRA	051	45°37' 20.42" N	122°40' 21.03" W	98.55	35	134	SIGNS AND ILLUMINATION			42.48			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1293 -NRA	052	45°37' 20.12" N	122°40' 20.13" W	80.20	17	97	EMERGENCY VEHICLE			7.17			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1294 -NRA	053	45°37' 19.57" N	122°40' 18.97" W	75.83	17	93	EMERGENCY VEHICLE			4.41			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1295 -NRA	054	45°37' 18.68" N	122°40' 18.45" W	73.12	17	90	EMERGENCY VEHICLE			3.65			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1296 -NRA	055	45°37' 17.77" N	122°40' 18.91" W	71.24	17	88	EMERGENCY VEHICLE			1.17			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1359 -NRA	056	45°37' 17.30" N	122°40' 20.11" W	69.35	17	86	EMERGENCY VEHICLE							712	"	"
2012-ANM- 1297 -NRA	057	45°37' 17.51" N	122°40' 21.45" W	67.47	17	84	EMERGENCY VEHICLE							712	"	"
2012-ANM- 1298 -NRA	058	45°37' 20.88" N	122°40' 19.79" W	93.65	35	129	SIGNS AND ILLUMINATION			39.5			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1299 -NRA	059	45°37' 21.20" N	122°40' 18.46" W	88.75	35	124	SIGNS AND ILLUMINATION			36.72			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1300 -NRA	060	45°37' 21.39" N	122°40' 17.07" W	83.86	35	119	SIGNS AND ILLUMINATION			34.09			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1301 -NRA	061	45°37' 21.36" N	122°40' 15.67" W	78.96	35	114	SIGNS AND ILLUMINATION			31.57			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1302 -NRA	062	45°37' 21.19" N	122°40' 14.28" W	74.06	35	109	SIGNS AND ILLUMINATION			29.07			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1303 -NRA	063	45°37' 20.87" N	122°40' 12.95" W	69.16	35	104	SIGNS AND ILLUMINATION			26.53			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1304 -NRA	064	45°37' 20.40" N	122°40' 11.72" W	64.25	35	99	SIGNS AND ILLUMINATION			23.86			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1305 -NRA	065	45°37' 19.48" N	122°40' 10.88" W	57.58	35	93	SIGNS AND ILLUMINATION			19.67			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1306 -NRA	066	45°37' 18.85" N	122°40' 09.80" W	54.80	35	90	SIGNS AND ILLUMINATION			18.79			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1307 -NRA	067	45°37' 18.22" N	122°40' 08.79" W	51.55	35	87	SIGNS AND ILLUMINATION			17.79			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1308 -NRA	068	45°37' 17.59" N	122°40' 07.71" W	47.91	35	83	SIGNS AND ILLUMINATION							712	"	"
2012-ANM- 1309 -NRA	069	45°37' 16.96" N	122°40' 06.63" W	43.97	35	79	SIGNS AND ILLUMINATION			14.05			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1310 -NRA	070	45°37' 16.34" N	122°40' 05.53" W	40.61	35	76	SIGNS AND ILLUMINATION			13.2			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1311 -NRA	071	45°37' 15.74" N	122°40' 04.41" W	34.63	35	70	SIGNS AND ILLUMINATION			9.93			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1312 -NRA	072	45°37' 15.15" N	122°40' 03.28" W	24.23	35	59	SIGNS AND ILLUMINATION			0.59			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1313 -NRA	073	45°37' 14.59" N	122°40' 02.12" W	14.21	35	49	SIGNS AND ILLUMINATION							712	"	"
2012-ANM- 1314 -NRA	074	45°37' 15.67" N	122°40' 00.71" W	29.72	35	65	SIGNS AND ILLUMINATION			10.92			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1315 -NRA	075	45°37' 16.95" N	122°40' 02.86" W	30.70	35	66	SIGNS AND ILLUMINATION			7.68			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1316 -NRA	076	45°37' 17.87" N	122°40' 05.03" W	34.37	35	69	SIGNS AND ILLUMINATION			6.53			Departure note for "low, close-in obstacle" required	712	"	"

2012-ANM- 1317 -NRA	077	45°37' 18.31" N	122°40' 04.89" W	34.44	35	69	SIGNS AND ILLUMINATION			6.62			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1318 -NRA	078	45°37' 19.26" N	122°40' 07.03" W	38.77	35	74	SIGNS AND ILLUMINATION			7.51			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1319 -NRA	079	45°37' 19.69" N	122°40' 06.91" W	37.42	35	72	SIGNS AND ILLUMINATION			5.57			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1320 -NRA	080	45°37' 20.78" N	122°40' 08.81" W	47.50	35	83	SIGNS AND ILLUMINATION			12.84			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1321 -NRA	081	45°37' 21.30" N	122°40' 08.53" W	45.84	35	81	SIGNS AND ILLUMINATION			11.14			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1322 -NRA	082	45°37' 22.57" N	122°40' 09.96" W	57.72	35	93	SIGNS AND ILLUMINATION			20.17			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1323 -NRA	083	45°37' 23.14" N	122°40' 09.52" W	56.73	35	92	SIGNS AND ILLUMINATION			19.74			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1324 -NRA	084	45°37' 24.52" N	122°40' 10.30" W	67.35	35	102	SIGNS AND ILLUMINATION			27.77			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1357 -NRA	085	45°37' 25.10" N	122°40' 09.66" W	66.32	35	101	SIGNS AND ILLUMINATION			27.55			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1325 -NRA	086	45°37' 26.47" N	122°40' 09.86" W	72.89	35	108	SIGNS AND ILLUMINATION			33.26			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1326 -NRA	087	45°37' 27.00" N	122°40' 09.02" W	70.63	35	106	SIGNS AND ILLUMINATION			32.22			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1327 -NRA	088	45°37' 28.26" N	122°40' 08.68" W	72.70	35	108	SIGNS AND ILLUMINATION							712	"	"
2012-ANM- 1358 -NRA	089	45°37' 28.78" N	122°40' 07.79" W	70.67	35	106	SIGNS AND ILLUMINATION							712	"	"
2012-ANM- 1328 -NRA	090	45°37' 25.58" N	122°40' 12.46" W	93.42	35	128	SIGNS AND ILLUMINATION			49.44			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1329 -NRA	091	45°37' 26.09" N	122°40' 11.26" W	96.46	35	131	SIGNS AND ILLUMINATION			54.16			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1330 -NRA	092	45°37' 26.18" N	122°40' 09.87" W	99.40	35	134	SIGNS AND ILLUMINATION			59.46			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1331 -NRA	093	45°37' 25.82" N	122°40' 08.57" W	101.81	35	137	SIGNS AND ILLUMINATION			64.94			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1332 -NRA	094	45°37' 25.09" N	122°40' 07.64" W	101.84	35	137	SIGNS AND ILLUMINATION			67.03			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1336 -NRA	095	45°37' 24.15" N	122°40' 07.28" W	99.33	35	134	SIGNS AND ILLUMINATION			65.22			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1337 -NRA	096	45°37' 23.19" N	122°40' 07.56" W	94.73	35	130	SIGNS AND ILLUMINATION			61.66			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1338 -NRA	097	45°37' 22.43" N	122°40' 08.43" W	89.92	35	125	SIGNS AND ILLUMINATION	2.00	Transitional	54.91			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1339 -NRA	098	45°37' 22.02" N	122°40' 09.70" W	85.11	35	120	SIGNS AND ILLUMINATION	2.00	Transitional	47.82		14.24	Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1340 -NRA	099	45°37' 22.05" N	122°40' 11.09" W	80.31	35	115	SIGNS AND ILLUMINATION			40.37		4.33	Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1341 -NRA	100	45°37' 22.52" N	122°40' 12.31" W	75.50	35	111	SIGNS AND ILLUMINATION			34.06			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1342 -NRA	101	45°37' 21.40" N	122°40' 24.95" W	94.53	25	120	TRANSIT ENVELOPE			21.24			Departure note for "low, close-in obstacle" required	527	"	"
2012-ANM- 1343 -NRA	102	45°37' 22.36" N	122°40' 24.60" W	90.07	25	115	TRANSIT ENVELOPE			16.51			Departure note for low, close- n obstacle" required	527	"	"
2012-ANM- 1344 -NRA	103	45°37' 23.32" N	122°40' 24.27" W	84.28	25	109	TRANSIT ENVELOPE			10.74			Departure note for "low, close-in obstacle" required	527	"	"
2012-ANM- 1345 -NRA	104	45°37' 24.23" N	122°40' 23.95" W	78.57	25	104	TRANSIT ENVELOPE			5.98			Departure note for "low, close-in obstacle" required	527	"	"
2012-ANM- 1346 -NRA	105	45°37' 25.19" N	122°40' 23.61" W	72.57	25	98	TRANSIT ENVELOPE			0.22			Departure note for low, close- n obstacle" required	527	"	"
2012-ANM- 1347 -NRA	106	45°37' 26.15" N	122°40' 23.28" W	66.57	25	92	TRANSIT ENVELOPE							527	"	"
2012-ANM- 1348 -NRA	107	45°37' 27.10" N	122°40' 22.94" W	60.57	25	86	TRANSIT ENVELOPE							527	"	"
2012-ANM- 1349 -NRA	108	45°37' 26.98" N	122°40' 21.74" W	62.26	35	97	SIGNS AND ILLUMINATION			1.58			Departure note for low, close- n obstacle" required	527	"	"
2012-ANM- 1350 -NRA	109	45°37' 27.96" N	122°40' 21.81" W	63.73	35	99	SIGNS AND ILLUMINATION			2.84			Departure note for "low, close-in obstacle" required	527	"	"
2012-ANM- 1351 -NRA	110	45°37' 28.84" N	122°40' 21.22" W	65.20	35	100	SIGNS AND ILLUMINATION			4.21			Departure note for "low, close-in obstacle" required	527	"	"
2012-ANM- 1352 -NRA	111	45°37' 29.43" N	122°40' 20.10" W	66.67	35	102	SIGNS AND ILLUMINATION			7.62			Departure note for low, close- n obstacle" required	527	"	"
2012-ANM- 1353 -NRA	112	45°37' 29.58" N	122°40' 18.72" W	68.14	35	103	SIGNS AND ILLUMINATION			10.8			Departure note for "low, close-in obstacle" required	527	"	"
2012-ANM- 1354 -NRA	113	45°37' 29.25" N	122°40' 17.41" W	70.32	35	105	SIGNS AND ILLUMINATION			15.27			Departure note for "low, close-in obstacle" required	527	"	"
2012-ANM- 1333 -NRA	114	45°37' 28.53" N	122°40' 16.47" W	75.34	35	110	SIGNS AND ILLUMINATION			22.46			Departure note for low, close- n obstacle" required	712	"	"
2012-ANM- 1334 -NRA	115	45°37' 27.59" N	122°40' 16.12" W	81.47	35	116	SIGNS AND ILLUMINATION			29.8			Departure note for "low, close-in obstacle" required	712	"	"
2012-ANM- 1335 -NRA	116	45°37' 26.64" N	122°40' 16.45" W	87.59	35	123	SIGNS AND ILLUMINATION			36.9			Departure note for "low, close-in obstacle" required	712	"	"



LOCALLY PREFERRED ALTERNATIVE
DATUM: NAD 83 / 91 NAVD88
WASHINGTON STATE PLANE
COORDINATE SYSTEM - SOUTH ZONE
40:1 Departure Surface Penetration
Part 77 and 40:1 Departure Surface Penetration
Part 77 Surface Penetration
40:1 Departure Surface Penetration Requiring Modified Climb Gradient and Part 77 Surface
LEGEND:
TRANSIT CENTERLINE
MAINLINE CENTERLINE
RAMP CENTERLINE
PART 77 IMAGINARY SURFACE CONTOUR LINE AND ELEVATION
FINISH GRADE POINT NUMBER
0 200 400 600 800 1000
SCALE IN FEET
THIS DRAWING IS FOR INFORMATION PURPOSES AND MAY NOT HAVE BEEN PREPARED FOR LEGAL ENGINEERING OR SURVEYING PURPOSES USERS OF THIS INFORMATION SHOULD REVIEW OR CONSULT THE PRIMARY DATA AND INFORMATION SOURCE TO ASCERTAIN THE USABILITY OF THIS INFORMATION
40:1 OBSTACLE CLEARANCE SURFACE
7:1 TRANSITIONAL SLOPE
HORIZONTAL SURFACE
PRIMARY SURFACE (3475'X 250')
RUNWAY 8-26 (3275'X 60')
20:1 SLOPE
EL 279'
EL 151'
1 MILE
EL 179'
EL 85'
A
KEY MAP
WASHINGTON
OREGON
COLUMBIA RIVER
EXHIBIT AREA
PEARSON AIRPORT
10L-28R
10R-28L
PORTLAND INTERNATIONAL AIRPORT
FUTURE RUNWAY
0 2,000 4,000 6,000 8,000 10,000
SCALE IN FEET
Columbia River CROSSING

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ATTACHMENT C

Navigation Impact Report (see separate .pdf)

ATTACHMENT K

Navigation Impact Report

Navigation Impact Report files are accessible from the Columbia River Crossing website at:

http://columbiarivercrossing.org/Library/Type.aspx?CategoryID=13