2. DESCRIPTION OF ALTERNATIVES

2.1 Introduction

Chapter Contents

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

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

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

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

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

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

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

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

Source: CRC 2008

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

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

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

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

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

Figure 2-1. IBR Program Location Overview

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

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

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

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

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

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

2.2 Components of the Modified LPA

The basic components of the Modified LPA include:

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

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

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

Figure 2-2. Modified LPA Components

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

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

Figure 2-3. Modified LPA – Geographic Subareas

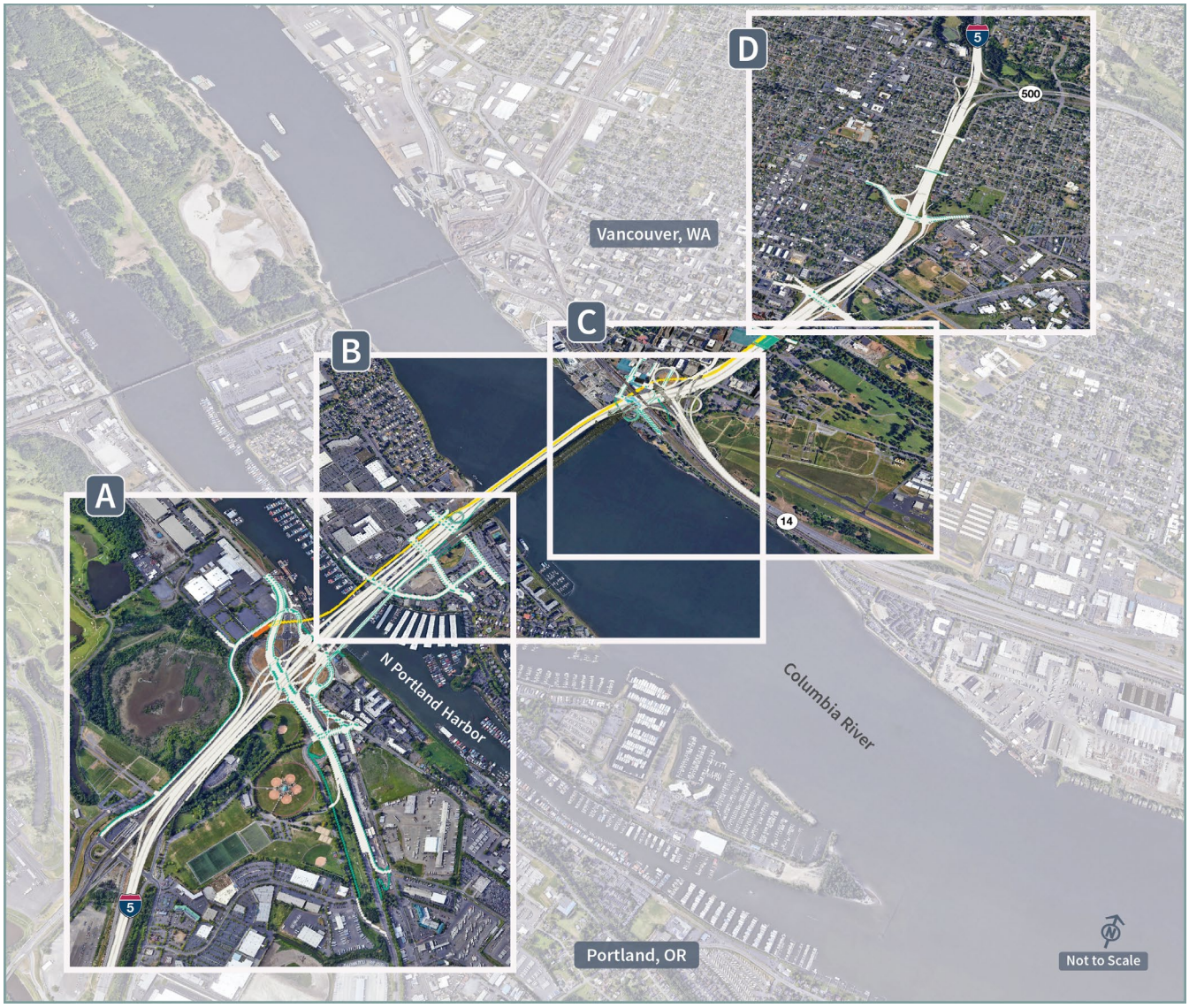


Table 2-2. Modified LPA and Design Options

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

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

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

2.2.1 Interstate 5 Mainline

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

What's changed with IBR?

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

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

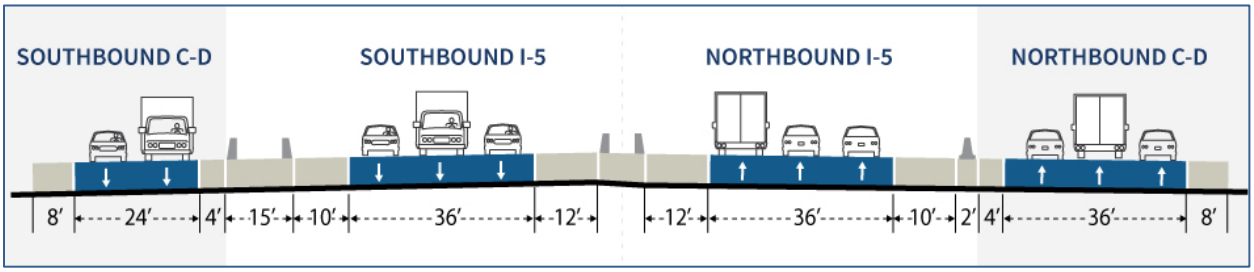
Figure 2-4 shows a cross section of the collector-distributor (C-D)[4] roadways, Figure 2-5 shows the location of the C-D roadways, and Figure 2-6 shows the proposed auxiliary lane layout. The existing Interstate Bridge over the Columbia River does not have an auxiliary lane; the Modified LPA would add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

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

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

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

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



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

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

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

Two Auxiliary Lane Design Option

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

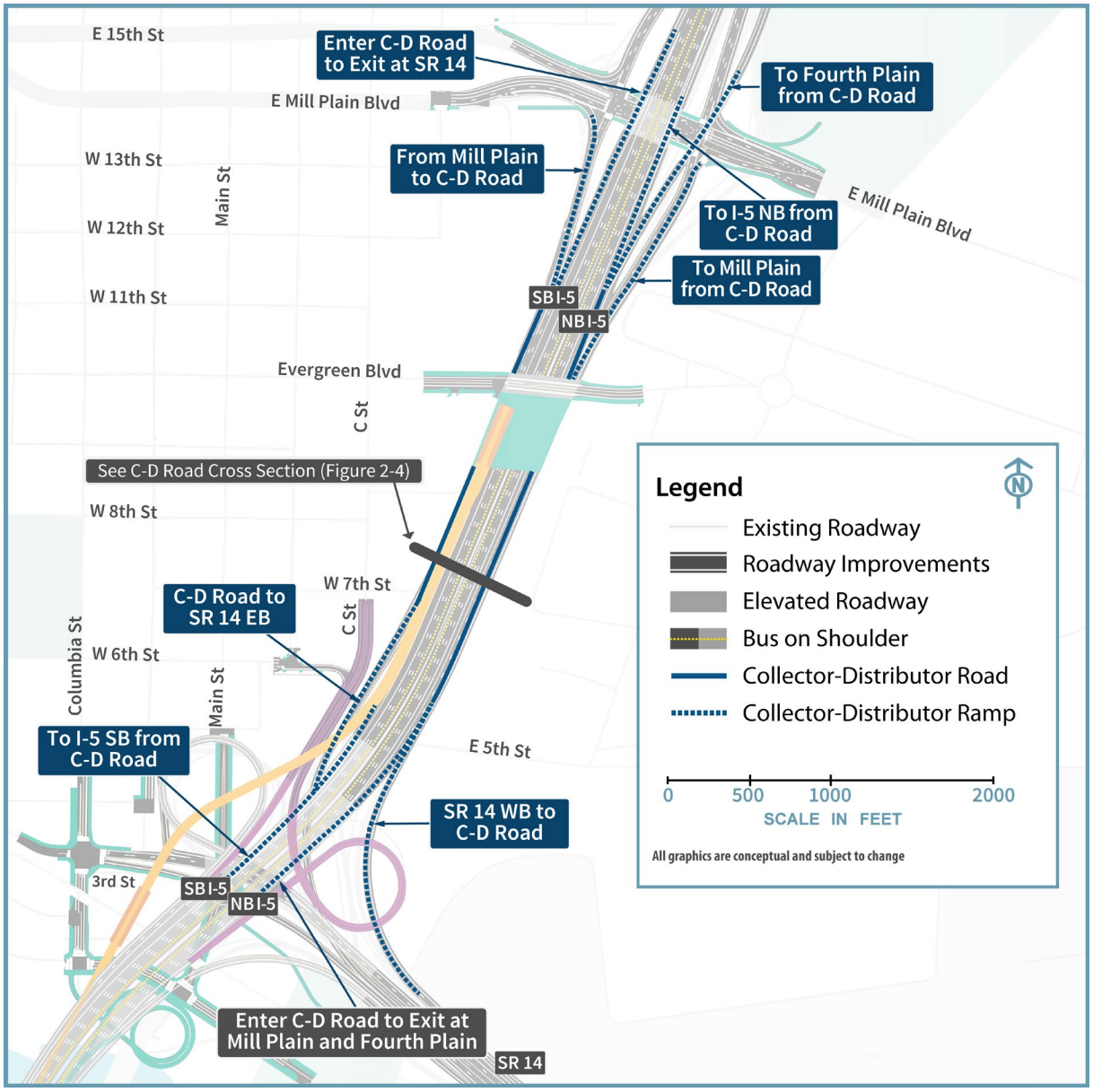
On I-5 northbound, one auxiliary lane would begin at the combined on-ramp from Interstate Avenue and Victory Boulevard, and a second auxiliary lane would begin at the on-ramp from Marine Drive. Both auxiliary lanes would continue across the northbound Columbia River bridge, and the on-ramp from Hayden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

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

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

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

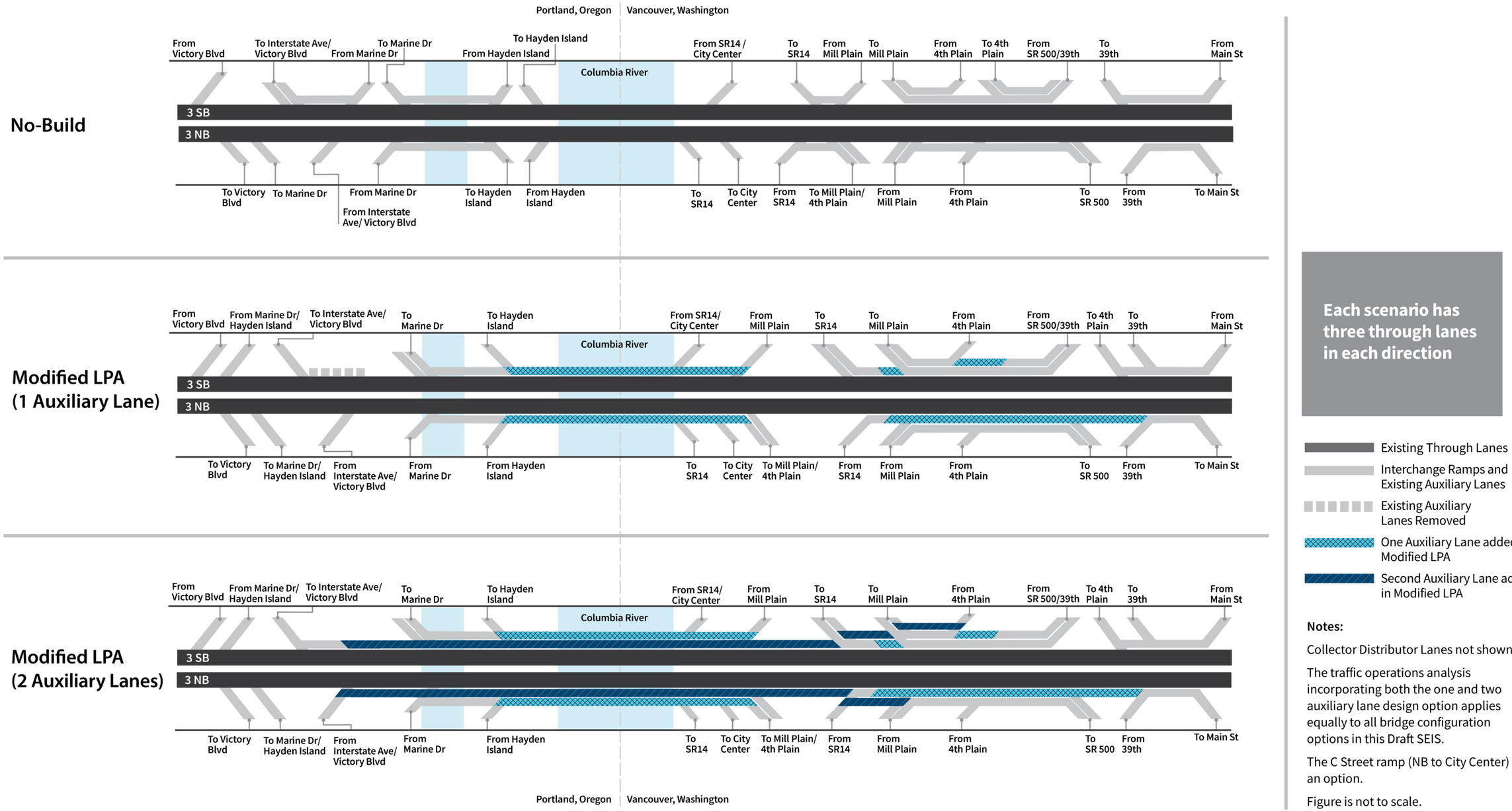
Figure 2-5. Collector-Distributor Roadways



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

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

Figure 2-6. Comparison of Auxiliary Lane Configurations



Each scenario has three through lanes in each direction

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

Notes:

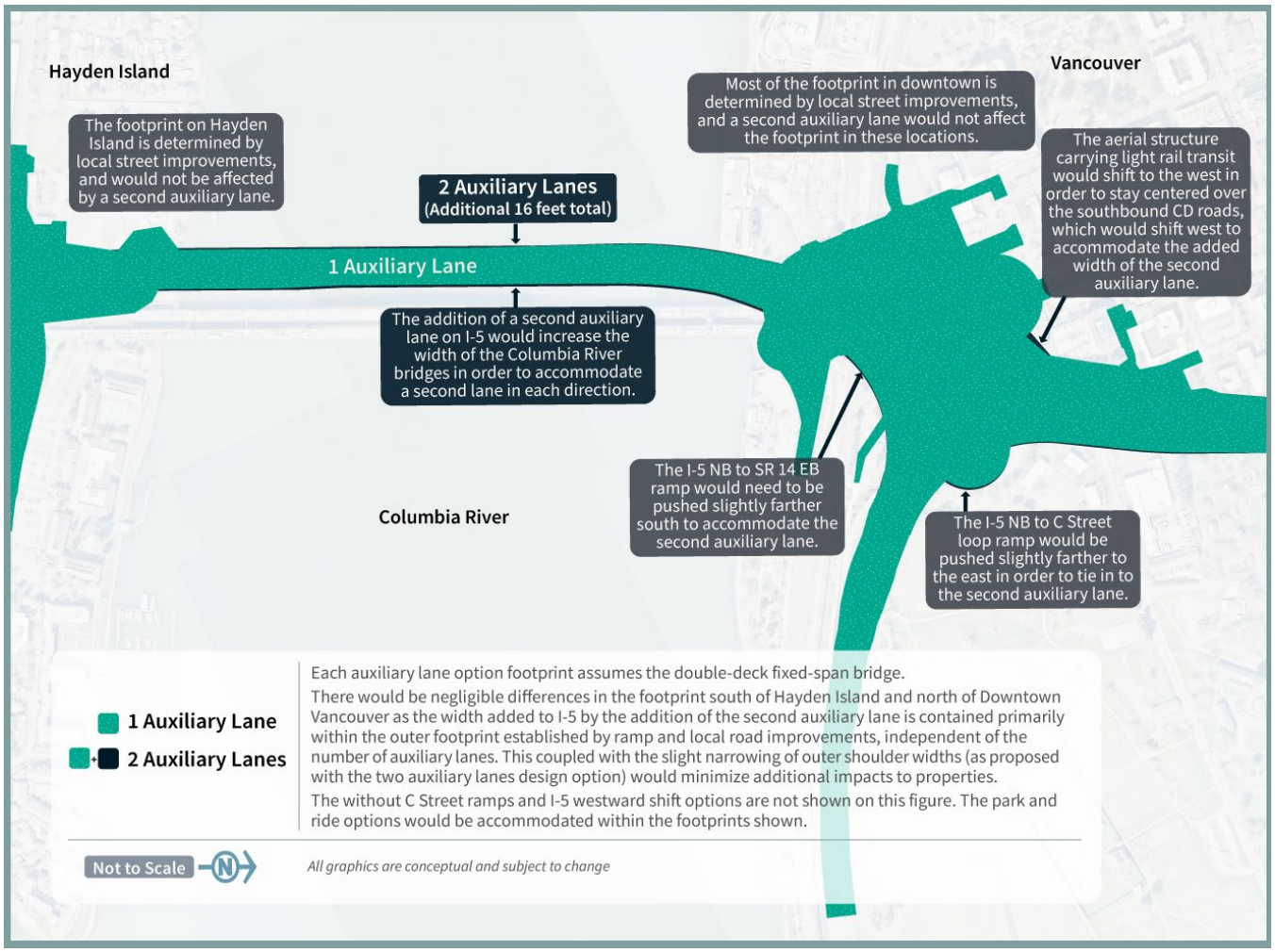
Collector Distributor Lanes not shown.

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

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

Figure is not to scale.

Figure 2-7. Auxiliary Lane Configuration Footprint Differences



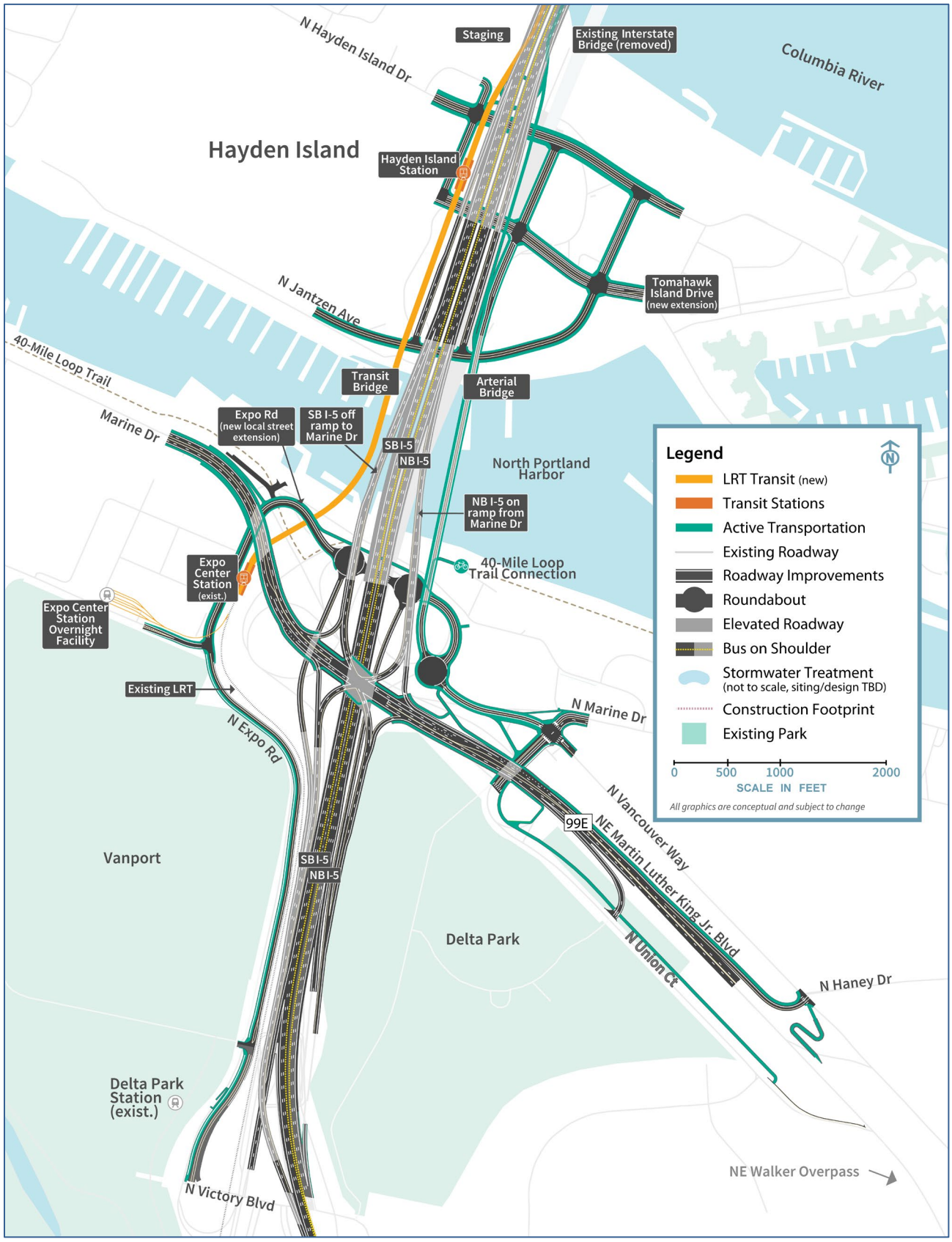
2.2.2 Portland Mainland and Hayden Island (Subarea A)

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

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

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

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



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

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

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

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

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

What's changed with IBR?

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

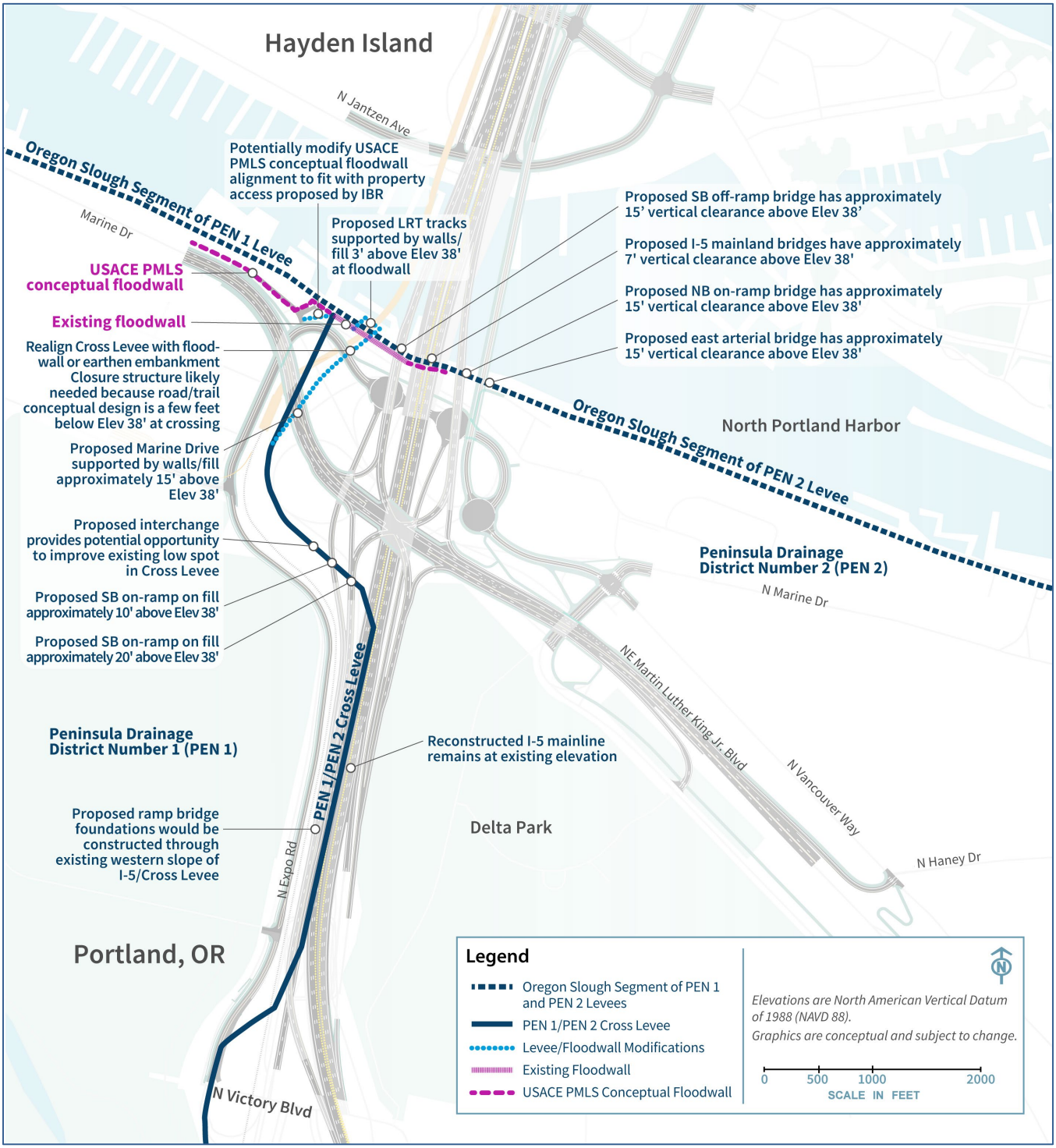
The IBR Program is in close coordination with these concurrent efforts to ensure that the IBR Program's design efforts consider the timing and scope of the PMLS and the FSCR proposed modifications. The intersection of the IBR Program proposed actions to both the existing levee configuration and the anticipated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

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

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

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

Figure 2-9. Levee Systems in Subarea A



Highways, Interchanges, and Local Roadways

Victory Boulevard/Interstate Avenue Interchange Area

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

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

What's changed with IBR?

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

Marine Drive Interchange Area

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

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

What's changed with IBR?

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

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

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

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

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

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

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

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

North Portland Harbor Bridges

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

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

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

What's changed with IBR?

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

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

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

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

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

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

Hayden Island Interchange Area

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

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

What's changed with IBR?

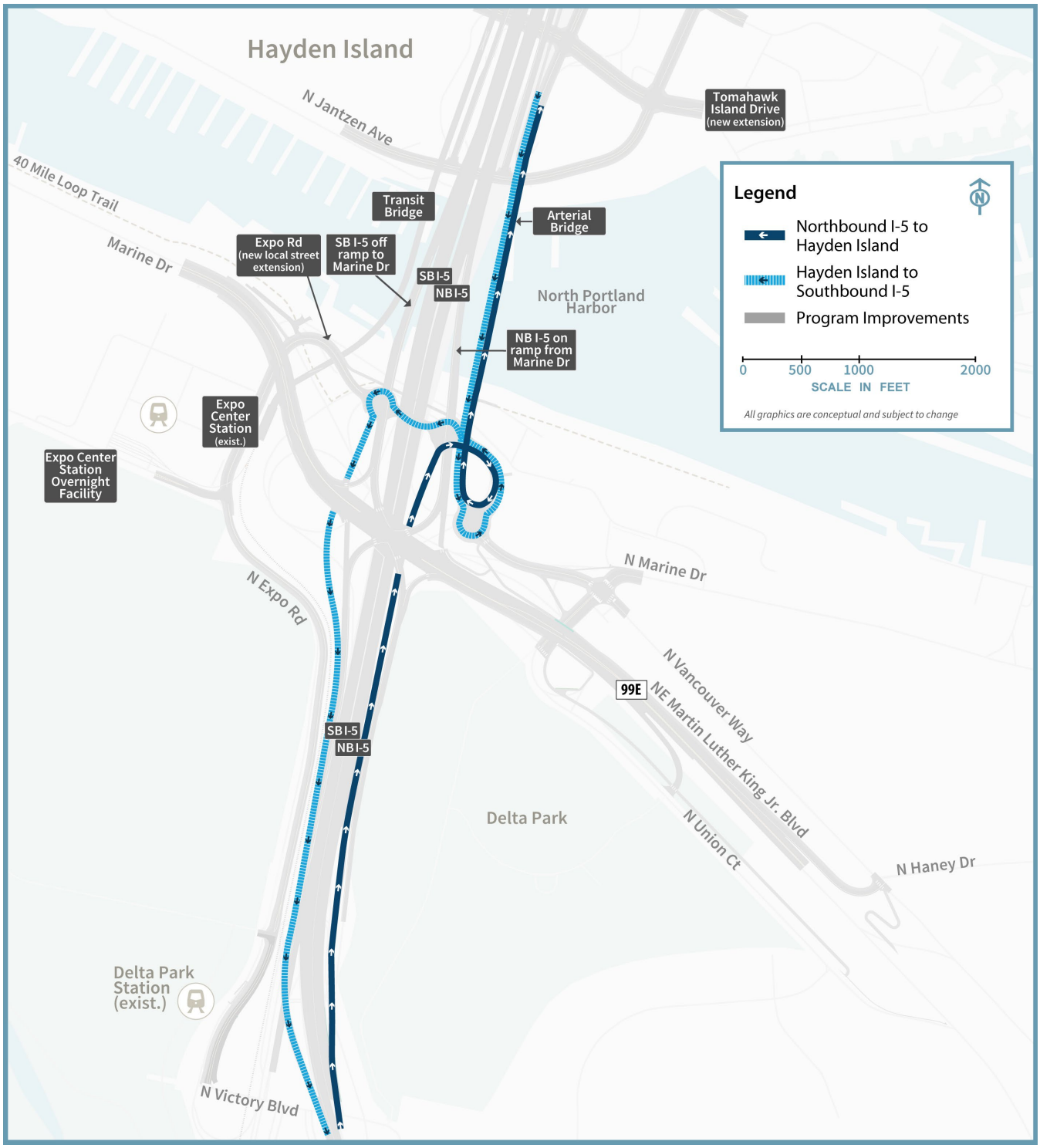
In response to local agency policies and community priorities, the IBR Program identified design modifications that could reduce the footprint (and associated impacts) on Hayden Island. Section 2.5.3, IBR Design Option Development and Screening, describes the screening process used to select design modifications.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

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

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

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

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



NB = northbound; SB = southbound

Transit

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

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

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

Active Transportation

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

What's changed with IBR?

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

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

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

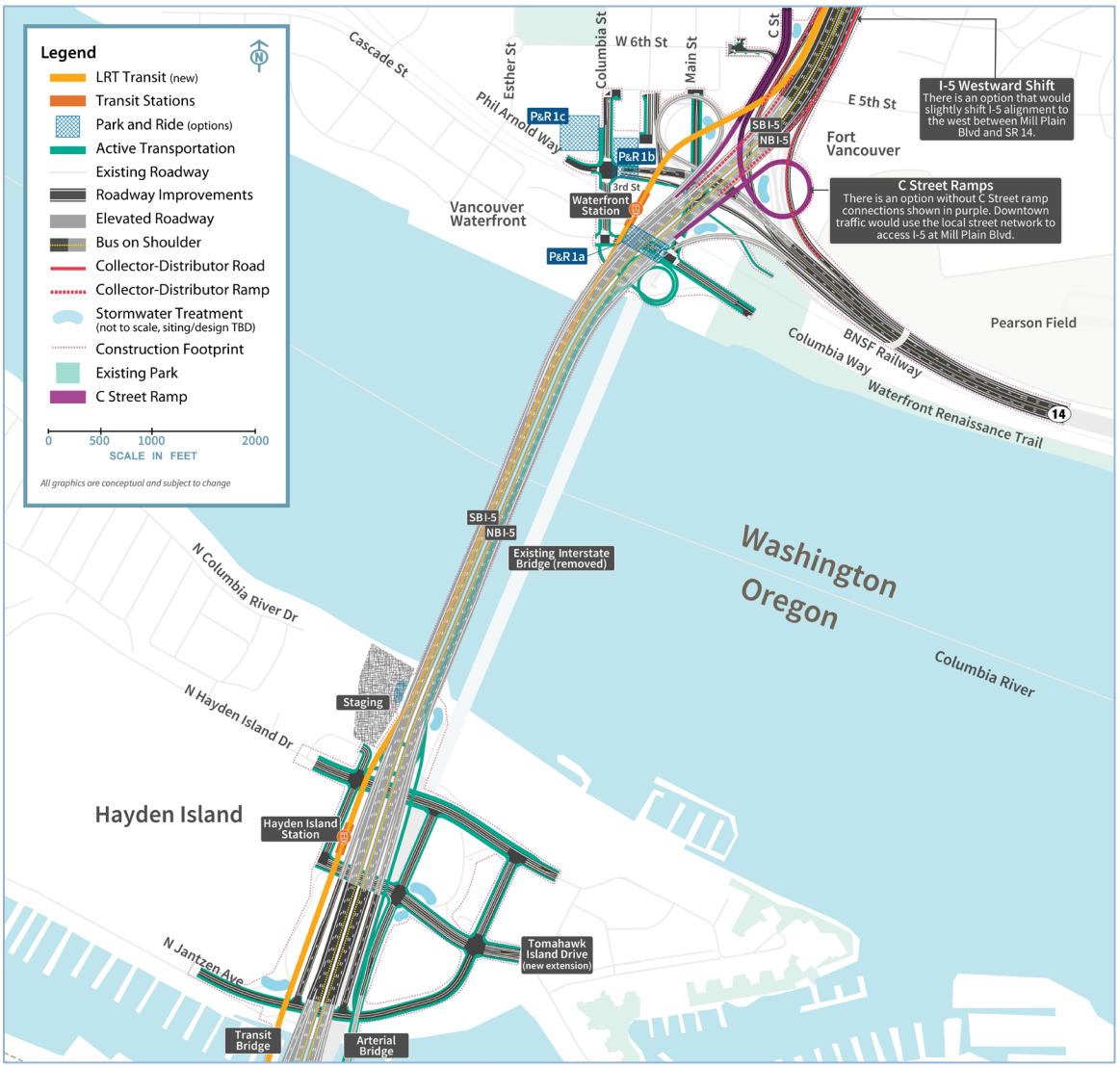
Island. The shared-use facilities on Martin Luther King Jr. Boulevard would provide westbound and eastbound cyclists and pedestrians with off-street crossings of the interchange and would also provide connections to both the Expo Center MAX Station and the 40-Mile Loop Trail to the west.

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

2.2.3 Columbia River Bridges (Subarea B)

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

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



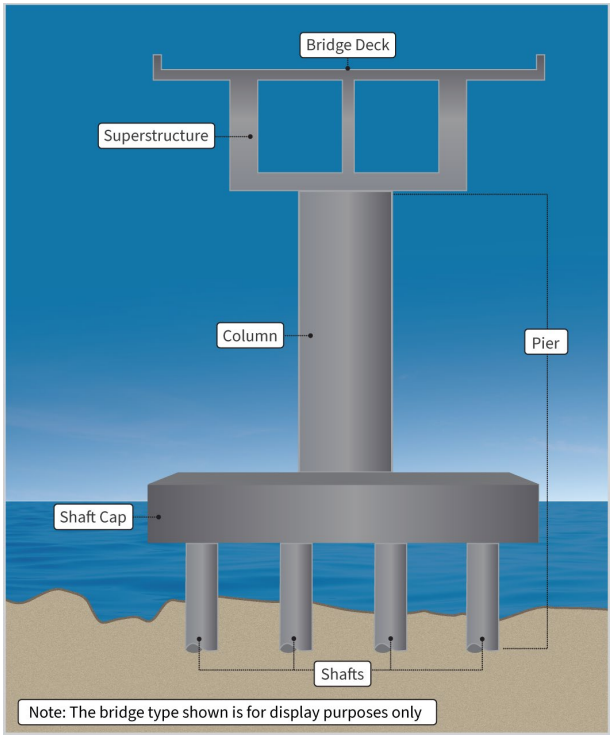
Highways, Interchanges, and Local Roadways

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

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

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

Figure 2-12. Bridge Foundation Concept



Bridge Configurations

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

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

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

What's changed with IBR?

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

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

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

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

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

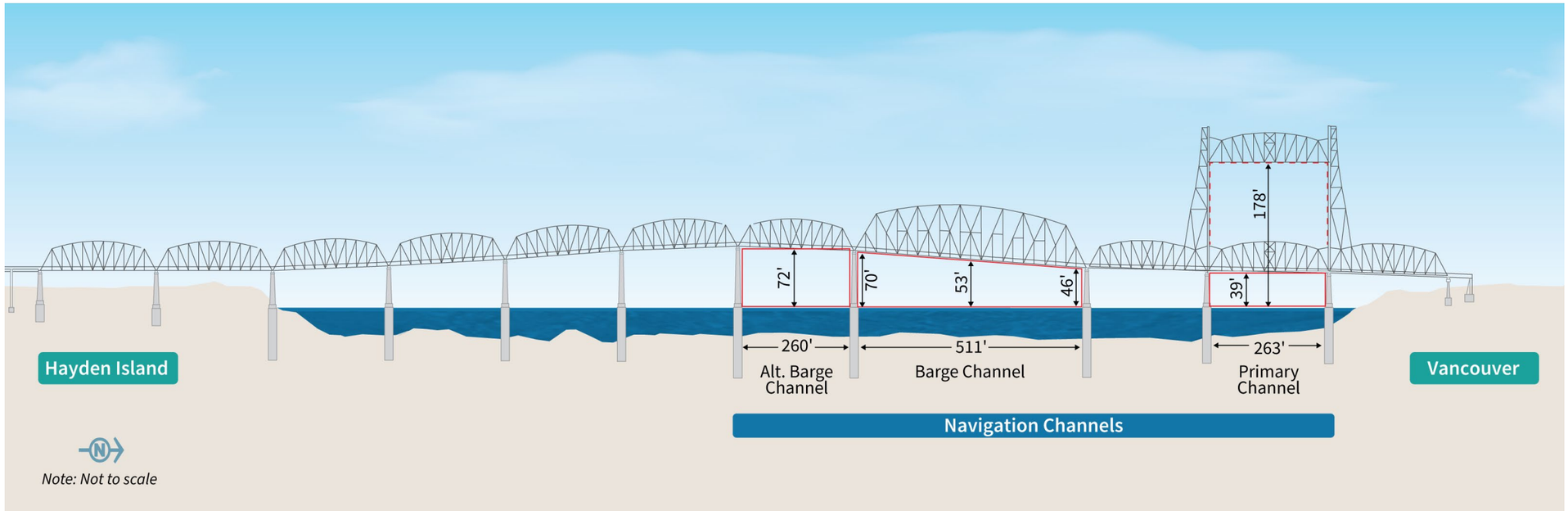
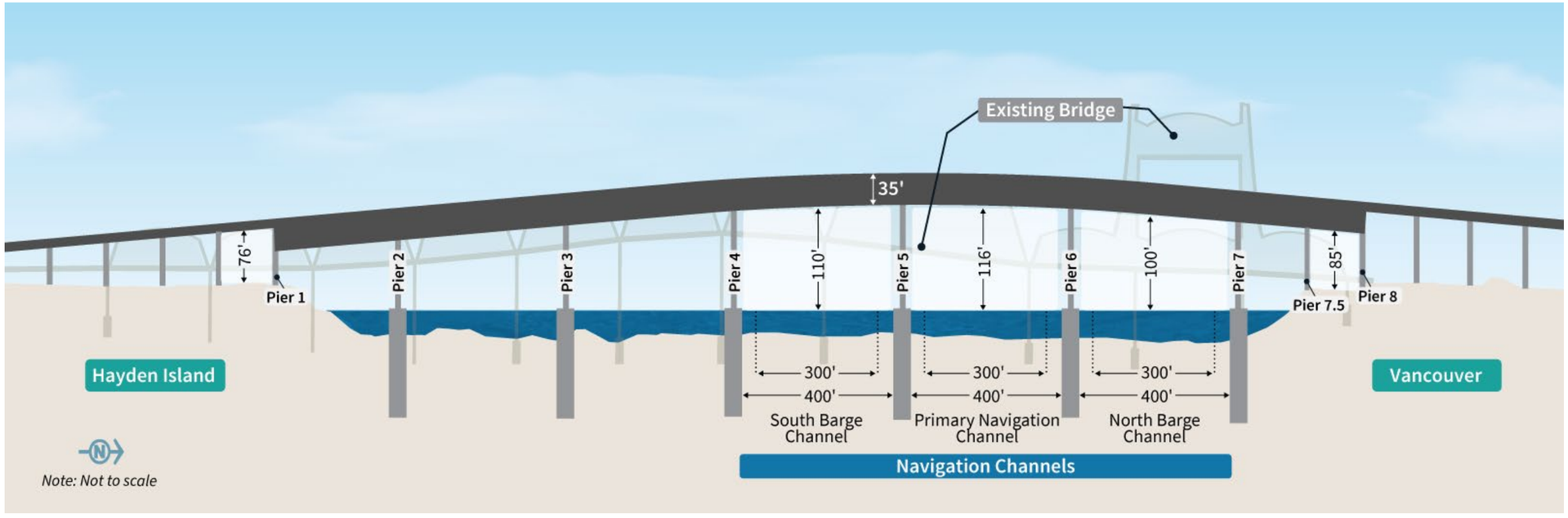


Figure 2-14. Profile and Navigation Clearances of the Proposed Modified LPA Columbia River Bridges with a Double-Deck Fixed-Span Configuration



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

Double-Deck Fixed-Span Configuration

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

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

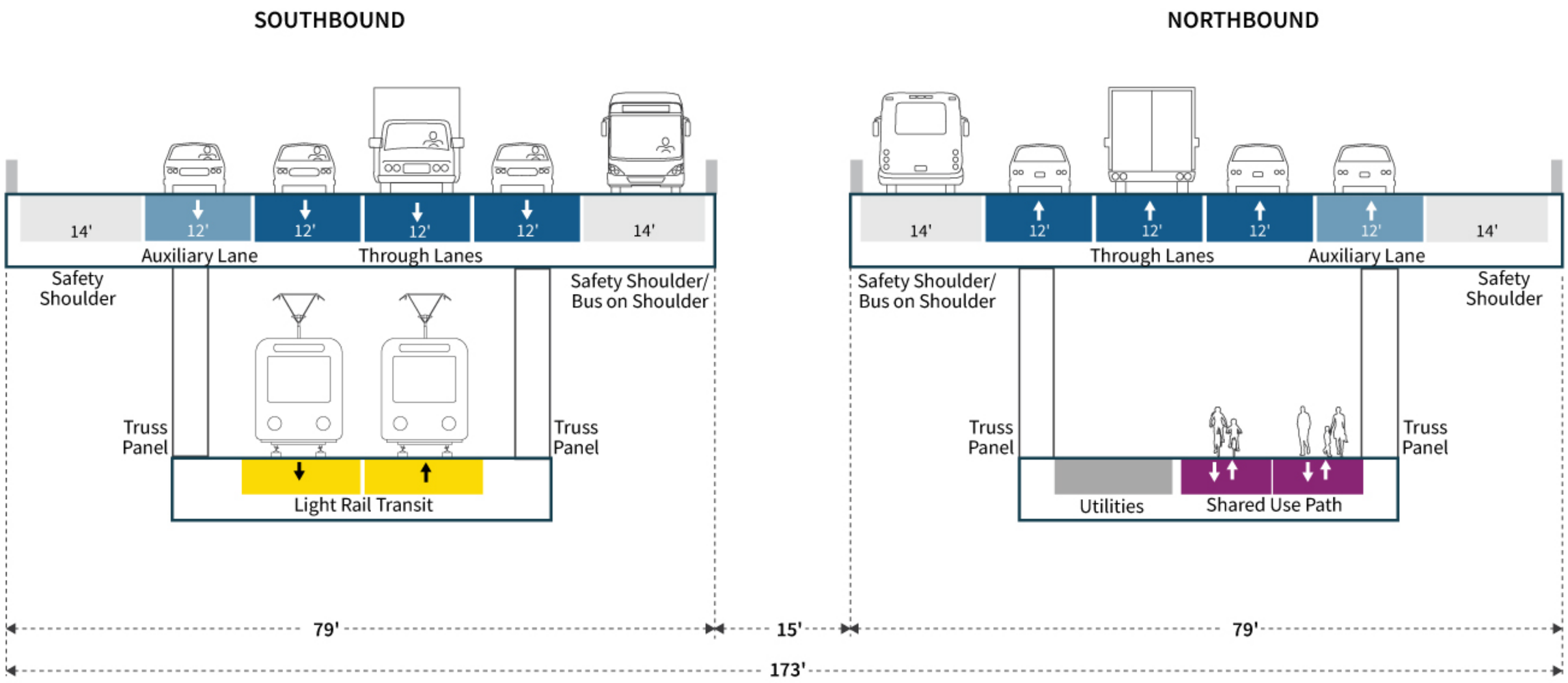
Figure 2-15. Conceptual Drawing of a Double-Deck Fixed-Span Configuration

Note: Visualization is looking southwest from Vancouver.

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

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

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



Single-Level Fixed-Span Configuration

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

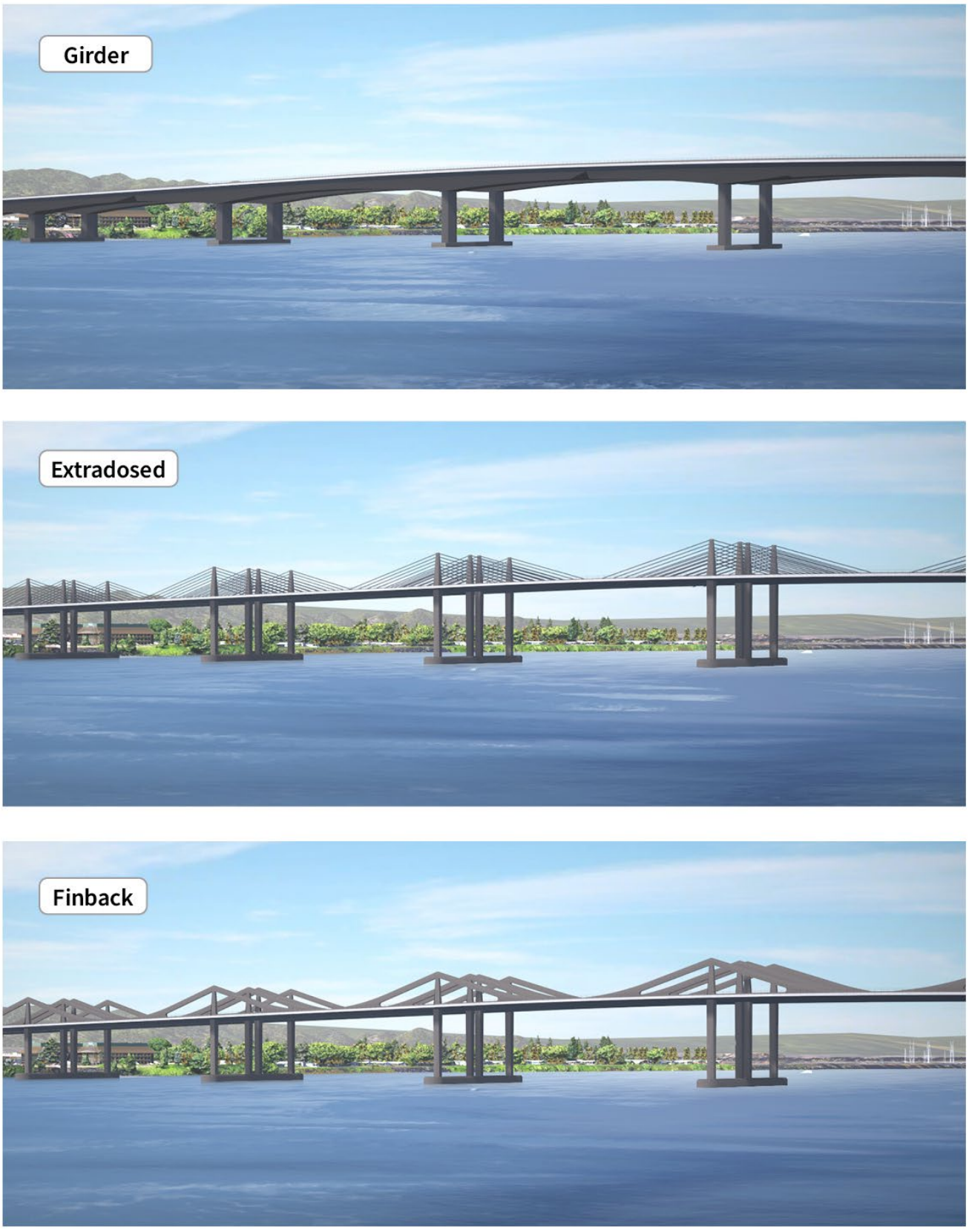
This configuration would provide 116 feet of vertical navigation clearance for river traffic using the primary navigation channel and 400 feet of horizontal navigation clearance at the primary navigation channel, as well as barge channels. This bridge height would not impede takeoffs and landings by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

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

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

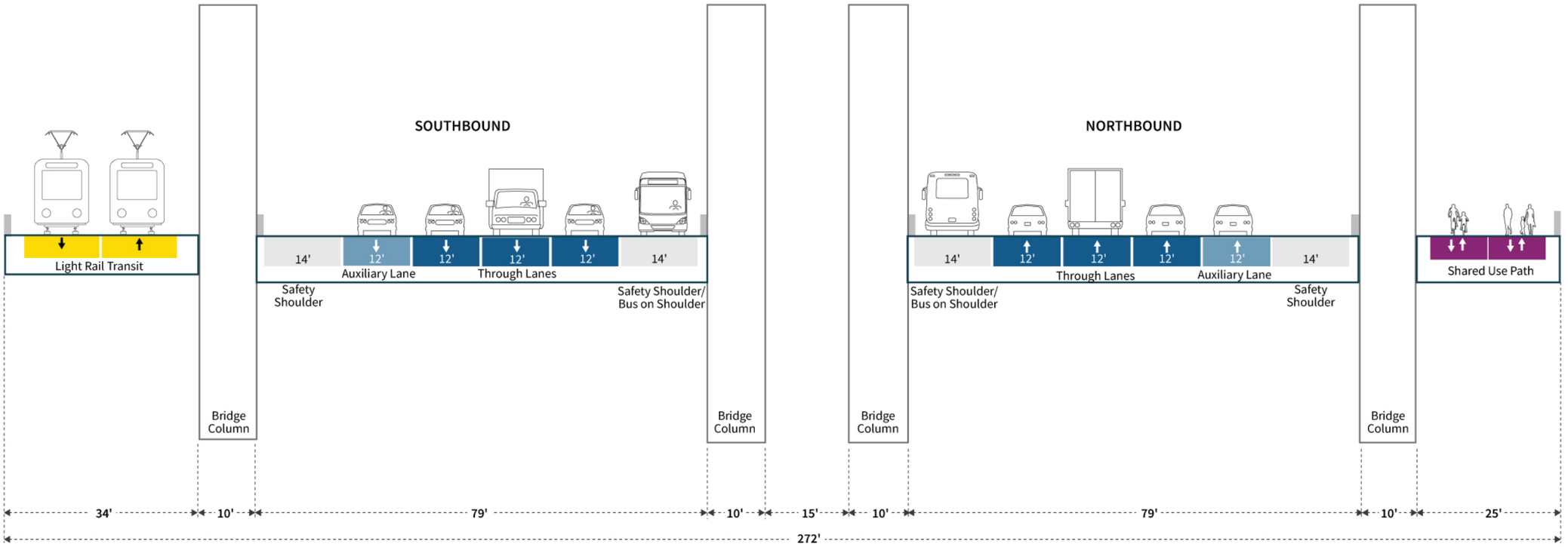
This bridge configuration would have a 3% maximum grade on both the Oregon and Washington sides of the bridge.

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



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

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



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

Single-Level Movable-Span Configuration

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

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

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

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

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

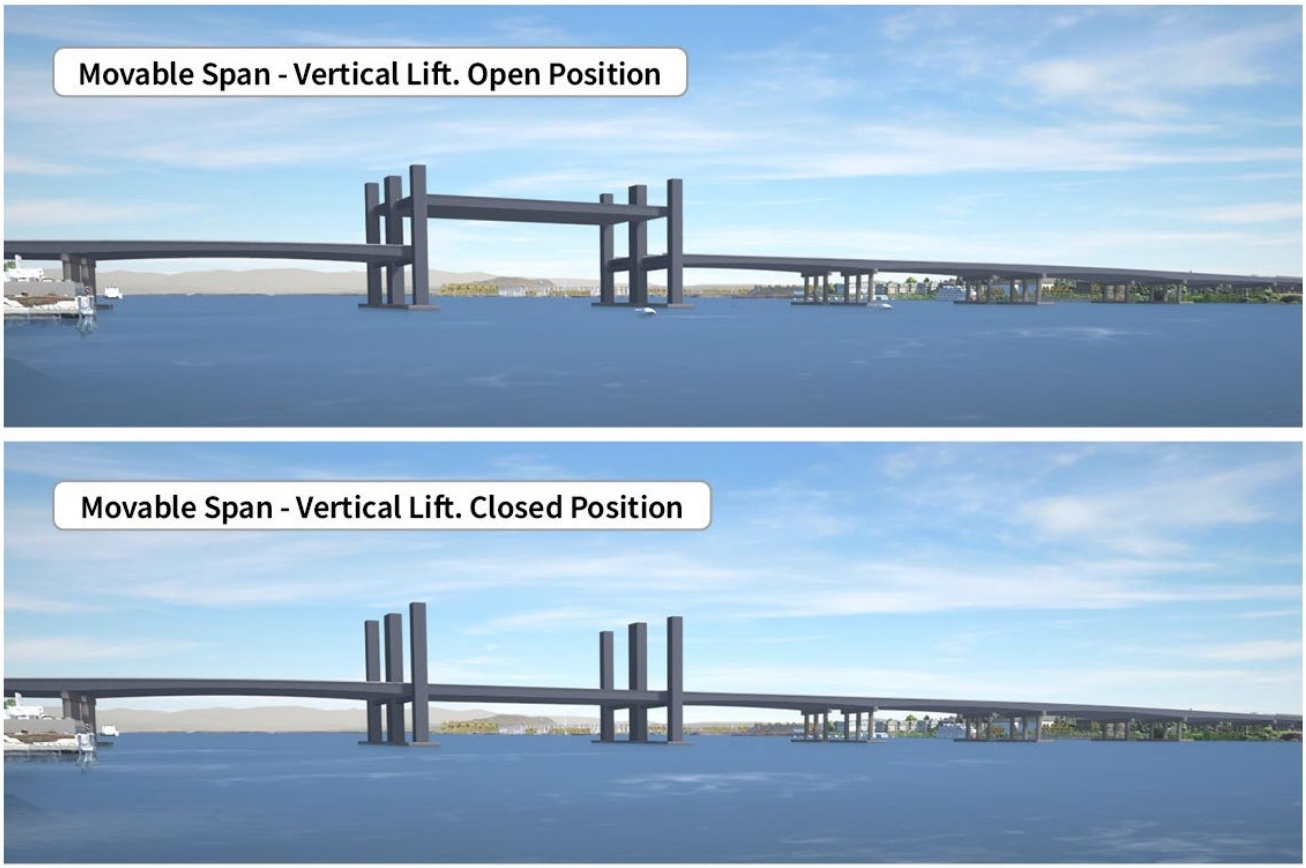
The vertical lift-span towers would be approximately 243 feet high; this is shorter than the existing lift-span towers, which are 247 feet high. This height of the vertical lift-span towers would not impede takeoffs and landings by aircraft using Portland International Airport. At Pearson Field, the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

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

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

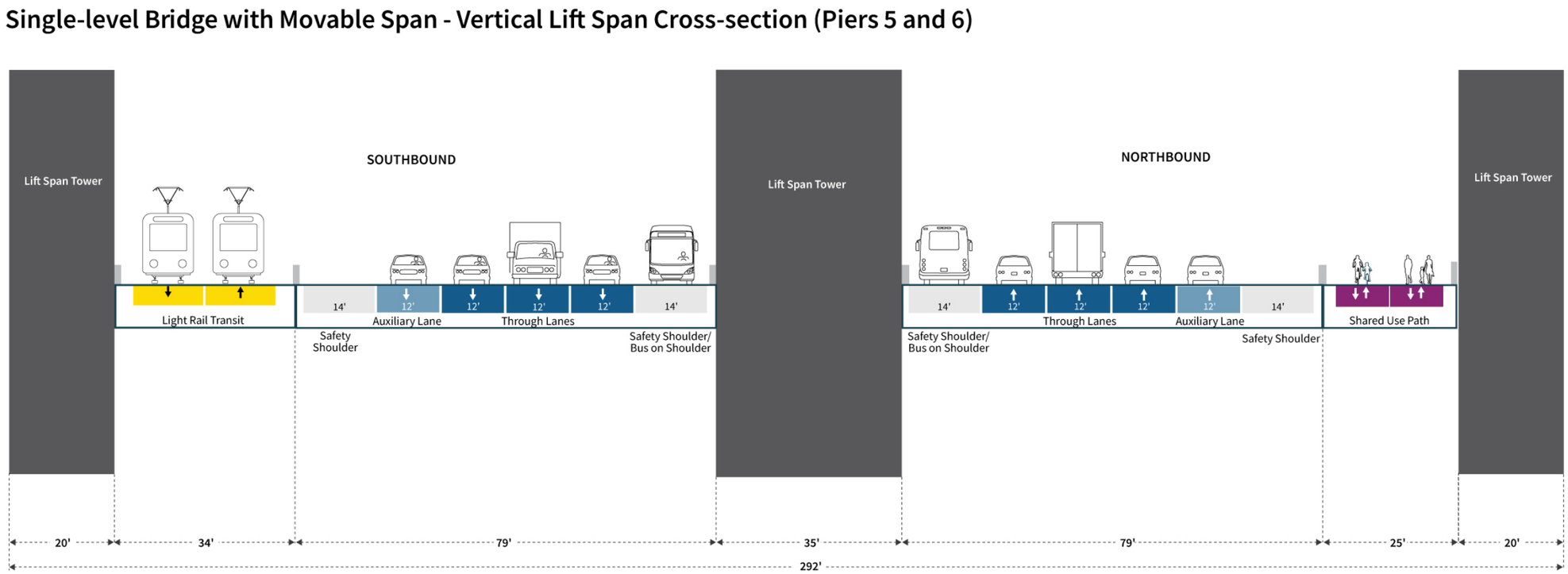
This single-level movable-span configuration would have a 3% maximum grade on the Oregon side of the bridge and a 1.5% maximum grade on the Washington side.

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



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

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



Summary of Bridge Configurations

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

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

Figure 2-21. Bridge Configuration Footprint Comparison

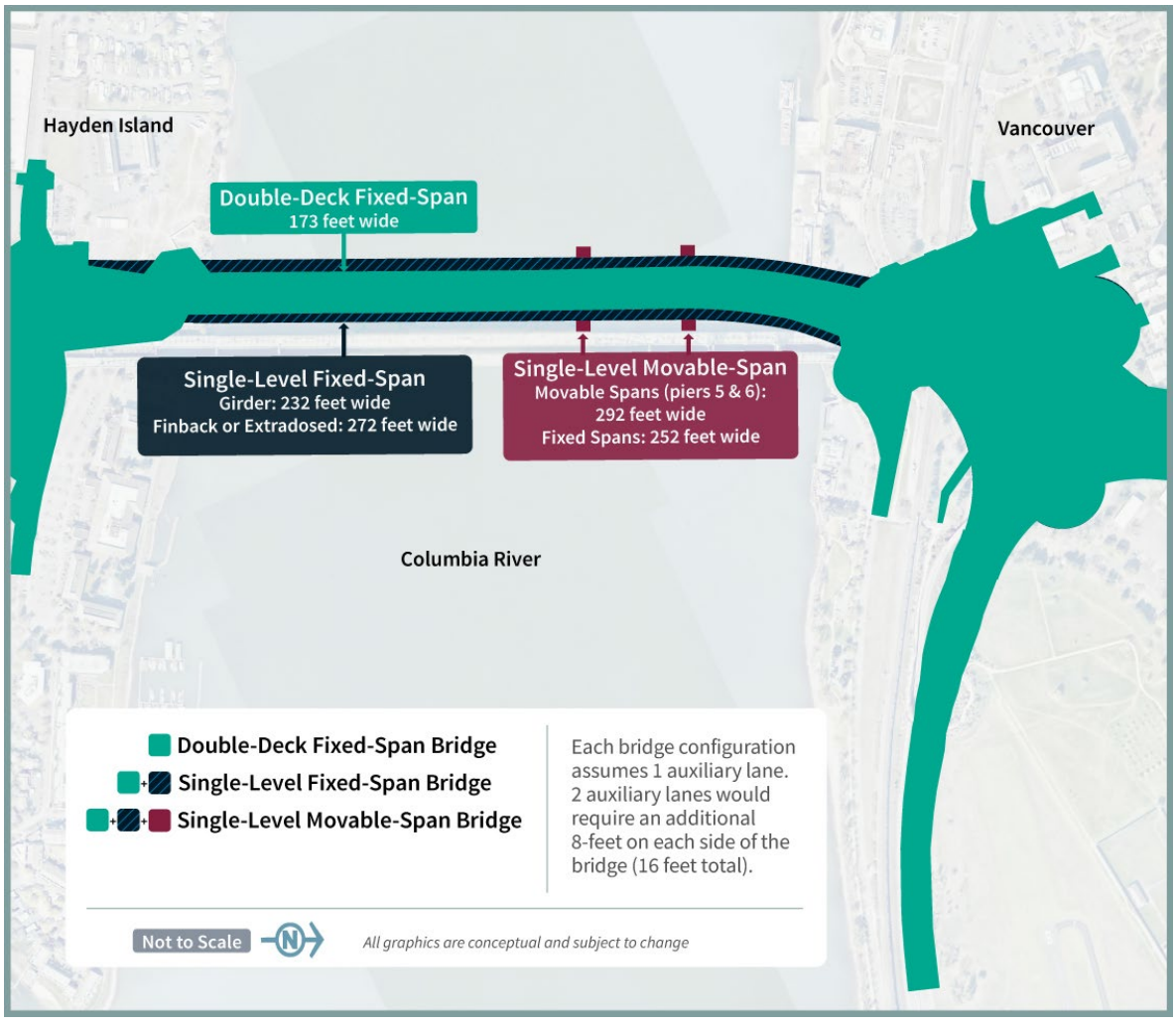
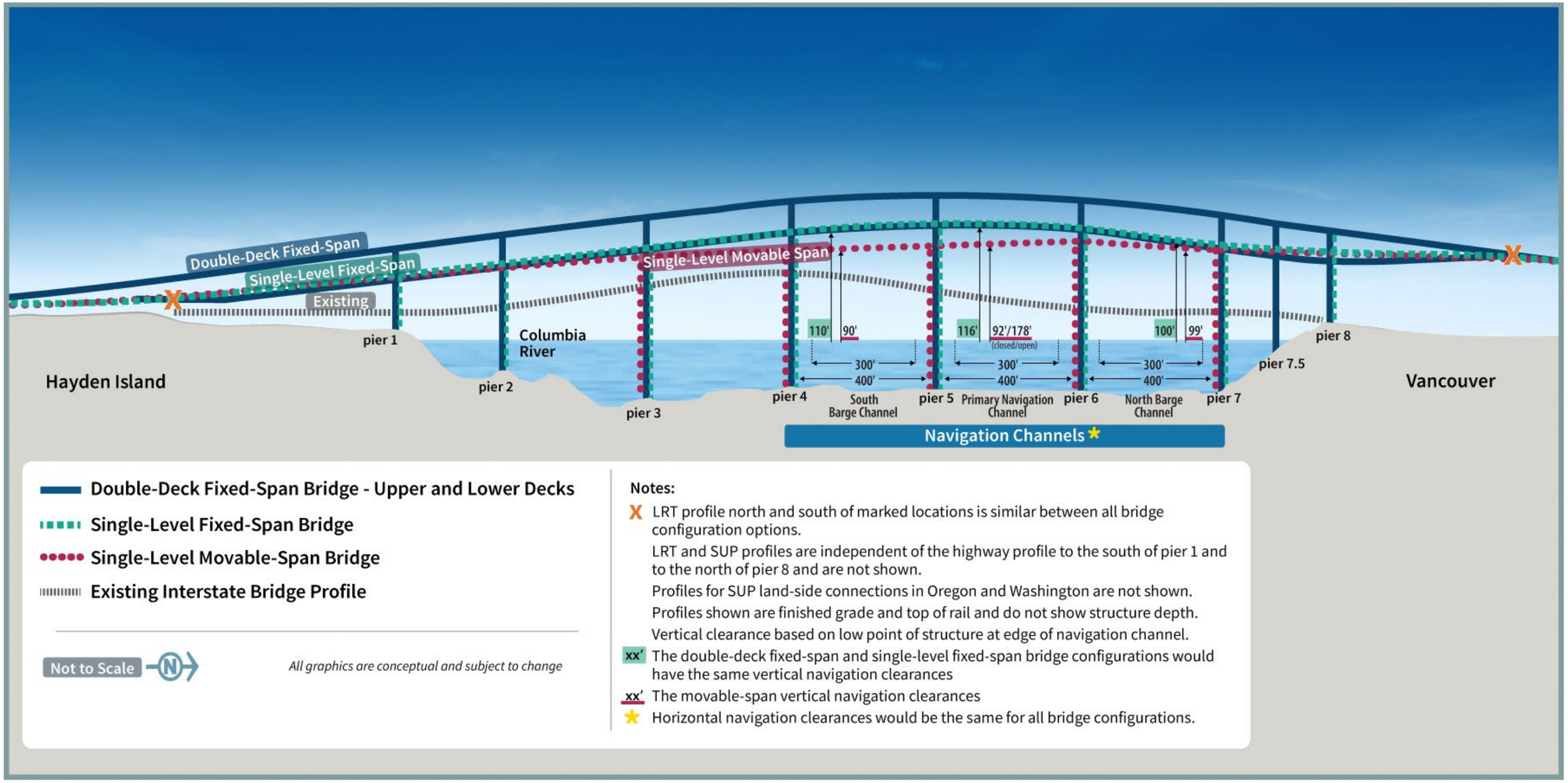


Figure 2-22. Bridge Configuration Profile Comparison



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

Table 2-3. Summary of Bridge Configurations

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

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

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

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

2.2.4 Downtown Vancouver (Subarea C)

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

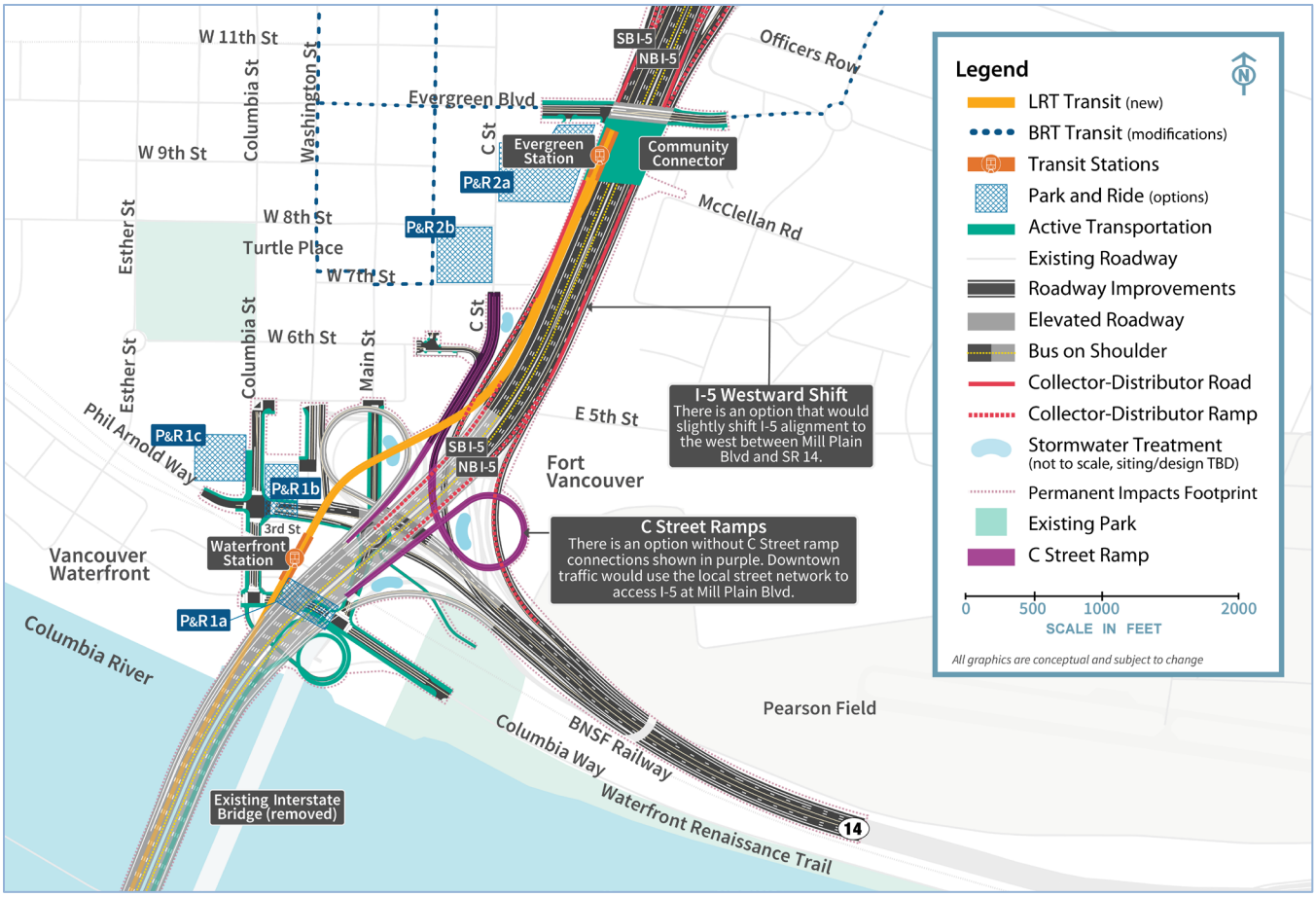
Highways, Interchanges, and Local Roadways

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

SR 14 Interchange

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

Figure 2-23. Downtown Vancouver (Subarea C)



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

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

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

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

Design Option Without C Street Ramps

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

What's changed with IBR?

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

Design Option to Shift I-5 Westward

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

Transit

Light-Rail Alignment and Stations

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

What's changed with IBR?

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

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

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

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

Park and Rides

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

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

Waterfront Station Park-and-Ride Options

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

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

Evergreen Station Park-and-Ride Options

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

What's changed with IBR?

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

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

Active Transportation

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

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

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

2.2.5 Upper Vancouver (Subarea D)

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

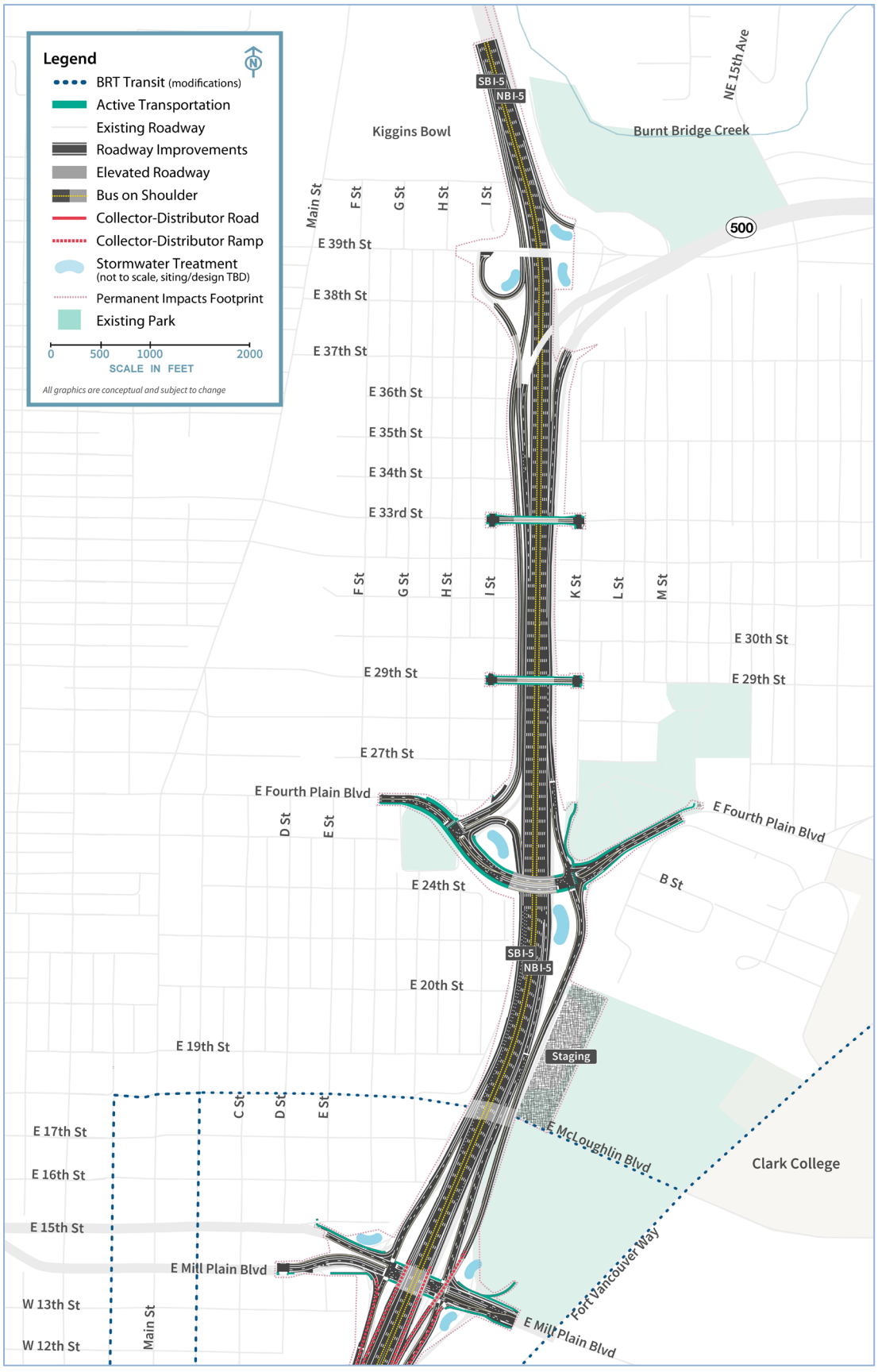
Highways, Interchanges, and Local Roadways

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

Mill Plain Boulevard Interchange

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

Figure 2-24. Upper Vancouver (Subarea D)



BRT = bus rapid transit; TBD = to be determined

Fourth Plain Boulevard Interchange

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

SR 500 Interchange

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

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

Transit

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

What's changed with IBR?

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

Active Transportation

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

What's changed with IBR?

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

2.2.6 Transit Support Facilities

Ruby Junction Maintenance Facility Expansion

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

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

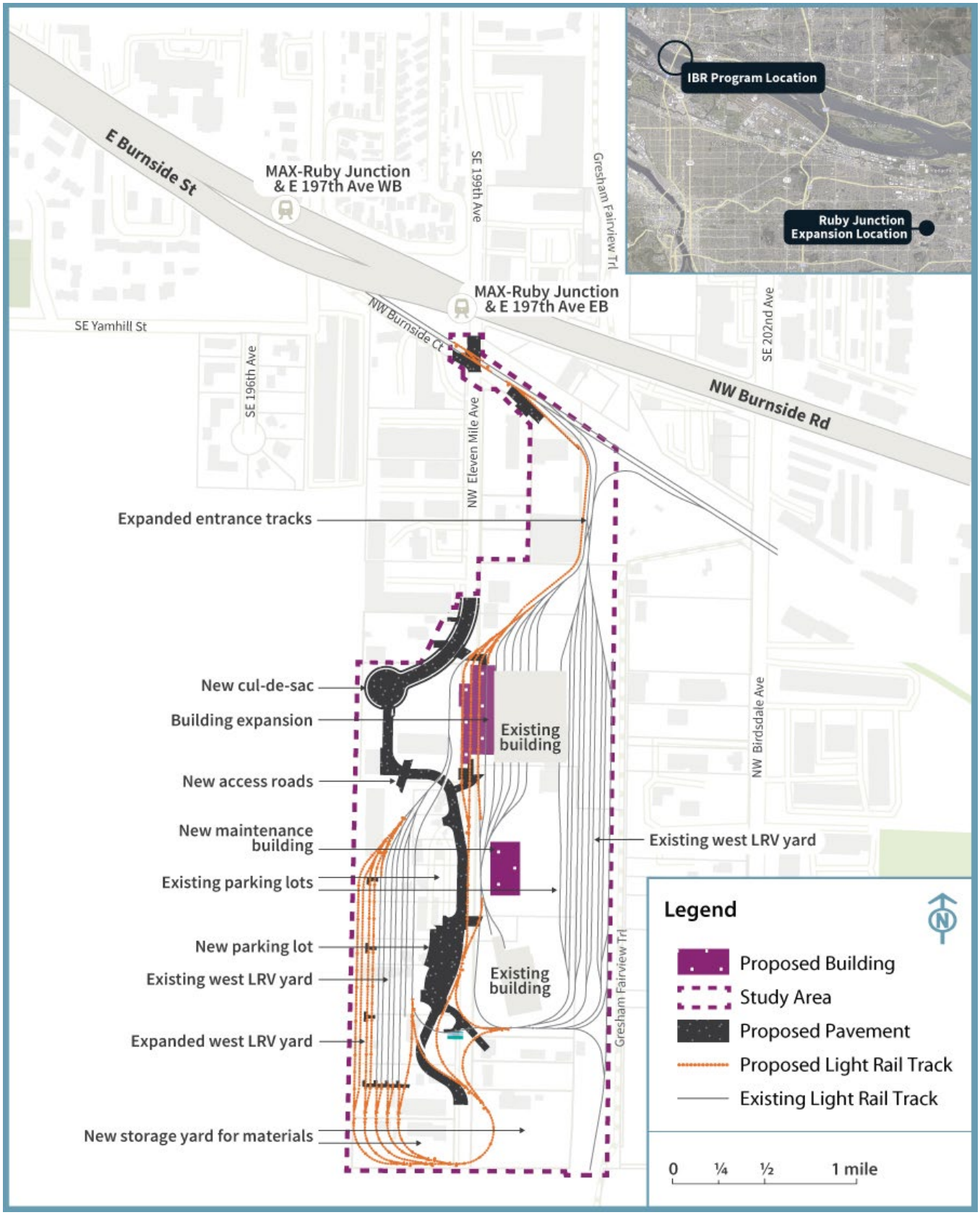
What's changed with IBR?

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

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

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

Figure 2-25. Ruby Junction Maintenance Facility Study Area



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

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

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

Expo Center Overnight LRV Facility

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

What's changed with IBR?

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

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

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

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

2.2.7 Transit Operating Characteristics

LRT Operations

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

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

Express Bus Service and Bus on Shoulder

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

What's changed with IBR?

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

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

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

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

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

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

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

Local Bus Route Changes

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

What's changed with IBR?

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

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

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

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

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

2.2.8 Tolling

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

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

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

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

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

2.2.9 Transportation System- and Demand-Management Measures

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

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

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

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

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

State Laws to Reduce Commute Trips

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

2.3 Modified LPA Construction

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

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

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

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

2.3.1 Construction Components and Duration

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

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

Table 2-5. Construction Activities and Estimated Duration

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

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

2.3.2 Potential Staging Sites and Casting Yards

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

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

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

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

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

2.4 No-Build Alternative

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

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

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

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

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

2.5 Development of the Modified LPA

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

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

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

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

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

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

2.5.2 Updating the CRC LPA

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

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

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

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

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

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

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

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

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

IBR Program Modifications

9 Park and Rides

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

8 Light Rail Transit

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

7 Downtown Vancouver

Modifies access to/from SR 14

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

6 Columbia River Bridges

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

5 Hayden Island Interchange

Modifies full interchange to half-diamond interchange

Minor modifications to local road configuration

4 North Portland Harbor I-5 Bridge

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

3 Expo Center Overnight Facility

Adds overnight maintenance facility for TriMet light rail vehicles

2 Marine Drive Interchange

Modifies interchange access

1 Victory Boulevard Interchange

Minor modifications to access

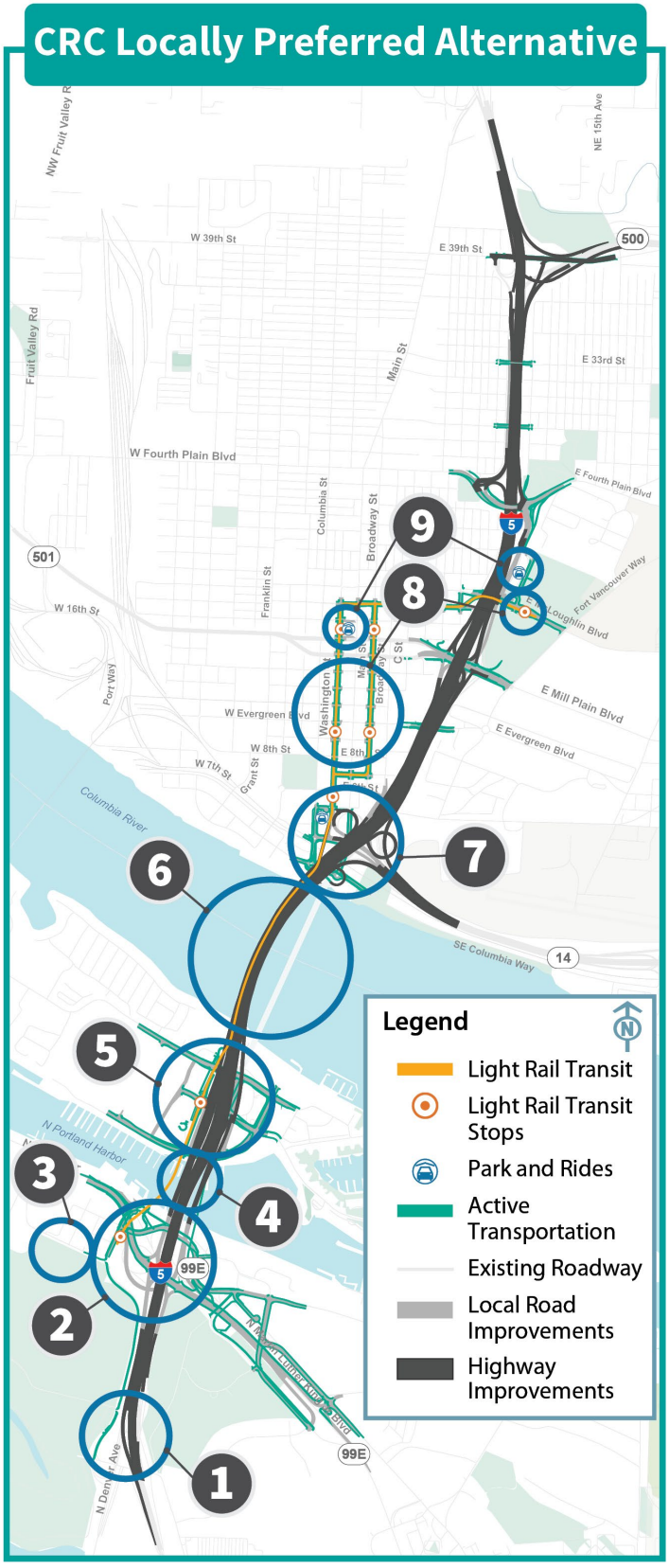
Active Transportation

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

Auxiliary Lanes

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

CRC Locally Preferred Alternative



Changes in Conditions since 2013

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

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

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

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

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

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

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

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

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

Columbia River Bridges

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

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

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

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

I-5 Highway

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

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

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

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

North Portland Harbor Bridge

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

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

Active Transportation

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

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

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

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

Transit

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

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

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

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

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

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

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

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

Transportation Demand and System Management Measure

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

2.5.3 IBR Design Option Development and Screening

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

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

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

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

Hayden Island and Marine Drive

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

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

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

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

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

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

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

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

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

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

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

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

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

Main River Crossing

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Transit – Mode, General Alignment, and Termini

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

- Transit system and service
- Vancouver land use

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

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

Table 2-9. Representative Transit Investment Descriptions

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

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

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

Mode

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

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

Table 2-10. Summary of Transit Mode Evaluation

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

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

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

Alignment

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

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

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

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

Terminus

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

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

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

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

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

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

Auxiliary Lanes

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

- Climate change
- Portland's transportation hierarchy

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

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

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

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

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

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

2.5.4 Adopting Foundational Components of the Modified LPA

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

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

2.6 Additional Compliance Underway

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

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

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

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

Table 2-12. Navigation Considerations

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

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

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

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

2.7 Anticipated Permits and Approvals

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

Table 2-13. Anticipated Permits and Approvals

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

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

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

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