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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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).

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[3] 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.

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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

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

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[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/FileLibrary/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/FileLibrary/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/FileLibrary/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)

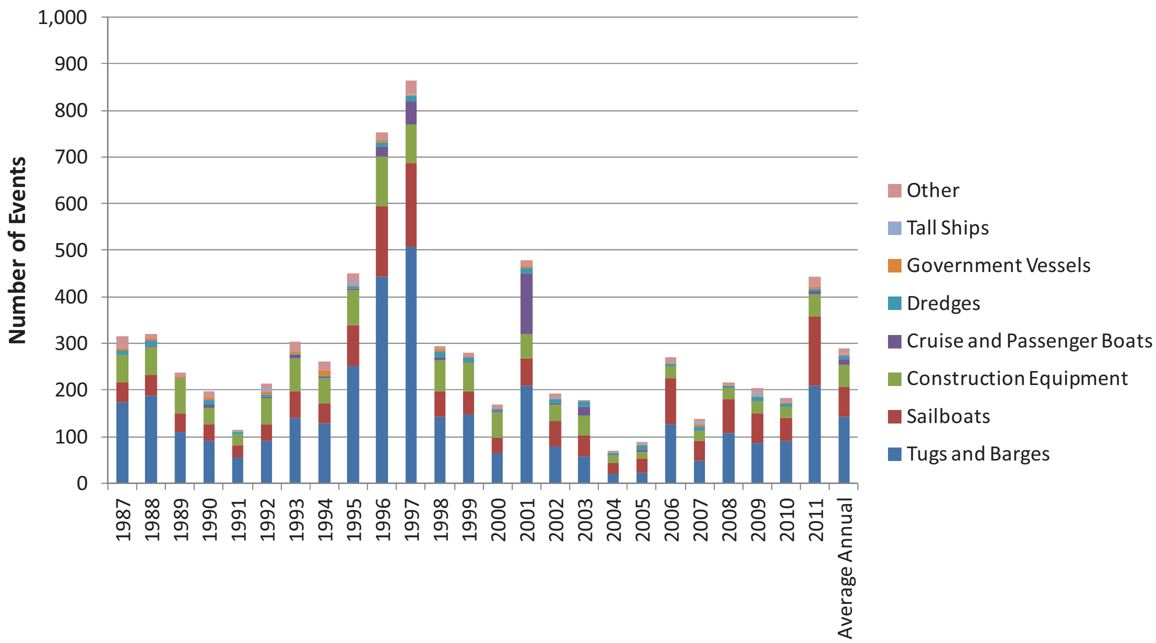
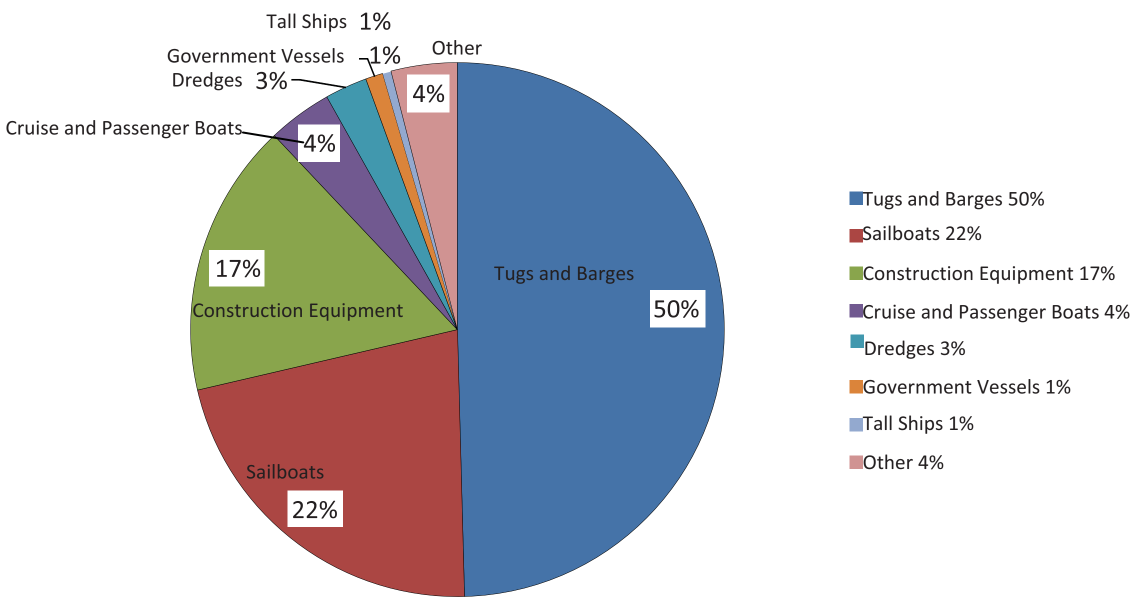


Exhibit 3-2 summarizes the share of bridge opening events by type of vessel over a 25-year time period: Tugs and barges accounted for half of all openings, followed by sailboats at 22 percent and construction equipment at 17 percent. Each of the remaining vessel types accounted for between one and four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

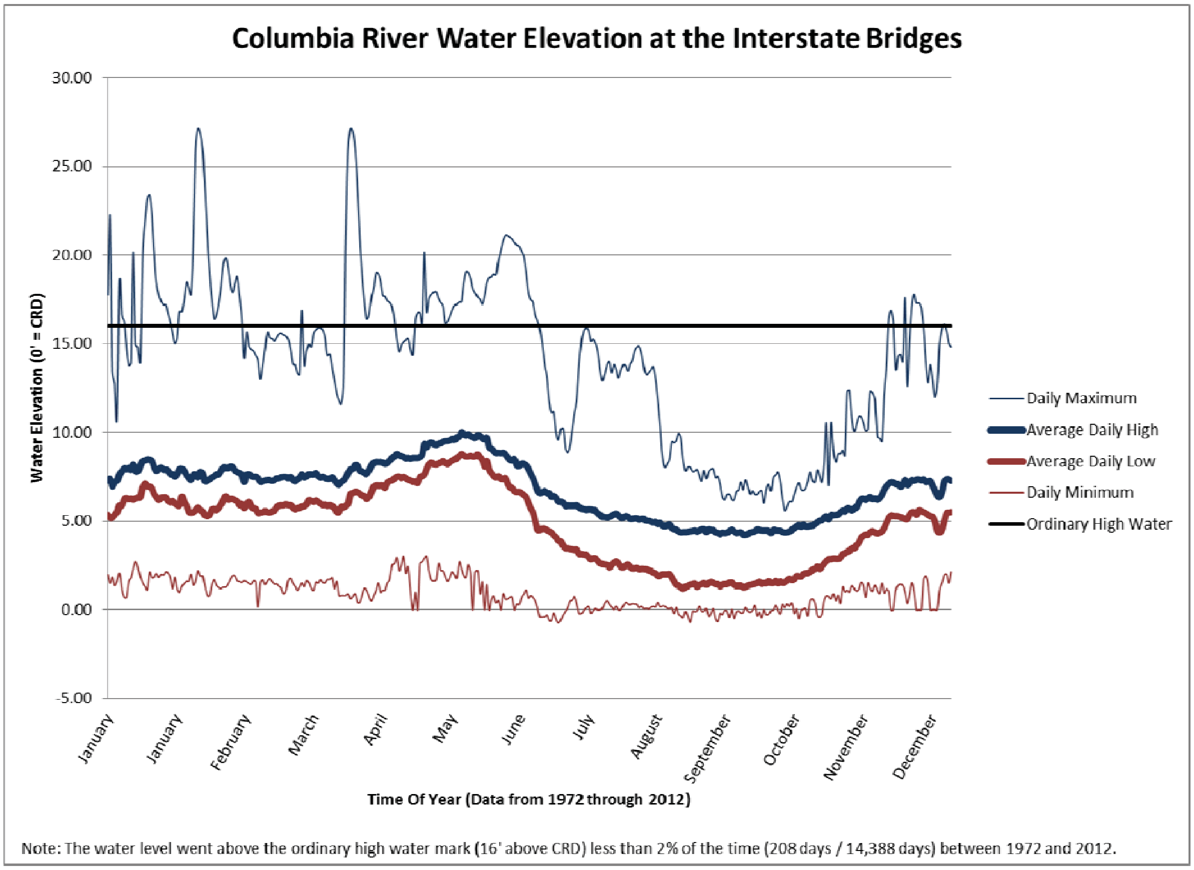
In conclusion, there are no reasonably foreseeable impacts to up-river future commercial land use development opportunities that would be constrained by the proposed 116-foot bridge.

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 flexibility 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)

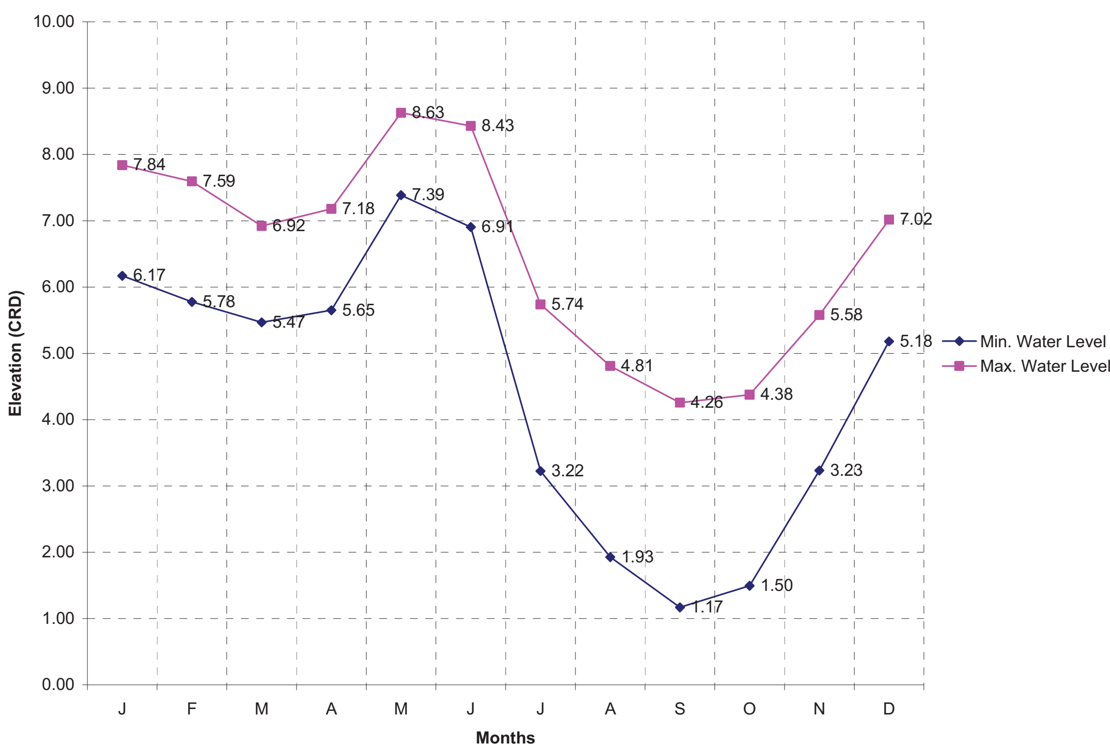
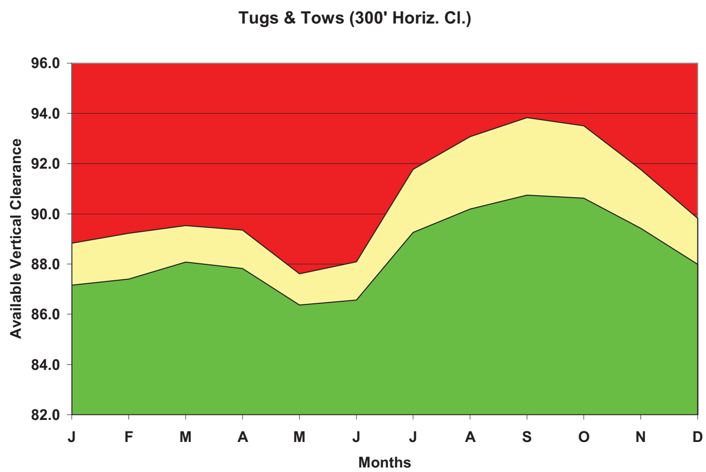


Exhibit 5-3. Existing Columbia River Navigation Channels (from the Navigation Technical Report)

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

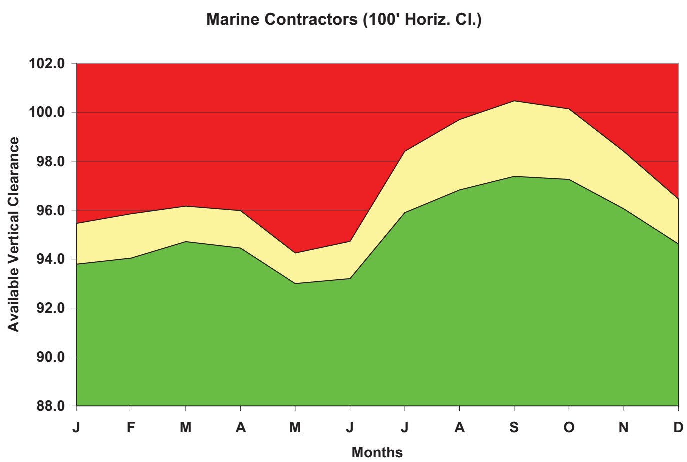
Exhibit 5-4. Proposed Replacement Alignment Clearances for 300-foot width (top), 100-foot width (center), and 50-foot width (bottom) (from the Navigation Technical Report)

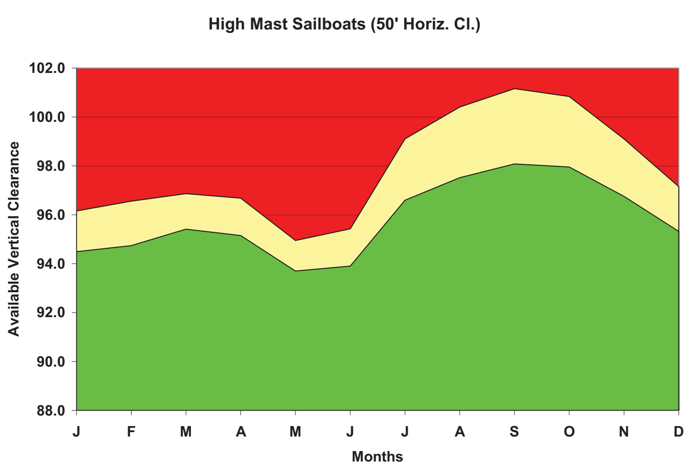


Green--vertical clearances available at the average maximum water level

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

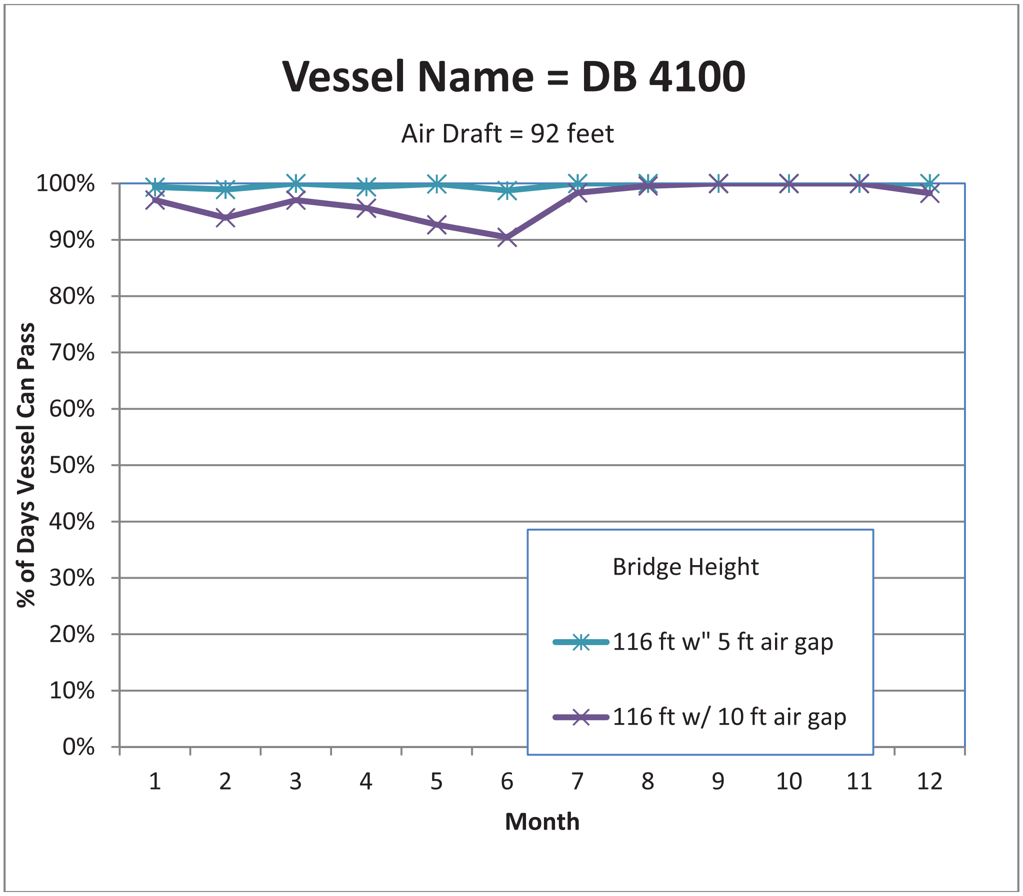
The charts and narrative below show the percent of days per month that each of these vessels could pass under a 116-foot bridge, based on both a 5-foot air gap and a 10-foot air gap. Based on their specific operating requirements, the navigation needs of each of these five vessels/users would not be substantially impacted. These charts show that:

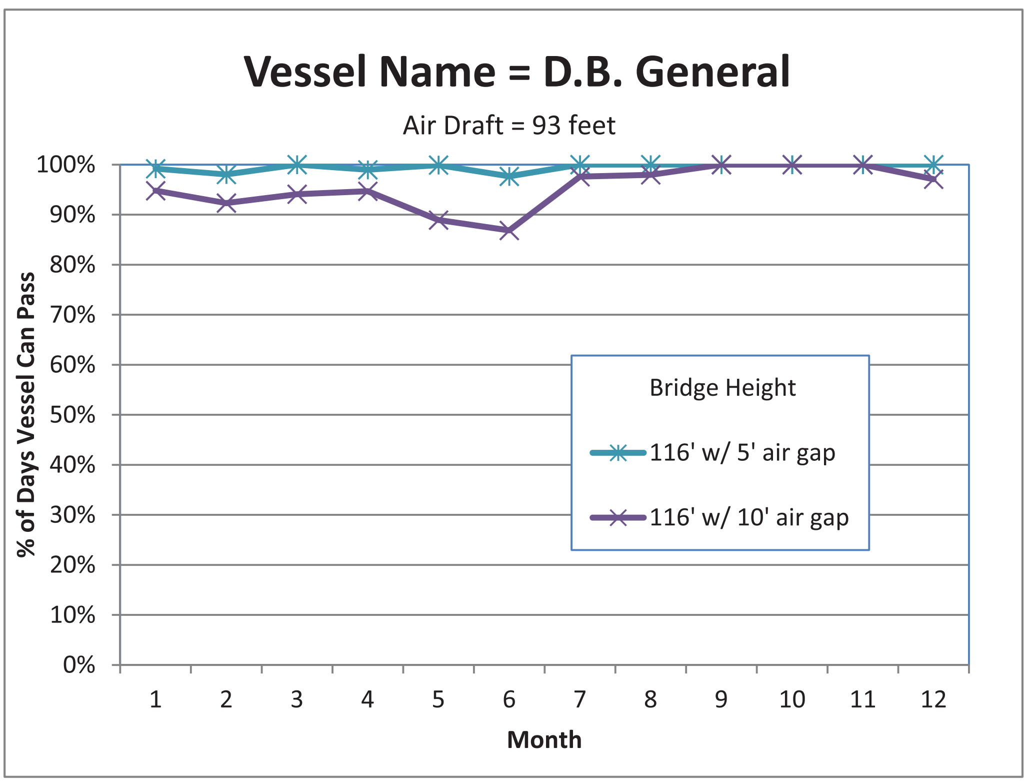
- Advanced American Construction's *DB 4100* would be minimally restricted, able to pass at least 90 percent of the days of each month of the year with a 10-foot air gap, and greater than 98 percent of days in all months of the year with a 5-foot air gap. Accordingly, for the purposes of this analysis, 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.

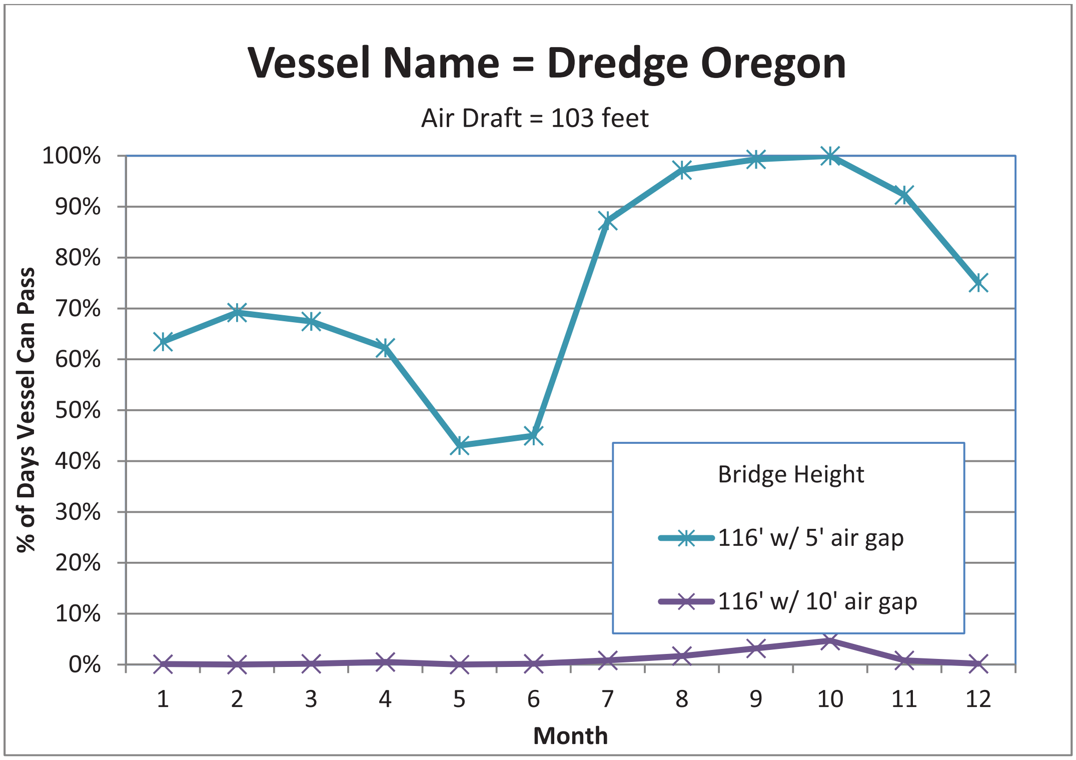
The Dredge *Oregon* is used by the Port of Portland under contract to USACE for channel deepening and maintenance projects on the lower Columbia River. This dredge has worked upriver of the Columbia River Bridge 6 times in the last 30 years and anticipates working upriver rarely in the future. The highest 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.

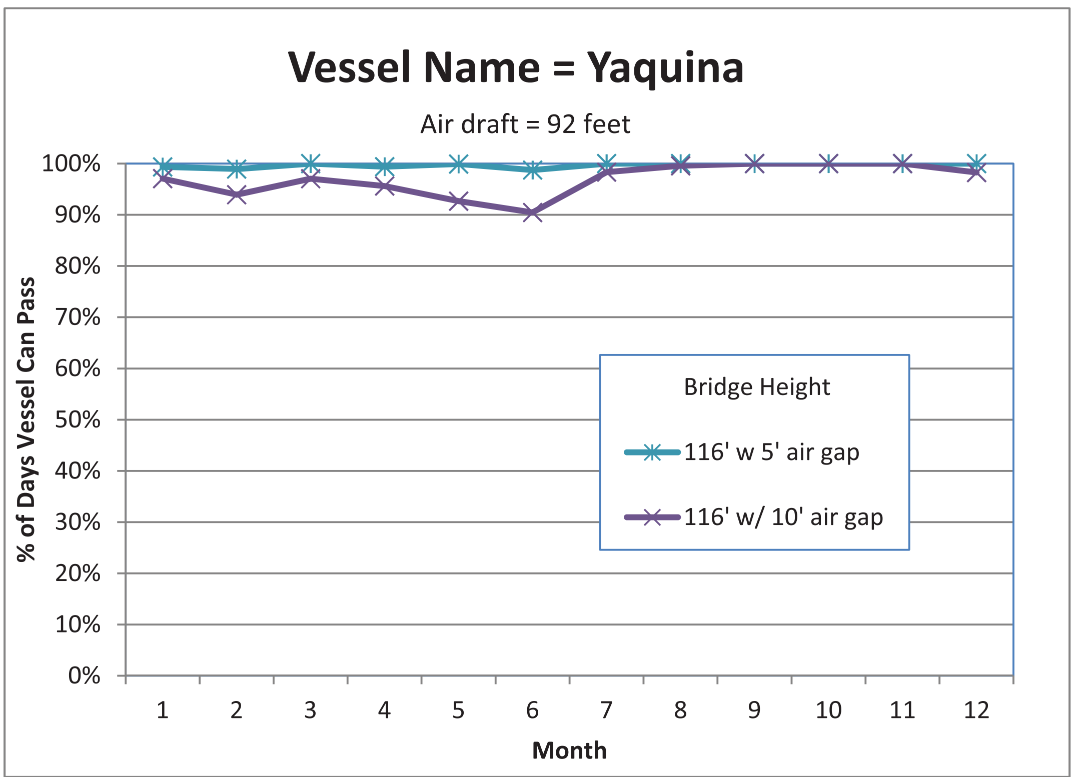
For a 116-foot bridge, the Port has suggested that an acceptable solution would be to lower their spuds for passage under the bridge. At ordinary high water (16 feet above zero CRD) and a 5-foot air gap, the spuds can be lowered by 8 feet to transit under the bridge. With this procedure as proposed by the owner, for the purposes of this analysis there is no impact.

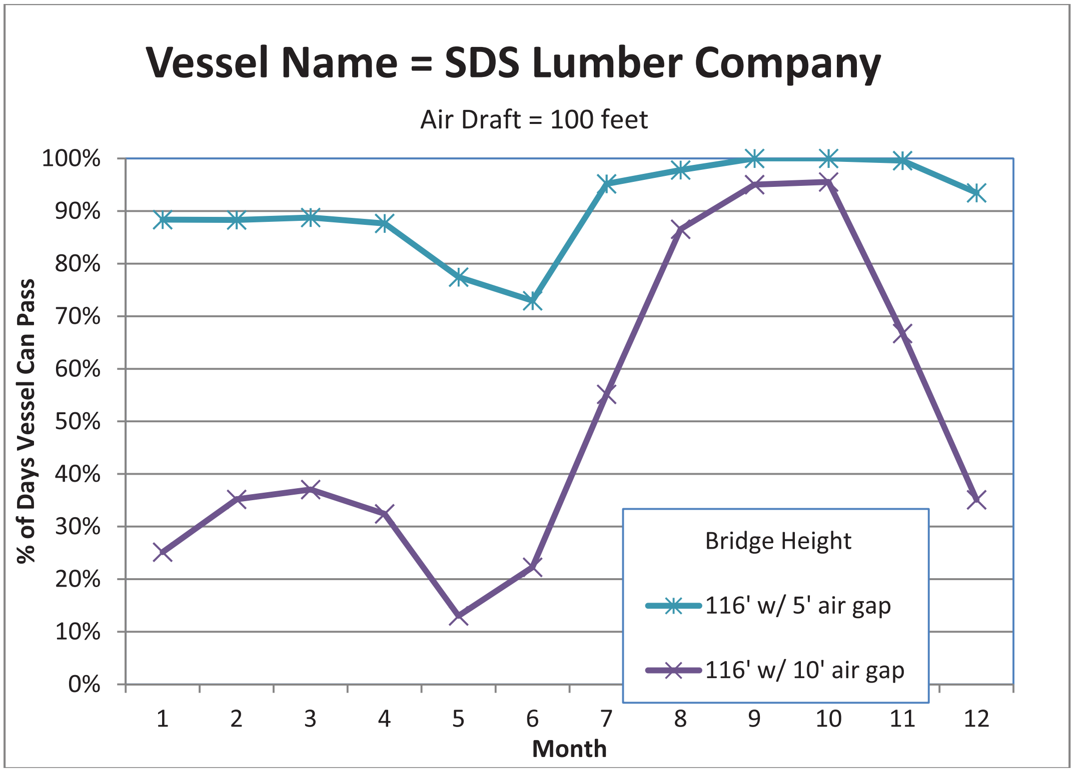
- The USACE's dredge *Yaquina* would be minimally restricted by a 10-foot air gap (able to pass more than 90 percent of the days of each month of the year), and would be essentially unaffected if only a 5-foot air gap is required (it could pass between 98 and 100 percent of the days for each month). 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
5
6
7
8
9
10
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. FTA and FHWA must concur in writing 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:*

Please answer the following questions, fill out the impact chart and attach project area and site maps. 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.

Impact category	Yes	No
Transportation	☒	☐
Land Use and Economics	☒	☐
Acquisitions, Displacements, & Relocations	☐	☒
Neighborhoods & Populations (Social)	☐	☒
Visual Resources & Aesthetics	☒	☐
Air Quality	☒	☐
Noise & Vibration	☒	☐
Ecosystems (Vegetation & Wildlife)	☒	☐
Water Resources	☒	☐
Energy & Natural Resources	☒	☐
Geology & Soils	☐	☒
Hazardous Materials	☐	☒
Public Services	☐	☒
Utilities	☐	☒

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.

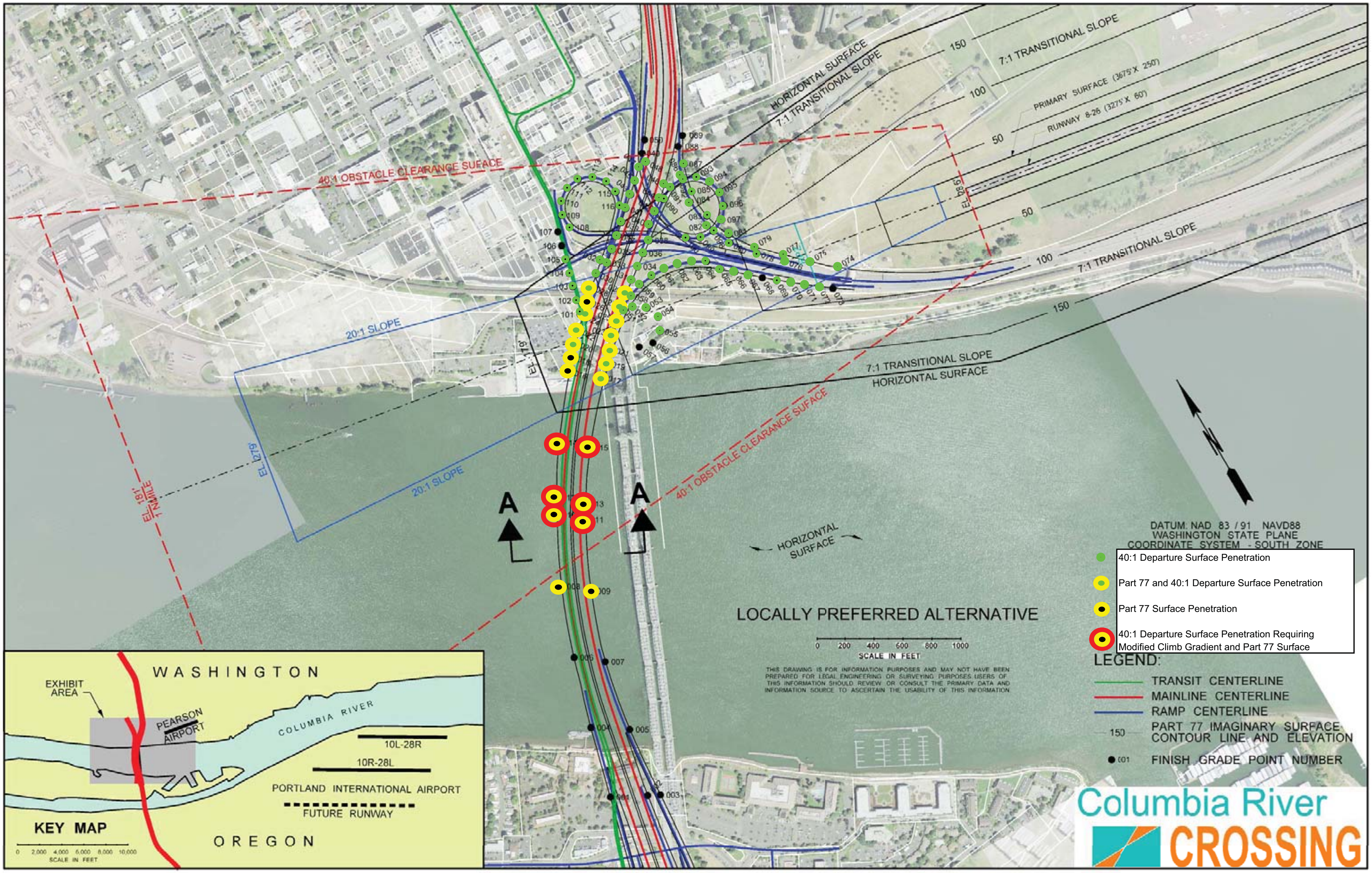
Sincerely,

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 determined that none of the proposed light poles nor the existing bridge's high rise tower (Case #2003 ANM 1031 OE) (draw bridge) penetrate the 62.5:1 surface for either Runway 28R or 28L. One additional hypothetical case was constructed for the more southern bridge area that affects the extended centerline for Runway 28L (no data was submitted for the bridge area south of the main Columbia River channel) and found not to penetrate. This hypothetical case used the highest/closest MSL altitude submitted for light poles within the Runway 28L 62.5:1 surface area. Additionally, a VFR analysis was done for the approach/departure end of Runway 8 at Pearson Airpark (VUO). Normal procedures at Pearson Airpark now call for a right turn north for all departures VFR and the proposed pole heights are reasonably close to existing structures to the point that their construction will have little 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 available 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 climb 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 climb 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 climb 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 climb 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 climb 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 climb 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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-in 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	"	"


40:1 OBSTACLE CLEARANCE SUFACE
HORIZONTAL SURFACE
7:1 TRANSITIONAL SLOPE
150
100
50
PRIMARY SURFACE (3675'X 250')
RUNWAY 8-26 (3275'X 60')
EL. 26.6'
20:1 SLOPE
EL. 219'
EL. 181' 1 MILE
A
HORIZONTAL SURFACE
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
LOCALLY PREFERRED ALTERNATIVE
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
WASHINGTON
EXHIBIT AREA
PEARSON AIRPORT
COLUMBIA RIVER
10L-28R
10R-28L
PORTLAND INTERNATIONAL AIRPORT
FUTURE RUNWAY
KEY MAP
OREGON
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)