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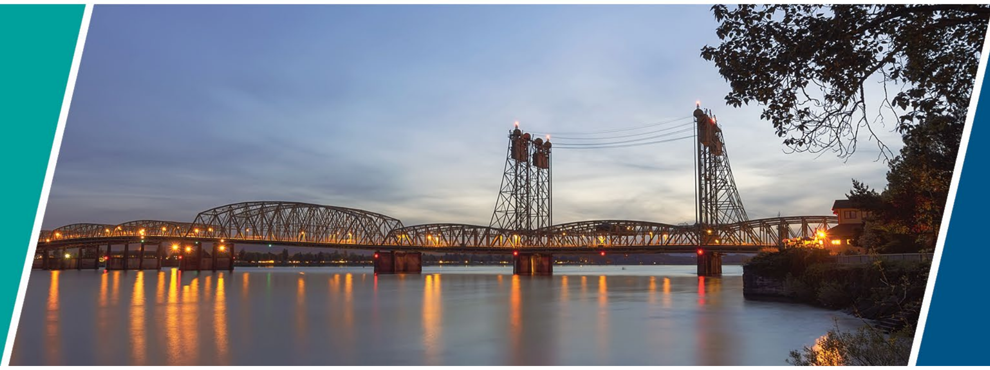

Utilities Technical Report

September 2024

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Utilities Technical Report

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ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition
BRT	bus rapid transit
CRC	Columbia River Crossing
CTR	Commute Trip Reduction
C-TRAN	Clark County Public Transit Benefit Area Authority
EIS	Environmental Impact Statement
FSCR	Flood Safe Columbia River
I-5	Interstate 5
IBR	Interstate Bridge Replacement
kV	kilovolts
LPA	Locally Preferred Alternative
LRT	light-rail transit
LRV	light-rail vehicle
MAX	Metropolitan Area Express
NAVD 88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
ODOT	Oregon Department of Transportation
OTC	Oregon Transportation Commission
PMLS	Portland Metro Levee System
PNCD	Preliminary Navigation Clearance Determination
SOV	single-occupancy vehicle
SR	state route
TriMet	Tri-County Metropolitan Transportation District
UFSWQD	Urban Flood Safety and Water Quality District

Acronym/Abbreviation	Definition
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCG	U.S. Coast Guard
WSDOT	Washington State Department of Transportation
WSTC	Washington State Transportation Commission

1. PROGRAM OVERVIEW

This technical report identifies, describes, and evaluates short-term and long-term effects on utilities from the Interstate Bridge Replacement (IBR) Program. The construction and operation of transportation infrastructure can have temporary and permanent effects on utilities such as water, sewer, electricity, natural gas, and communications. The Modified Locally Preferred Alternative (LPA) would be designed to avoid and/or minimize these effects to the greatest extent possible. This report provides mitigation measures for potential effects on these resources when avoidance is not feasible.

The purpose of this report is to satisfy applicable portions of the National Environmental Policy Act (NEPA) 42 United States Code (USC) 4321 “to promote efforts which will prevent or eliminate damage to the environment.” Information and potential environmental consequences described in this technical report will be used to support the Draft Supplemental Environmental Impact Statement (SEIS) for the IBR Program pursuant to 42 USC 4332.

The objectives of this report are to:

- Define the Program study area and the methods of data collection and evaluation used for the analysis (Chapter 2).
- Describe existing utilities within the study area (Chapter 3).
- Discuss potential long-term, temporary, and indirect effects on utilities resulting from construction and operation of the Modified LPA in comparison to the No-Build Alternative (Chapters 4, 5, and 6). Because the Modified LPA is in the early stages of design, these impacts are described at a general level and with a focus on critical utilities.
- Provide proposed avoidance and mitigation measures to help prevent, eliminate, or minimize environmental consequences from the Modified LPA (Chapter 7).
- Identify federal, state, and local permits that would be required (Chapter 8).

The 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 1-1.

The Modified LPA is a modification of the CRC LPA, which completed the NEPA process with a signed Record of Decision (ROD) in 2011 and two re-evaluations that were completed in 2012 and 2013. The CRC project was discontinued in 2014. This Technical Report is evaluating the effects of changes in project design since the CRC ROD and re-evaluations, as well as changes in regulations, policy, and physical conditions.

Figure 1-1. IBR Program Location Overview

1.1 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.

a. 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.

b. 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.

a. 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 1.1.7, 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.

a. 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.

b. 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 1-2. 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 sections below.

Figure 1-2. Modified LPA Components

Section 1.1.1, Interstate 5 Mainline, describes the overall configuration of the I-5 mainline through the study area, and Sections 1.1.2, Portland Mainland and Hayden Island (Subarea A), through Section 1-45, Upper Vancouver (Subarea D), provide additional detail on four geographic subareas (A through D), which are shown on Figure 1-3. 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 1-1 shows the different combinations of design options analyzed in this Technical Report. 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 1-3. Modified LPA – Geographic Subareas

Table 1-1. 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
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.

1.1.1 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.

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 1.1.7, Transit Operating Characteristics). The shoulder would be available for express bus service when general-purpose speeds are below 35 miles per hour (mph).

Figure 1-4 shows a cross section of the collector-distributor (C-D)[1] roadways, Figure 1-5 shows the location of the C-D roadways, and Figure 1-6 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.

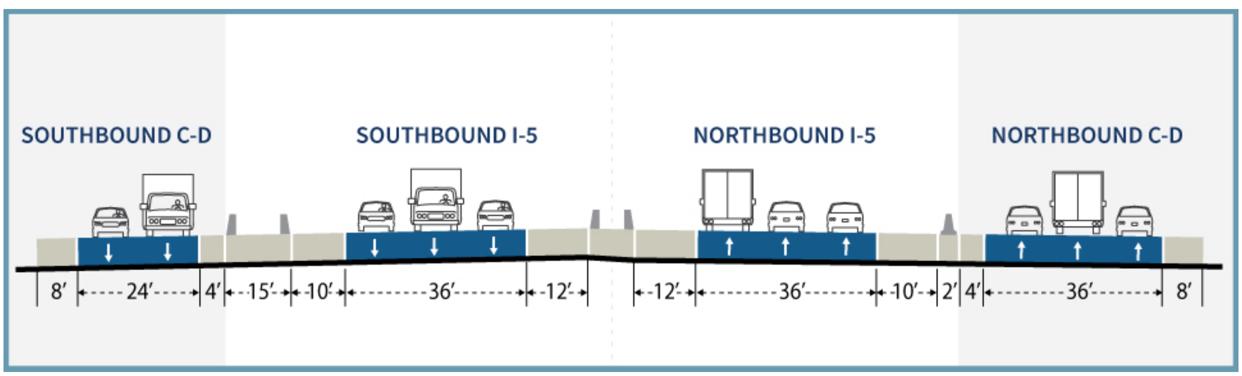
On I-5 northbound, the auxiliary lane that would begin at the on-ramp from Marine Drive would continue across the Columbia River bridge and end at the off-ramp to the C-D roadway, north of SR 14 (see Figure 1-5). The on-ramp from SR 14 westbound would join the off-ramp to the C-D roadway, forming the northbound C-D roadway between SR 14 and Fourth Plain Boulevard. The C-D roadway would provide access from I-5 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.

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.

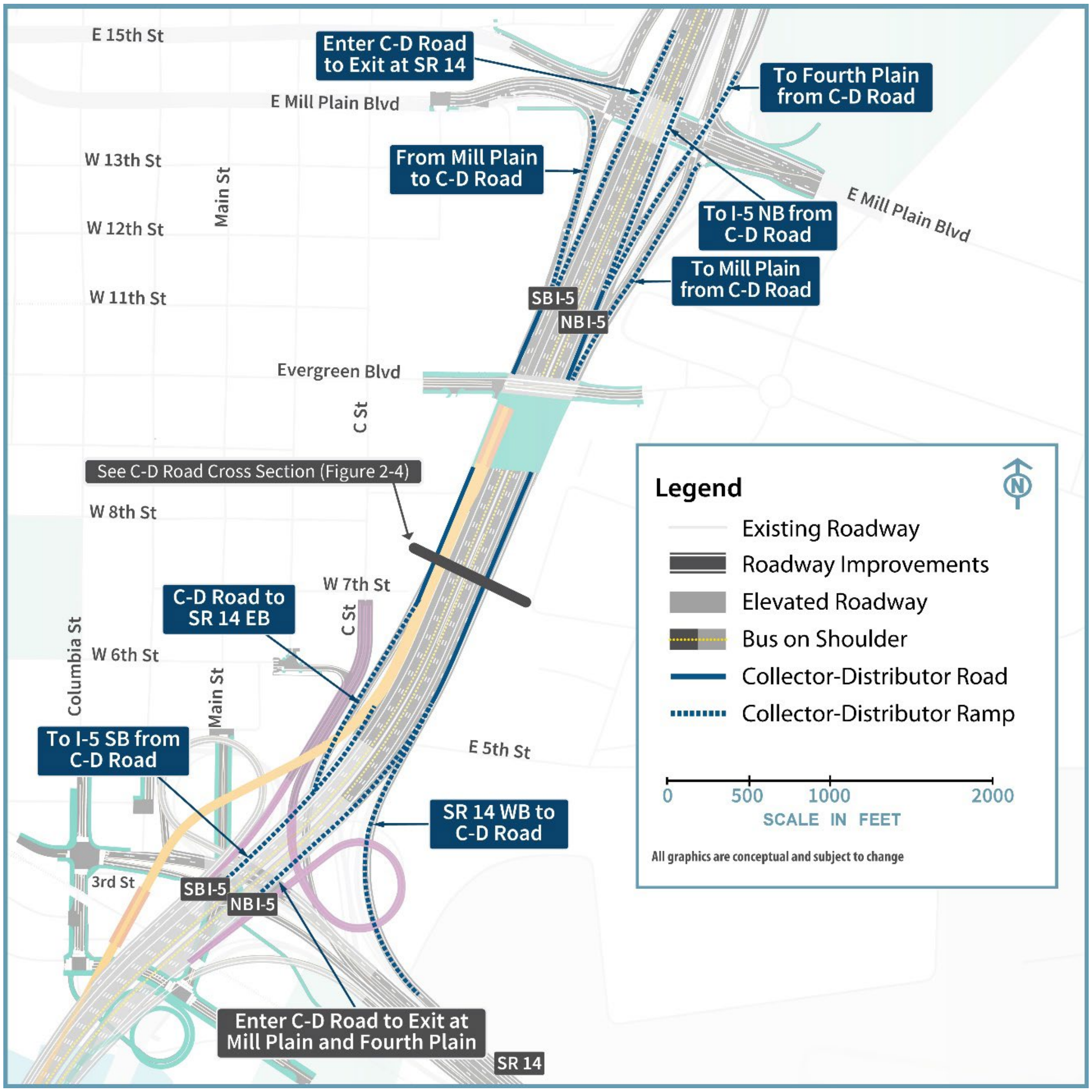
On I-5 southbound, an auxiliary lane would begin at the on-ramp from the C-D roadway and would continue across the southbound Columbia River bridge and end at the off-ramp to Marine Drive. The combined on-ramp from SR 14 westbound and C Street would merge into this auxiliary lane.

Figure 1-4. Cross Section of the Collector-Distributor Roadways



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

Figure 1-5. Collector-Distributor Roadways



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

1.1.1.1 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 1-6 shows a comparison of the one auxiliary lane configuration and the two auxiliary lane configuration design option. Figure 1-7 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 1.1.3, Columbia River Bridges (Subarea B)), 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.[2] The traffic operations analysis incorporating both the one and two auxiliary lane design options applies equally to all bridge configurations in this Technical Report.

[2] 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 1-6. Comparison of Auxiliary Lane Configurations

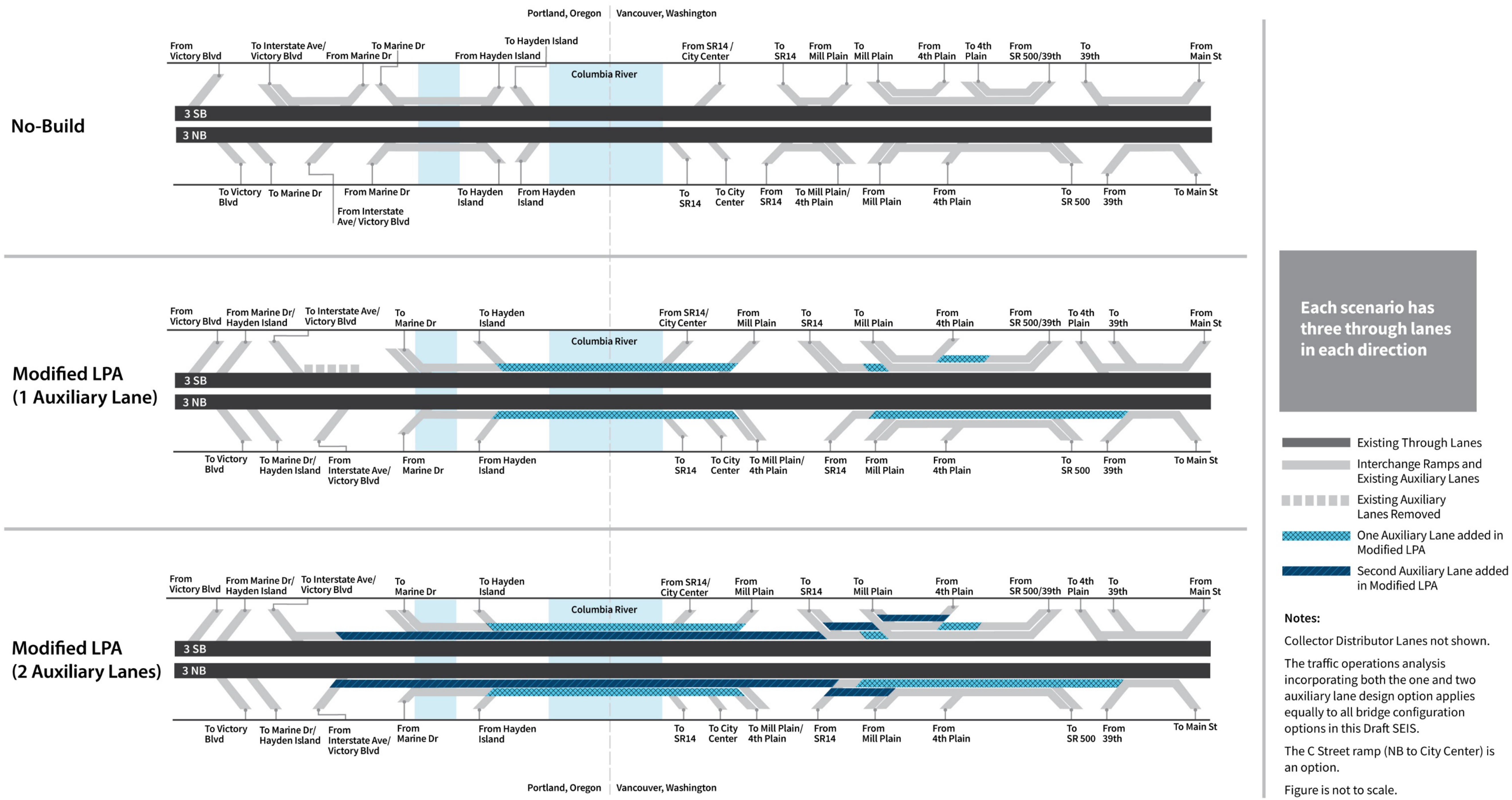
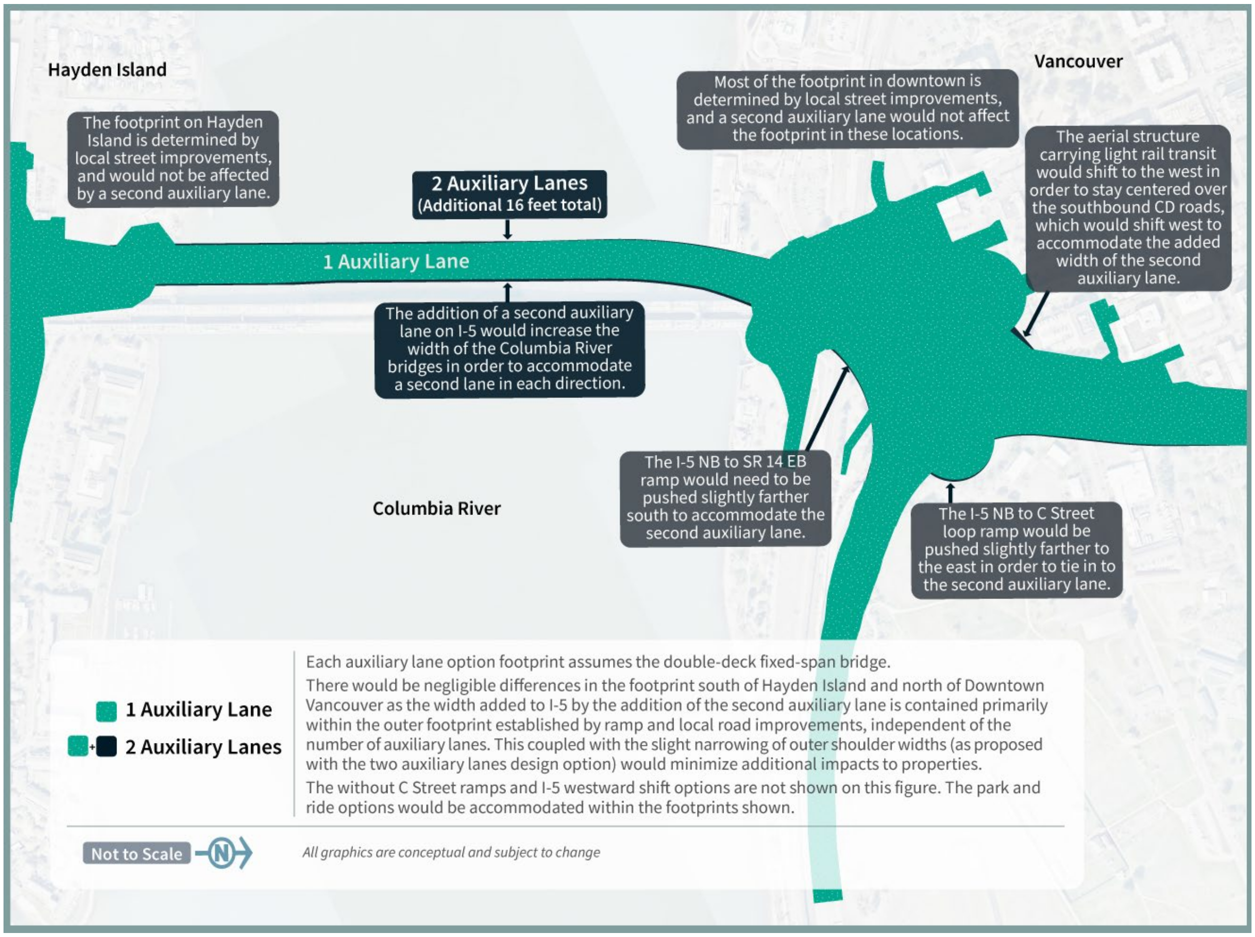


Figure 1-7. Auxiliary Lane Configuration Footprint Differences



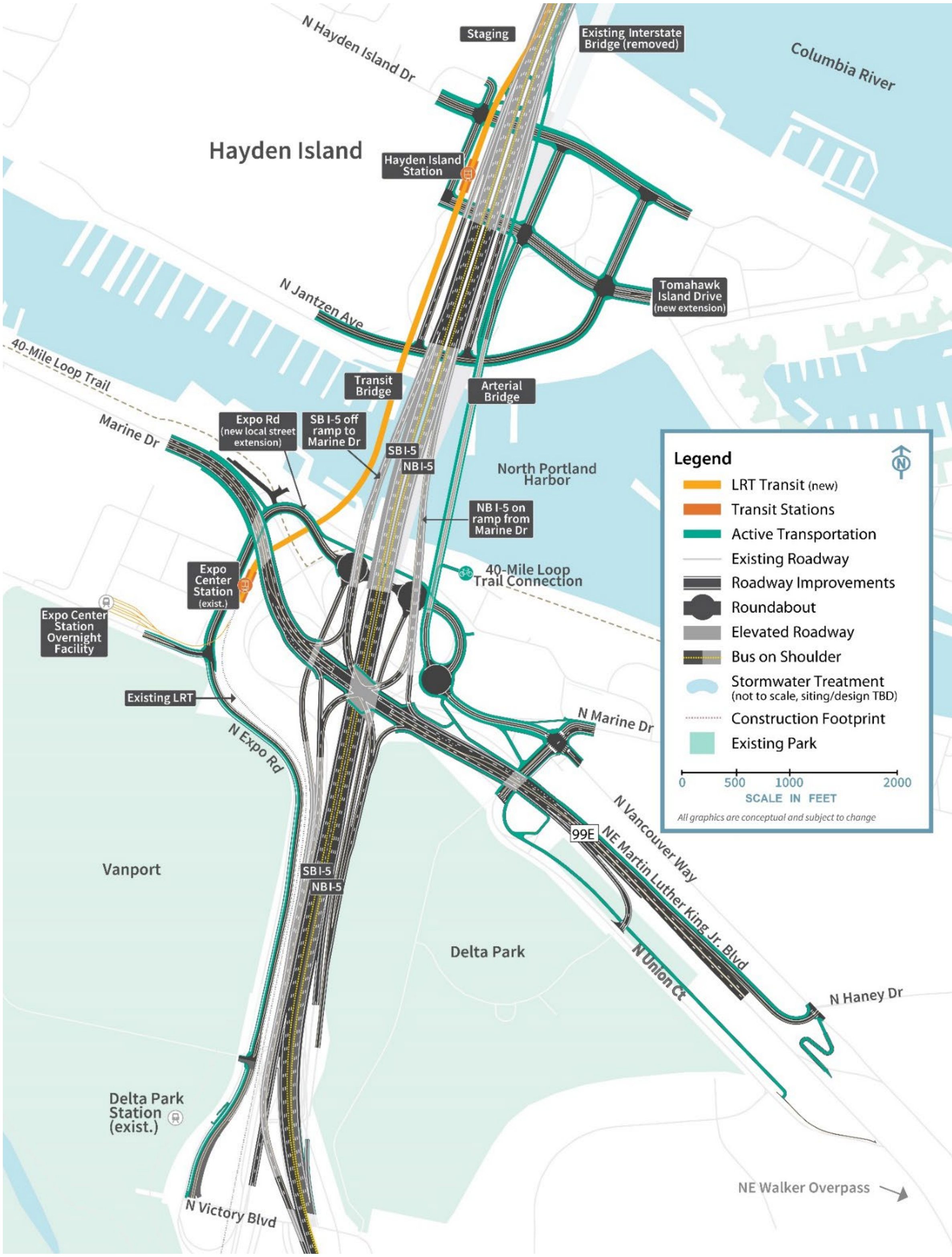
1.1.2 Portland Mainland and Hayden Island (Subarea A)

This section discusses the geographic Subarea A shown in Figure 1-3. See Figure 1-8 for highway and interchange improvements in Subarea A, including the North Portland Harbor bridge. Figure 1-8 illustrates the one auxiliary lane design option; please refer to Figure 1-6 and the accompanying description for how two auxiliary lanes would alter the Modified LPA's proposed design. Refer to Figure 1-3 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 1-8. 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 1-9, and intersections with Modified LPA components are described throughout Section 1.1.2, 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.[3]

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)[4] 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]).[5] 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.

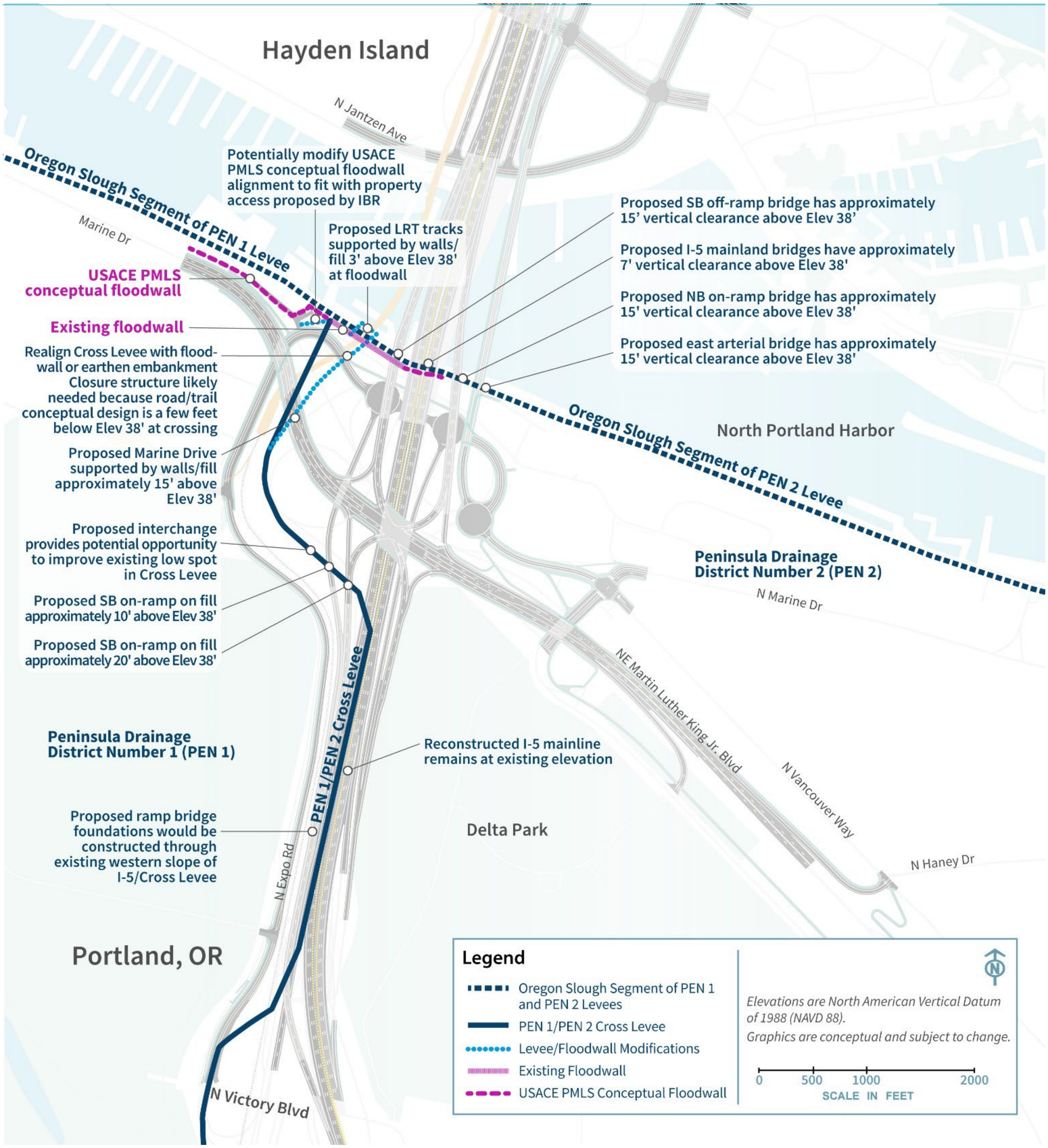
The IBR Program is in close coordination with these concurrent efforts to ensure that the IBR Program's design efforts consider the timing and scope of the PMLS and the FSCR proposed modifications. The intersection of the IBR Program proposed actions to both the existing levee configuration and the anticipated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

[3] 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.

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

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

Figure 1-9. Levee Systems in Subarea A



1.1.2.1 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 1-8). 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 1-9). 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.

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 1-8 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.

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[6] 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 1-8. 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.

[6] 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.

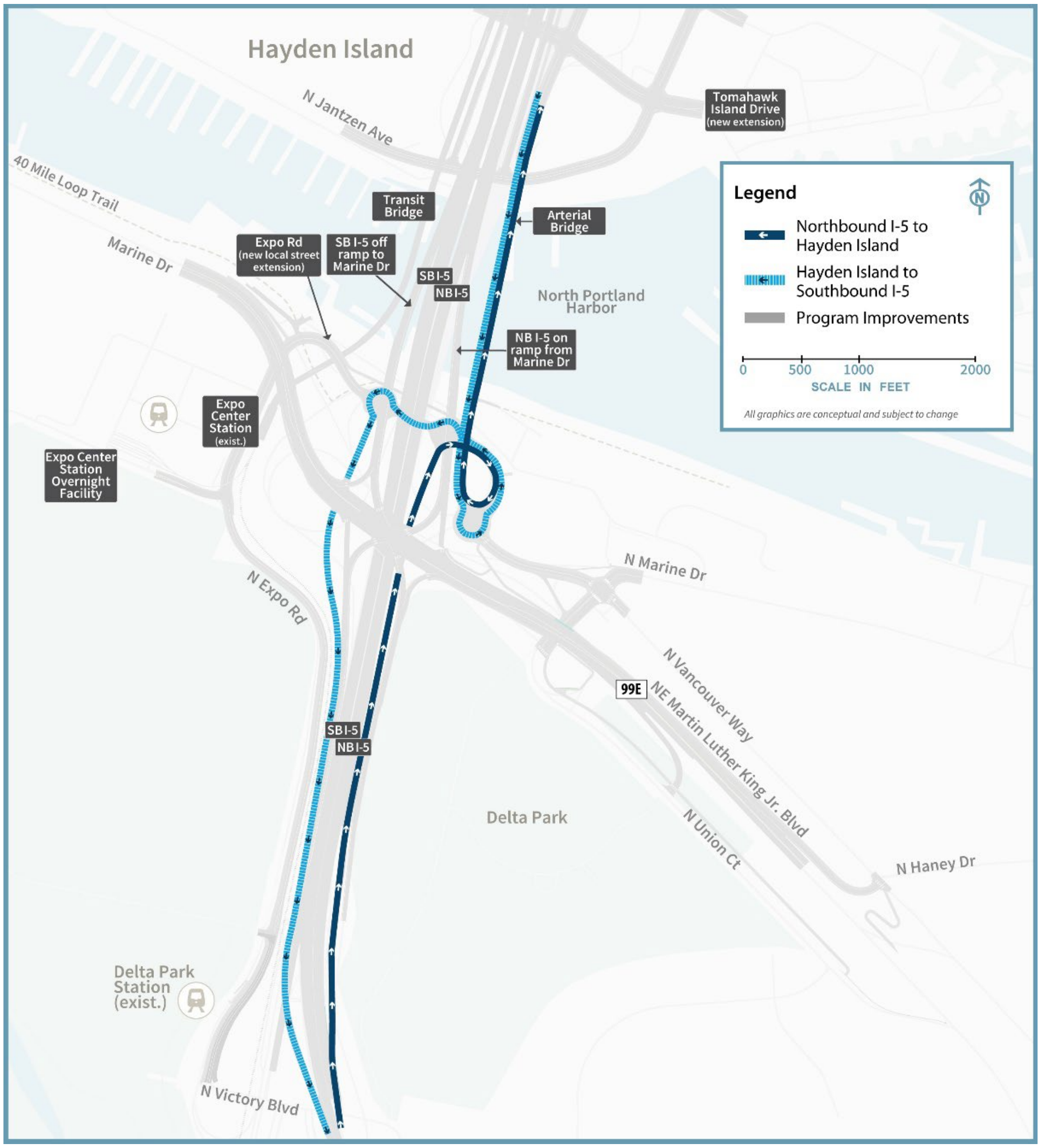
HAYDEN ISLAND INTERCHANGE AREA

All traffic movements for the Hayden Island interchange would be reconfigured. See Figure 1-8 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 1-10). 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.

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 1-10. Vehicle Circulation between Hayden Island and the Portland Mainland



NB = northbound; SB = southbound

1.1.2.2 Transit

A new light-rail alignment for northbound and southbound trains would be constructed within Subarea A (see Figure 1-8) 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 1-8) to provide storage for trains during hours when MAX is not in service. This facility is described in Section 1.1.6, 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 1-8). 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 1-9). 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.

1.1.2.3 Active Transportation

In the Victory Boulevard interchange area (see Figure 1-8), 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.

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 1-8). 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.

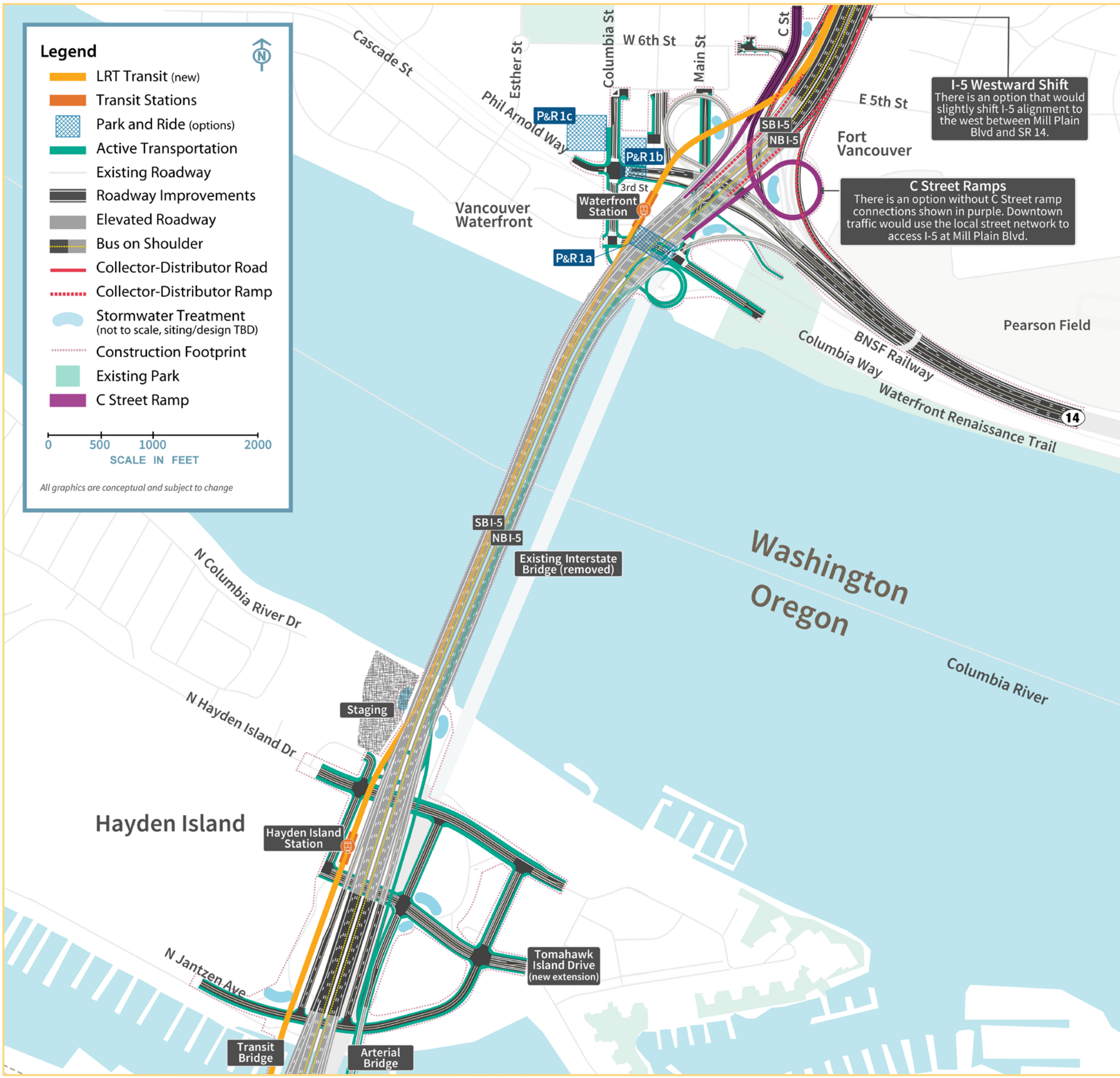
1.1.3 Columbia River Bridges (Subarea B)

This section discusses the geographic Subarea B shown in Figure 1-3. See Figure 1-11 for highway and interchange improvements in Subarea B. Refer to Figure 1-3 for an overview of the geographic subareas.

1.1.3.1 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 1-11). 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.

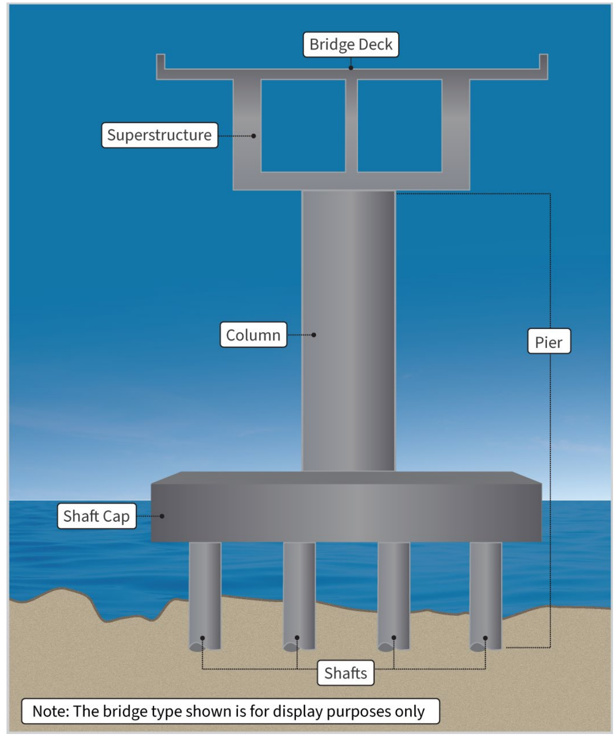
Figure 1-11. Columbia River Bridges (Subarea B)



As with the existing bridge (Figure 1-13), the new Columbia River bridges would provide three navigation channels: a primary navigation channel and two barge channels (see Figure 1-14). 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,[7] 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 1-14). 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 1-12).

Figure 1-12. 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).

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

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

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.

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. 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.

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 1-13. Existing Navigation Clearances of the Interstate Bridge

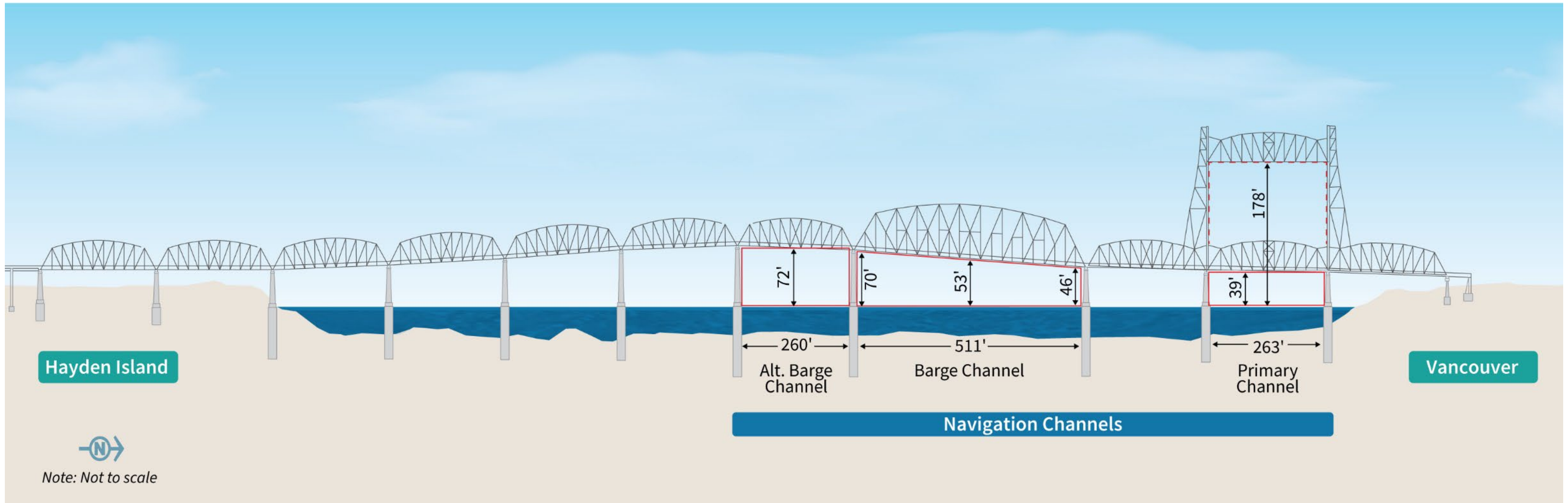
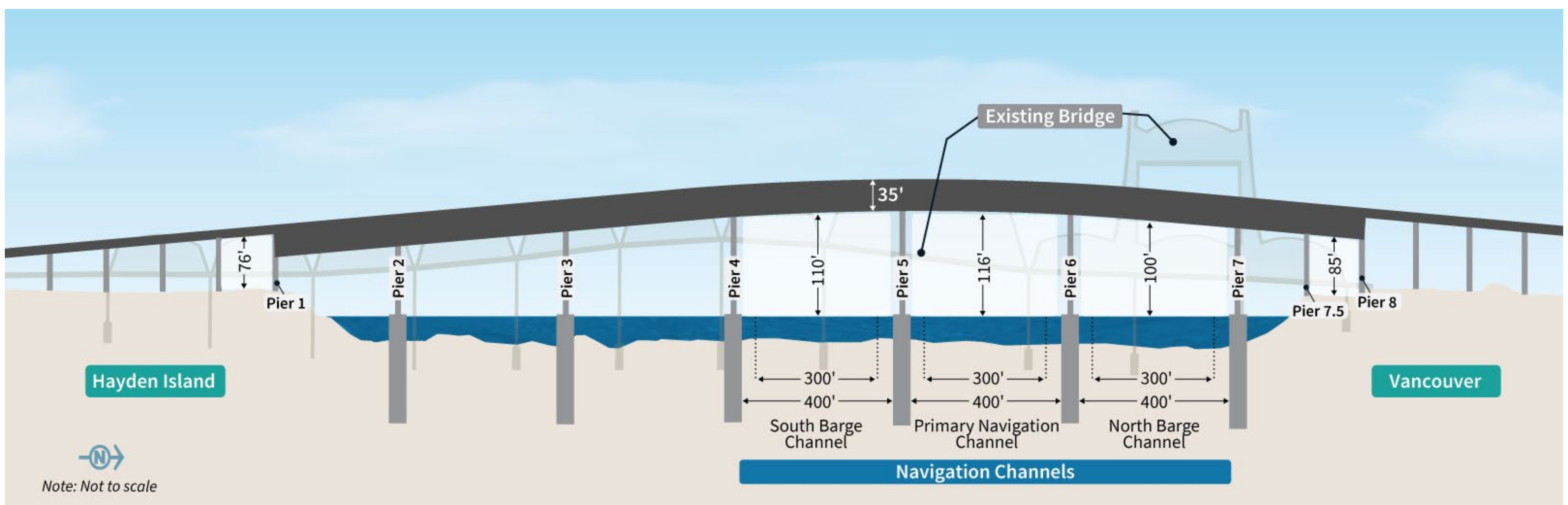


Figure 1-14. Profile and Navigation Clearances of the Proposed Modified LPA Columbia River Bridges with a Double-Deck Fixed-Span Configuration



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 1-15 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.[8]

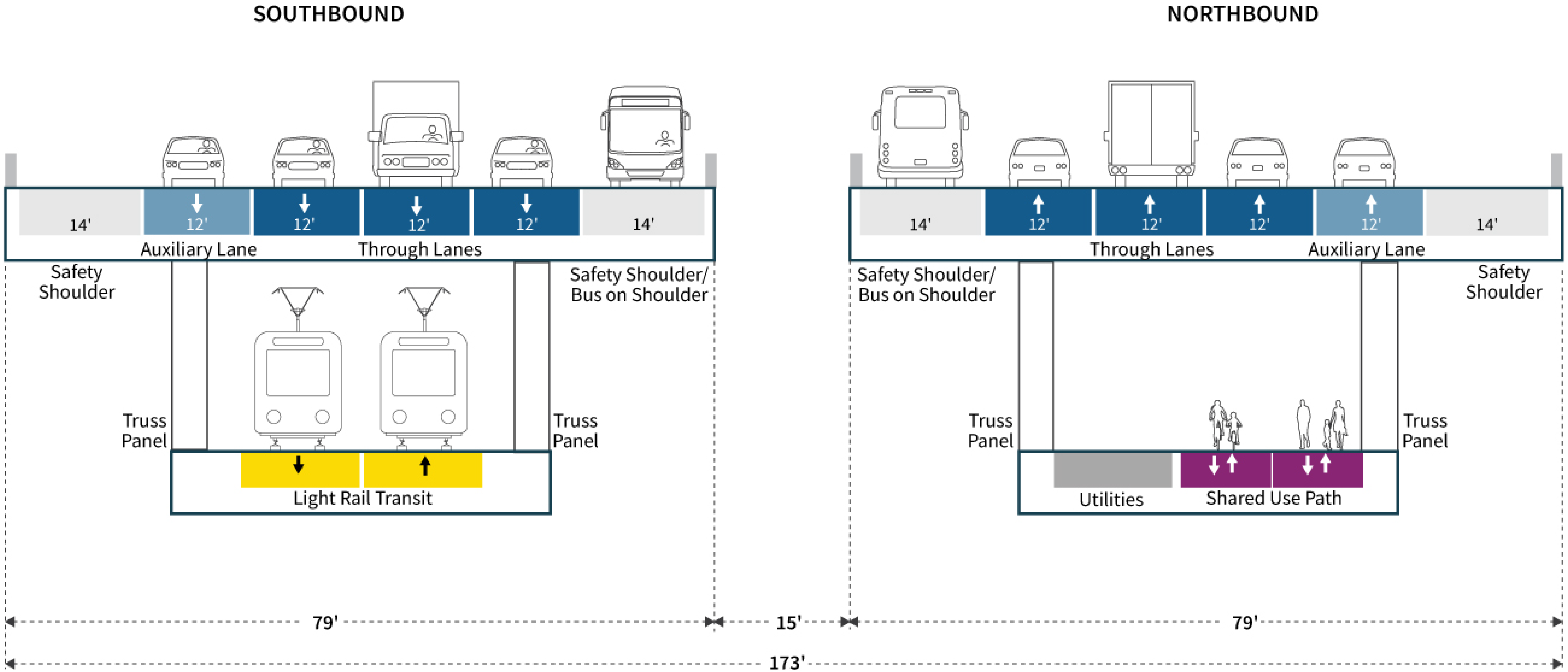
Figure 1-15. Conceptual Drawing of a Double-Deck Fixed-Span Configuration

Note: Visualization is looking southwest from Vancouver.

Figure 1-16 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.

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

Figure 1-16. 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 report 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 1-17. These images are subject to change and do not represent final design.

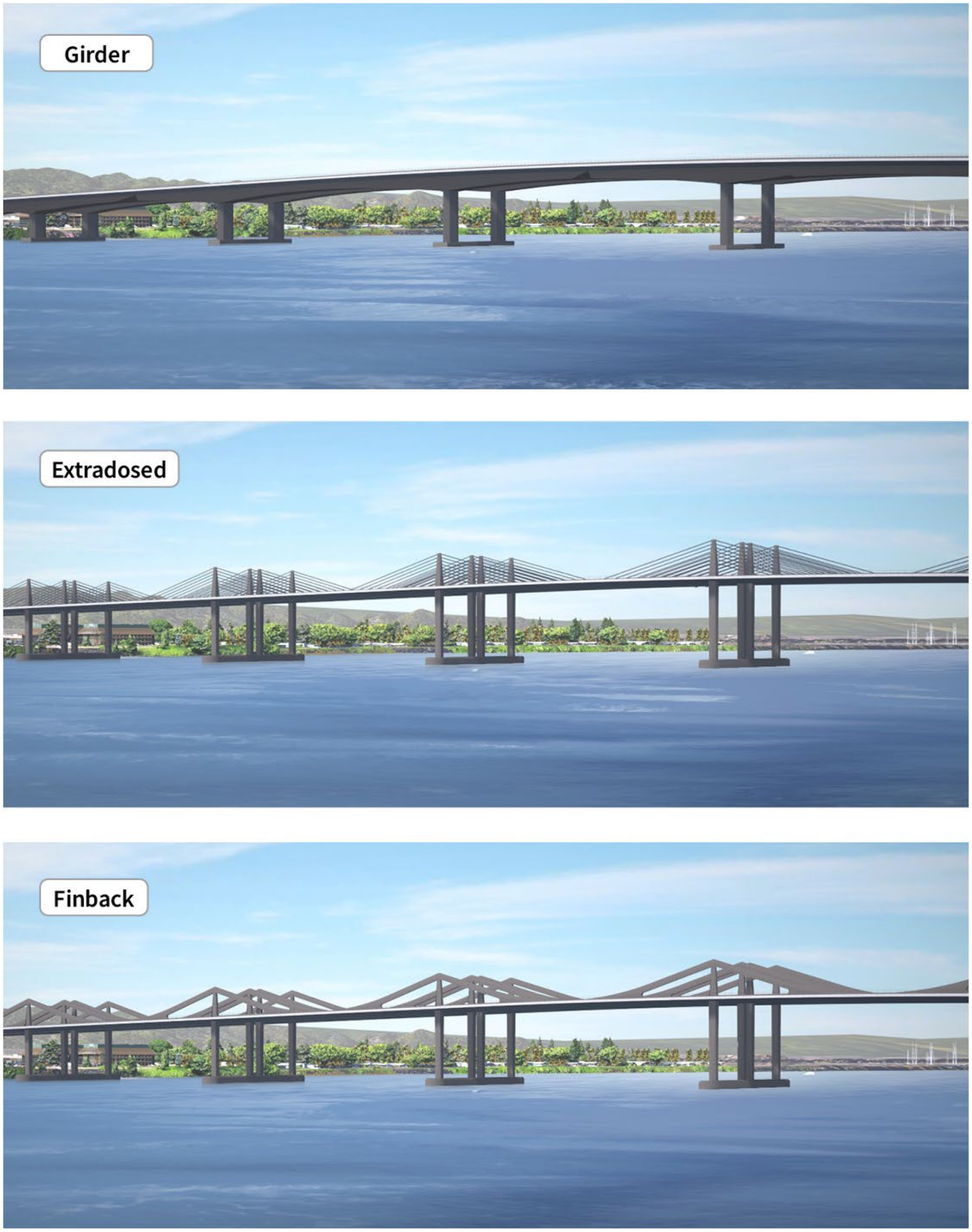
This configuration would provide 116 feet of vertical navigation clearance for river traffic using the primary navigation channel and 400 feet of horizontal navigation clearance at the primary navigation channel, as well as barge channels. This bridge height would not impede takeoffs and landings by 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 1-18 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 1-18.

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.

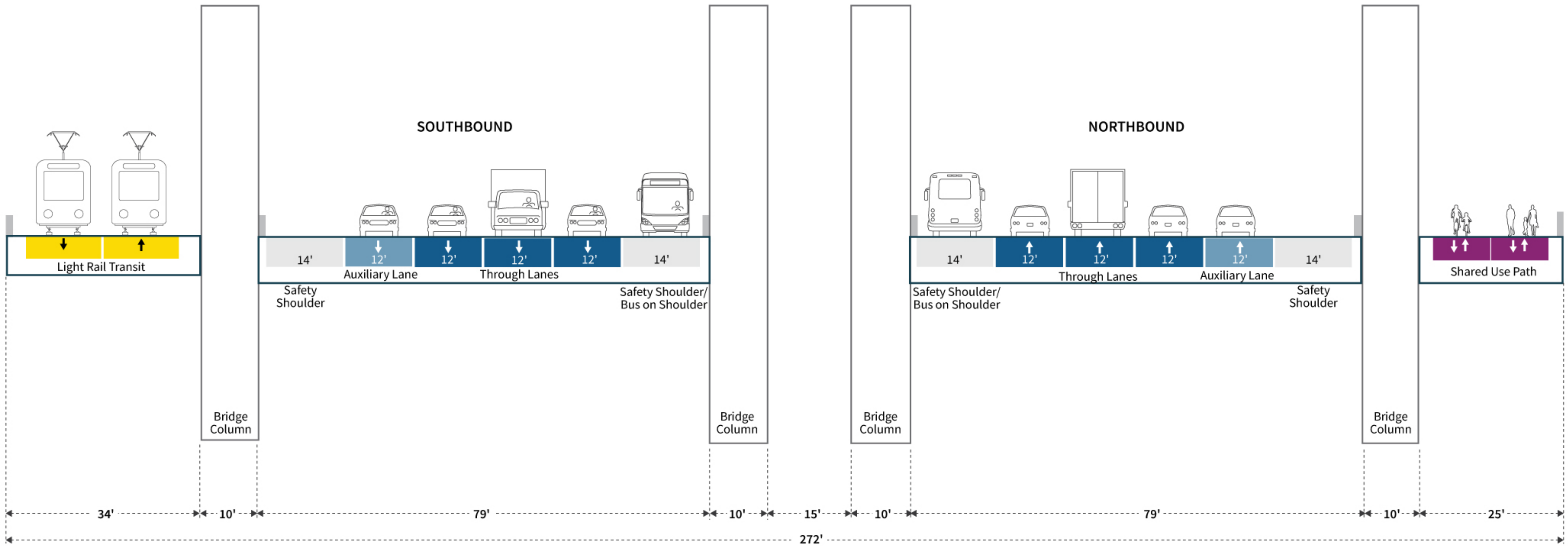
This bridge configuration would have a 3% maximum grade on both the Oregon and Washington sides of the bridge.

Figure 1-17. 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 1-18. 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 report, the IBR Program assessed a vertical lift span 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 1-19. 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 1-20; 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.

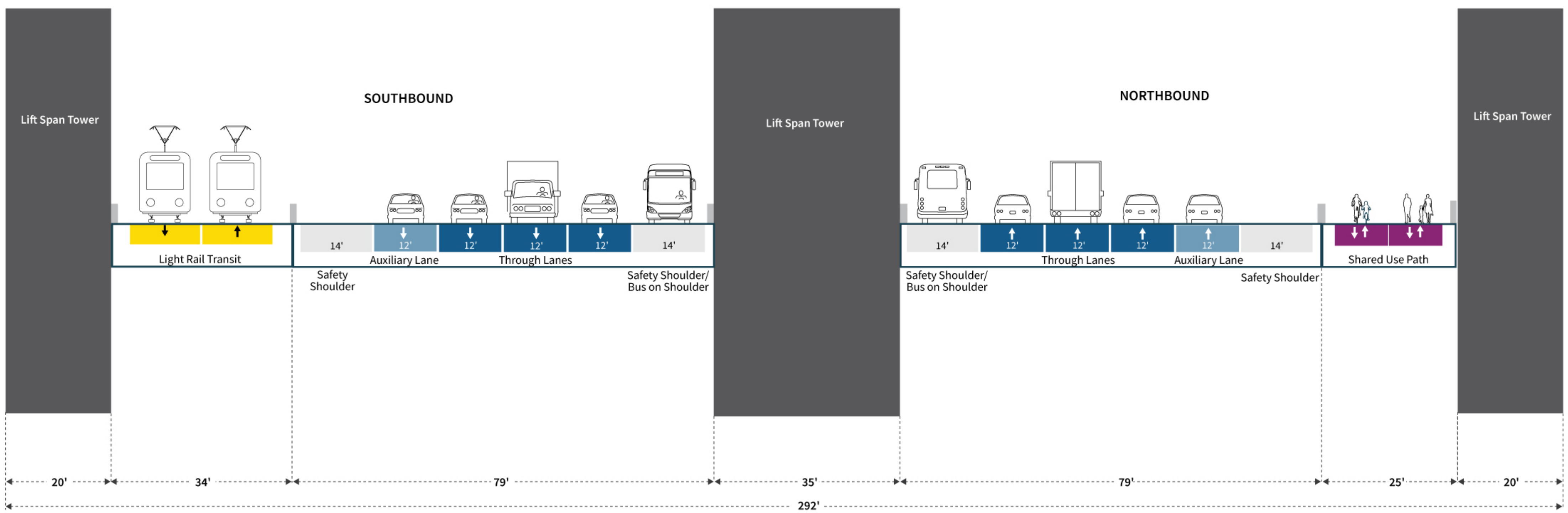
This single-level movable-span configuration would have a 3% maximum grade on the Oregon side of the bridge and a 1.5% maximum grade on the Washington side.

Figure 1-19. Conceptual Drawings of Single-Level Movable-Span Configurations in the Closed and Open Positions

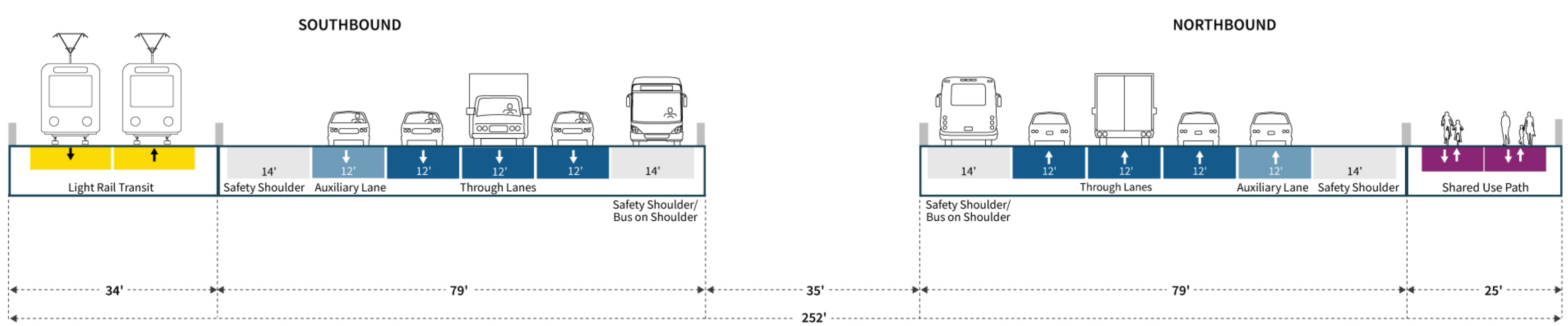
Note: Visualizations are for illustrative purposes only. They do not reflect property impacts or represent final design. Visualization is looking southeast (upstream) from Vancouver.

Figure 1-20. Cross Section of the Single-Level Movable-Span Bridge Type

Single-level Bridge with Movable Span - Vertical Lift Span Cross-section (Piers 5 and 6)



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



Summary of Bridge Configurations

This section summarizes and compares each of the bridge configurations. Table 1-2 lists the key considerations for each configuration. Figure 1-21 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 1-22 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.

This section summarizes and compares each of the bridge configurations. Table 1-2 lists the key considerations for each configuration. Figure 1-21 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.

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Figure 1-21. Bridge Configuration Footprint Comparison

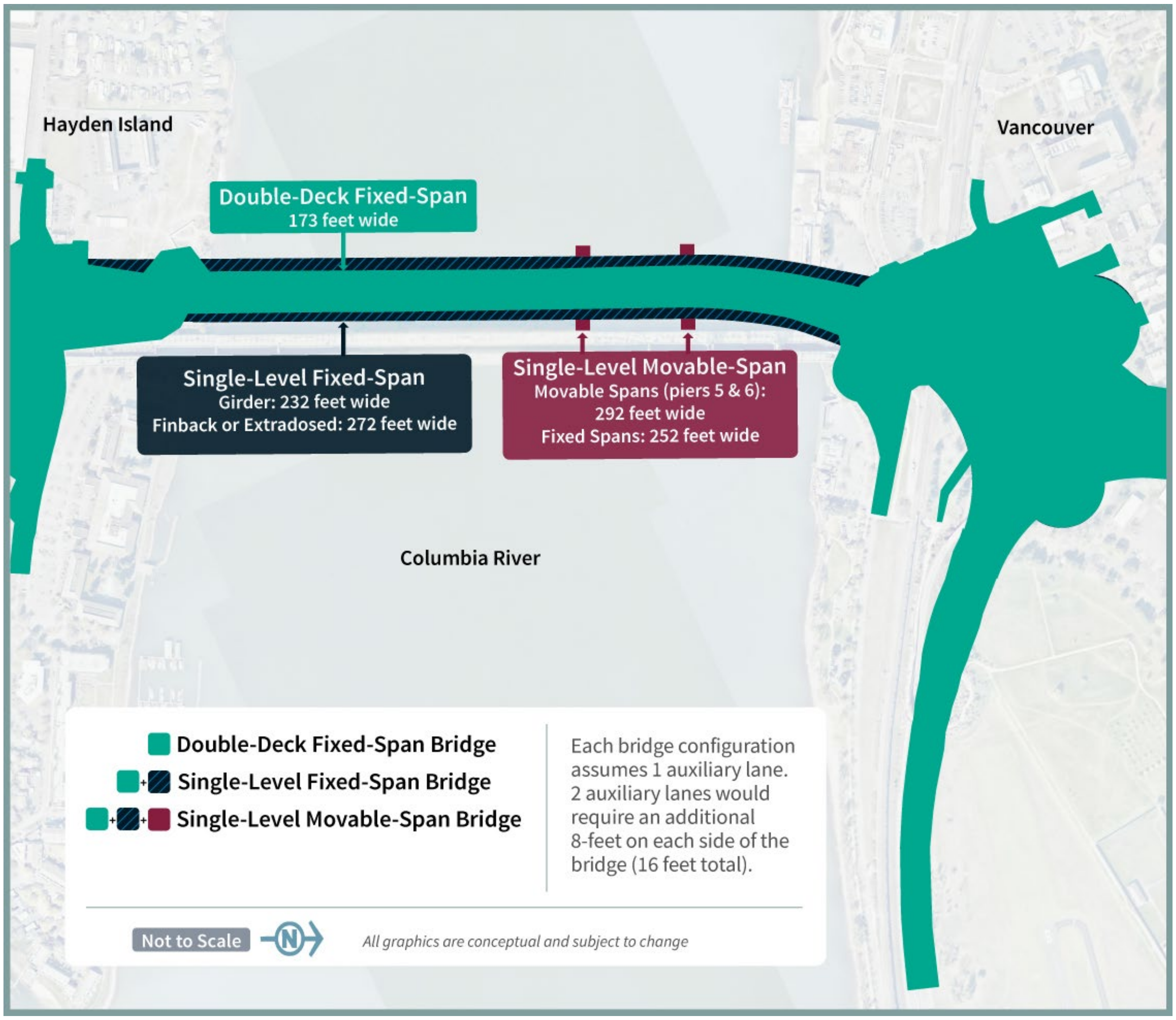


Figure 1-22. Bridge Configuration Profile Comparison

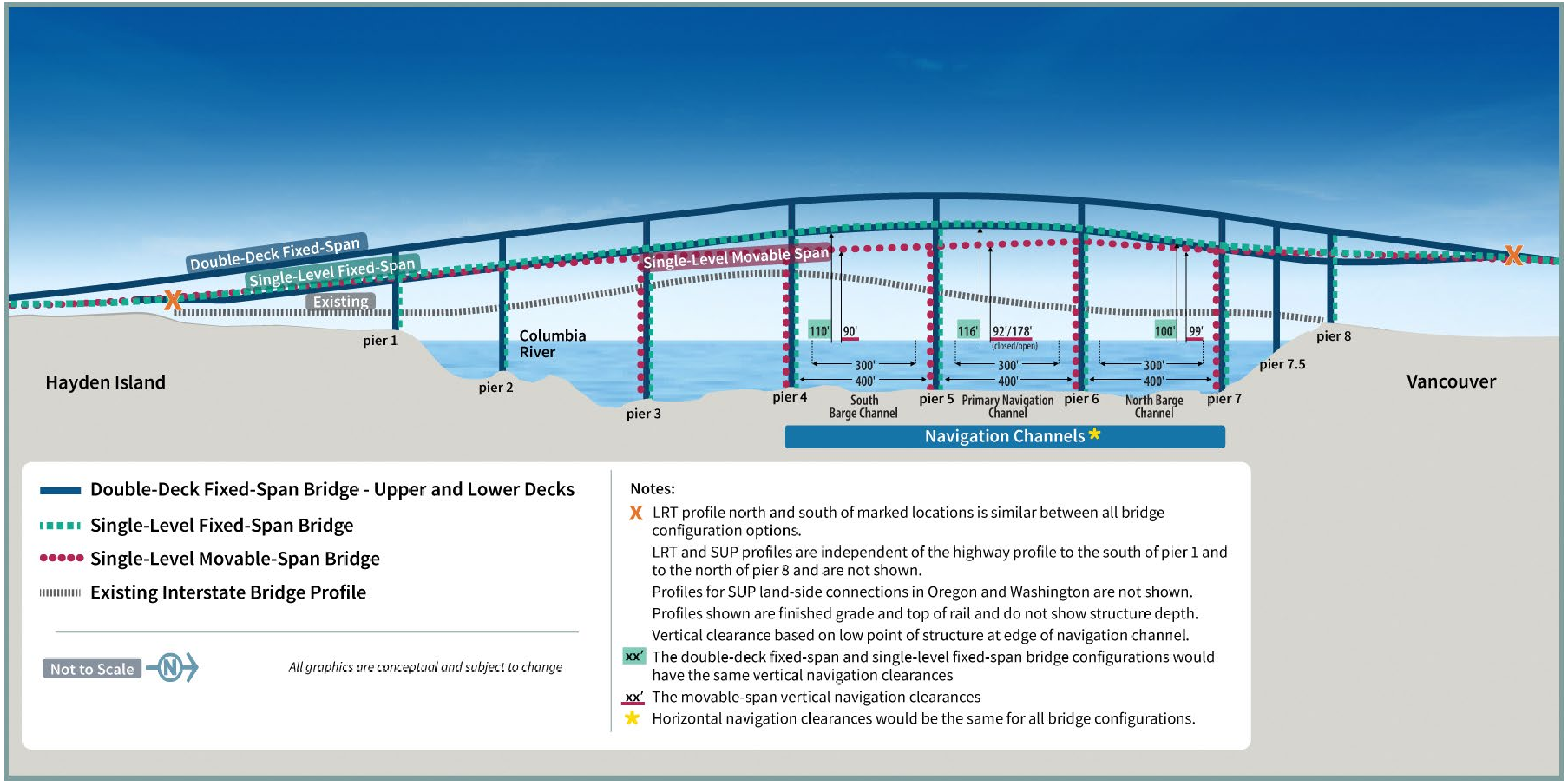


Table 1-2. Summary of Bridge Configurations

	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.

	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
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.
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).

	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
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.
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.

	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
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 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 (see the Transportation Technical Report), the movable-span opening time is assumed to be an average of 12 minutes.

1.1.4 Downtown Vancouver (Subarea C)

This section discusses the geographic Subarea C shown in Figure 1-3. See Figure 1-23 for all highway and interchange improvements in Subarea C. Refer to Figure 1-3 for an overview of the geographic subareas.

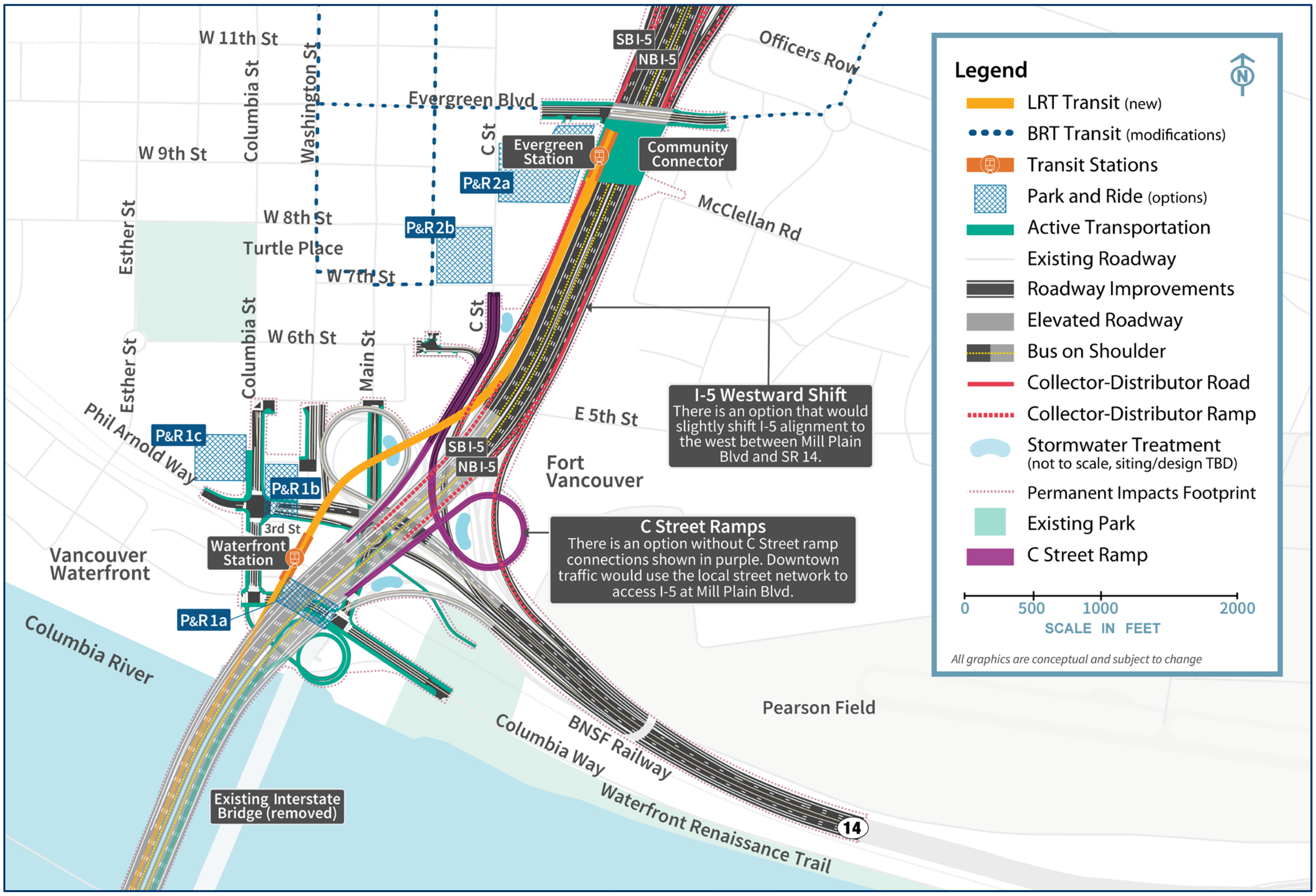
1.1.4.1 Highways, Interchanges, and Local Roadways

North of the Columbia River bridges in downtown Vancouver, improvements are proposed to the SR 14 interchange (Figure 1-23).

SR 14 INTERCHANGE

The new Columbia River bridges would touch down just north of the SR 14 interchange (Figure 1-23). 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 1-23. 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.

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.

1.1.4.2 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 1-23). 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 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 1-23). 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 C-TRAN's existing 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 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 1-23). 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 1-23).

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

1.1.4.3 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 1-23). 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 1-23). 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.

1.1.5 Upper Vancouver (Subarea D)

This section discusses the geographic Subarea D shown in Figure 1-3. See Figure 1-24 for all highway and interchange improvements in Subarea D. Refer to Figure 1-3 for an overview of the geographic subareas.

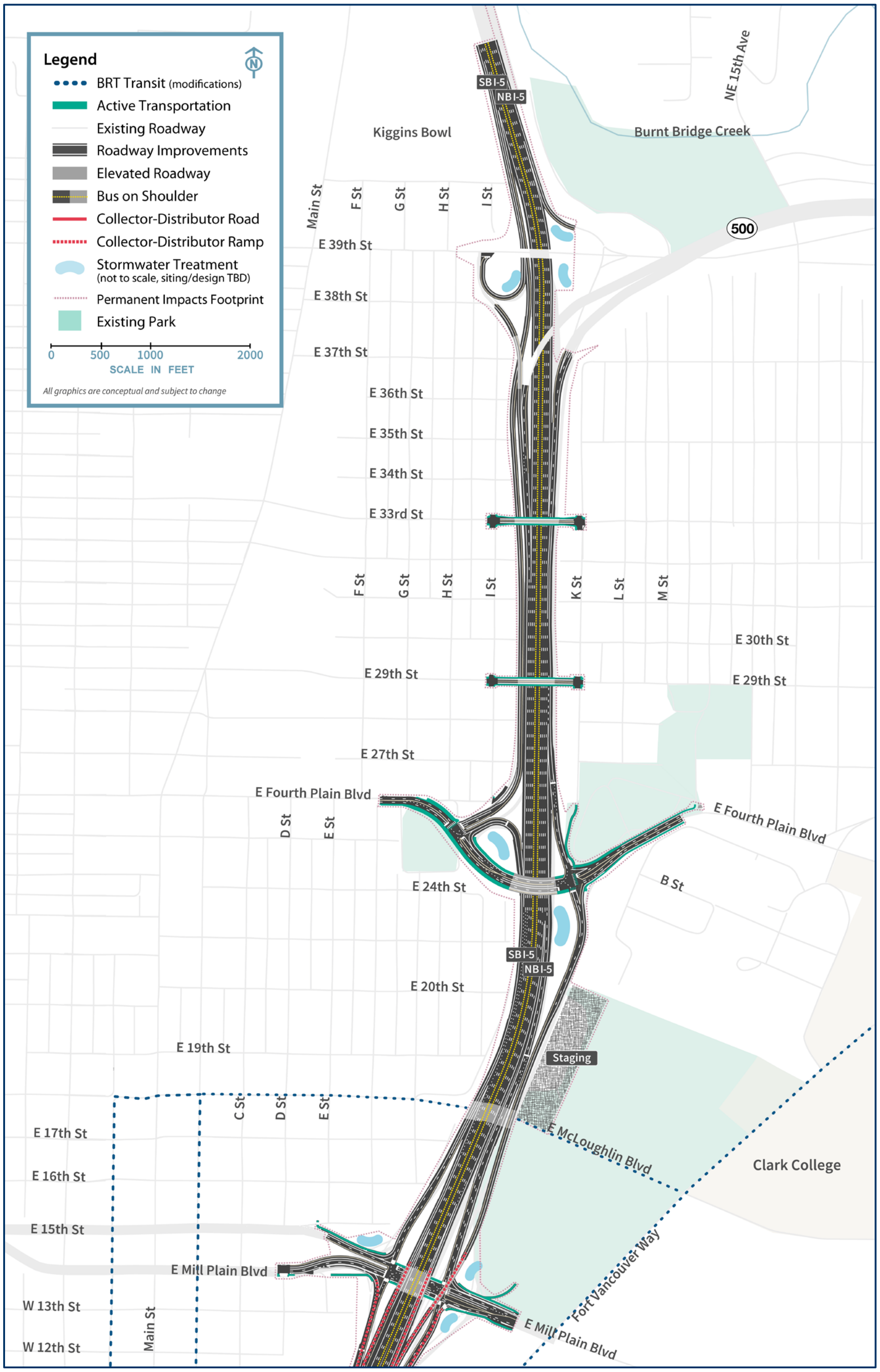
1.1.5.1 Highways, Interchanges, and Local Roadways

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 1-24). 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 1-24. Upper Vancouver (Subarea D)



BRT = bus rapid transit; TBD = to be determined

FOURTH PLAIN BOULEVARD INTERCHANGE

At the Fourth Plain Boulevard interchange (Figure 1-24), 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 1-24). 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.

1.1.5.2 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 1.1.7, Transit Operating Characteristics.

1.1.5.3 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.

1.1.6 Transit Support Facilities

1.1.6.1 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 1-25). 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 1-25 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.

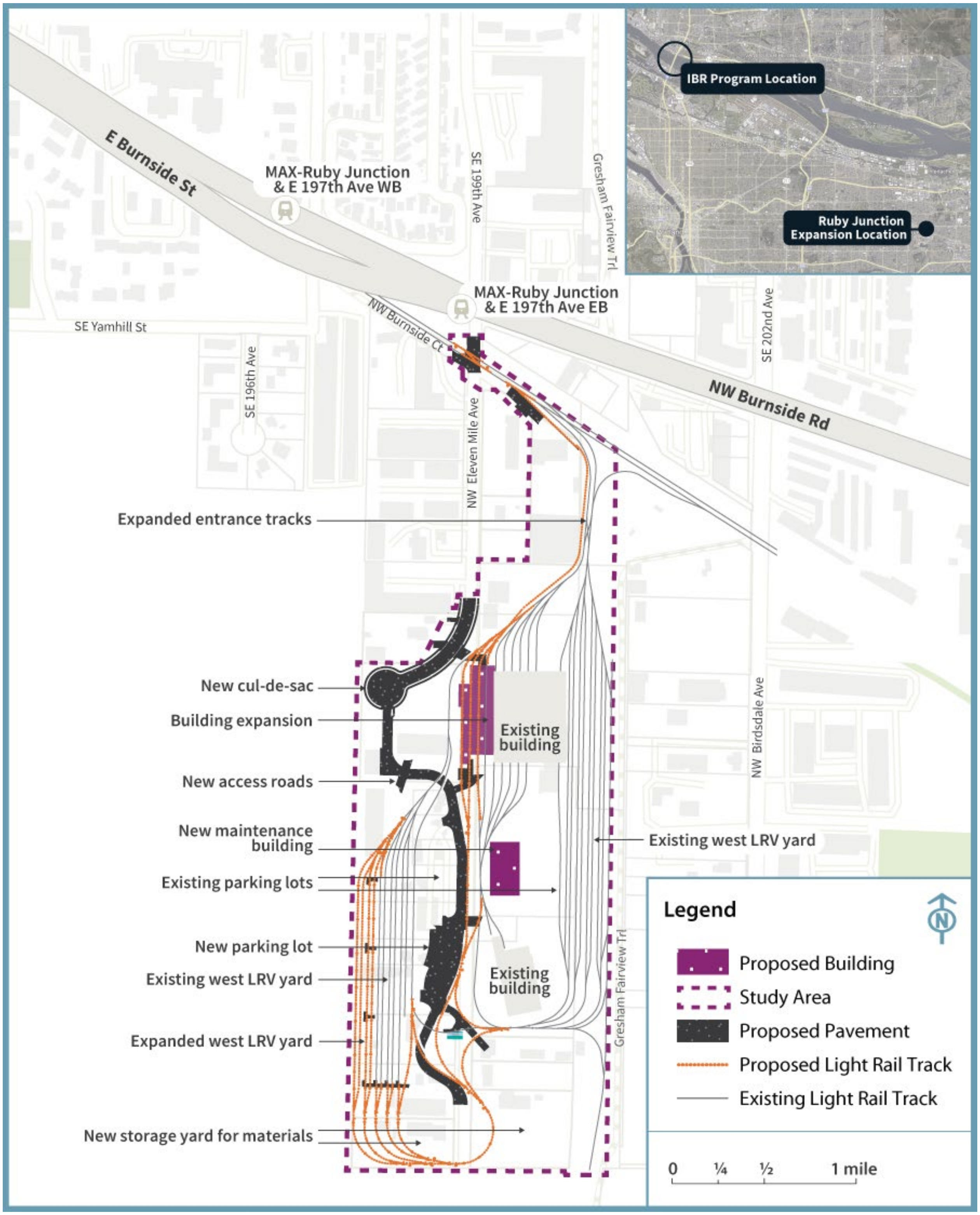
The existing LRV storage yard, west of Eleven Mile Avenue, would be expanded to the west to accommodate additional storage tracks and a runaround track (a track constructed to bypass congestion in the maintenance yard). This expansion would require partial demolition of an existing TriMet building (just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

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.

Figure 1-25. Ruby Junction Maintenance Facility Study Area



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

1.1.6.2 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 1-8) 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.

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.

1.1.6.3 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 1.1.7, Transit Operating Characteristics). Modifications to the facility would accommodate new vehicles as well as maintenance equipment.

1.1.7 Transit Operating Characteristics

1.1.7.1 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.

1.1.7.2 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.

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 1-8, Figure 1-16, Figure 1-23, and Figure 1-24 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.

1.1.7.3 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 1-3 shows existing service and anticipated future changes to TriMet Line 6.

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 1-3 shows existing service and anticipated future changes to C-TRAN bus routes. In addition to the changes noted in Table 1-3, 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 1-3. 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.
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.

Bus Route	Existing Route	Changes with Modified LPA
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.

1.1.8 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).

1.1.9 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.

1.2 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 1.1.8, Tolling).

1.2.1 Construction Components and Duration

Table 1-4 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 the Transportation Technical Report, 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.

Table 1-4. 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.
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).

Component	Estimated Duration	Notes
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.

1.2.2 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 1-8 and Figure 1-23). 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.

1.3 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 2018) 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 this report. 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. METHODS

2.1 Introduction

This chapter describes the methods that were used to support the IBR Program environmental evaluation. This chapter outlines the approach to identifying and evaluating the beneficial and adverse impacts of the Modified LPA.

This chapter describes the study area, relevant laws and regulations, and methods for collecting data, assessing impacts, and evaluating possible mitigation measures. The analysis was designed to comply with NEPA and relevant federal, state, and local laws. These methods build on those developed for the CRC project, which completed the NEPA process with a signed Record of Decision in 2011. NEPA reevaluations were completed in 2011 to address a change in Interstate Bridge height and in 2013 to address phasing of project construction. The CRC project was discontinued in 2014; the IBR Program is evaluating what changes in regulations, policy, and physical conditions have occurred since the completion of the Record of Decision.

Methods to identify the impacts on publicly and privately owned utilities remain largely unchanged from those used for the CRC project. The analysis for the IBR Program consisted mainly of updating the previous information to more accurately reflect the current locations of existing utilities and Program impacts. Because the Modified LPA is in an early phase of design, it is not possible to identify all potential impacts to utility systems, such as specific disruptions to local distribution networks. As a result, the analysis in this Draft SEIS is focused on impacts to major utilities (further defined in Section 3.1) that are within the anticipated limits of disturbance for Modified LPA construction. More detailed design information, including measures to minimize potential effects, is expected to be available by the time of the Final SEIS, and the impact analysis will be updated as appropriate in that document. The analysis in this report is intended identify the impacts with the greatest potential for significance.

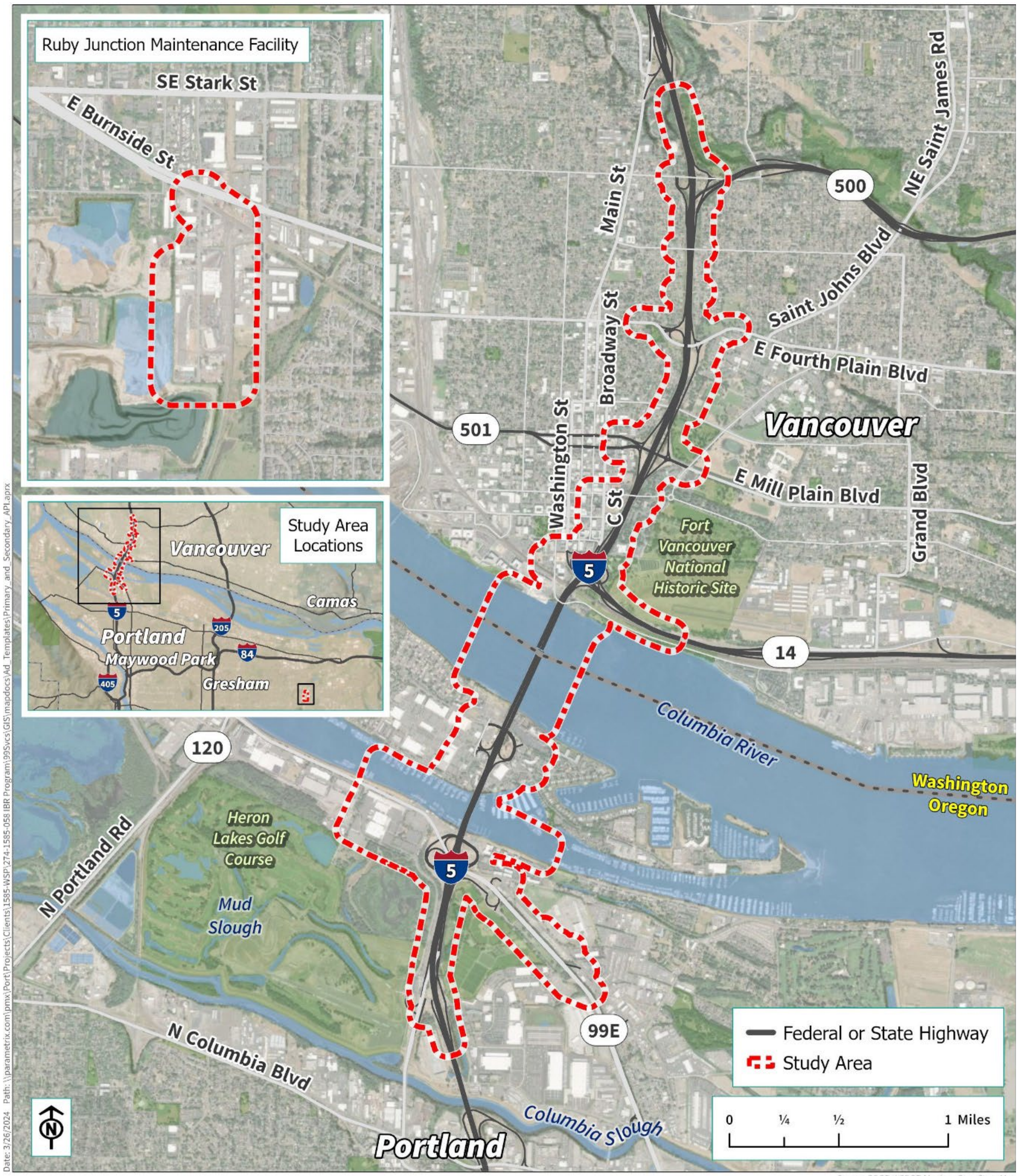
The IBR study area includes both public and private utilities. Public utilities would be improved or relocated by the IBR Program as part of project construction contracts. Typically, the cost for private utility relocation for facilities that are in the public right of way is borne by the private utility owner. This is based on franchise agreements between the private utility companies and the jurisdiction that owns the right of way.

2.2 Study Area

The study area runs along a 5-mile segment of Interstate 5 (I-5), between approximately the State Route (SR) 500 interchange in Washington and the I-5/Columbia Boulevard interchange in Oregon. Most physical changes associated with the Program would occur in this area, though mitigation could still occur outside of it. Temporary construction easements would be established directly adjacent to the proposed construction areas, while larger staging areas and casting yards could be located upstream or downstream of the Interstate Bridge. The CRC LPA and the IBR Modified LPA also include expansion of the Ruby Junction Maintenance Facility in Gresham, Oregon.

Figure 2-1 shows the study area, which is the same as the CRC project study area. For clarity of information of utility impacts, the study area is separated into three sub-study areas: Oregon sub-study area, Downtown Vancouver sub-study area, and North Vancouver sub-study area). Chapter 1 of this report provides more information on the Modified LPA. In general, the impact of the Modified LPA on utilities would be limited to the immediate proximity of the project footprint.

Figure 2-1. Utilities Study Area



2.3 Relevant Laws and Regulations

NEPA requires the evaluation of impacts to the built environment including utility systems. In addition, many federal, state, and local laws regulate the construction, operation, and maintenance of utility facilities. State and local regulations also require the issuance of permits or franchises for utilities that are placed within public rights of way including roads and highways.

2.4 Effects Guidelines

Effects were identified by determining whether a specific utility would need to be relocated or modified to facilitate construction or operation of the Modified LPA. This includes both temporary and permanent impacts. As noted previously, the analysis focused on major utilities, which are defined in Section 3.1.

2.5 Data Collection Methods

The mapping and engineering data that was developed using MicroStation (a computer-aided drafting software program) for the CRC project was confirmed and updated with new information collected. The base maps used to show the utility data included color aerial photography, existing highways and streets, transit facilities, surface utility features such as manholes and poles, and property boundaries.

The following utilities were identified during the CRC project effort within and close to the project footprint:

- Water (Portland Water Bureau, Oregon, and City of Vancouver, Washington).
- Sanitary sewers (Bureau of Environmental Services, Oregon, and City of Vancouver, Washington).
- Storm sewers (City of Portland Bureau of Environmental Services, ODOT, Clark County, WSDOT).
- Power (Portland General Electric and Pacific Power).
- Natural gas (NW Natural).
- Communications (telephone, cable television, fiber optic, etc.). See Sections 3.2.3 and 3.3.3 below for detailed lists.
- Other (street and highway illumination, ramp meters, signalization, etc.). Information is not available at this phase of the project.

The list of utility owners that was compiled and developed for the CRC project was used for the initial utility owner review for the IBR Program. No updates were conducted for the Draft SEIS analysis. As design for the Modified LPA advances, the utility owners list will be updated and recompiled based on coordination and contacts. The CRC utility owners list was based on the resources and collection methods listed below:

- Discussions with WSDOT and ODOT staff.
- Review of permits and franchise agreements for utilities located within the I-5 right of way.

- CRC project permits provided by the U.S. Army Corps of Engineers.
- Internet searches.
- Information provided by One-Call organizations in Washington and Oregon.

Work, adjustments, field visits, or permit investigations performed during the CRC project to fit the data to existing features (such as poles and manholes) on the base map were used as a starting point for the IBR Program. Composite utility drawings prepared previously were used for the current phase of the project. More detailed information will be compiled during subsequent phases of design development and included in the Final SEIS as available.

Following the NEPA process, during detailed design, a subsurface utility company will begin working to update and complete the utility base maps. Once all utilities have been recorded, a conflict analysis will be performed to determine specific conflicts between the utilities and the project design, including at the local distribution level. The subsurface utility company will work with utility owners and designers to minimize impacts, determine relocation needs, and assist in creating agreements between each utility owner and the appropriate Program sponsor.

3. AFFECTED ENVIRONMENT

3.1 Introduction

This chapter describes existing utilities within the project footprint. There are a significant number of utilities that could be affected by the Modified LPA (for example, the plethora of overhead and underground lines and pipes located on Hayden Island and in downtown Vancouver).

As noted earlier, because the IBR Program is in an early stage of design development, the discussion in this report focuses only on major utility infrastructure. Major utility infrastructure has the greatest potential effect on and risk to the project budget, schedule, and the environment, while minor utility infrastructure is considered standard construction. Detailed planning for the protection and/or relocation of minor utilities during construction will take place during later phases of project design, after the NEPA process is complete.

For purposes of this technical report, major utilities were defined based on utility sizes or on a utility's importance to the system, such as utility lines that are the sole source of service to a particular area. The following utility sizes/types were defined as major utilities:

- Water lines 18 inches or larger
- Sanitary sewer lines 21 inches or larger
- Storm sewer lines 21 inches or larger
- High-pressure gas lines or steel pipe 8 inches or larger
- High-voltage transmission lines
- All communications infrastructure

In general, transportation agencies prefer that utilities not be located parallel to and under high-use corridors such as a freeway or light rail guideway. Most utilities owners also do not want their facilities located under such corridors because they would be difficult and expensive to maintain, repair, and replace. Additional concerns include the potential effect of stray currents from a light rail track electrification system. Within the study area, utilities typically cross rather than run parallel to the existing I-5 alignment, with one notable exception: Hayden Island and the bridges across North Portland Harbor and the Columbia River. In addition, the proposed light rail alignment through Vancouver includes areas where utilities run both parallel to and across the guideway.

Although there are some utilities on the Interstate Bridge, the Oregon-Washington state line (about mid-river) provides a logical place to separate how the affected environment and potential impacts are presented.

3.2 Existing Utilities – Oregon

Existing utilities in Oregon are shown on Figure 3-1. As mentioned above, the presence of bridges across North Portland Harbor and the Columbia River, combined with the narrow 2,200-foot width of Hayden Island at this location, focus utilities along the I-5 right of way. Utilities identified in the Oregon portion of the study area include:

- A water transmission main across the North Portland Harbor bridge (Portland Water Bureau).
- A main gas feed line across the North Portland Harbor bridge (NW Natural).
- Underwater power cable (Portland General Electric) and telephone lines located under the bed of North Portland Harbor, immediately west of the I-5 bridges.
- A trunk of communication cables, including a major telephone trunk line approximately 500 feet east of the existing Interstate Bridge, (telephone, television, data, and fiber optic from multiple utility providers) across North Portland Harbor, Hayden Island, and the Interstate Bridge across the Columbia River.

3.2.1 Water and Sanitary Sewer

Within the Oregon portion of the study area and its immediate environs, the City of Portland provides water and sanitary sewer services, the Portland Water Bureau provides water supplies, and the City of Portland Bureau of Environmental Services provides sanitary sewer service. Sewage from this part of the study area is conveyed to the Columbia Boulevard Wastewater Treatment Plant, several miles west of I-5 and well outside the study area.

There are two water transmission mains and one major sewage force main between Victory Boulevard and North Portland Harbor. One water main crosses I-5 between Victory Boulevard and Marine Drive, runs north along the west side of Expo Road, and then west along Marine Drive. The second water main crosses I-5 immediately south of North Portland Harbor and connects with the first main west of the Marine Drive interchange. A branch from the second main crosses North Portland Harbor on the existing highway bridge and is one of the two primary water supplies to Hayden Island. The sewage force main, composed of two pipes under I-5, crosses the highway between Victory Boulevard and Marine Drive east of I-5; the two force mains combine into a single 36-inch-diameter pipe and head north before crossing under Marine Drive.

On Hayden Island, two water mains cross under I-5: one on Jantzen Drive and one on Hayden Island Drive. While not shown on the figures, a smaller-diameter sewage force main is located on Jantzen Drive, and a water supply well, which is abandoned, is located immediately north of Jantzen Drive and east of I-5. Although smaller, the force main is important in that it serves all Hayden Island properties east of I-5. An unused well, which was formerly used to supply a water storage tank, is located south of Jantzen Drive and west of I-5. Both the well and the storage tank have been abandoned.

Figure 3-1. Existing Major Utilities in Oregon Study Area

3.2.2 Power and Natural Gas

South of the Oregon-Washington state line, Portland General Electric provides electricity to the area west of I-5 and south of North Portland Harbor and to all of Hayden Island. The City of Portland provides street lighting along Jantzen Drive on the west side of Hayden Island. Pacific Power serves the area east of I-5 and south of North Portland Harbor.

South of North Portland Harbor, electrical utilities comprise overhead primary distribution systems with a voltage of 13 kilovolts (kV) or less. An underwater power cable located immediately west of the North Portland Harbor Bridge connects the Delta Park and Hayden Island distribution systems; this cable also has a voltage of 13 kV or less. The location of the underwater cable is such that several main feed lines and primary switches for Hayden Island are located adjacent to I-5. On Hayden Island, electrical services within and close to the study area are typically underground, except for an overhead line located on the north bank of North Portland Harbor and west of the highway.

NW Natural provides natural gas service to the Oregon sub-study area. Existing infrastructure generally comprises low- or medium-pressure distribution and feed pipes. Of note is a major feed pipe that is located on the North Portland Harbor Bridge and is the sole supply of natural gas to Hayden Island.

3.2.3 Communications

There are six communication service providers with infrastructure within the Oregon sub-study area: AT&T Local Network Services, Comcast, Integra, Qwest, Time Warner, and Verizon Wireless. Comcast provides television, telephone, and wireless internet services; AT&T and Qwest provide telephone and internet services; and Integra and Time Warner provide data and internet services primarily to larger clients. The customer base of AT&T, Comcast, and Qwest extends through the Oregon sub-study area. While Integra and Time Warner only have customers in Vancouver within or near the study area, both companies have customers elsewhere within the Portland-Vancouver metropolitan area. In addition to the land-line-based infrastructure, AT&T and Verizon Wireless have cellular antenna arrays in the vicinity of Jantzen Drive, close to I-5 where it crosses Hayden Island.

The infrastructure of all four providers is concentrated along the I-5 corridor from the Marine Drive interchange south of North Portland Harbor to the SR 14 interchange north of the Columbia River. All providers consider this infrastructure to be part of their major trunk systems. The trunk systems for all four service providers are located on the North Portland Harbor Bridge, and three are located on the Interstate Bridge across the Columbia River. One trunk system crosses the Columbia River approximately 500 feet upstream of the Interstate Bridge and is beyond the expected direct influence of construction activities. On Hayden Island, communications services are located underground. South of North Portland Harbor, the infrastructure is frequently co-located on power poles.

One communication service provider has additional underwater cables immediately west of the North Portland Harbor Bridge that provide local services to Hayden Island. One provider also has a large controlled-environment vault on Hayden Island. Relocating this vault, which requires power and ventilation, would be a major undertaking for the utility owner in terms of both cost and duration.

In addition to the privately owned communication service providers described above, there is an ODOT communications system within this area. Figures and composite plans do not show this network for security reasons.

3.3 Existing Utilities – Washington

Existing utilities in Washington are shown on Figure 3-2 and Figure 3-3. As with the Oregon portion of the study area, the information shown for utility owners is based on that from the CRC project. Utilities identified in the Washington portion of the study area include:

- Three water transmission mains (City of Vancouver).
- Three sewer mains—including the Waterfront Sewer Pump Station system—that cross the study area (City of Vancouver).
- Low-to-medium pressure main gas lines (NW Natural).
- High-voltage transmission line that crosses I-5 at E 33rd Street (Clark Public Utilities).
- A trunk of communication cables (telephone, television, data, and fiber optics multiple utility providers) parallel to and crossing the study area.

3.3.1 Water and Sanitary Sewer

North of the Oregon-Washington state line, the City of Vancouver provides water and sanitary sewer services.

Within the Vancouver area, there are three major water transmission mains, two major gravity sanitary sewage pipes, and the City of Vancouver Waterfront Sewer Pump Station, which was built after the CRC project was discontinued. The water main and sewage pipes generally run in an east-west direction. The water mains all cross under I-5: one at Mill Plain Boulevard, one at McLoughlin Boulevard, and one at NE 40th Street. The latter main also crosses SR 500 between N and M Streets, east of the I-5/SR 500 interchange. One sewer (the South Side Interceptor) crosses I-5 between 5th and 6th Streets, while the second (the North Side Interceptor) is located on NE 39th Street east of I-5.

Although there are numerous water and sanitary sewage pipes located under downtown Vancouver streets, they mostly comprise smaller-diameter distribution and collection systems. While not shown on the figures, there is one smaller-diameter water main and also a sewer main that is part of the City of Vancouver Waterfront Sewer Pump Station system, both located along Columbia Way. These mains are the only sources of potable water, fire flows, and sewer service to businesses adjacent to Columbia Way and immediately east of I-5.

3.3.2 Power and Natural Gas

North of the Oregon-Washington state line, Clark Public Utilities provides electrical services. Some of the Clark Public Utility overhead power lines also carry fiber-optic cables owned by the utility, as well as communication cables owned by others. With the exception of a 69 kV transmission line that crosses I-5 at 33rd Street, electrical utilities within this part of the study area comprise overhead feed and distribution systems with a voltage of 13 kV or less.

As in Oregon, NW Natural provides natural gas service to the entire Washington sub-study area. Existing infrastructure generally comprises low- or medium-pressure distribution and feed pipes. The one exception is a high-pressure pipe located on Columbia Avenue and Columbia Street. This pipe is considered critical for maintaining gas pressure to customers in downtown Vancouver. A smaller gas line that crosses I-5 at McLoughlin Boulevard is also considered important for maintaining gas pressure to downtown Vancouver.

3.3.3 Communication

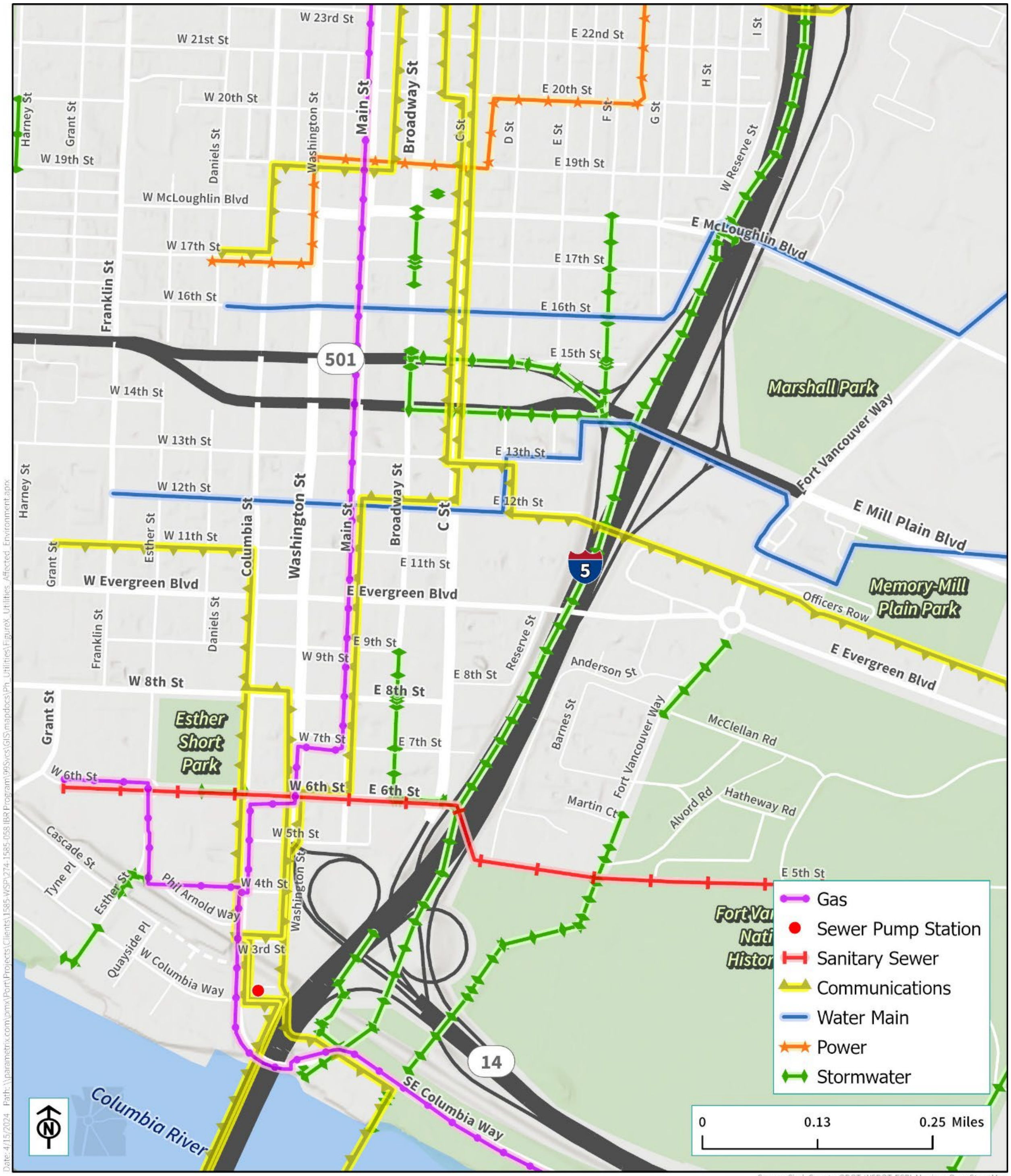
The utility provider list that was developed and compiled for the CRC project was used to identify communication service providers. There are five providers with infrastructure within the Washington portion of the study area: AT&T Local Network Services, Comcast, Integra, Qwest, and Time Warner.

Communications infrastructure within the Washington study area is frequently co-located on Clark Public Utility power poles. Three service providers maintain infrastructure located on the west side of the Interstate Bridge. One private utility provider has a submersible conduit crossing the Columbia River east of the Interstate Bridge. In addition, three service providers are co-located on a loop that re-crosses the Columbia River at the I-205 Glen Jackson Bridge.

One service provider has a large controlled-environment vault located in downtown Vancouver. Relocating this vault, which requires power and ventilation, would be a major undertaking for the utility owner in terms of both cost and duration. The same provider has an underground trunk line located on Washington Street, as well as trunk lines running east-west that cross I-5 at the Fourth Plain interchange and at E McLoughlin Boulevard.

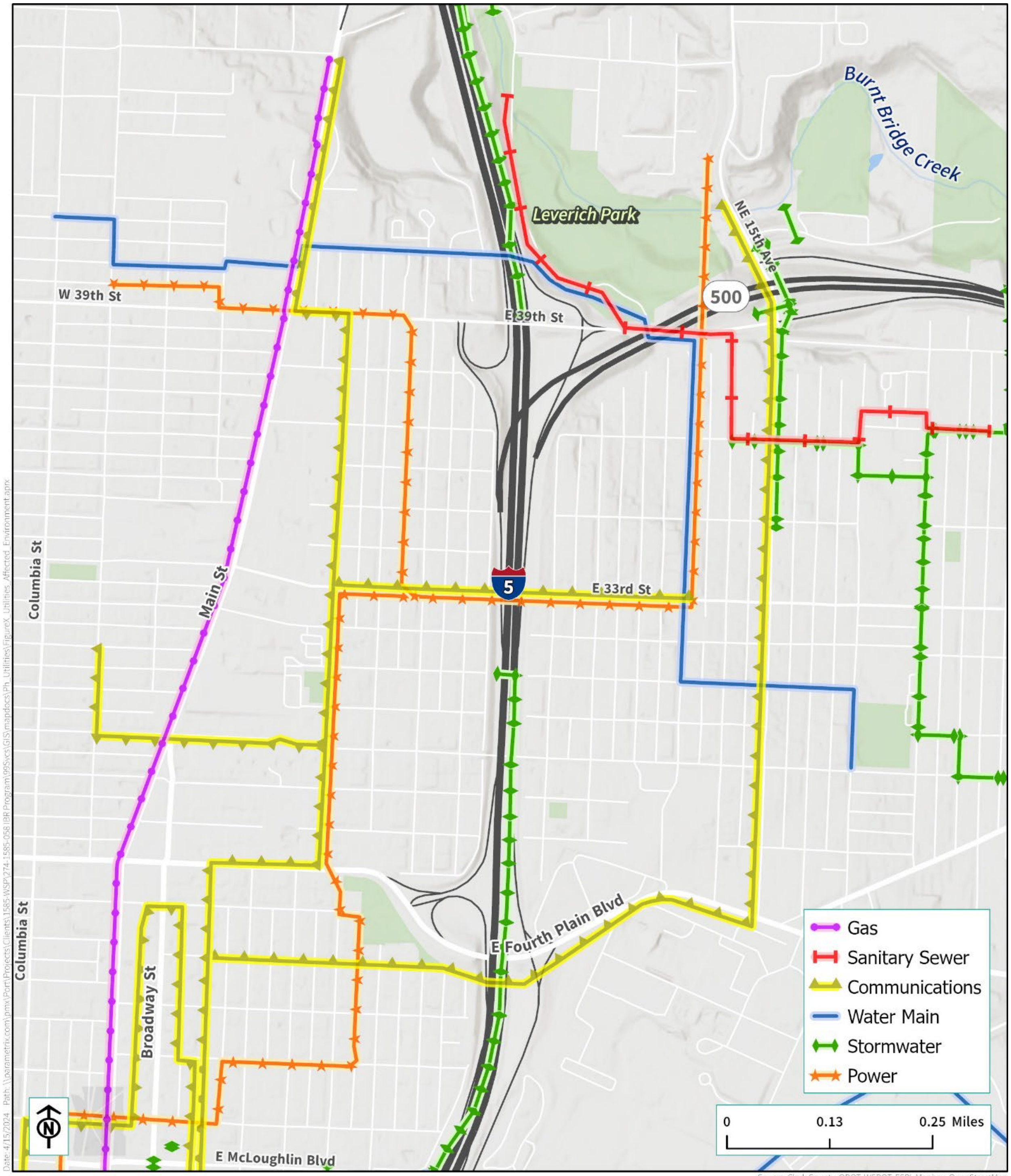
In addition to the privately owned communication service providers described above, there are two publicly owned networks within this segment: the WSDOT communication system and the Vancouver Area Smart Trek system. The Vancouver Area Smart Trek system is a cooperative effort by public transportation agencies in Clark County and is used, among other things, for transportation management and for transit operation and management. Figures and composite plans do not show these networks for security reasons.

Figure 3-2. Existing Major Utilities in Downtown Vancouver Study Area



Source: Clark County, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

Figure 3-3. Existing Major Utilities in North Vancouver Study Area



Source: Clark County, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

4. LONG-TERM EFFECTS

Long-term utility effects are defined as consequences of the Modified LPA, including adverse and beneficial effects, that could affect the operation of utilities in the study area. Long-term effects on utilities could include direct impacts to infrastructure, elements of the as-constructed project impairing access for maintenance, and reductions in the level of service.

The effects presented in this chapter focus on changes that could have a major impact on a utility's operation or level of service or on public safety. Although there are numerous utilities within or near the study area, most of them are part of local distribution systems and are not considered significant enough to warrant separate discussions.

The Modified LPA has the potential to affect a number of utilities within the study area. Their presence would be confirmed during final design, at which time their locations would be determined with a greater level of accuracy. As the design progresses, coordination with utility providers will be conducted to confirm there are no changes in impacts since the CRC EIS was prepared. In general, affected utilities would either be relocated or protected to maintain existing levels of service. Either the IBR Program or the utility owner would perform and/or pay for such work. Once relocated, the utilities would be more robust and reliable. Therefore, no long-term adverse impacts to utilities are expected.

4.1 No-Build Alternative

The No-Build Alternative would not involve any changes to existing utilities in the study area. However, damage to the Interstate Bridge from a seismic event could have adverse impacts to utilities located on or near the bridge and could hinder the provision of emergency services.

Failure of the North Portland Harbor Bridge could result in a loss of natural gas supplies to and water for fire flows on Hayden Island, and the underwater electrical cables and local telephone service to the island could also be severed. In addition, trunk communications cables could be cut if the North Portland Harbor and southbound Interstate Bridges failed, thus resulting in a loss of land-based communications within the Portland-Vancouver metropolitan area and beyond.

4.2 Modified Locally Preferred Alternative

Long-term effects on utilities could occur if the Modified LPA results in permanent changes to the location or operation of utility infrastructure. The IBR Program would work with utility providers as project design progresses to avoid impacts wherever feasible; the potential impacts noted below are in locations where it may be difficult for Program improvements to avoid modifying existing utility lines. If utilities must be relocated or otherwise modified, the IBR Program would work with the providers to ensure that existing infrastructure quality and service levels are maintained.

4.2.1 Potential Long-Term Effects – Oregon

The study area in Oregon is where the largest utility impacts (change in a utility's operation or level of service) would occur, particularly in terms of coordination. As stated previously, utilities are concentrated in a relatively narrow corridor between the Marine Drive and SR 14 interchanges, and potential impacts are complicated by utilities being located parallel to and under I-5 (see Figure 4-1). The major utilities in Oregon that may be affected are:

- Water supply main on the North Portland Harbor Bridge. This main, which is vital for maintaining fire flows on Hayden Island, could be affected by construction of an additional span at the north end of the bridge to accommodate the realignment of Jantzen Drive.
- Natural gas feed main on North Portland Harbor Bridge. This main provides supplies to Hayden Island and would be affected by construction of the new North Portland Harbor bridge.
- Communication cables across the North Portland Harbor Bridge, Hayden Island, and the southbound Interstate Bridge. Several of these are trunk lines and would be impacted by construction of the new North Portland Harbor bridge and reconstruction of the Marine Drive and Hayden Island interchanges.
- Underwater communication and power cables west of the existing North Portland Harbor Bridge would be affected by new ramp construction.
- Smaller-diameter sewage force main located under Jantzen Drive could be affected by the realignment of this street as it passes under I-5.
- Sanitary sewer force main crossing Marine Drive east of I-5 would be affected by the depth of fill or proposed improvements above the pipe. The force main then crosses I-5 between the Victory Boulevard and Marine Drive interchanges but would likely not be affected due to the minimal change in vertical profile.

Some of the above-mentioned utilities are the only links to Hayden Island. To maintain services, either temporary utility relocation and/or staging and sequencing provisions in the construction of new structures and demolition of the existing structures would need to be negotiated and mutually agreed to prior to start of project construction.

Other potentially affected utilities include:

- Water, power, gas, and communications infrastructure within the Marine Drive interchange could be affected by reconstruction of that interchange including potential ground improvements.
- Main electrical feeds and switches and main gas feed adjacent to I-5 on Hayden Island that would be affected by reconstruction of the Hayden Island interchange and by construction of the elevated light rail guideway. The extent of the impact would also depend on the extent of potential ground improvements and whether right of way would be vacated should existing streets be realigned.
- The existing cellular antenna array in the vicinity of Jantzen Drive would be affected by reconstruction of the Hayden Island interchange.

There are a number of utilities under Jantzen Drive and Hayden Island Drive. These two streets currently provide the only through connection under I-5 between developments on the island to the east and west of the highway.

The water main that crosses I-5 between the Victory Boulevard and Marine Drive interchanges is not likely to be affected by the Modified LPA. The vertical profile of the highway would not be substantially altered, and construction would be kept within the existing right of way.

Expansion of the existing TriMet Ruby Junction maintenance base and operations center would only involve the redevelopment of existing property and TriMet facilities. As such, utility impacts would be limited to infrastructure serving those facilities and located on the property being developed.

Figure 4-1. Impacts to Existing Major Utilities in Oregon Study Area

4.2.2 Potential Long-Term Effects – Washington

Within the Washington portion of the study area, the major existing utilities tend to cross rather than run parallel to the highway. A number of utilities within or near the study area may result in a change in the utility's location or operation (see Figure 4-2 and Figure 4-3). The major utilities that may be affected are:

- A large-diameter gravity sanitary interceptor sewer crossing I-5 around 5th and 6th Streets in downtown Vancouver could be affected by construction of new ramps at the SR 14 interchange.
- Communications infrastructure, a sewage lift station and force main, and a high-pressure gas line between the SR 14 interchange and the Columbia River could be affected by proposed bridge construction, SR 14 interchange improvements, and local street improvements. The extent of impacts to the gas line, which is considered critical, would depend on whether the Columbia Way right of way would be vacated should the street be realigned.
- The water supply main crossing I-5 at Mill Plain Boulevard could be affected when the vertical profile of the boulevard is lowered to provide vertical clearance for the widened highway. Loss of the main could affect water supplies and fire flows.
- A communications duct bank crossing I-5 at Fourth Plain Boulevard could be affected by the construction of additional lanes.
- A high-voltage electrical transmission line crossing I-5 at 33rd Street could be affected by over-crossing reconstruction. One or both poles at either end of the Interstate Bridge could conflict with construction of the new, longer Columbia River bridges.
- A water supply main crossing I-5 at NE 40th Street could be affected by construction of a new ramp near 39th Street. Loss of the main could affect water supplies and fire flows.
- Depending on the type of bridge foundations adopted, a sewage lift station on Columbia Street might be affected.
- Communications trunk lines belonging to two service providers, located along Washington Street south of W 6th Street, could be affected by road improvements south of West 6th Street.
- A water supply main and gas line crossing I-5 at McLoughlin Boulevard, which would have been affected by the CRC LPA, are unlikely to be affected by the Modified LPA when the vertical profile of the boulevard is lowered.

Figure 4-2. Impacts to Existing Major Utilities in Downtown Vancouver Study Area

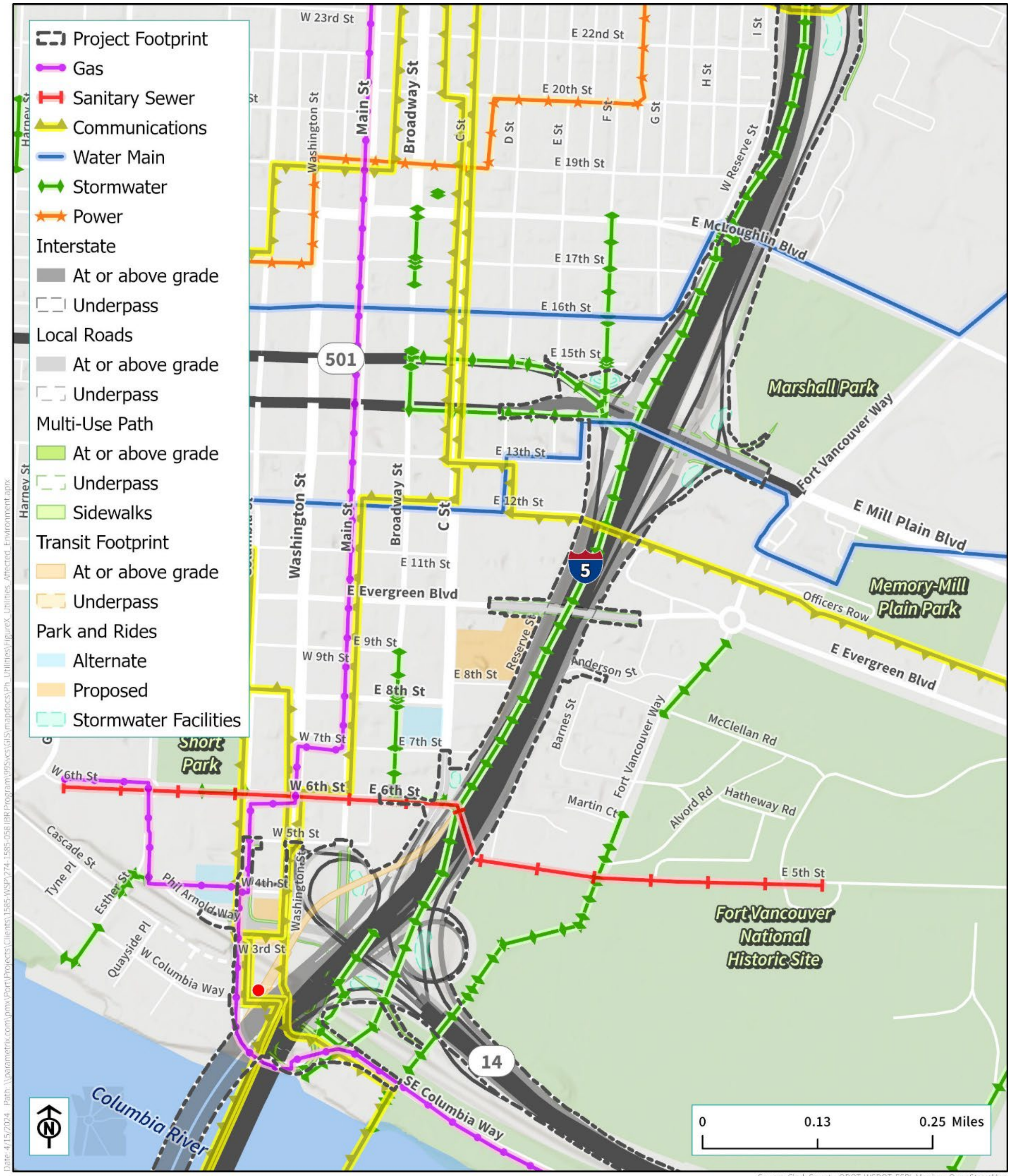
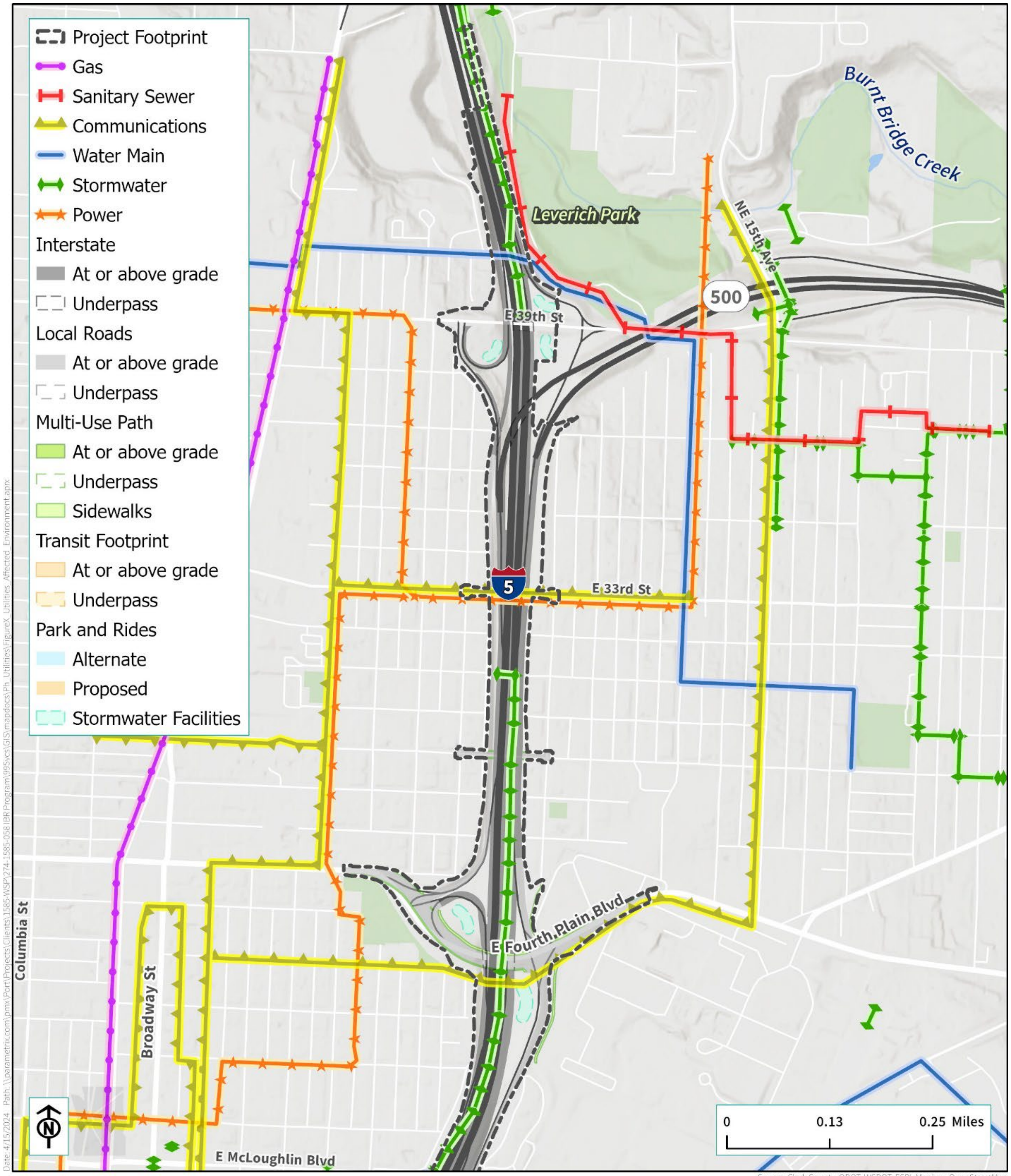


Figure 4-3. Impacts to Existing Major Utilities in North Vancouver Study Area



4.2.3 Design Options

4.2.3.1 Two Auxiliary Lanes

The long-term direct effects would be the same as the Modified LPA with one auxiliary lane.

4.2.3.2 Single-Level Fixed-Span Configuration

The long-term direct effects would be the same as the Modified LPA with double-deck fixed-span configuration.

4.2.3.3 Single-Level Movable-Span Configuration

The long-term direct effects would be the same as the Modified LPA with double-deck fixed-span configuration.

4.2.3.4 State Route 14 Interchange without C Street Ramps

The long-term direct effects would be the same as the Modified LPA with the C Street ramps.

4.2.3.5 I-5 Mainline Westward Shift

The long-term direct effects would be the same as the Modified LPA with the centered I-5 mainline.

4.2.3.6 Park and Rides

The park-and-ride locations at W 4th Street and W 3rd Street could each create an additional long-term impact by requiring relocation or replacement of the existing utilities located there. The other park-and-ride facility options would not create additional long-term impacts to existing utilities.

5. TEMPORARY EFFECTS

Temporary utility effects are defined as consequences of the Modified LPA that would occur during construction. These could include temporary rerouting of utility lines and work to reconnect relocated utilities to the system. Such activities may result in temporary service outages for limited periods of time. Generally, affected utilities would be restored to pre-project conditions or better after the project is completed. More information on temporary utility changes will be developed during detailed design and construction planning; the facilities noted in this subsection are those determined to have the highest likelihood of experiencing temporary impacts due to their location and the type of construction activities anticipated.

5.1 Modified LPA

Temporary impacts to utilities during construction would result from the need to relocate the utilities or protect them in place to prevent damage from, or conflict with, new Modified LPA infrastructure. The largest temporary utility impacts would occur in the area between Marine Drive and the SR 14 interchange. Between these interchanges, utilities are concentrated in a relatively narrow corridor parallel to or under I-5; the utilities would require temporary relocation during construction. Throughout the study area, utility providers would be contacted during design regarding temporary utility relocations and/or staging and sequencing provisions, many of which could occur in the early phase of construction, prior to heavy civil construction phases.

Tying in relocated utilities could result in a temporary loss of services; these impacts are expected to have a short duration. However, for some utilities such as communications, tying in to the existing trunk lines from the new relocated lines could take an extended period for splicing and connecting multiple cables.

Depending on the construction sequence, temporary relocations could be necessary before a utility is in its final location. Construction contracts for the project would include provisions to protect and maintain utilities. Such provisions could include providing duct banks, facilitating the attachment of utilities to new structures, and construction windows that provide adequate time for utilities to pull cables and to tie in relocated utilities.

Specific locations for staging areas or casting yards have not been identified outside of the project footprint. At this stage of project development, it is not known what sites may be used or the specifics of how a particular site might be developed. However, it is anticipated that sites used for these purposes would only contain utilities serving those parcels. Should this not be the case, the utility infrastructure would be protected in place or relocated.

5.1.1 Potential Temporary Effects – Oregon

The following major utilities in Oregon on the North Portland Harbor bridge may be temporarily affected:

- A water main that supplies water to Hayden Island, including for fire flows, would be affected by a new span to accommodate the Jantzen Drive realignment.

- A natural gas feed main serving Hayden Island would be affected by the new North Portland Harbor bridges.
- Communication cables across the North Portland Harbor bridge, on Hayden Island, and on the southbound Columbia River bridge, including several trunk lines, would be affected by the new North Portland Harbor bridges and improvements to the Marine Drive and Hayden Island interchanges.

Additionally, underwater communication and power cables west of the North Portland Harbor bridge would be affected by construction of the new North Portland Harbor bridges and ramps. Sanitary sewer force mains crossing Marine Drive and Jantzen Drive could also be affected.

Other potentially affected utilities include:

- Water, power, gas, and communications infrastructure would be affected by Marine Drive interchange reconstruction.
- Electrical feeds and switches and the main gas feed adjacent to I-5 on Hayden Island would be affected by reconstruction of the Hayden Island interchange, construction of light-rail, and roadway realignments.
- The existing cellular antenna array in the vicinity of Jantzen Drive would be affected by reconstruction of the Hayden Island interchange.

5.1.2 Potential Temporary Effects – Washington

Major utilities that cross I-5 in Washington and would be temporarily affected include:

- A sanitary interceptor sewer crossing I-5 around 5th and 6th Streets in Vancouver would be affected by construction of new ramps at the SR 14 interchange.
- Communications infrastructure, a sewage lift station and force main, and a high-pressure gas line between the SR 14 interchange and the Columbia River may be affected by bridge construction, improvements to SR 14, and local street improvements.
- A water supply main crossing I-5 at Mill Plain Boulevard would be affected by street reconstruction.
- A communications cable and duct bank crossing I-5 at Fourth Plain Boulevard would be affected by the construction of additional lanes.
- A high-voltage electrical transmission line crossing I-5 at 33rd Street could be affected by overcrossing reconstruction. One or both poles at either end of the existing Interstate Bridges could conflict with construction of the new, longer Columbia River bridges.
- A water supply main crossing I-5 at McLoughlin Boulevard may be affected when the street is modified to allow for the widened highway and transit guideway, and by construction of the guideway S-curve between 17th Street and McLoughlin.
- A sewage lift station at Columbia Street could be affected by new bridge foundations.
- A water supply main crossing I-5 at NE 40th Street would be affected by construction of a new ramp at NE 39th Street.

- Communication trunk lines on Washington Street south of W 6th Street would be affected by road reconstruction.

5.2 Design Options

Construction at the potential park-and-ride locations in downtown Vancouver could temporarily impact existing utilities located along local streets near the park-and-ride site options. This could include temporary service disruptions, utility relocation, and/or installation of new utility services.

6. INDIRECT EFFECTS

Indirect effects are reasonably foreseeable, projected, or unknown effects that may occur as a result of the Modified LPA but occur later in time or outside of the study area.

Public and private utilities—including water, sanitary sewer, electricity, natural gas, and communications service providers—could experience indirect effects from operation of the Modified LPA. These utilities generally plan for service based on forecast population and development patterns reflected in the long-range comprehensive plans of the jurisdictions they serve. Providers evaluate future population growth and calculate needed future service increases such as expanded treatment plants, new equipment, or new facility locations. As described in the Land Use Technical Report, the Modified LPA would facilitate growth in the study area, particularly in new light-rail station areas, in a manner consistent with local and regional land use plans. This, in turn, could result in increased demand for utilities in areas where growth occurred. The increased needs would be in urbanized areas where utilities are already present; it is not anticipated that any extension of service to new geographic areas would be required. Because anticipated density increases in downtown Vancouver and on Hayden Island are consistent with current long-range plans and growth assumptions, the Program is not expected to require changes to individual long-range service plans. To the extent that transit-oriented development occurs sooner as a result of constructing the Modified LPA, elements of individual service plans (such as changing service boundaries) could occur sooner than the long-range plans anticipated. Increased service provision would be made easier by the fact that transit-oriented development would occur in urbanized areas that are already well served by utility infrastructure. Depending on the utility, the costs of expanding service may be covered in whole or in part through an expanded customer base and/or development fees.

7. MITIGATION FOR LONG-TERM AND TEMPORARY EFFECTS

7.1 Long-Term Effects

7.1.1 Regulatory Requirements

- ODOT and WSDOT would develop or modify agreements with affected utility owners to specify the locations of utilities within the right of way, access and maintenance requirements, etc.

7.1.2 Program-Specific Mitigation

There is no Program-specific mitigation for utilities.

7.2 Temporary Effects

7.2.1 Regulatory Requirements

- The IBR Program would comply with current federal Dig Once laws (23 Code of Federal Regulations 645.307) and associated state regulations and guidelines, which require advanced coordination with the broadband/fiber industry to invite these providers to participate in highway improvement projects.

7.2.2 Program-Specific Mitigation

- Protect utilities in place where feasible and cost-effective.
- Work with utility providers to relocate utilities when protection in place is not feasible, with the goal of relocating facilities only once to reduce service disruptions.
- Coordinate closely with utility owners during project design to identify temporary facility needs and minimize temporary construction disruptions.

8. PERMITS AND APPROVALS

Use and occupancy agreements (permits and franchises) would be required from ODOT and WSDOT for utilities located within their right of way. The utility owners, however, would obtain these. The utility owner or contractor performing relocation work would also obtain any other permits and approvals specifically required for that work by federal, state, or local government agencies. Appendix A provides a list of existing permits and franchises issued by ODOT and WSDOT for utilities within the I-5 right of way.

9. REFERENCES

Metro. 2018. 2018 Regional Transportation Plan. Available at <https://www.oregonmetro.gov/regional-transportation-plan>. Accessed April 5, 2023.

RTC (Regional Transportation Commission). 2019. Regional Transportation Plan for Clark County. Available at <https://www.rtc.wa.gov/programs/rtp/clark/>. Accessed June 6, 2023.

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Appendix A. ODOT and WSDOT Permits and Franchises

Table A-1. Permits Issued by ODOT for I-5 Right of Way

Permit No.	Year Issued	Utility Type	Applicant	Comments
4734	1955	Communications	Pacific Telephone & Telegraph Company	MP 6.24 (prior Mile Post system). Telephone cable crossing.
6142	1962	Communications	Pacific Northwest Bell	MP 307.45. U/G telephone cable.
5225	1964	Communications	Pacific Northwest Bell	MP 6.63 - 6.77 (prior Mile Post system). Telephone cable. Modified later.
11761	1967	Water	Hayden Island, Inc.	MP 308.02. 6" steel. Not shown on City of Portland data - could be abandoned.
11973	1967	Electricity	Portland General Electric	MP 307.69. U/G 11 kV crossing. Amended in Salem Permit Office.
12240	1968	Sewer	Hayden Island, Inc.	MP 6.28 (prior Mile Post system). 8" welded steel pipe.
12259	1971	Communications	Pacific Northwest Bell	Location on attached map is not clear: it is likely at intersection of Hayden Island Drive and Center Avenue.
13509	1970	Water	Hayden Island, Inc.	MP 7.69 (prior Mile Post system). 12" pipe. Replaced - see Permit #30861.
13681	1970	Electricity	Portland General Electric	MP 6.59 - 6.60 (prior Mile Post system). 17kV buried cable and switch/transformer house. Current configuration not as shown on the permit.
14228	1971	Gas	Northwest Natural Gas Company	MP 307.69 - 307.99. 2" and 4" pipe.
15306	1972	Water	City of Portland	MP 307.06. 24-inch casing for 16-inch steel main.
15572	1972	Water	City of Portland	MP 307.05. 16-inch DIP crossing.
16216	1973	Communications	City of Portland	MP 307.48 - 307.70. Fire alarm cable suspended under Oregon Slough Bridge. Not shown for security reasons.
17675	1976	Communications	Pacific Northwest Bell	MP 308.14 - 308.16. Concrete parking area.
18599	1977	Sewer	City of Portland	MP 306.64 - 306.83. 6-inch DIP force main.

Permit No.	Year Issued	Utility Type	Applicant	Comments
19107	1977	Gas	Northwest Natural Gas Company	MP 308.15 - 308.17. 2-inch steel.
20738	1979	Communications	Pacific Northwest Bell	MP 368.25. U/G cable. Mile Post is incorrect.
25437	1985	Communications	Pacific Northwest Bell	MP 307.45. U/G telephone cable and cable suspended under North Portland Harbor Bridge deck.
27148	1987	Communications	Roger's Cable Systems	MP 307.47 - 307.70. U/G TV cable and suspended cable under North Portland Harbor Bridge deck.
30693	1990	Water	City of Portland	MP 307.33 - 307.51. 16-inch DIP.
30861	1990	Water	City of Portland	MP 308.06 - 308.16. 12-inch DIP.
2BM35007	1990	Gas	Northwest Natural Gas Company	MP 307.32 - 307.47. 8-inch steel line.
2BM35178	1992	Sewer	City of Portland	MP 307.70. 10-inch PVC force main crossing.
2BM35338	1993	Communications	Red Lion Inn	MP 308.00. Record existing telephone cable.
2BM35356	1994	Communications	Columbia Cable of Washington	MP 307.99 - 308.38. 2-inch conduit with fiber-optic cable across Interstate Bridge. Extends onto Washington side. Shown as a submarine crossing at lift span.
2BM35638	1996	Sewer	City of Portland	MP 307.16. 20-inch and 30-inch force main.
2BM35797	1997	Communications	TCI	MP 307.99 - 308.38. Temporary permit for installing fiber-optic cable on Interstate Bridge. Extends onto Washington side.
2BM35800	1997	Communications	All Phase Communications	MP 307.80 - 307.99. U/G fiber-optic cable.
2BM35801	1997	Communications	All Phase Communications	MP307.99 - 308.38. PVC conduits on I-5 bridges for fiber-optic cable. Extends onto Washington side, and includes vault and pull boxes.
2BM35831	1997	Communications	All Phase Communications	MP 307.46 - 307.70. Fiber-optic cable suspended under Oregon Slough Bridge.
2BM35873	1997	Communications	GST Telecom	MP 307.30. U/G fiber-optic cable. Mile Post is incorrect – cable located on Pier 99 Street.
2BM36005	1998	Water	City of Portland	MP 307.45. 8-inch DIP.
2BM36010	1998	Communications	Electric Lightwave	MP 307.48. O/H fiber-optic line on PP&L poles.

Permit No.	Year Issued	Utility Type	Applicant	Comments
2BM36073	1999	Communications	Paragon Cable	MP 307.46 - 307.47. U/G fiber-optic & TV cable.
2BM36236	2000	Electricity	Portland General Electric	MP 308.00. U/G mainline backbone feeder.
2BM36242	2000	Electricity	Portland General Electric	MP 308.00. 4-inch and 6-inch U/G power conduit.
2BM36281	2000	Communications	Hayden Corner	MP 308.00. Replace traffic loop detector - loops not shown on drawings.
2BM36614	2002	Water	Doubletree Hotel	MP 308.00. Connection to ODOT water line. Insufficient information to verify location. Private connections not shown on the drawings.
2BM36829	2003	Communications	Qwest	MP 307.71. U/G 2-inch service conduit. Service connections not shown on drawings.
2BM37005	2005	Communications	Qwest	MP 307.71. U/G telephone cable.

Table A-2. Franchises and Permits Issued by WSDOT for I-5 Right of Way

Permit No.	Year Issued	Utility Type	Applicant	Comments
FRANCHISES				
	1994	Communications	Columbia Cable of Washington	MP 0.00 - 0.17. See ODOT Permit # 2BM35356.
	1997	Communications	All Phase Communications	See ODOT Permit # 2BM35801.
	1997	Communications	TCI	MP 0.00 - 0.23. See ODOT Permit # 2BM35797.
6423	1980	Electricity	Clark Public Utilities	MP 0.27. Existing 12.5kV O/H crossing. Franchise Agreement (expires 2005).
6423	1980	Electricity	Clark Public Utilities	MP O.53. Existing guy wire and neutral wire O/H crossing. Franchise Agreement (expires 2005). No longer there.
6423	1980	Electricity	Clark Public Utilities	MP 0.65. Existing 12.5kV O/H crossing. Franchise Agreement (expires 2005).
6423	1980	Electricity	Clark Public Utilities	MP 0.93. Existing 12.5kV O/H crossing. Franchise Agreement (expires 2005).
6423	1980	Electricity	Clark Public Utilities	MP 1.23. Existing 2-inch to 6-inch conduits without cable. Franchise Agreement (expires 2005).
6423	1980	Electricity	Clark Public Utilities	MP 1.82. Existing 12.5kV O/H crossing. Franchise Agreement (expires 2005).
6423	1980	Electricity	Clark Public Utilities	MP 2.02. Existing 69kV O/H crossing. Franchise Agreement (expires 2005).
6644	1984	Communications	Pacific Northwest Bell Telephone Co.	MP 0.54. O/H telephone cable crossing. Franchise Agreement (expires 2009). Crossing no longer exists.
6644	1984	Communications	Pacific Northwest Bell Telephone Co.	MP 0.84. O/H telephone cable crossing. Franchise Agreement (expires 2009). Crossing is on Interstate Bridge.
6644	1984	Communications	Pacific Northwest Bell Telephone Co.	MP 1.55. U/G telephone cable crossing encased in a 30-inch steel pipe. Franchise Agreement (expires 2009).
6644	1984	Communications	Pacific Northwest Bell Telephone Co.	MP 1.56. U/G telephone cable crossing. Franchise Agreement (expires 2009).
6644	1984	Communications	Pacific Northwest Bell Telephone Co.	MP 1.98. O/H telephone cable crossing. Franchise Agreement (expires 2009). Crossing is actually at 33rd (MP 2.02).

Permit No.	Year Issued	Utility Type	Applicant	Comments
6644	1984	Communications	Pacific Northwest Bell Telephone Co.	MP 0.29 - 0.32. U/G telephone cable crossing. Franchise Agreement (expires 2009).
6644	1991	Communications	Pacific Northwest Bell Telephone Co.	MP 1.55 - 1.62. U/G telephone cable crossing: within an existing duct. Franchise Agreement (expires 2009).
6644	1991	Communications	Pacific Northwest Bell Telephone Co.	MP 1.56 - 1.62. U/G telephone cable crossing: within existing ducts. Franchise Agreement (expires 2009).
40006	1985	Gas	Northwest Natural Gas Company	MP 0.25. 6-inch steel. Franchise Agreement (expires 2010).
40006	1985	Gas	Northwest Natural Gas Company	MP 1.28 - 1.29. 4-inch steel. Franchise Agreement (expires 2010).
40025	1987	Water	City of Vancouver	MP 0.25. 6-inch DIP. Franchise Agreement (expires 2012).
40025	1987	Water	City of Vancouver	MP 0.54 - 0.56. 12-inch DIP. Franchise Agreement (expires 2012).
40025	1987	Water	City of Vancouver	MP 0.58 - 0.60. 12-inch DIP. Franchise Agreement (expires 2012).
40025	1987	Water	City of Vancouver	MP 1.00 - 1.04. 12-inch DIP. Franchise Agreement (expires 2012).
40025	1987	Water	City of Vancouver	MP 1.03 - 1.08. 8-inch pipe. Franchise Agreement (expires 2012). Partly abandoned.
40025	1987	Water	City of Vancouver	MP 1.03 - 1.04. 6-inch pipe. Franchise Agreement (expires 2012).
40025	1987	Water	City of Vancouver	MP 2.33 - 2.37. 8-inch DIP. Franchise Agreement (expires 2012).
40025	1987	Water	City of Vancouver	MP 2.36 - 2.38. 8-inch DIP with a 2-inch galvanized pipe. Franchise Agreement (expires 2012).
40025	1987	Water	City of Vancouver	MP 1.30. 20-inch DIP crossing not previously described. Franchise Agreement (expires 2012).
40025	1987	Water	City of Vancouver	MP 1.68. 6-inch pipe crossing in 36-inch culvert not previously described. Franchise Agreement (expires 2012). Abandoned.
40025	1987	Water	City of Vancouver	MP 1.83. 12-inch DIP crossing in 42-inch culvert not previously described. Franchise Agreement (expires 2012).

Permit No.	Year Issued	Utility Type	Applicant	Comments
40025	1987	Water	City of Vancouver	MP 1.97. 10-inch DIP crossing in 42-inch culvert not previously described. Franchise Agreement (expires 2012).
40058	1988	Sewer	City of Vancouver	MP 0.26. Existing 8-inch CSP. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 0.43 - 0.44. Existing 8-inch CSP. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 0.44 - 0.45. Existing 8-inch CSP. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 0.56 - 0.58. Existing 33-inch pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 1.03. Existing 8-inch pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 1.08. Existing 8-inch pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 1.19 - 1.26. Existing 10-inch pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 1.30 - 1.37. Existing 8-inch pipe. Franchise Agreement (expires 2013). Abandoned.
40058	1988	Sewer	City of Vancouver	MP 1.68. Existing 14-inch pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 1.68. Existing 12-inch pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 2.25 - 2.29. Existing 8-inch pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 2.29 - 2.34. Existing 8-inch pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 2.34 - 2.35. Existing 27-inch pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 2.31 - 2.37. Existing 8-inch pipe. Franchise Agreement (expires 2013).
40058	1988	Sewer	City of Vancouver	MP 2.41 - 2.44. Existing 12-inch pipe. Franchise Agreement (expires 2013).
40118	1994	Communications	Columbia Cable of Washington	MP 0.00 - 0.26. 2-inch duct with fiber-optic cable on Interstate Bridge. Franchise Agreement (expires 2019).
40118	1998	Communications	TCI	MP 0.00 - 0.26. 2-inch duct with fiber-optic cable. High level crossing of

Permit No.	Year Issued	Utility Type	Applicant	Comments
				Interstate Bridge lift span. Franchise Agreement (expires 2019).
40118	1998	Communications	TCI	MP 2.02. O/H fiber-optic cable crossing. Franchise Agreement (expires 2019).
40151	1997	Communications	Electric Lightwave	MP 0.26 - 0.27. O/H fiber-optic cable crossing. Franchise Agreement (expires 2022).
40151	1997	Communications	Electric Lightwave	MP 2.02. O/H fiber-optic cable crossing. Franchise Agreement (expires 2022).
40161	1998	Communications	GTE	MP 1.82. O/H fiber-optic cable crossing. Franchise Agreement (expires 2023).
PERMITS				
8828	1983	Communications	Cox Cable	MP 0.94. O/H CATV cable crossing. See #11072.
8842	1984	Communications	Cox Cable	MP 1.84. Two CATV cables within 29th Street structure.
8868	1983	Electricity	Clark Public Utilities	MP 0.66 - 0.69. 4-inch PVC duct with 12.5kV cable.
9749	1984	Communications	City of Vancouver	MP 1.03 - 1.05. U/G cable in PVC duct.
9278	1985	Communications	Cox Cable	MP 0.79 - 0.84. U/G CATV cable parallel to I-5 in 2-inch PVC duct.
11013	1994	Communications	Clark Public Utilities	MP 0.94 - 0.95. O/H fiber-optic cable lashed to neutral wire authorized under Franchise #6423.
11072	1995	Communications	Columbia Cable of Washington	MP 0.94. O/H CATV cable crossing.
11466	1996	Communications	TCI	MP 1.27 - 1.28. Two, 2-inch PVC ducts. One is empty and one has a CATV cable.
U1196	2001	Communications	City of Vancouver	MP 1.03 - 1.05. U/G 3-inch duct with fiber-optic cable.
U1271	2002	Communications	Clark County Dept. of Information Technology	MP 0.85. Three, 1.25-inch fiber-optic cable ducts.
U1315	2002	Communications	Clark Public Utilities	MP 0.26 - 0.28. O/H fiber-optic cable crossing.
U1444	2004	Communications	City of Vancouver	MP 1.58. Fiber-optic cables.