

3.2 Navigation

This section discusses existing river navigation conditions and evaluates the long-term and temporary reasonably foreseeable effects of the Modified LPA and the No-Build Alternative on the public interest in navigation. The assessment of reasonably foreseeable effects in this section is based upon the geographic and temporal proximity parameters detailed in Section 3.2.3.

The Columbia River and North Portland Harbor are navigable waters of the United States. This designation signifies that all construction or alteration of bridges crossing these waterways must first receive approval from the U.S. Coast Guard (USCG), pursuant to the General Bridge Act of 1946, as amended. The bridge permitting process conducted by the USCG, pursuant to the Rivers and Harbors Act (33 U.S.C. § 401, and 33 CFR § 114.10), and in accordance with applicable interagency Memorandum of Understanding (MOU)¹ and Memorandum of Agreement (MOA),² outlined in Section 3.2.1 below, is wholly separate from the environmental review process under NEPA. This section of the Final SEIS, which discloses the reasonably foreseeable effects to the public interest in navigation under NEPA, is independent of the review conducted by the USCG. To the extent this Final SEIS references the Navigation Impact Report (NIR) for the IBR Program, prepared as part of the USCG bridge permitting process, such reliance is limited to data and information relevant to the public's interest in navigation and disclosure of reasonably foreseeable effects under NEPA, and does not alter or affect the permitting process for which USCG is responsible. For more information on the NIR and USCG bridge permitting process, please see the NIR (IBR 2025; as listed in Appendix H).

3.2.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision, as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment near the Interstate Bridge, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Program Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with navigation has been updated in this Final SEIS to include the following analyses and new information:

- Changes to existing and prospective marine vessel navigation and marine freight shipments in both the main channel of the Columbia River and North Portland Harbor.
- Changes to USCG policy with 2025 updates to the USCG Bridge Permit Application Guide (USCG 2025).
- IBR Program's NIR baseline navigation data (IBR 2025).
- USCG's Preliminary Navigation Clearance Determination (PNCD) (USCG 2022) for the North Portland Harbor responding to the IBR Program's initial 2022 NIR.
- USCG's two PNCDs (USCG 2026 and USCG 2022) for the Columbia River responding to the IBR Program's two NIRs (IBR 2025 and IBR 2022).
- IBR Program's Navigation Simulation Study (Appendix H).
- 2014 MOU among the USCG, FHWA, FTA, and FRA to coordinate and improve bridge planning and permitting.
- 2014 MOA between USCG and FHWA to coordinate and improve bridge planning and permitting.

¹ The USCG-FHWA-FTA-FRA Memorandum of Understanding (2014) to Coordinate and Improve Bridge Planning and Permitting.

² The USCG-FHWA Memorandum of Agreement (2014) to Coordinate and Improve Bridge Planning and Permitting.

- New bridge configurations added for evaluation due to changed conditions, one of which would provide increased vertical navigation clearance (VNC).

The replacement bridges over the Columbia River and North Portland Harbor are the main component of the Modified LPA relevant to navigation considerations. The CRC LPA included a pair of double-deck fixed-span replacement bridges. The proposed Modified LPA includes a pair of replacement bridges and considers three bridge configuration design options: a pair of double-deck fixed-span bridges, a pair of single-level fixed-span bridges and a pair of single-level movable-span bridges. Consideration of the three bridge configuration design options involves coordination with U.S. Army Corps of Engineers (USACE) and USCG regarding multiple navigation-related items; see Section 2.7 Anticipated Permits and Approvals for a discussion of current and future actions necessary to reach resolution on an acceptable bridge configuration for the Modified LPA.

3.2.2 Existing Conditions

Columbia River

As one of the largest rivers in North America, the Columbia River is among the defining geographic features of the Pacific Northwest. It serves as an important part of the U.S. Maritime Transportation System corridor, and its resources have provided, and continue to provide, the economic and cultural foundations of Native American and western settlements.

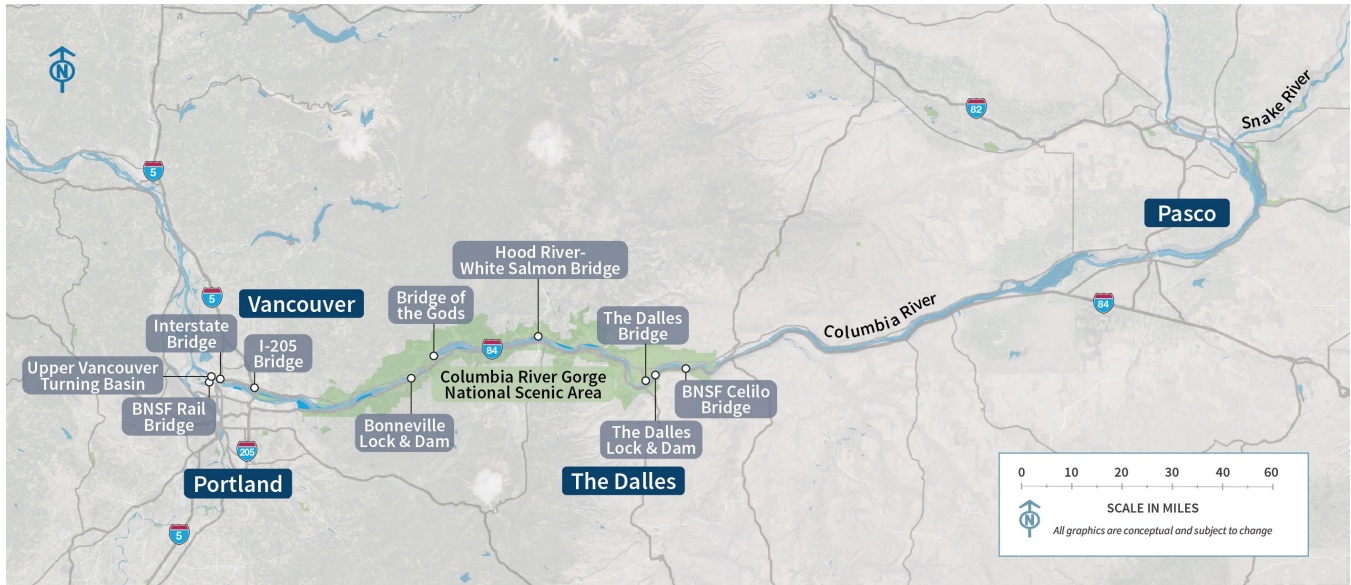
The Columbia River headwaters are located in British Columbia, Canada, through which the river flows for approximately 425 miles before entering the continental U.S. in northeast Washington. From the U.S./Canada border it flows generally south to its confluence with the Snake River, where it turns west and forms the boundary between Washington and Oregon for the remainder of its course to the Pacific Ocean.

The Maritime Administration Marine Highway 84 (M-84) includes the Columbia, Willamette and Snake rivers, connecting commercial navigation channels, ports, and harbors. It spans the Columbia and Snake rivers in Oregon, Washington, and Idaho from Astoria, Oregon, to Lewiston, Idaho, and a 26-mile portion of the Willamette River in Oregon from Willamette Falls to the confluence with the Columbia River. The M-84 connects to Marine Highway 5 (M-5), the coastal waters route extending from the U.S./Canada border north of Seattle, Washington to the U.S./Mexico border south of San Diego, California.

The Columbia River is an important natural resource and serves a vital role for power generation, irrigation, navigation, and recreational purposes. It is authorized as a navigation channel for deep-draft vessels from its mouth to Portland, Oregon, and Vancouver, Washington, and for shallow-draft vessels to Lewiston, Idaho via the Snake River. The Columbia River's deep-draft navigation system provides for a 43-foot-deep by 600-foot-wide channel from inside the Columbia River Bar upriver to ports on both the Washington and Oregon sides of the river at approximately river mile (RM) 106, which is just downriver from the existing Interstate Bridge (Figure 3.2-1).

From the eastern side of the Upper Vancouver Turning Basin (RM 106), which is just downstream of the Interstate Bridge (RM 106.5), to the Snake River confluence (RM 325) near Pasco, Washington, the Columbia River is maintained as a shallow-draft system supporting tug and tow vessels, dredges, marine contractors, government vessels, cruise ships, sailboats, and other vessels. The shallow-draft system has a maintained depth of approximately 17 feet. Just east of The Dalles, Oregon, is a BNSF Railway Bridge at Celilo Falls (RM 200) with a VNC of 79 feet, which is the governing structure for vessels transiting upriver of the Interstate Bridge because all bridges between the Interstate Bridge and Celilo Bridge provide greater VNC than the Celilo Bridge. Between the Interstate Bridge and the Celilo Falls BNSF Railway Bridge, approximately 95 miles to the east, many shoreline land uses are dependent on the Columbia River. Currently, the shoreline of the Columbia River is used by local jurisdictions as a resource for river-dependent functions such as recreational, environmental, or economical purposes more than for industrial marine, water-dependent uses.

Figure 3.2-1. Columbia and Snake River System from the Interstate Bridge to Pasco, Washington



The intrinsic value of the Columbia River is largely in its natural beauty, especially within the Columbia River Gorge located east of the Interstate Bridge. The most significant land use control is the 85-mile-long Columbia River Gorge National Scenic Area, which protects the natural beauty of the gorge where the Columbia River is nestled in a deep canyon with steep cliffs on both sides of the river and severely limits industrial development outside of existing incorporated communities in Oregon and Washington from roughly Troutdale, Oregon to Wishram, Washington. The BNSF Railway Bridge at Celilo Falls, which has a VNC of 79 feet, is also located within the Columbia River Gorge National Scenic Area near its eastern limits.

Historically, the Columbia River for many Native Americans living in the Pacific Northwest was central to culture, sustenance, trade, and transportation. As EuroAmerican settlement traveled to the Pacific Northwest, river transport, commercial fishing and associated canneries, and agriculture developed along the Columbia River (OHS 2024a). When dams were constructed along the Columbia and Snake rivers in the 1900s, increased industrialization occurred and corresponded to increased movement of freight and agricultural products up and downriver. Shipbuilding operations, supporting industries, and employees were established along the Columbia and Willamette rivers during World War II, including three Kaiser Shipyards in the Vancouver and Portland areas (OHS 2024b). Additionally, new and affordable hydroelectric power ushered in aluminum smelting operations, and new U.S. Bureau of Reclamation (USBR) irrigation projects spurred increased agriculture production in central/eastern Oregon and Washington. Navigation along the Columbia and Snake rivers grew tremendously during this time to support these economies. Over the 109 years of service life of the Interstate Bridge (northbound span opened in 1917 and southbound span opened in 1958), numerous bridge lifts have been conducted for mariners with large VNC requirements, including those requiring openings for clearances over 116 feet and up to 178 feet. Although overall vessel traffic has remained stable since 2000, industries along the river have changed to a mix of marine and non-marine enterprises, and barge traffic through the locks has trended downward due to changing grain export patterns (USACE, USBR, BPA 2020). However, the capacity of the Columbia River to support marine development and transport remains similar to conditions after the dams were constructed.

Federally Authorized Navigation Projects

I-5 crosses the Columbia River via the existing Interstate Bridge and the North Portland Harbor bridge. Within the vicinity of the Interstate Bridge, there are four federally authorized navigation projects on the Columbia River: three federally authorized navigation channels that pass beneath the Interstate Bridge. The following are the four USACE Civil Works projects located in the Columbia River:

- Primary Navigation Channel on the Columbia River, authorized by the Rivers and Harbors Act of 1899, as amended August 26, 1937.
- Barge Channel, authorized under Section 107 of the Rivers and Harbors Act of 1899, as amended July 14, 1960.
- Vancouver Upper Turning Basin downstream of the Interstate Bridge, authorized by the Rivers and Harbors Act 1899, as amended October 23, 1962.
- Alternative Barge Channel, authorized by the Water Resources Development Act of August 17, 1999.

The Vancouver Upper Turning Basin turning basin has historically provided a turning location for deep-draft ships navigating up to, but not beyond, the Interstate Bridge. It is the uppermost reach of the Columbia and Lower Willamette (C&LW) project and has a separate authorized depth of -35 feet. It serves as a turning basin and transition area between the deeper C&LW project (authorized depth of -43 feet) and the shallower Vancouver to The Dalles project (authorized depth of -27 feet/maintained to -17 feet). Temporary and permanent alterations to USACE Civil Works projects would require approval from the USACE in compliance with Section 14 of the Rivers and Harbors Act of 1899 (codified as 33 U.S.C § 408).

The primary navigation channel as part of the Vancouver to The Dalles navigation project was authorized in 1938 and updated in 1946; this channel was authorized to a depth of -27 feet to accommodate deeper draft ocean-going vessels past Bonneville Dam to The Dalles. This traffic never materialized, and the channel is currently maintained to a shallower depth consistent with current traffic.

There is no federally authorized navigation channel within North Portland Harbor in the vicinity of the Interstate Bridge. Table 3.2-1 summarizes the widths and depths of the federally authorized navigation projects near the Interstate Bridge.

Table 3.2-1. Widths and Depths of Federally Authorized Navigation Projects near the Interstate Bridge

Federally Authorized Navigation Channel	Authorized Width (feet)	Existing Horizontal Clearance (feet)	Authorized Depth (feet)	Maintained Depth (feet)	Current Waterway Depth (feet)
Primary Columbia River Navigation Channel (Vancouver to The Dalles)	300	263	-27	-17	30
Barge Channel	300	511	-15	-15	~21 to 25
Alternate Barge Channel	200	260	-17	-15	~21 to 25
Upper Vancouver Turning Basin	800	N/A ^a	-35	-35	~20 to 30

Source: USACE n.d.

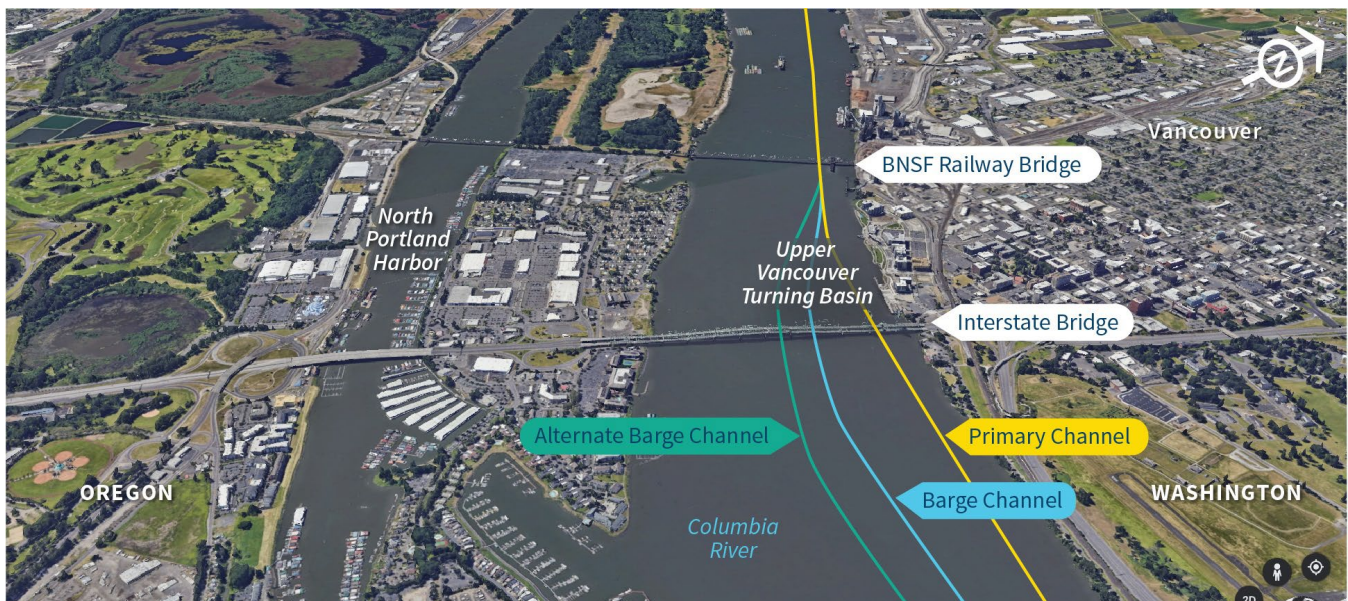
a Not applicable. The federal authorization for the Upper Vancouver Turning Basin includes dimensions of 2,000 feet long and 800 feet wide. Horizontal clearance as referenced for the other federally authorized projects in this table relates to distance between bridge piers for ships navigating beneath the bridge and therefore does not apply to the turning basin.

Vessel Operations and Navigation Clearance

Vessels that currently operate near and/or navigate beneath the Interstate Bridge include tugs and barges, recreational sailboats and powerboats, marine contractor barges with construction cranes and materials, cruise and passenger boats, dredges, government vessels, transporting manufactured and fabricated goods, and others. The Columbia River, from the Interstate Bridge to the Bonneville Dam (approximately 39.5 river miles upstream), is an active waterway, and details regarding vessel operations in this area are provided below.

Near the Interstate Bridge, Columbia River navigation is limited by channel depths as well as horizontal and vertical clearances associated with the Interstate Bridge and North Portland Harbor bridge, the BNSF Railway Bridge that crosses the Columbia River to the west (downstream) of the Interstate Bridge, and a second BNSF Railway Bridge that crosses North Portland Harbor (see Figure 3.2-2). The alignments of the navigation channels factor into vessel passage of both the Interstate Bridge and the BNSF Railway Bridge. Figure 3.2-2 illustrates these alignments with different magnitudes of curvature between the two bridges. A variety of navigation factors, such as downstream or upstream transit, vessel/cargo load, vessel size and draft, weather conditions, water flow velocities, wind/wave conditions, and more are important considerations for vessel maneuverability and safety.

Figure 3.2-2. Existing Navigation Channels Under the Interstate Bridge and BNSF Railway Bridge

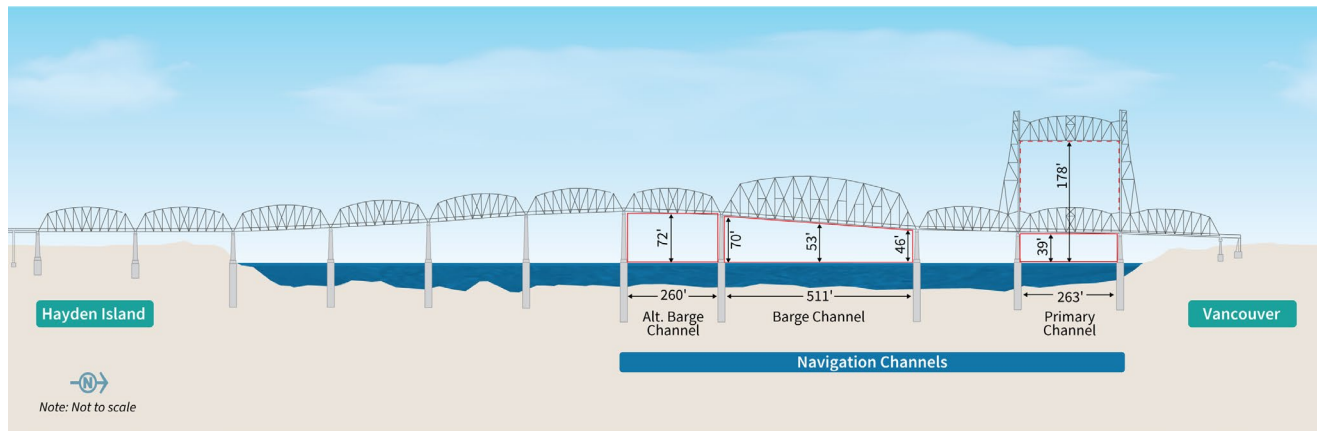


Due to the proximity of the Interstate Bridge and the BNSF Railway Bridge (approximately 0.9 river mile), vessel operators typically plan their routes in consideration of navigation factors associated with both bridges. VNC and vessel cargo play a role in route options because USCG regulations specify that movable-span bridge openings are only allowed for vessels that are otherwise unable to pass under the bridge via alternate channels. For example, vessels that need less than 33 feet VNC (including adjustments for weather, water level, and other conditions) to pass the BNSF Railway Bridge may take a route outside the primary navigation channel. Vessels needing additional VNC require the BNSF Railway Bridge swing span to be opened and typically use the primary navigation channel. This route is near the Washington shore (shown in Figure 3.2-2).

Figure 3.2-3 shows that when the Interstate Bridge lift spans are in the closed position, the vertical clearance within the primary navigation channel is 39 feet (as measured above 0 Columbia River Datum [CRD]).³ When the lift spans are raised, the maximum vertical clearance is 178 feet. The barge channel lies under the wide span of the bridge and has a horizontal navigation clearance (HNC) of 511 feet and a vertical clearance ranging from 46 to 70 feet; however, vessels tend to use the southern half of this channel where the vertical clearance is the highest. The alternate barge channel has an HNC of 260 feet and a vertical clearance of 72 feet. Water levels dictate the available clearance at a specific time. Water levels vary seasonally based on flows and daily based on tidal influence. The average daily high is approximately 10 feet CRD and typically occurs in late spring. The average daily low is approximately 2 feet CRD and typically occurs in early fall.

For passage through the Interstate Bridge, vessels requiring more than 72 feet VNC must use the primary navigation channel with the opened lift spans; vessels that can pass with less than 72 feet of VNC can use one or more of the three channels without a bridge opening depending on vessel size and pilot choice. Interstate Bridge openings are currently restricted to avoid weekday peak highway traffic operations between 6:30 a.m. and 9:00 a.m. and between 2:30 p.m. and 6:00 p.m., excluding emergency bridge openings. Thus, vessels that require a bridge opening must schedule their passage times outside these restricted time periods.

Figure 3.2-3. Existing Interstate Bridge Navigation Clearances



Note: all vertical VNCs shown are measured in feet above 0 CRD.

Historical bridge opening data by vessel type for 2007-2024 and the number of bridge openings as a share of the total river navigation are documented in the NIR (see Sections G.1.2 and G.1.3 of IBR 2025). Details for each bridge opening, such as the time of day, duration, and height the bridge was lifted as recorded by the ODOT bridge tender were documented (see Appendix E of IBR 2025), and additional outreach was conducted to validate vessel and cargo dimensions to supplement information from ODOT (see Appendix B of IBR 2025). There are no sources of information that directly compare the number of bridge lift opening events with all river activity because the only recorded transits of the bridge are those that require a bridge opening. However, using the number of recorded lockages at the upstream Bonneville Dam as well as the number of bridge openings at the downstream BNSF Rail Bridge, it is estimated that approximately 4-7% of the commercial vessel and sailboat trips that transit under the Interstate Bridge request bridge lifts (IBR 2025). With the exception of some specialized vessels that use the Columbia River infrequently, most vessels require vertical clearances of less than 90 feet.

³ Columbia River Datum is the plane of reference from which river stage is measured on the Columbia River from the lower Columbia River up to Bonneville Dam, and on the Willamette River up to Willamette Falls. Equals 1.82 feet above mean sea level (equivalent to National Geodetic Vertical Datum [NGVD]) at Vancouver, Washington (USACE 2014).

On June 17, 2022, the USCG issued a preliminary navigation clearance determination (PNCD) requiring any proposed new bridge to meet or exceed the existing VNC of the current I-5 twin bridges (178 feet) and any side channels to have vertical clearances equal to or greater than 72 feet. The PNCD also proposed any bridge would have an HNC requirement greater than or equal to that of the current or future permitted USACE federal navigation channel projects, and noted USACE may have additional requirements. The USCG issued a revised PNCD for the replacement bridge requiring any proposed new bridge to have a vertical navigation clearance of greater than or equal to 116 feet above zero CRD (USCG 2026).

The federal navigation channels have various authorized widths. The authorized width of the Vancouver to The Dalles channel (i.e., the primary Columbia River navigation channel) is 300 feet. The authorized widths of the two side channels are 300 feet and 200 feet, respectively. The existing 263-foot HNC for the primary navigation channel beneath the Interstate Bridge, which is a function of bridge pier locations within the Columbia River, is less than the USACE-authorized channel width of 300 feet. The existing HNC was established when the original Interstate Bridge (current northbound span) was constructed, which was prior to federal authorization of the primary navigation channel.

Navigation is further affected by other bridges and structures that present obstructions to vessels. Upstream of the Interstate Bridge, this includes the following vertical clearances:

- I-205/Glenn L. Jackson Bridge, 136 feet (144 feet at center)
- Bridge of the Gods, 135 feet
- Hood River Bridge, 148 feet⁴
- The Dalles Bridge, 100 feet
- The Dalles Lock and Dam, 100 feet
- BNSF Railway Celilo Bridge, 79 feet

Downstream of the Interstate Bridge, this includes the following vertical clearances:

- BNSF Railway Bridge, Unlimited (39 feet when swing span closed)
- Lewis & Clark Bridge, 187 feet
- Astoria-Megler Bridge, 193 feet (205 feet at center)

North Portland Harbor

North Portland Harbor, previously known as the Oregon Slough, is a 5-mile-long side channel of the Columbia River, located between Hayden Island and mainland Oregon. The waterway is bounded by a federal levee on the south bank and urban development and infrastructure on both shorelines. The following three USACE Civil Works projects are located along the North Portland Harbor, including:

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

Temporary and permanent alterations to USACE Civil Works projects would require approval from the USACE in compliance with Section 14 of the Rivers and Harbors Act of 1899 (codified as 33 U.S.C § 408).

⁴ The Hood River Bridge, currently with a lift span providing up to 148 feet VNC, is proposed to be replaced with a fixed span that would allow for 90 feet VNC.

North Portland Harbor supports marinas of floating homes and primarily noncommercial boats. It is largely traveled by recreational boaters and those accessing the water-oriented uses along the harbor. Many floating home residents use North Portland Harbor to travel by recreational vessel to and from their residences. The HNC beneath the existing North Portland Harbor bridge is approximately 215 feet and a vertical clearance is approximately 35 feet. Farther west (downstream), large ocean-going cargo ships use North Portland Harbor to reach Port of Portland Terminal 6. However, while smaller vessels capable of ocean-going can transit upstream to the Port of Portland's Terminal 6, larger cargo vessels are unable to travel farther upstream due to the depth of the waterway.

3.2.3 Long-Term Reasonably Foreseeable Effects

The geographic proximity and temporal scope are defined as follows and are used to assess long-term benefits and effects to navigation:

- Geographic proximity for navigation includes those effects within or directly adjacent to the primary study area for the IBR Program as well as the section of the Columbia River and the corresponding shorelines from the BNSF Railway Bridge (RM 105.6) just west of the Interstate Bridge (RM 106.5) to the BNSF Railway Bridge at Celilo Falls (RM 200) to the east.
- Temporal scope for navigation includes those long-term effects that are expected to occur between 2023 (the year the Notice to Prepare an SEIS was published) and the lifespan of the new Columbia River bridges, estimated to be 100+ years upon completion of construction, and temporary effects that are expected to occur during construction.

No-Build Alternative

With the No-Build Alternative, navigation conditions would not change. Vessels requiring more than 72 feet of VNC would need to schedule passage through the Interstate Bridge around existing restrictions on lift-span operation. No additional timing restrictions on bridge lifts were assumed for the No-Build Alternative; however, highway congestion would increase in the future (see Figure 3.1-11 for the 2045 Forecast Average Weekday Daily Traffic Volumes on I-5 and I-205) as noted in Section 3.1 (Transportation). Future bridge lift trends for the Interstate Bridge are challenging to predict because they would be driven by numerous factors. Nevertheless, an increase in highway congestion without a change to the timing restrictions on bridge lifts would result in correlative increases to transportation impacts (e.g., extending the duration of congestion), which could be resolved by further restricting the timing for bridge lifts. Any such restrictions would require coordination with USCG. The primary navigation channel would remain in its current location and vessels would continue to use the same channels available today.

The No-Build Alternative would have the same navigation considerations for mariners as existing conditions because the pier locations and navigation clearances would remain unchanged. Navigation simulations were conducted to evaluate existing, proposed future, and construction conditions for a variety of vessels (deep draft and shallow draft); upbound and downbound directions; daytime and nighttime conditions; various water flow conditions; loaded, light and unloaded cargo; and wind conditions. For additional information on this topic, including the methodology for the analysis of reasonably foreseeable effects to navigation safety, see Appendix H, List of Technical Reports, Navigation Simulation Study; Section 4 of the Navigation Simulation Study summarizes the results of the navigation simulations and Appendix C of that study documents the mariner evaluation feedback surveys.

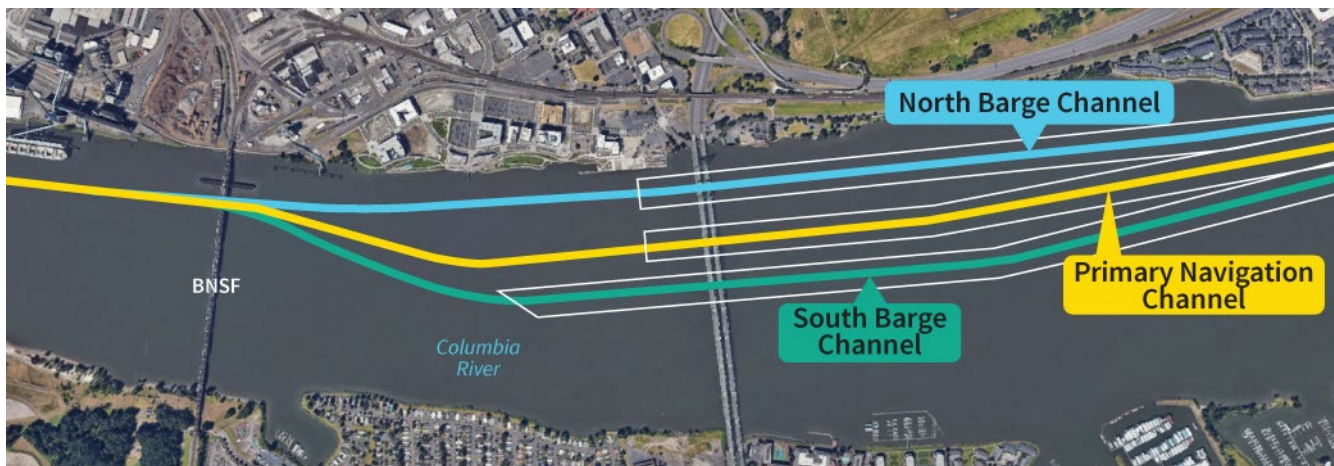
Without the seismic upgrades to the Interstate Bridge, a major earthquake could collapse or seriously damage one or both bridges, temporarily restricting or preventing navigation. Similar impacts to vessels navigating North Portland Harbor could occur if the bridge over North Portland Harbor is not replaced.

Modified LPA

Columbia River Navigation Channels

For all bridge configuration design options under consideration for the Modified LPA, the routes that vessels would be required to take to pass through both the new Columbia River bridges and BNSF Railway Bridge would change due to the proposed relocations of the primary navigation channel and north barge channel (see Figure 3.2-4). All bridge configuration design options would modify the federally authorized navigation channels, switching the relative positions of the primary navigation channel and the barge channel from those shown in Figure 3.2-2. The north barge channel would be located closest to the Washington shore, while the primary navigation channel would be located one bridge span south at the bridge's highest point of vertical clearance. The south barge channel would continue to be in approximately the same location as the existing alternative barge channel.

Figure 3.2-4. Proposed Columbia River Navigation Channels under the Modified LPA



Navigation Clearance

With the Modified LPA and all bridge configuration design options, the navigation clearance would change for all channels on the Columbia River:

- The north barge channel dimensions would be 100 feet VNC (fixed-span bridge configurations) or 99 feet VNC (movable-span bridge configuration) with 400 feet HNC. Most vessels and cargo would be able to pass under the new Columbia River bridges using the north barge channel with all bridge configurations. With a wider opening and higher vertical clearance, the north barge channel would provide increased navigation clearances for most users compared to the existing primary navigation channel of the Interstate Bridge. The north barge channel would continue to provide vessel pilots with the most direct route, including fewer turning movements, to transit under the new Columbia River bridges and through the downstream BNSF Rail Bridge.
- The new primary navigation channel (center location) dimensions would be 116 feet VNC with 400 feet HNC for the fixed-span bridge configurations and 92 feet VNC (closed position) to 178 feet VNC (open position) with 400 feet HNC for the movable-span bridge configuration. Vessels that require more than 100 feet VNC (fixed-span bridge configurations) or 99 feet VNC (movable-span bridge configuration) would use this channel.
- The south barge channel dimensions would be 110 feet VNC (fixed-span bridge configurations) or 90 feet VNC (movable-span bridge configuration) with 400 feet HNC.

Fixed-Span Bridge Configuration Design Options

The Modified LPA with either the double-deck or single-level fixed-span bridge configuration would reduce the maximum VNC of the primary navigation channel from 178 to 116 feet, which would limit future navigation by introducing a permanent and complete obstruction to navigation upstream of the new Columbia River bridges for vessels or cargo loads with vertical clearance requirements greater than 116 feet. The NIR (IBR 2025) analyzed vessels or cargo that historically transited under the Interstate Bridge from 2007-2024 to determine reasonably foreseeable effects that would occur to navigation. Analysis of this historical information provides a basis for evaluating reasonably foreseeable effects for the Modified LPA with fixed-span bridge configuration design options. Results of this analysis are described in the NIR for emergency and government vessels, recreational vessels, and commercial vessels and cargo moved on the Columbia River (see Sections E, F, and G, respectively, of the NIR for additional detail). The Modified LPA with either the double-deck or single-level fixed-span bridge configuration design option would continue to allow most vessels and cargo that have historically transited the bridge during the 2007-2024 time period to transit the new Columbia River bridges. Several vessels and cargos would be unable to transit the new Columbia River bridges (see Section S of the NIR for additional detail; see Section 3.4 Land Use and Economic Activity for additional discussion on the associated economic effects). Both double-deck and single-level fixed-span bridge configurations would meet the PNCD for the Columbia River issued by the USCG on January 16, 2026.

Movable-Span Bridge Configuration Design Option

The Modified LPA with a single-level movable-span bridge configuration would retain 178 feet VNC; all vessels and cargo that transit under the existing Interstate Bridge would continue to transit in the future and would not experience effects. This configuration would meet the PNCD for the Columbia River issued by the USCG on January 16, 2026 (USCG 2026).

Considering 2007-2024 data on vessels transiting under the Interstate Bridge, as listed in Section G.1.2 of the NIR (IBR 2025), there would be fewer bridge lifts with the single-level movable-span bridge configuration design option compared to the No-Build Alternative due to increased VNC in the closed position (99 feet compared to 72 feet). Analysis of the ODOT bridge tender data (Appendix E of the NIR [IBR 2025]) estimates that the Modified LPA with a movable-span bridge configuration design option would require approximately half of the number of bridge openings requested annually for the existing Interstate Bridge, roughly 75 bridge openings per year compared to the annual average of 156 bridge openings (2007-2024).

Under the movable-span bridge configuration design option, bridge openings would temporarily stop traffic, freight, transit, and active transportation on the new bridges. Typical bridge opening durations are assumed to be 9 to 18 minutes but would ultimately depend on various operational considerations related to vessel height, river dynamics, and weather conditions. Additional time would also be required to stop traffic and close the safety gates prior to opening and restarting traffic after the bridge closes. Similar to the No-Build Alternative, bridge openings would be restricted to minimize impacts to highway traffic and transit operations during peak periods. For the purposes of this analysis of the Modified LPA with the movable-span bridge configuration, it is assumed that bridge openings would be more restrictive than the current requirements⁵ due to growth in traffic volumes over time as well as the addition of light-rail transit (LRT). It is reasonable to expect that expanded timing restrictions for bridge lifts would accompany increased highway traffic volumes and new transit service. With bridge openings further restricted, highway congestion would be reduced (compared to the No-Build Alternative) and LRT performance and reliability would be improved. For more information on impacts to highway traffic and transit service from movable-span bridge openings, see Section 3.1.3 Transportation, Long-term Reasonably Foreseeable Effects, Bridge Openings and Gate Closures in 2025.

⁵ Currently, lifts are not permitted Monday through Friday from 6:30 a.m. to 9:00 a.m. and from 2:30 p.m. to 6:00 p.m., except in emergencies and on federal holidays.

Expanded bridge opening restrictions would have greater impacts on navigation. Vessels that require a bridge opening would have fewer time periods available to transit under the bridge, which could have schedule, cost, and safety implications. For these vessels, transit under the bridge would need to be scheduled at earlier or later times of day than are used today and under the No-Build Alternative. Additionally, transiting under the bridge at night would increase potential safety hazards because visibility would be reduced, requiring vessels to travel more slowly, thereby affecting steerage and maneuverability.

If the Modified LPA with the movable span bridge configuration design option were to be the Selected Alternative, expanded bridge opening restrictions would need to be coordinated with the navigation community and USCG (see Section 2.6, Additional Compliance, for more discussion on the rulemaking process) to establish timing restrictions on movable-span openings.

North Portland Harbor

On July 12, 2022, the USCG issued a PNCD for the I-5 Oregon Slough Bridge over North Portland Harbor. The Modified LPA is consistent with the PNCD issued for the North Portland Harbor bridge because it would continue to provide unobstructed navigation for vessels requiring up to 35 feet of VNC.

Navigation Safety

Under the Modified LPA, the new Columbia River bridges would be constructed to the west (downstream) of the existing Interstate Bridge. This would reduce the distance between the BNSF Railway Bridge and the new Columbia River bridges, and as a result, vessels would have a shorter available distance to align with the openings of the BNSF Railway Bridge and the new Columbia River bridges. There would also be fewer bridge piers in the water under the Modified LPA, resulting in a greater distance between the piers and a greater HNC under the Modified LPA. This would allow mariners headed downstream to position earlier to begin turning movements as they are transiting under the new Columbia River bridges. In addition, realignment of the primary navigation channel from the north to the center channel under the Modified LPA would allow a greater passing distance between cruise vessels docked at Terminal 1 and transiting vessels. The wider HNC on all navigation channels would improve navigation safety by creating more space for vessels to begin turning movements supporting safer maneuvering, increased visibility, and easier transitions between the new Columbia River bridges and the BNSF Railway bridge. Columbia River navigation safety was evaluated by simulating future navigation conditions with varying vessel types, cargo loads, water flow conditions, wind conditions, transit direction, and other elements. For additional information on this topic, including the methodology for the analysis of reasonably foreseeable effects to navigation safety, see Appendix H, List of Technical Reports, Navigation Simulation Study; Section 4 of the Navigation Simulation Study summarizes the results of the navigation simulations and Appendix C documents the mariner evaluation feedback surveys.

Upper Vancouver Turning Basin

Under the Modified LPA, the proposed Columbia River bridges would be constructed to the west of the existing Interstate Bridge. Consequently, all of the bridge configurations would shift the Upper Vancouver Turning Basin west by approximately 300-350 feet compared to the No-Build Alternative. This shift would continue to provide horizontal distance and vertical depth for vessels that have historically used this turning basin, allowing them to make similar turning movements in the future.

Seismic Resilience

Bridges are vital links in a transportation network and are particularly vulnerable during seismic events. The existing Interstate Bridge is seismically obsolete, and major earthquakes or other seismic events could temporarily restrict or prevent navigation. The Modified LPA, with any of the bridge configuration options, would enhance seismic resilience, resulting in improvements to public safety and structural stability in the event of a seismic event, reduction in the potential for soil erosion and slope failure, and a risk reduction of

damage to the new Columbia River bridges due to scour from a lahar event (i.e., quickly flowing volcanic material and water), all of which have significant potential impacts on navigation. Additional information about seismic resilience and the proposed design options can be found in Section 3.17, Geology and Groundwater.

Summary of Long-Term Reasonably Foreseeable Effects

Table 3.2-2 compares the long-term effects to navigation on the main stem of the Columbia River of the Modified LPA to the No Build Alternative.

The new North Portland Harbor bridges proposed under the Modified LPA would not reduce or increase vessel navigation clearance from current conditions. In addition, mariners transiting the North Portland Harbor would continue to have an alternate route via the main channel of the Columbia River. Therefore, no long-term effects to navigation are expected to result from the new North Portland Harbor bridges.

Table 3.2-2. Bridge and Navigational Characteristics with Reasonably Foreseeable Long-Term Benefits and Effects

0 Effect	1 No-Build Alternative	2: IBR Program Recommended Design Options Modified LPA with Single-Level Fixed-Span Bridge Configuration, One Auxiliary Lane, with C Street Ramp, Centered I-5, and All Five Park and Rides	3 Modified LPA with <u>Double-Deck</u> or Single-Level Fixed-Span Bridge Configuration, <u>Two Auxiliary Lanes</u> , <u>without C Street Ramps</u> , and <u>I-5 Shifted West</u> , and All Five Park and Rides	4 Modified LPA with <u>Single-Level Movable-Span Bridge Configuration</u> , One Auxiliary Lane, with C Street Ramp, Centered I-5, and All Five Park and Rides
Primary Navigation Channel	<ul style="list-style-type: none"> Location: North Width: 263 feet Height: 39 feet (closed) to 178 feet (open) 	<ul style="list-style-type: none"> Location: Center Width: 400 feet Height: 116 feet 	<ul style="list-style-type: none"> Location: Center Width: 400 feet Height: 116 feet 	<ul style="list-style-type: none"> Location: Center Width: 400 feet Height: 92 feet (closed) to 178 feet (open)
North Barge Channel	<ul style="list-style-type: none"> Location: Center Width: 511 feet Height: 46–70 feet 	<ul style="list-style-type: none"> Location: North Width: 400 feet Height: 100 feet 	<ul style="list-style-type: none"> Location: North Width: 400 feet Height: 100 feet 	<ul style="list-style-type: none"> Location: North Width: 400 feet Height: 99 feet
South Barge Channel	<ul style="list-style-type: none"> Location: South Width: 260 feet Height: 72 feet 	<ul style="list-style-type: none"> Location: South Width: 400 feet Height: 110 feet 	<ul style="list-style-type: none"> Location: South Width: 400 feet Height: 100 feet 	<ul style="list-style-type: none"> Location: South Width: 400 feet Height: 90 feet
Safety	<ul style="list-style-type: none"> HNC for all navigation channels remain unchanged. VNC remains unchanged. Primary navigation channel (north location) would provide straightest route to/from the BNSF Railway Bridge compared to existing barge (center) and alternate barge (south) channels. Unchanged navigation visibility associated with HNC (263–511 feet) and VNC (39–72 feet in the closed position; 178 feet in the open position). 	<ul style="list-style-type: none"> Increased HNC (400 feet) for primary (center) and alternate barge (south) channels. Reduced VNC for new primary navigation channel (center). Increased VNC for the north barge channel and south barge channel. Improved alignment with the BNSF Railway Bridge. Increased navigation visibility. 	Same as effects listed in Column 2.	<ul style="list-style-type: none"> Increased HNC for all channels. Same or increased VNC for all channels. Improved alignment with the BNSF Railway Bridge. Increased navigation visibility.
Number of In-water Pier Sets	9	6	6	6
Bridge Opening Timing Restrictions	No lifts allowed on weekdays: 6:30 a.m. to 9:00 a.m. and 2:30 p.m. to 6:00 p.m.	N/A	N/A	Additional timing restrictions on bridge openings anticipated. ^a
Upper Vancouver Turning Basin	Approximately 2,000 feet long.	Maintained length with an approximately 300–325-foot shift west.	Maintained length with an approximately 300–325-foot shift west.	Maintained length with an approximately 350-foot shift west.
Seismic Resilience	Continued risks of impacts to navigation from potential earthquake events including the potential for the bridge failing and blocking or obstructing the navigation channels.	Increased seismic resiliency in event of potential seismic activity reducing risk of bridge failure or collapse and blocking or obstructing the navigation channels.	The double-deck fixed-span bridge configuration would have the same effects as those described in Column 2 for the single-level fixed-span bridge configuration design option.	The single-level movable-span bridge configuration would have the same effects as those described in Column 2 for the single-level fixed-span bridge configuration design option.
Demolition	N/A	Existing bridge foundation elements would be removed to a depth determined by the USACE to not pose a hazard to current or future dredging operations.	The double-deck fixed-span bridge configuration would have the same effects as those described in Column 2 for the single-level fixed-span bridge configuration design option.	The single-level movable-span bridge configuration would have the same effects as those described in Column 2 for the single-level fixed-span bridge configuration design option.

Note: The underlined design options shown in columns 3 and 4 identify the specific effects on navigation for that particular design option compared to the Modified LPA with Recommended Design Options (column 2). For example, the effects of double-deck fixed-span bridge configuration (column 3) would occur with any other combination of the auxiliary lanes, C Street ramps, I-5 alignment, and park and ride design options. For additional information on Navigation Clearance and Safety, please see the Navigation Simulation Study, as listed in Appendix H.

a New bridge opening restrictions would require coordination with USCG and mariners. Federal rulemaking process would need to occur to modify current restrictions for long-term operations of the Modified LPA with a single-level movable-span bridge configuration.

HNC = horizontal navigation clearance; LPA = Locally Preferred Alternative; N/A = not applicable; USACE = U.S. Army Corps of Engineers; USCG = U.S. Coast Guard; VNC = vertical navigation clearance

3.2.4 Temporary Reasonably Foreseeable Effects

No-Build Alternative

No IBR Program-related construction activities would take place under the No-Build Alternative that would have temporary reasonably foreseeable effects to navigation.

Modified LPA

Temporary reasonably foreseeable effects on navigation would not differ among the Modified LPA design options, unless otherwise noted below. Construction of the Modified LPA includes the construction of the new bridges and removal of the existing Interstate Bridge. Construction activities would result in temporary effects to navigation on the Columbia River. During construction of the Modified LPA, some of the new piers, which are located outside the current navigation channel, would not align with the existing piers. Construction of the new bridge pier sets would occur one-by-one, resulting in changes to the three navigation channels at different points in time. For the estimated 6- to 8-year duration of construction, the existing Interstate Bridge would still be operational, and channels would be restricted by the presence of both the existing and constructed piers until demolition of the existing piers could occur. HNC could be further affected due to crane barges and other equipment present in the vicinity of the channel during pier construction. Smaller vessels and most recreational craft, which have limited horizontal and vertical clearance needs, would not be restricted from passing.

Construction would be staged so that at least one navigation channel would be open at a given time (Appendix C of IBR 2025). A minimum unobstructed navigation clearance of 72 to 75 feet (vertical) by 150 to 200 feet (horizontal) would be maintained during construction. This clearance would meet vessel clearance needs of most waterway users; however, for vessels requiring more VNC or HNC, accommodations would be implemented to maintain safe passage through the construction area. Any such coordination would take place between the river user (public or private) and the construction contractor and in advance of needing passage. Pilot and tug master feedback during the navigation simulations provided the following observations for the construction conditions:⁶

- The north barge channel/existing primary navigation channel felt like a typical transit through the existing north channel with more obstacles due to passing through two pairs of bridges. Overall, the mariner had limited concerns with this channel during construction.
- The horizontal and vertical navigation clearance limitations on the south barge channel, pilots/tug masters noted the channel is tight. As a result, until mariners are familiar with transiting this channel the 2-barge (length) by 2-barge (abreast) tows should be broken into a narrower 2-barge (length) by 1-barge (abreast) tow. For specialty barges with high and/or wide cargo, which could be unwieldy and use maximum clearances, maneuvers should happen during daylight to have greatest visibility and optimize safe transit. Additionally, the deckhand would need to be on the barge constantly giving the tug captain distances throughout this transit, an assist tug would be required, and environmental conditions would need to be evaluated for each transit.
- All construction barges should have an active Automatic Identification System (AIS) signal and construction channel lines should be updated on the published navigation charts.

⁶ The new primary navigation channel (center location) was assumed to have a minimum width of 200 feet and be limited to a vertical clearance of 43 feet during the simulated construction scenario. Thus, this channel would be closed as none of the design vessels would have sufficient clearance (see Appendix H, List of Technical Reports, Navigation Simulation Study, for additional details on the modeling assumptions for simulations).

For vessels requiring greater than 72 to 75 feet VNC, advance coordination would be undertaken to seek opportunities to accommodate larger vessels and cargo with construction activities. Closures or restrictions on river traffic would need to be approved by the USCG and communicated in advance, enabling river users to accommodate their schedules without undue interruption. The majority of vessels currently using the navigation channel would be able to continue their use throughout most of the construction period. Larger vessels may require a tug to assist their navigation of the construction area, particularly if a vessel is traveling downriver with cargo.

The VNC restrictions during construction would prevent the *Yaquina* from navigating above the Interstate Bridge to conduct yearly maintenance dredging of the federal navigation channel. Without yearly maintenance dredging, portions of the river could shoal and reduce the ability of vessels to navigate the federal navigation channel or could require reduced loads and vessel drafts. Modifications to the *Yaquina*, such as converting the fixed mast to a lowerable mast, use of alternative vessels, or changing dredging methods would be undertaken to fulfill the USACE's navigation missions during these time periods, per discussions with USACE.

While the size of vessels transiting the North Portland Harbor is more limited than those using the mainstem of the Columbia River, construction staging schemes would be devised for the Modified LPA to minimize adverse impacts to the vessels using North Portland Harbor. Construction in North Portland Harbor is not expected to occur at the same time as the Columbia River; thus, vessels that typically transit the full length of the North Portland Harbor could use the Columbia River as an alternate route. However, residents of floating homes in the vicinity, who use small vessels to travel to and from their homes, as well as vessels traveling to and from businesses and services located near the North Portland Harbor bridges construction area may need to use detour navigation routes. Restrictions and temporary closures of the navigation channel and the availability of the alternate route would be communicated to marinas and moorages on North Portland Harbor, as these are the primary users.

Temporary navigation effects under the single-level movable-span bridge configuration would be similar in character to those described above for the fixed-span bridge configurations, including restricted VNC and HNC, but would affect vessel transit for slightly more distance because of the larger footings, shaft caps, and piers (approximately 82 feet longer for Piers 5 and 6 than those for all other in-water footings) on either side of the primary navigation channel and the additional construction time, materials, and equipment needed to construct this option compared to the fixed-span bridge configurations.

See Section 3.2.6 for more discussion of staging and related construction-phase mitigation.

3.2.5 Intentionally Left Blank

3.2.6 Avoidance, Minimization, and Mitigation Measures

Standards and regulatory measures to avoid or minimize long-term reasonably foreseeable effects on navigation have been evaluated and screened. These measures have been incorporated during the development of the Modified LPA to the extent possible and will continue to be refined as the design progresses. Table 3.2-3 lists temporary and long-term avoidance and minimization measures. Table 3.2-4 lists temporary and long-term mitigation measures.

Table 3.2-3. Avoidance and Minimization Measures

Temporary or Long-Term	Impact Type	Avoidance and Minimization Measure
Temporary	Construction of new bridges in a navigable waterway	ODOT and WSDOT will coordinate with all IBR Program contractors to follow permit requirements for construction as detailed in the individual local, state, and federal permits and authorizations that must be obtained as part of the USCG Permit application.
Temporary	Closures and limited horizontal and vertical clearances to navigation channels and turning basin during construction	<p>ODOT and WSDOT will coordinate with USCG Captain of the Port and the USACE to prepare a Construction Sequencing Plan identifying changes to three navigation channels and the turning basin. The Plan will include all navigation channel restrictions or changes throughout construction of the new bridge and demolition of the existing bridge.</p> <p>ODOT and WSDOT will coordinate with the contractor to provide construction schedule and duration information, impacts to VNC and HNC or other issues that may impact river users, as well as means to minimize impacts to navigation (e.g., maintaining an open channel, tug assists, etc.) to the USCG for a Local Notice to Mariners, which USCG will publish to provide information to river users prior to and during construction.</p>
Temporary	Presence of construction barges and equipment in and near the navigation channels	ODOT and WSDOT will coordinate with the contractor to require all construction barges to have active AIS signals, in compliance with 33 CFR § 164.46, and coordinate with NOAA and USACE to update published navigation charts for construction channel lines. (NOAA is required to provide nautical charts per the Coast and Geodetic Survey Act of 1947).
Long-Term	New bridges in a navigable waterway	ODOT and WSDOT will follow USCG requirements for visual aids when constructing the bridges and provide obstruction marking and lighting to make the river crossing structures visible to river traffic. Design roadway or accent lighting on the bridges and surrounding interchanges to limit light or glare that could affect river navigation.

CFR = Code of Federal Regulations; IBR = Interstate Bridge Replacement; NOAA = National Oceanic and Atmospheric Administration; ODOT = Oregon Department of Transportation; USCG = U.S. Coast Guard; WSDOT = Washington State Department of Transportation

Table 3.2-4. Mitigation Measures

Temporary or Long-Term	Impact Type	Mitigation Measure
Temporary	Closures and limited horizontal and vertical clearances to navigation channels and turning basin during construction	<p>ODOT and WSDOT will coordinate with the contractor to make assist tug(s) available to support safe navigation when vertical or horizontal clearances are reduced and assistance is needed to safely navigate the restricted channel, as required.</p> <hr/> <p>ODOT and WSDOT will work with the USACE and the USCG to coordinate navigation channel restrictions and closures during construction with dam lock closures. Consider seasonal factors, such as the spring freshet (high-water, high velocity conditions) and annual agricultural harvests (transport of high freight volume), to the extent feasible.</p> <hr/> <p>ODOT and WSDOT will coordinate with USACE to enable passage of the Interstate Bridge by dredge(s) during construction to support upstream dredging missions.</p>
Temporary	Navigation community would need to be aware of waterway restrictions and construction activities	ODOT and WSDOT will conduct outreach to inform the navigation community, recreational boaters, and other river users of waterway restrictions and other construction activities that may restrict or otherwise change local navigation conditions via a variety of platforms, including local maritime publications.
Long-Term	Vertical and horizontal navigation clearance for each navigation channel would change with the new Columbia River bridges	ODOT and WSDOT will coordinate with the USCG and USACE to update navigation charts and other navigation publications to reflect changes to vertical and horizontal navigation clearance for future river users.

ODOT = Oregon Department of Transportation; USACE = U.S. Army Corps of Engineers; USCG = U.S. Coast Guard; WSDOT = Washington State Department of Transportation