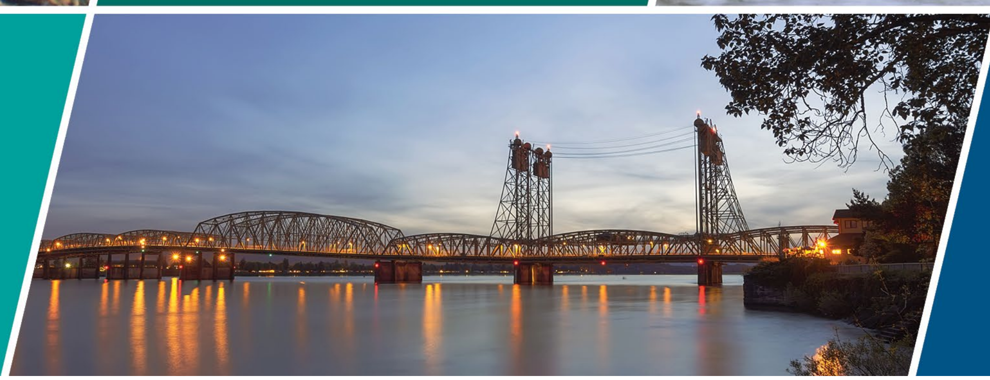
Considering the importance of our natural environment



Hazardous Materials Technical Report

September 2024

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Hazardous Materials Technical Report

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CONTENTS

1. PROJECT OVERVIEW ... 1-1
1.1 Components of the Modified LPA ... 1-3
1.1.1 Interstate 5 Mainline ... 1-7
1.1.2 Portland Mainland and Hayden Island (Subarea A) ... 1-12
1.1.3 Columbia River Bridges (Subarea B) ... 1-21
1.1.4 Downtown Vancouver (Subarea C) ... 1-40
1.1.5 Upper Vancouver (Subarea D) ... 1-43
1.1.6 Transit Support Facilities ... 1-46
1.1.7 Transit Operating Characteristics ... 1-49
1.1.8 Tolling ... 1-52
1.1.9 Transportation System- and Demand-Management Measures ... 1-53
1.2 Modified LPA Construction ... 1-54
1.2.1 Construction Components and Duration ... 1-55
1.2.2 Potential Staging Sites and Casting Yards ... 1-56
1.3 No-Build Alternative ... 1-57

2. METHODS ... 2-1
2.1 Introduction ... 2-1
2.2 Study Area ... 2-2
2.3 Relevant Laws and Regulations ... 2-2
2.3.1 Federal ... 2-2
2.3.2 State ... 2-4
2.4 Data Collection Methods ... 2-9
2.4.1 Phase I Environmental Site Assessments ... 2-9
2.4.2 Program-Wide Evaluation of Environmental Conditions ... 2-14
2.5 Guidelines for Evaluating Potential Effects ... 2-15
2.6 Data Screening Methods ... 2-15
2.6.1 Phase I ESAs ... 2-15
2.6.2 Full and Partial Acquisitions ... 2-16
2.6.3 Program-Wide Evaluation of Environmental Conditions ... 2-16
2.7 Methods for Evaluating Short-Term and Long-Term Effects ... 2-26
2.7.1 Short-Term Effects from Construction Activities ... 2-26
2.7.2 Long-Term Effects from Operation and Maintenance ... 2-26
2.8 Mitigation Measures ... 2-26

2.9 Coordination 2-27

3. AFFECTED ENVIRONMENT 3-1

3.1 Physical Setting 3-1

3.1.1 Current Land Use 3-1

3.2 Environmental Setting 3-3

3.2.1 Topography and Drainage 3-3

3.2.2 Fluvial Setting 3-3

3.2.3 Existing Stormwater Conveyance Systems 3-10

3.2.4 Stormwater Quality 3-11

3.2.5 Geologic Setting 3-11

3.2.6 Hydrogeologic Setting 3-12

3.2.7 Groundwater Quality 3-13

3.3 Phase I Environmental Site Assessments 3-13

3.4 Program-Wide Evaluation of Environmental Conditions 3-29

3.4.1 Database Review 3-29

3.4.2 Historical Land Use Review 3-29

3.4.3 Site Reconnaissance Results 3-30

3.4.4 TriMet Ruby Junction Maintenance Facility 3-31

3.4.5 Staging Areas 3-31

4. ENVIRONMENTAL SITE ASSESSMENT AND HAZARDOUS MATERIALS SITE IDENTIFICATION EVALUATION 4-1

4.1 Phase I Environmental Site Assessments 4-1

4.1.1 Overview of Identified Recognized Environmental Conditions and Recommendations. 4-1

4.1.2 Washington 4-2

4.1.3 Oregon 4-8

4.2 Program-Wide Evaluation of Environmental Conditions 4-13

4.3 Evaluation of Results 4-13

4.3.1 No-Build Alternative 4-13

4.3.2 Modified LPA 4-13

4.3.3 Design Options 4-14

5. TEMPORARY EFFECTS 5-1

5.1 Property Acquisition Liability 5-1

5.2 Effects on the Environment from Construction 5-2

5.2.1 Acquisitions 5-2

5.2.2 Permanent and Temporary Easements 5-3

5.3 Environmental Impacts on the Modified LPA 5-3
5.3.1 Surface and Subsurface Soils 5-4
5.3.2 Stormwater 5-5
5.3.3 Surface Water 5-5
5.3.4 Sediment 5-6
5.3.5 Groundwater 5-7
5.4 Potential Effects on Construction Activities 5-9
5.4.1 Worker Safety and Public Health 5-9
5.4.2 Hazardous and Non-Hazardous Wastes 5-10
5.4.3 Underground Storage Tanks 5-11
5.4.4 Lead and Asbestos-Containing Materials 5-11
5.4.5 Other Areas to Address for the Modified LPA 5-12

6. LONG-TERM BENEFITS AND EFFECTS 6-1
6.1 Property Acquisition Liability 6-1
6.1.1 No-Build Alternative 6-1
6.1.2 Modified LPA 6-1
6.1.3 Design Options 6-2
6.2 Adverse Effects on the Environment from Operation and Maintenance 6-2
6.2.1 Spills and Releases 6-2
6.2.2 Stormwater Conveyance System and Treatment Facilities 6-3
6.3 Adverse Effects on Operation and Maintenance from Hazardous Materials 6-4
6.3.1 Legacy Hazardous Material Sites 6-4

7. INDIRECT EFFECTS 7-1

8. PROPOSED MITIGATION MEASURES FOR THE MODIFIED LPA 8-1
8.1 Long-Term Effects 8-1
8.1.1 Regulatory Requirements 8-1
8.1.2 Program-Specific Mitigation 8-1
8.2 Temporary Effects 8-2
8.2.1 Regulatory Requirements 8-2
8.2.2 Program-Specific Mitigation 8-2

9. PERMITS AND APPROVALS 9-1
9.1 Federal 9-1
9.2 State of Oregon 9-1
9.3 State of Washington 9-1
9.4 City of Portland 9-2

9.5 City of Vancouver 9-2

10. REFERENCES 10-1

FIGURES

Figure 1-1. IBR Program Location Overview 1-2
Figure 1-2. Modified LPA Components 1-5
Figure 1-3. Modified LPA – Geographic Subareas 1-6
Figure 1-4. Cross Section of the Collector-Distributor Roadways 1-8
Figure 1-5. Collector-Distributor Roadways 1-9
Figure 1-6. Comparison of Auxiliary Lane Configurations 1-11
Figure 1-7. Auxiliary Lane Configuration Footprint Differences 1-12
Figure 1-8. Portland Mainland and Hayden Island (Subarea A) 1-13
Figure 1-9. Levee Systems in Subarea A 1-15
Figure 1-10. Vehicle Circulation between Hayden Island and the Portland Mainland 1-19
Figure 1-11. Columbia River Bridges (Subarea B) 1-22
Figure 1-12. Bridge Foundation Concept 1-23
Figure 1-13. Existing Navigation Clearances of the Interstate Bridge 1-24
Figure 1-14. Profile and Navigation Clearances of the Proposed Modified LPA Columbia River Bridges with a Double-Deck Fixed-Span Configuration 1-24
Figure 1-15. Conceptual Drawing of a Double-Deck Fixed-Span Configuration 1-26
Figure 1-16. Cross Section of the Double-Deck Fixed-Span Configuration 1-27
Figure 1-17. Conceptual Drawings of Single-Level Fixed-Span Bridge Types 1-28
Figure 1-18. Cross Section of the Single-Level Fixed-Span Configuration (Extradosed or Finback Bridge Types) 1-29
Figure 1-19. Conceptual Drawings of Single-Level Movable-Span Configurations in the Closed and Open Positions 1-30
Figure 1-20. Cross Section of the Single-Level Movable-Span Bridge Type 1-32
Figure 1-21. Bridge Configuration Footprint Comparison 1-34
Figure 1-22. Bridge Configuration Profile Comparison 1-35
Figure 1-23. Downtown Vancouver (Subarea C) 1-41
Figure 1-24. Upper Vancouver (Subarea D) 1-45
Figure 1-25. Ruby Junction Maintenance Facility Study Area 1-47
Figure 2-1. Hazardous Materials Study Area 2-3
Figure 2-2. Areas of Acquisition 2-17
Figure 2-3. Areas of Acquisition – Map 1 2-18

Figure 2-4. Areas of Acquisition – Map 2 2-19
Figure 2-5. Areas of Acquisition – Map 3 2-20
Figure 2-6. Areas of Acquisition – Map 4 2-21
Figure 2-7. Areas of Acquisition – Map 5 2-22
Figure 2-8. Areas of Acquisition – Map 6 2-23
Figure 2-9. Areas of Acquisition – Map 7 2-24
Figure 2-10. Areas of Acquisition – Map 8 2-25
Figure 3-1. Existing Land Use Location Map 3-2
Figure 3-2. Topography and Drainage 3-4
Figure 3-3. Columbia River Bathymetry Map 3-5
Figure 3-4. Recognized Environmental Conditions 3-14
Figure 3-5. Recognized Environmental Conditions – Map 1 3-15
Figure 3-6. Recognized Environmental Conditions – Map 2 3-16
Figure 3-7. Recognized Environmental Conditions – Map 3 3-17
Figure 3-8. Recognized Environmental Conditions – Map 4 3-18
Figure 3-9. Recognized Environmental Conditions – Map 5 3-19
Figure 3-10. Recognized Environmental Conditions – Map 6 3-20
Figure 3-11. Recognized Environmental Conditions – Map 7 3-21
Figure 3-12. Recognized Environmental Conditions – Map 8 3-22
Figure 4-1. Phase I ESA Recommendations Overview 4-3
Figure 4-2. Phase I ESA Recommendations – Map 1 4-4
Figure 4-3. Phase I ESA Recommendations – Map 2 4-5
Figure 4-4. Phase I ESA Recommendations – Map 3 4-6
Figure 4-5. Phase I ESA Recommendations – Map 4 4-7
Figure 4-6. Phase I ESA Recommendations – Map 5 4-9
Figure 4-7. Phase I ESA Recommendations – Map 6 4-10
Figure 4-8. Phase I ESA Recommendations – Map 7 4-11
Figure 4-9. Phase I ESA Recommendations – Map 8 4-12

TABLES

Table 1-1. Modified LPA and Design Options 1-7
Table 1-2. Summary of Bridge Configurations 1-36
Table 1-3. Proposed TriMet and C-TRAN Bus Route Changes 1-51
Table 1-4. Construction Activities and Estimated Duration 1-55
Table 2-1. Primary Federal Databases 2-10

Table 2-2. Supplemental Federal Databases 2-11
Table 2-3. Primary State Databases 2-12
Table 2-4. Supplemental State Databases 2-13
Table 3-1. Columbia River Sediment Quality 3-7
Table 3-2. Summary of Recommendations – Washington 3-23
Table 3-3. Summary of Recommendations – Oregon 3-26

ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition
µg	micrograms
ACM	asbestos-containing material
API	area of potential impact
AST	above ground storage tank
ASTM	American Society of Testing and Materials
BMP	best management practice
BNSF	Burlington Northern Santa Fe Railroad
BRT	bus rapid transit
BTEX	Benzene, toluene, ethylbenzene, and xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Act Information System
CFR	Code of Federal Regulations
CMMP	contaminated media management plan
CORRACTS	RCRA Corrective Action Sites
CPC	City of Portland Code
CRBG	Columbia River Basalt Group
CRC	Columbia River Crossing
CSCSL	Confirmed and Suspected Contaminated Sites List
CTR	Commute Trip Reduction
C-TRAN	Clark County Public Transit Benefit Area Authority
DDT	Dichlorodiphenyltrichloroethane e
DEQ	Oregon Department of Environmental Quality

Acronym/Abbreviation	Definition
Ecology	Washington State Department of Ecology
ECSI	Environmental Cleanup Site Information
EPA	U.S. Environmental Protection Agency
ERNS	Emergency Response Notification System
ERTS	Environmental Report Tracking System
ESA	Environmental Site Assessment
FHWA	Federal Highway Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act of 1972
FINDS	Facility Index System/Facility Identification Initiative Program Summary Report
FSCR	Flood Safe Columbia River
FTA	Federal Transit Administration
FTTS	FIFRA/TSCA Tracking System
g	gram
gpd/ft	gallons per day per foot
HAZMAT	Hazardous Materials/Incidents
HBMS	hazardous building materials survey
HOT	heating-oil tank
I-5	Interstate 5
I-5	Interstate 5
IBR	Interstate Bridge Replacement
kg	kilogram
LPA	Locally Preferred Alternative
LQG	large quantity generator
LRT	light-rail transit

Acronym/Abbreviation	Definition
LRV	light-rail vehicle
LUST	leaking underground storage tank
MAX	Metropolitan Area Express
MCL	Maximum contaminant limit
MDR	Methods and Data Report
mg/kg	milligrams per kilograms
mi	mile
mm	millimeter
Modified LPA	Modified Locally Preferred Alternative
MSL	Mean sea level
MTCA	Model Toxics Control Act
NAVD 88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
NFA	no further action
NFRA	no further remedial action
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OAR	Oregon Administrative Rule
ODOT	Oregon Department of Transportation
ORS	Oregon Revised Statute
OTC	Oregon Transportation Commission
PADS	PCB Activity Database
PAHs	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl

Acronym/Abbreviation	Definition
PCE	tetrachloroethene
PGIS	pollutant-generating impervious surface
PMLS	Portland Metro Levee System
PNCD	Preliminary Navigation Clearance Determination
RAATS	RCRA Administration Action Tracking System
RCRA-NLR	Resource Conservation and Recovery Act – No Longer Regulated
RCRIS	Resource Conservation and Recovery Information System
RCW	Revised Code of Washington
REC	recognized environmental condition
RM	river mile
ROD	Record of Decision
SHWS	State Hazardous Waste Sites
SMCL	Secondary maximum contaminant limit
SOP	standard operating procedure
SOV	single-occupancy vehicle
SPILLS	spill data
SQG	small quantity generator
SR	state route
SWF-LF	Solid Waste Facilities List
TBT	tributyltin
TCE	temporary construction easement
TDM	transportation demand management
TGA	Troutdale gravel aquifer
TriMet	Tri-County Metropolitan Transportation District of Oregon

Acronym/Abbreviation	Definition
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act of 1976
UFSWQD	Urban Flood Safety and Water Quality District
USA	unconsolidated sedimentary aquifer
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCG	U.S. Coast Guard
UST	underground storage tank
VCP	Voluntary Cleanup Program
VMC	Vancouver Municipal Code
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation
WSTC	Washington State Transportation Commission

1. PROJECT OVERVIEW

This technical report identifies, describes, and evaluates potential temporary and long-term hazardous materials related effects resulting from the Interstate Bridge Replacement (IBR) Program. The construction and operation of transportation infrastructure can have effects on, and can be affected by, hazardous materials in soil or groundwater within or near the project footprint. The Modified LPA would be designed to avoid and/or mitigate these effects to the greatest extent possible. This report provides mitigation measures for potential effects 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 project study area and the methods of data collection and evaluation used for the analysis (Chapter 2).
- Describe existing sites within the study area that are known to be or potentially contaminated by hazardous materials (Chapter 3).
- Discuss potential long-term, temporary, and indirect effects resulting from property acquisition, construction (including temporary and permanent easements), and operation of the Modified LPA in comparison to the No-Build Alternative (Chapters 4 through 7).
- Provide proposed avoidance and mitigation measures to help prevent, eliminate, or minimize environmental consequences from the Modified LPA (Chapter 8).
- Identify federal, state, and local permits that would be required (Chapter 9).

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 National Environmental Policy Act (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.
  - Three bridge configurations are under consideration: (1) double-deck truss bridges with fixed spans, (2) single-level bridges with fixed spans, and (3) single-level bridges with movable spans over the primary navigation channel. The fixed-span configurations would provide up to 116 feet of vertical navigation clearance, and the movable-span configuration would provide 178 feet of vertical navigation clearance in the open position. The primary navigation channel would be relocated approximately 500 feet south (measured by channel centerline) of its existing location near the Vancouver shoreline.
  - A two auxiliary lane design option (two ramp-to-ramp lanes connecting interchanges) across the Columbia River is also being evaluated. The second auxiliary lane in each direction of I-5 would be added from approximately Interstate Avenue/Victory Boulevard to SR 500/39th Street.
- A 1.9-mile light-rail transit (LRT) extension of the current Metropolitan Area Express (MAX) Yellow Line from the Expo Center MAX Station in North Portland, where it currently ends, to a terminus near Evergreen Boulevard in Vancouver. Improvements would include new stations at Hayden Island, downtown Vancouver (Waterfront Station), and near Evergreen Boulevard (Evergreen Station), as well as revisions to the existing Expo Center MAX Station. Park and rides to serve LRT riders in Vancouver could be included near the Waterfront Station and Evergreen Station. The Tri-County Metropolitan Transportation District of Oregon (TriMet), which operates the MAX system, would also operate the Yellow Line extension.
  - Potential site options for park and rides include three sites near the Waterfront Station and two near the Evergreen Station (up to one park and ride could be built for each station location in Vancouver).
- Associated LRT improvements such as traction power substations, overhead catenary system, signal and communications support facilities, an overnight light-rail vehicle (LRV) facility at the Expo Center, 19 new LRVs, and an expanded maintenance facility at TriMet's Ruby Junction.
- Integration of local bus transit service, including bus rapid transit (BRT) and express bus routes, in addition to the proposed new LRT service.
- Wider shoulders on I-5 from Interstate Avenue/Victory Boulevard to SR 500/39th Street to accommodate express bus-on-shoulder service in each direction.
- Associated bus transit service improvements would include three additional bus bays for eight new electric double-decker buses at the Clark County Public Transit Benefit Area Authority

(C-TRAN) operations and maintenance facility (see Section 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.
  - An option that shifts the I-5 mainline up to 40 feet westward in downtown Vancouver between the SR 14 interchange and Mill Plain Boulevard interchange is being evaluated.
  - An option that eliminates the existing C Street ramps in downtown Vancouver is being evaluated.
- Six new adjacent bridges across North Portland Harbor: one on the east side of the existing I-5 North Portland Harbor bridge and five on the west side or overlapping with the existing bridge (which would be removed). The bridges would carry (from west to east) LRT tracks, southbound I-5 off-ramp to Marine Drive, southbound I-5 mainline, northbound I-5 mainline, northbound I-5 on-ramp from Marine Drive, and an arterial bridge for local traffic with a shared-use path for pedestrians and bicyclists.
- A variety of improvements for people who walk, bike, and roll throughout the study area, including a system of shared-use paths, bicycle lanes, sidewalks, enhanced wayfinding, and facility improvements to comply with the Americans with Disabilities Act. These are referred to in this document as *active transportation* improvements.
- Variable-rate tolling for motorists using the river crossing as a demand-management and financing tool.

The transportation improvements proposed for the Modified LPA and the design options are shown in Figure 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 1.1.5, 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 with an asterisk (*) 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.

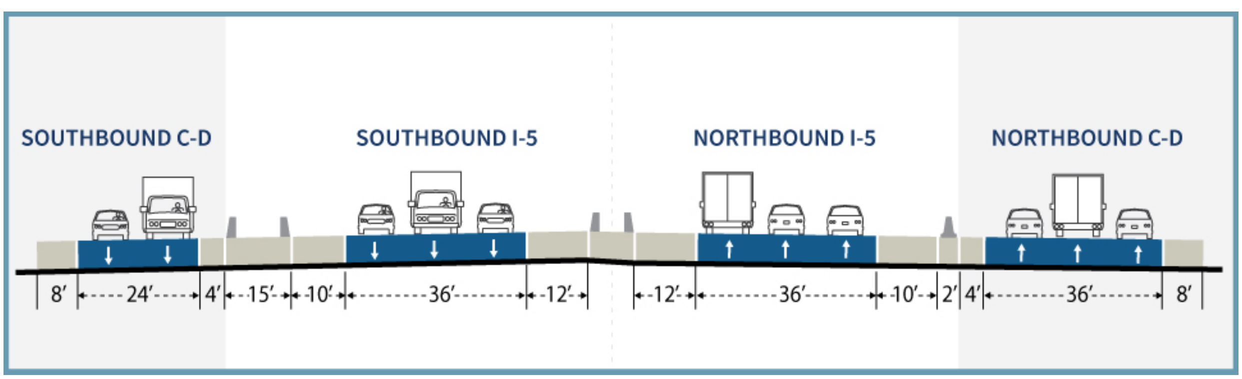
On I-5 northbound, the auxiliary lane that would begin at the on-ramp from Marine Drive would continue across the Columbia River bridge and end at the off-ramp to the C-D roadway, north of SR 14 (see Figure 1-5). The on-ramp from SR 14 westbound would join the off-ramp to the C-D roadway, forming the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

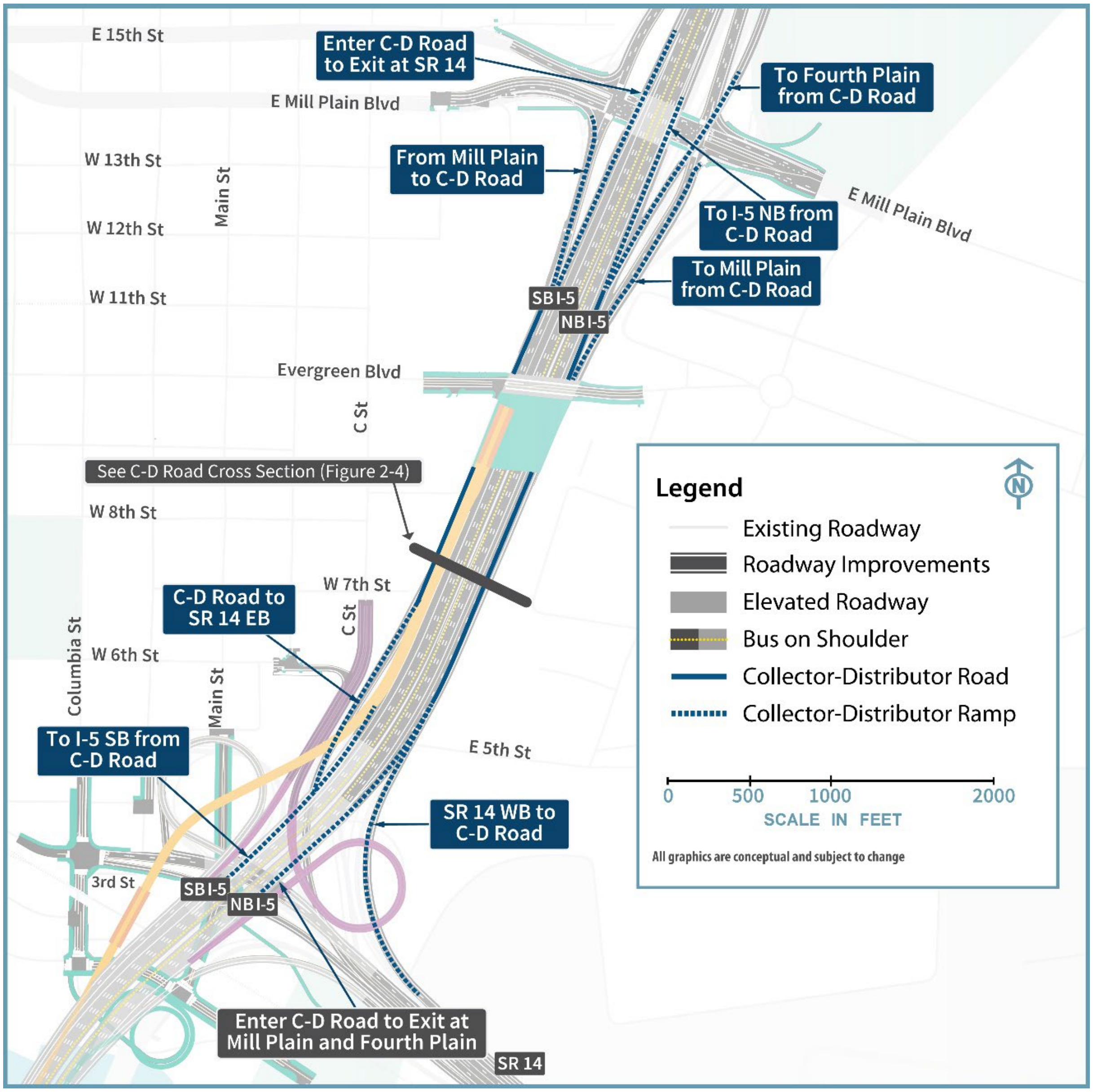
On I-5 southbound, an auxiliary lane would begin at the on-ramp from the C-D roadway and would continue across the southbound Columbia River bridge and end at the off-ramp to Marine Drive. The combined on-ramp from SR 14 westbound and C Street would merge into this auxiliary lane.

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

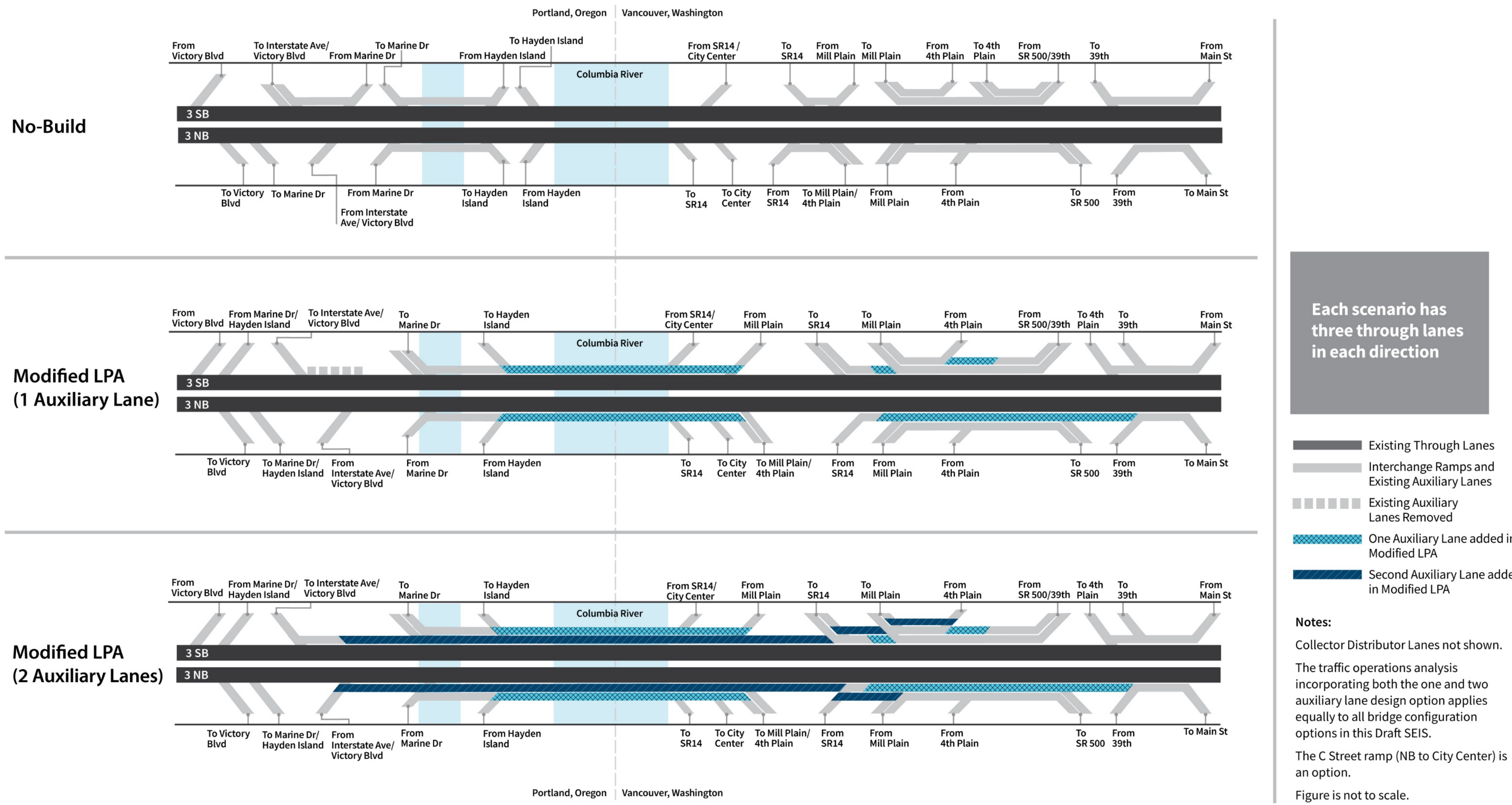
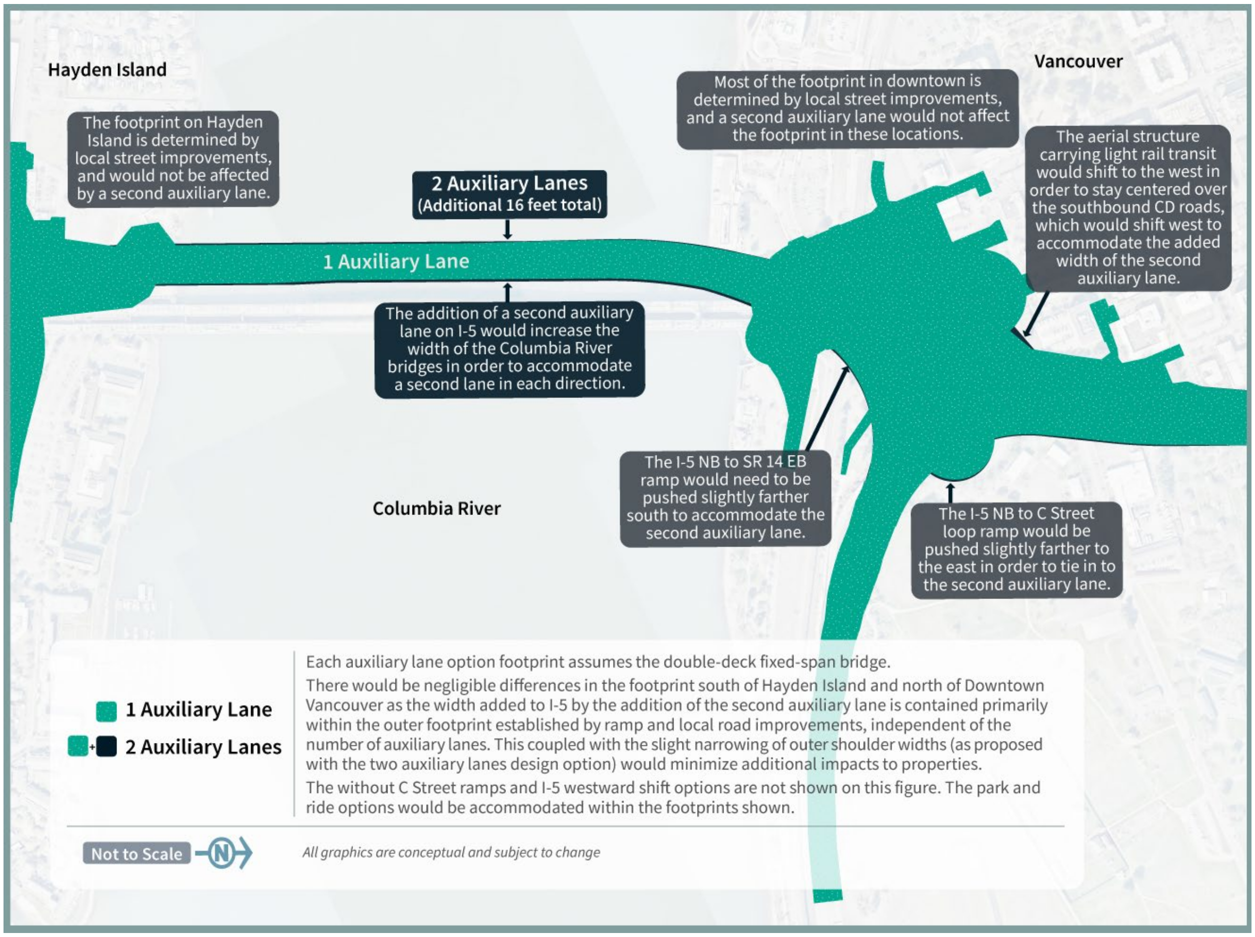


Figure 1-7. Auxiliary Lane Configuration Footprint Differences



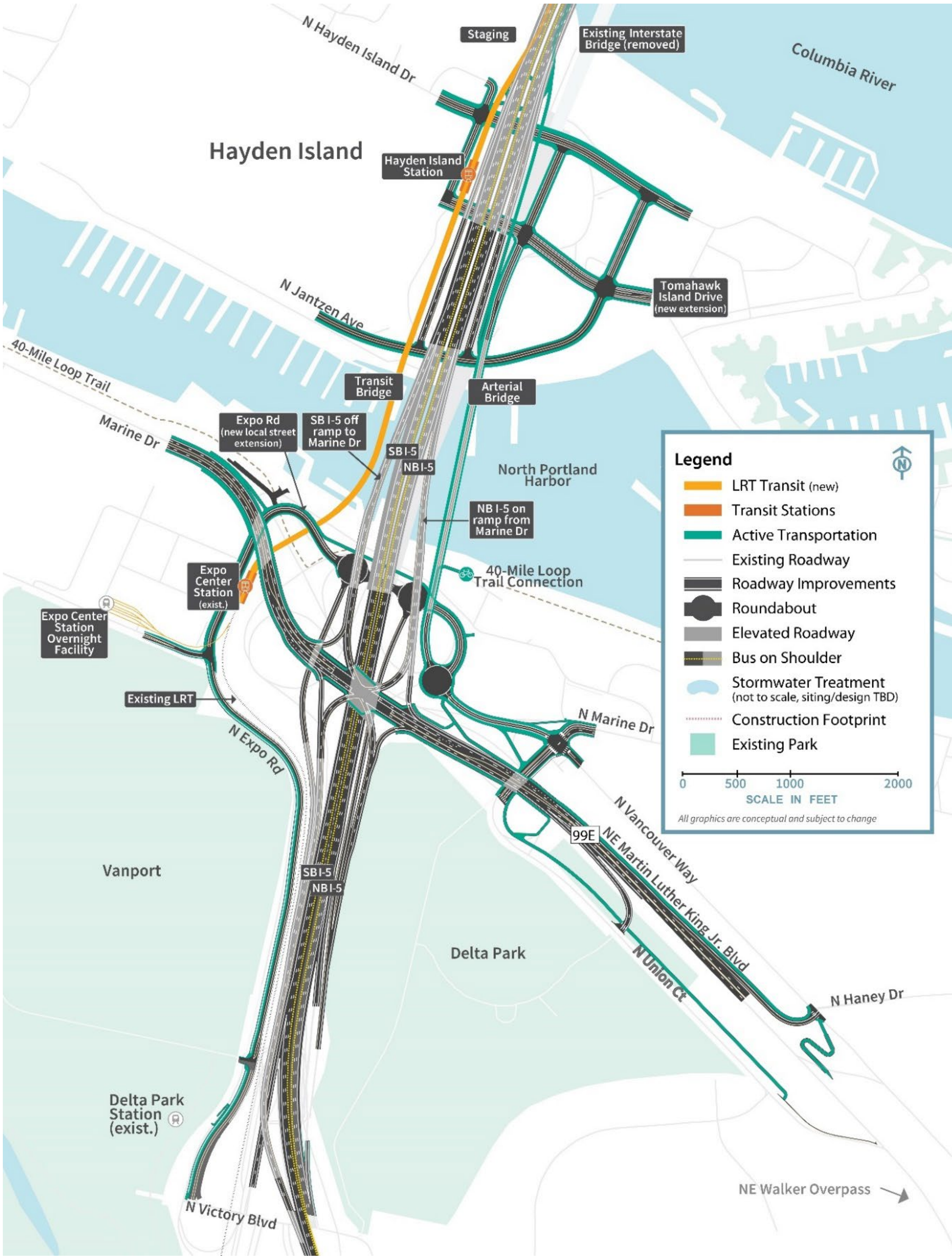
1.1.2 Portland Mainland and Hayden Island (Subarea A)

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:

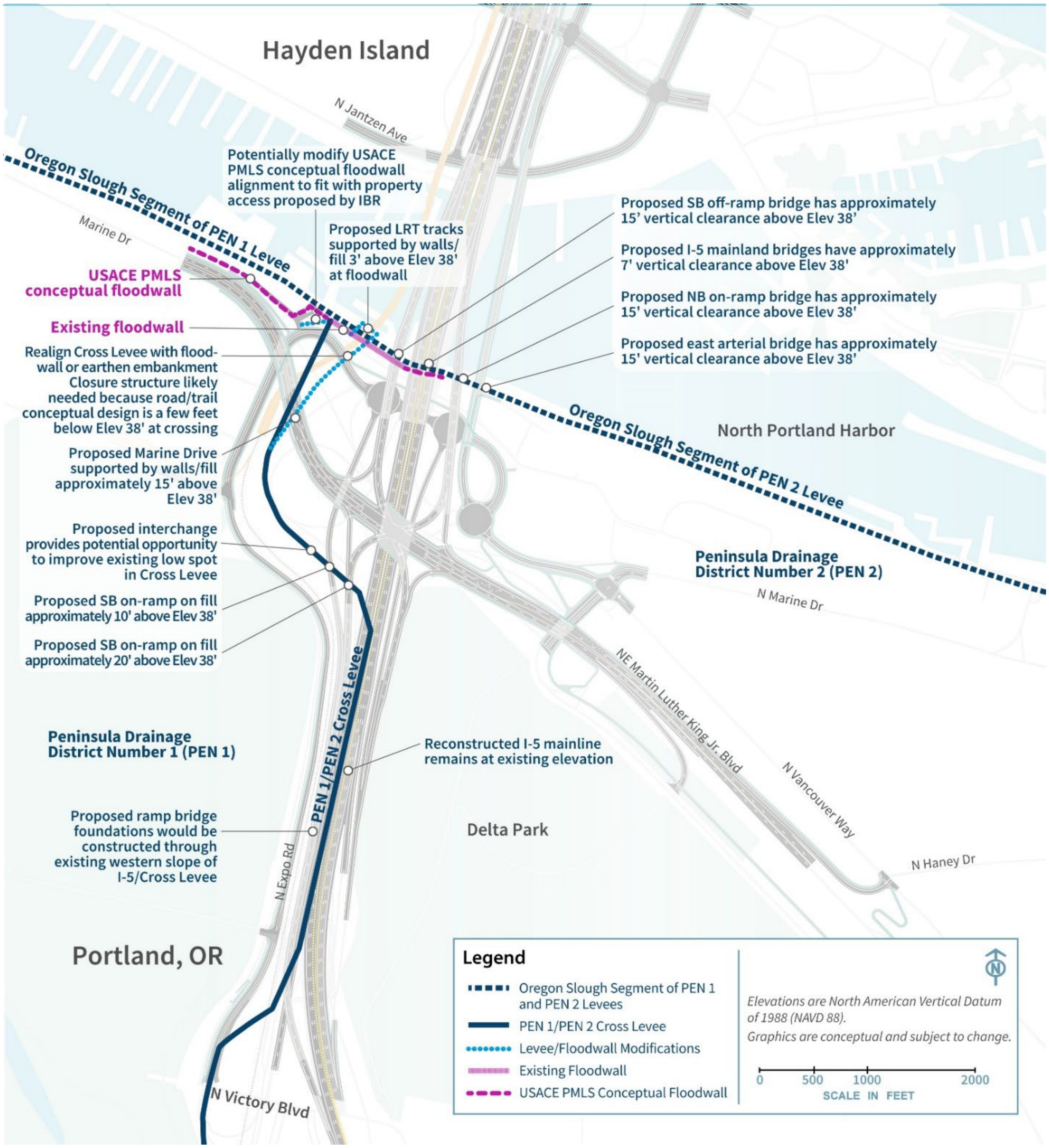
- The U.S. Army Corps of Engineers (USACE) Portland Metro Levee System (PMLS) project.
- The Flood Safe Columbia River (FSCR) program (also known as “Levee Ready Columbia”).

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 Drive 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.
- 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

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

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.

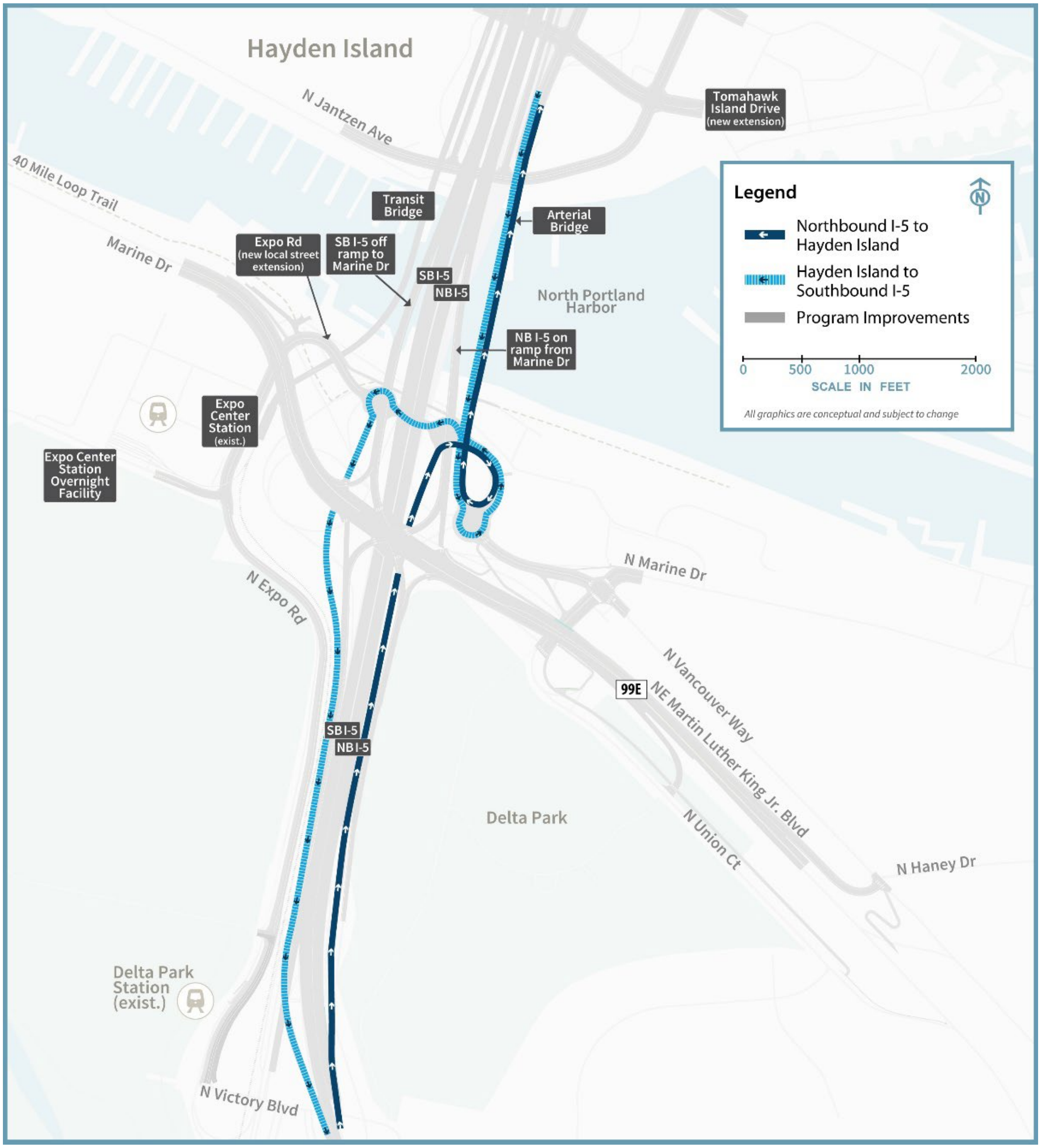
HAYDEN ISLAND INTERCHANGE AREA

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.

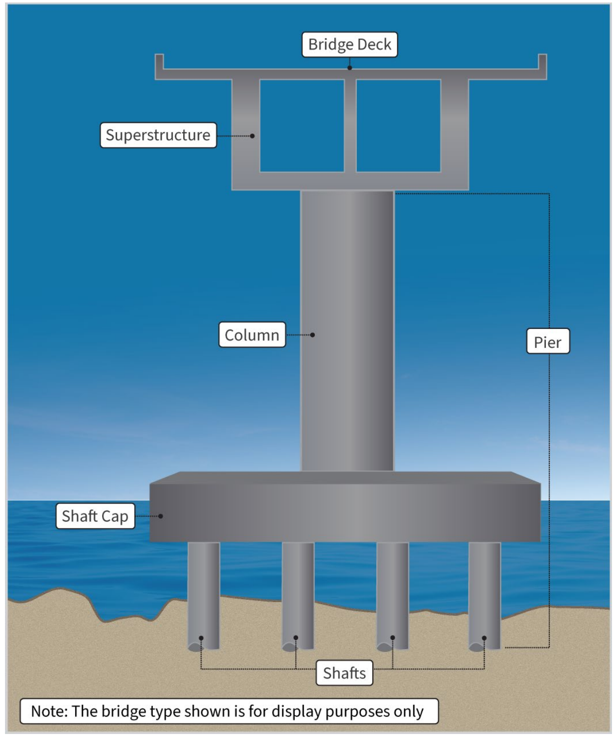
1.1.3.1 Highways, Interchanges, and Local Roadways

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.

Figure 1-12. Bridge Foundation Concept



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).

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).

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

Figure 1-13. Existing Navigation Clearances of the Interstate Bridge

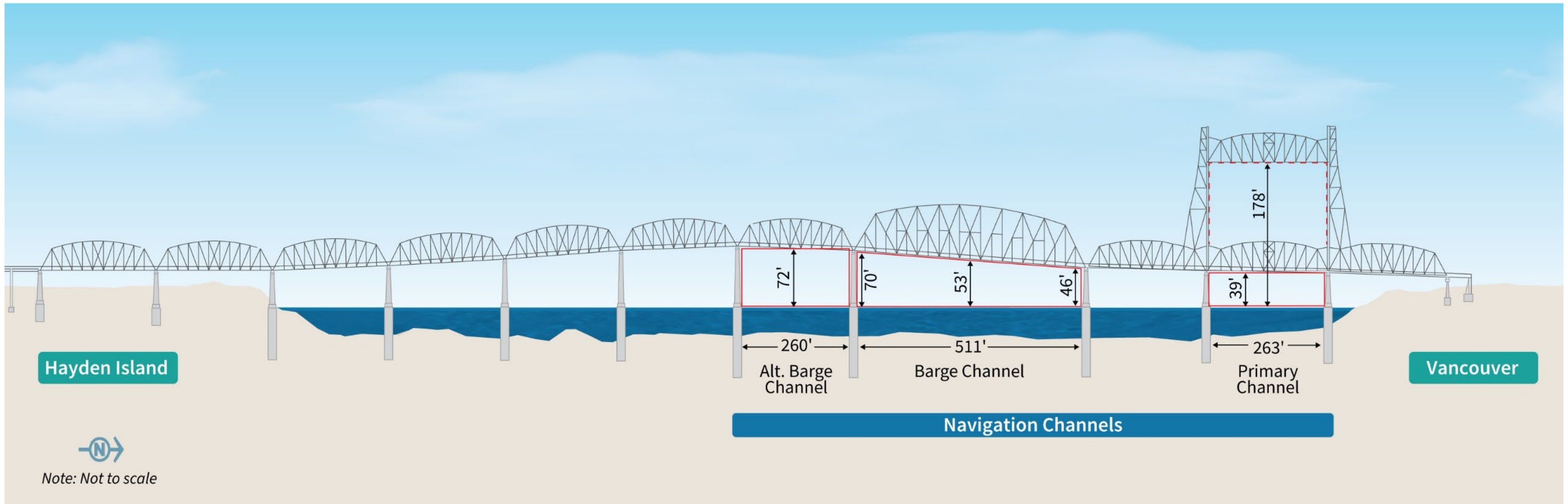
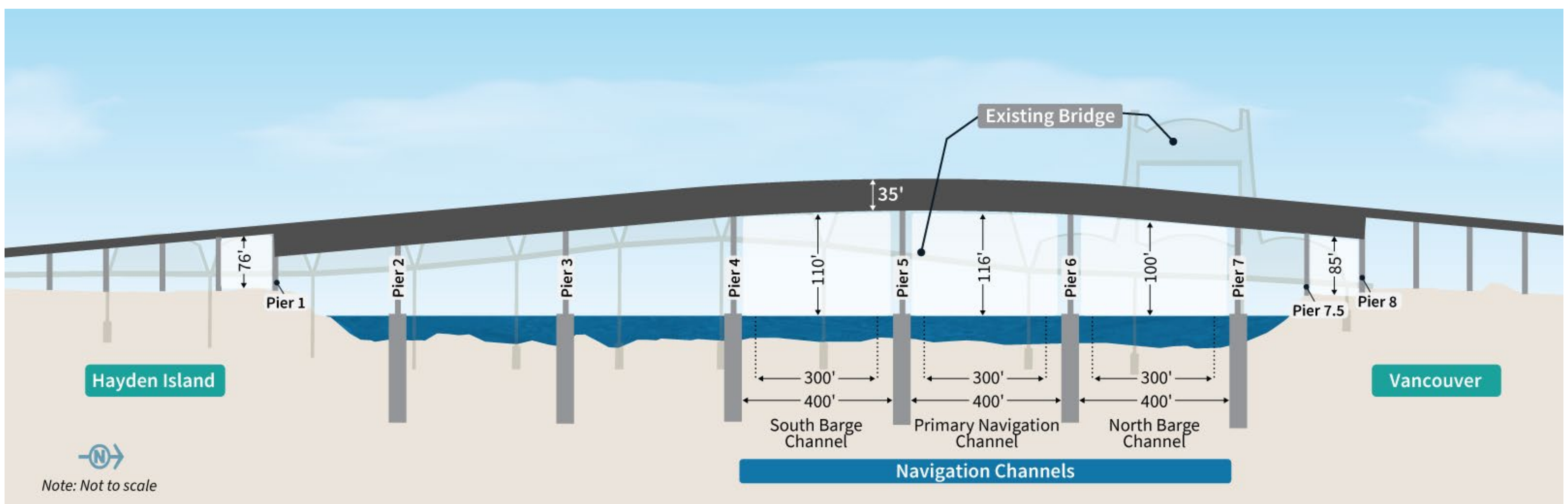


Figure 1-14. Profile and Navigation Clearances of the Proposed Modified LPA Columbia River Bridges with a Double-Deck Fixed-Span Configuration



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.

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

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.

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 1-16 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 1-15. Conceptual Drawing of a Double-Deck Fixed-Span Configuration

Note: Visualization is looking southwest from Vancouver.

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 1-16. Cross Section of the Double-Deck Fixed-Span Configuration

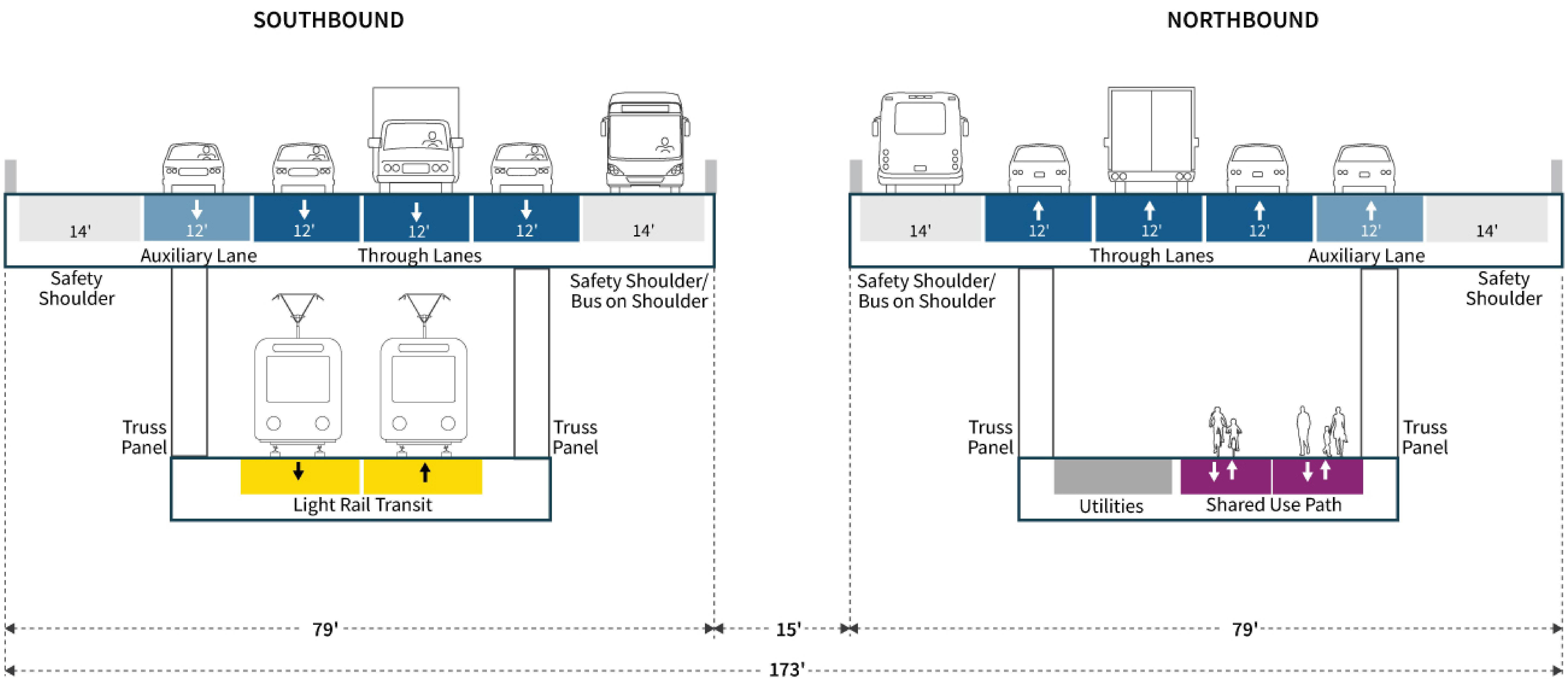
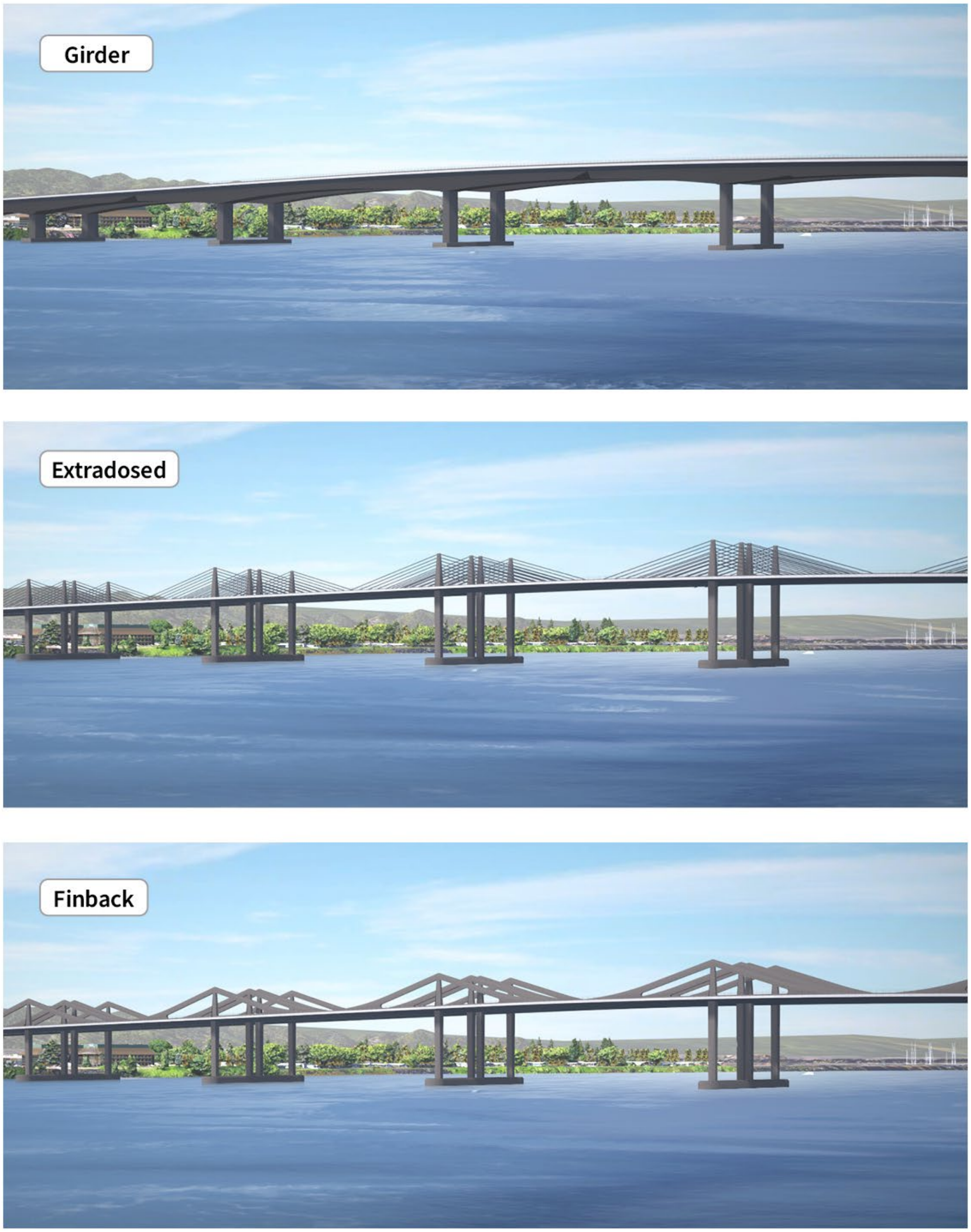
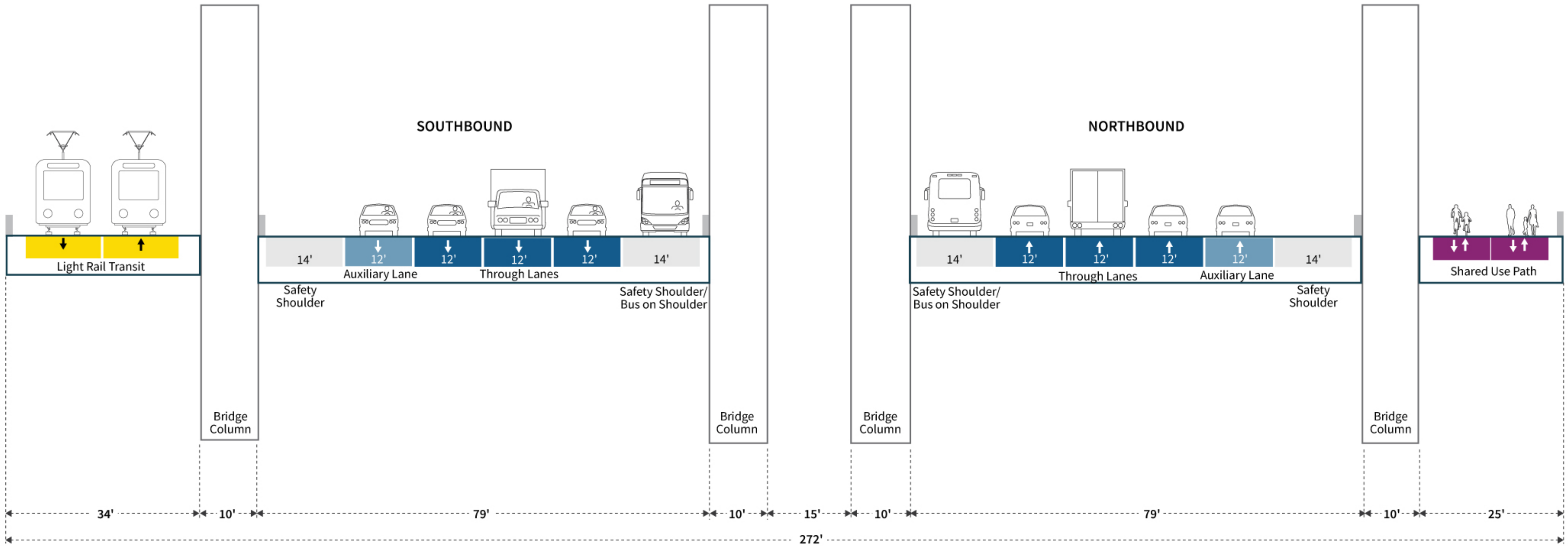


Figure 1-17. Conceptual Drawings of Single-Level Fixed-Span Bridge Types



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.

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.

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.

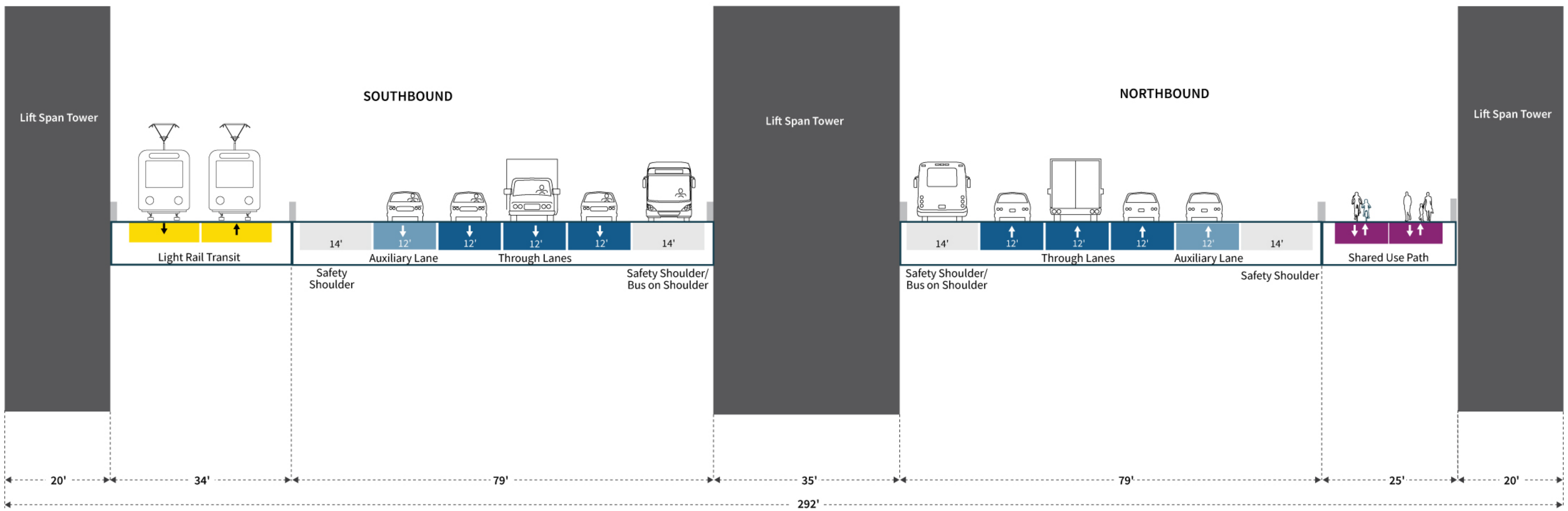
Similar to the single-level fixed-span configuration, the eastern bridge would accommodate northbound highway traffic and the shared-use path, and the western bridge would carry southbound traffic and two-way light-rail tracks. The I-5 highway, light-rail tracks, and shared-use path would be on the same 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.

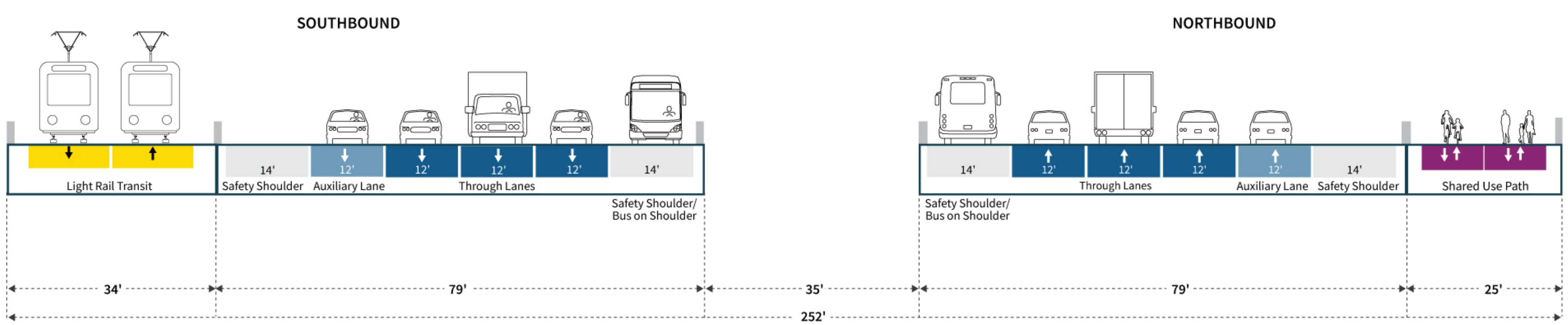
This single-level movable-span configuration would have a 3% maximum grade on the Oregon side of the bridge and a 1.5% maximum grade on the Washington side.

Figure 1-20. 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.

Figure 1-21. Bridge Configuration Footprint Comparison

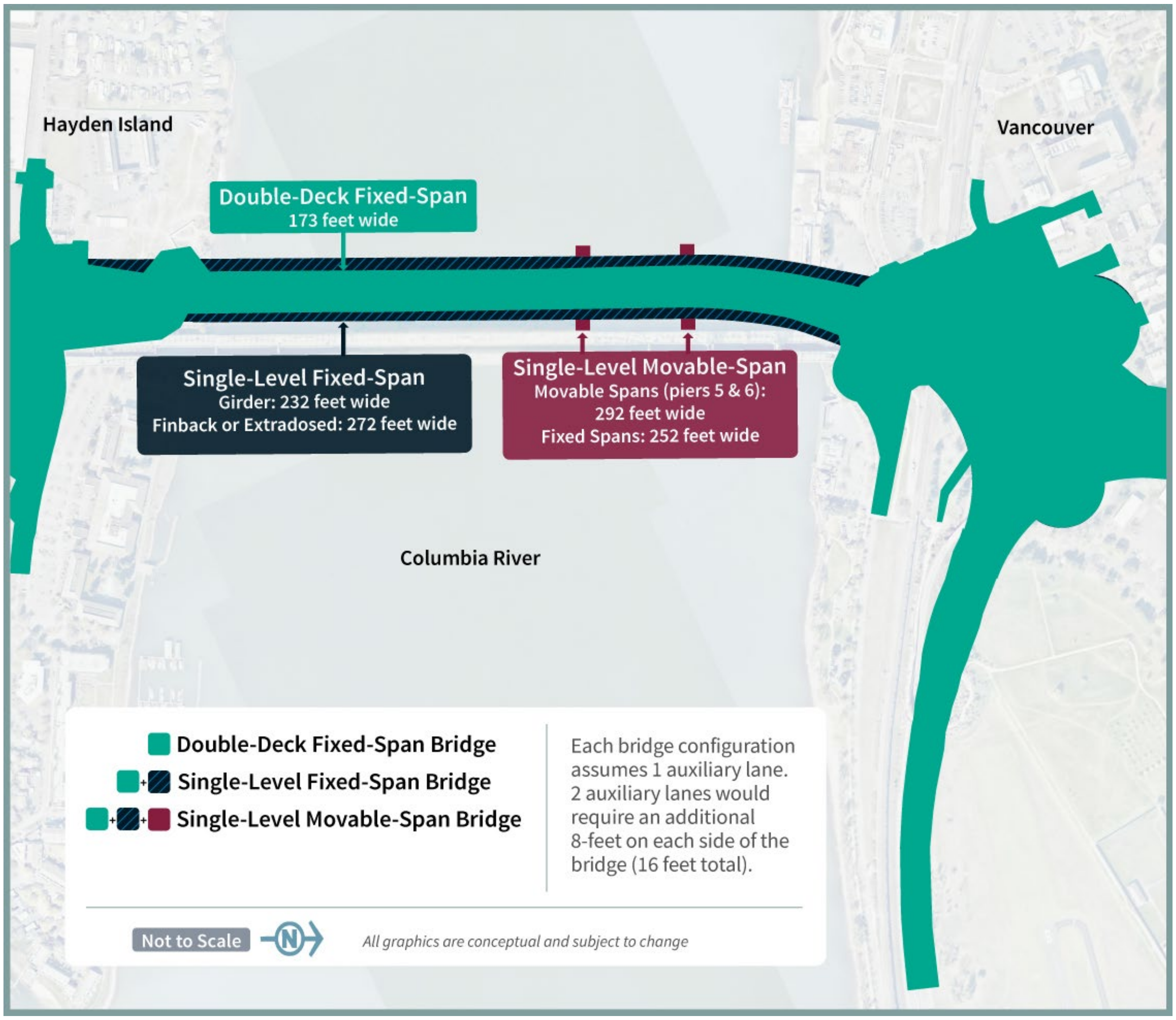
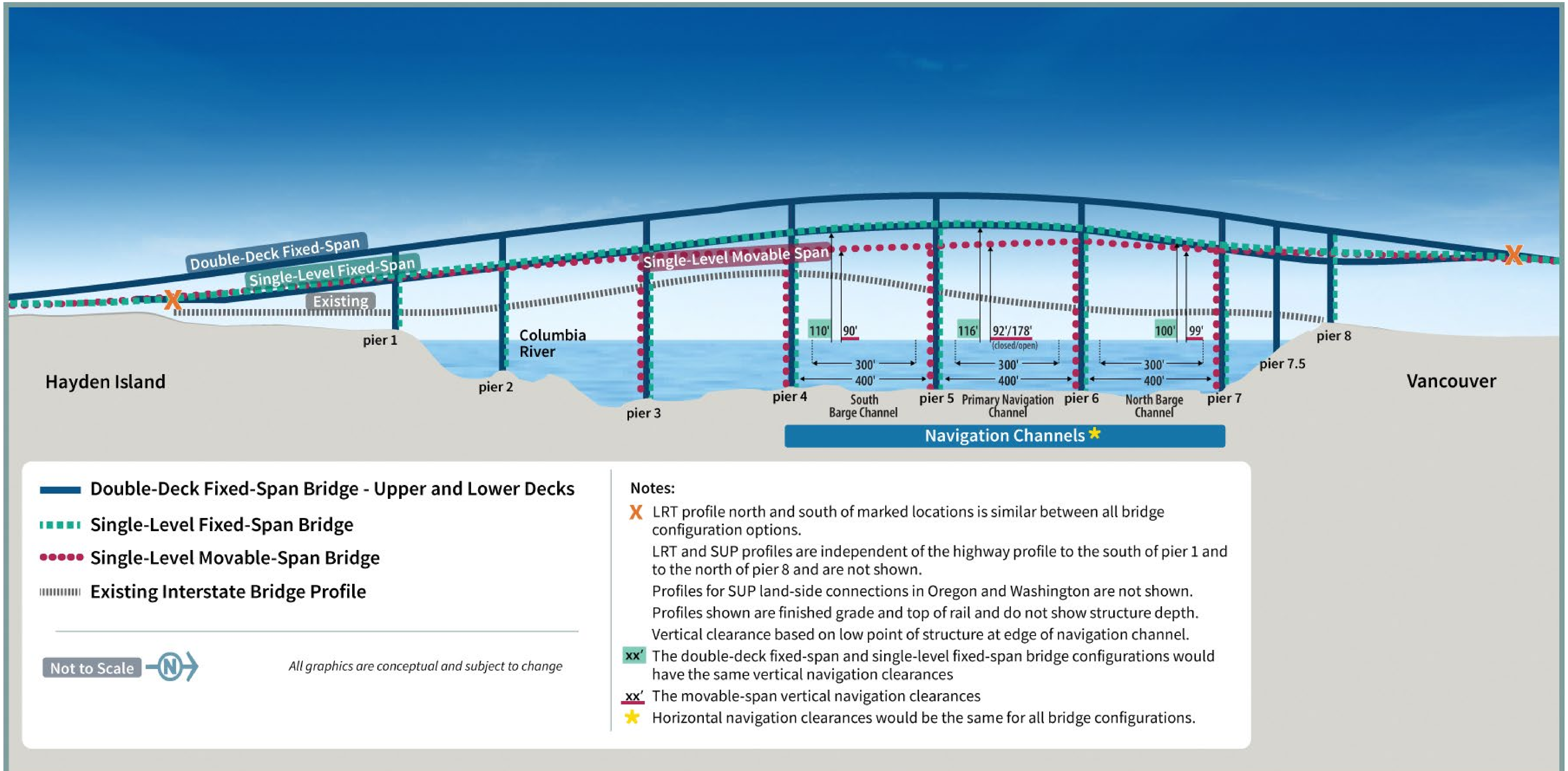


Figure 1-22. Bridge Configuration Profile Comparison



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

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.

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

e NAVD 88 (North American Vertical Datum of 1988) is a vertical control datum (reference point) used by federal agencies for surveying.

NB = northbound; SB = southbound; USCG = U.S. Coast Guard

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.

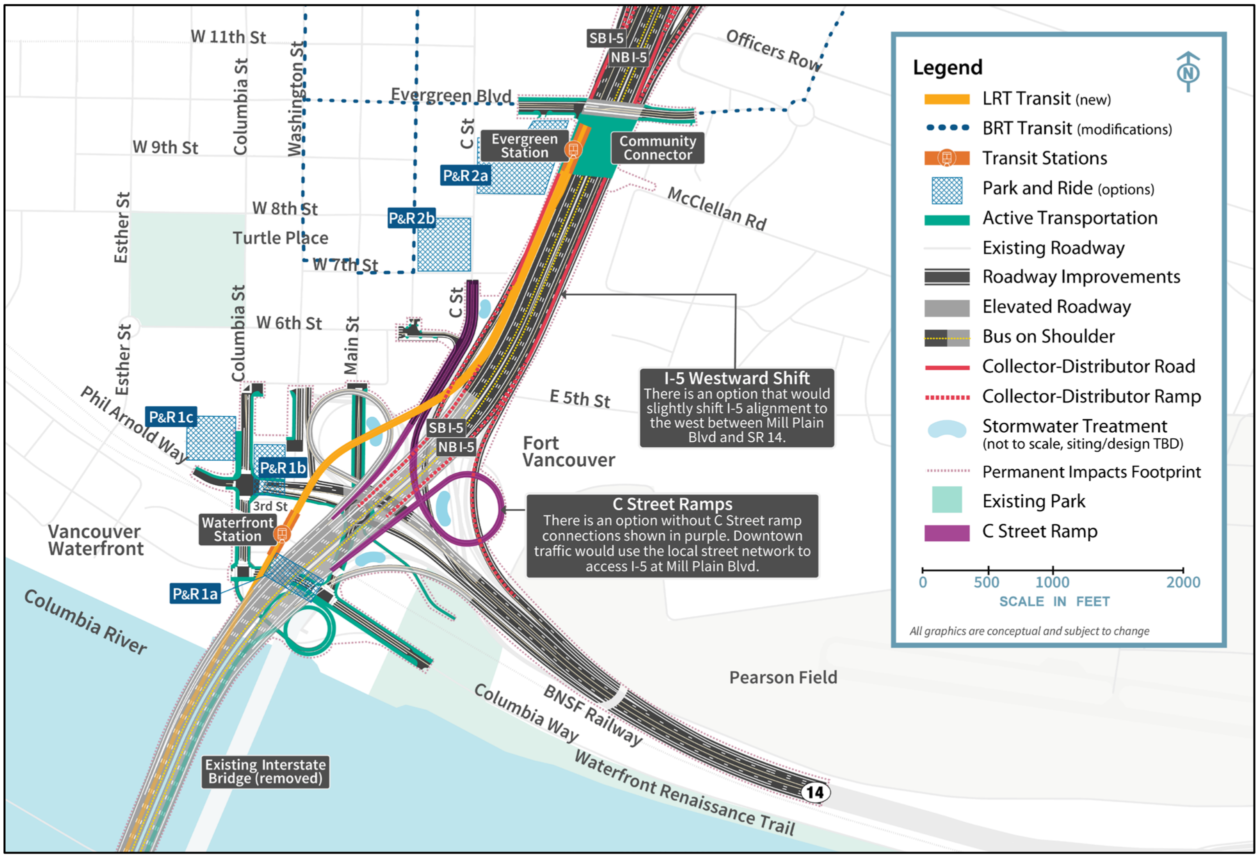
Main Street would be extended between 5th Street and Columbia Way. Vehicles traveling from downtown Vancouver to access SR 14 eastbound would use the new extension of Main Street to the roundabout underneath I-5. If coming from the west or south (waterfront) in downtown Vancouver, vehicles would use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

Figure 1-23. Downtown Vancouver (Subarea C)



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

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.

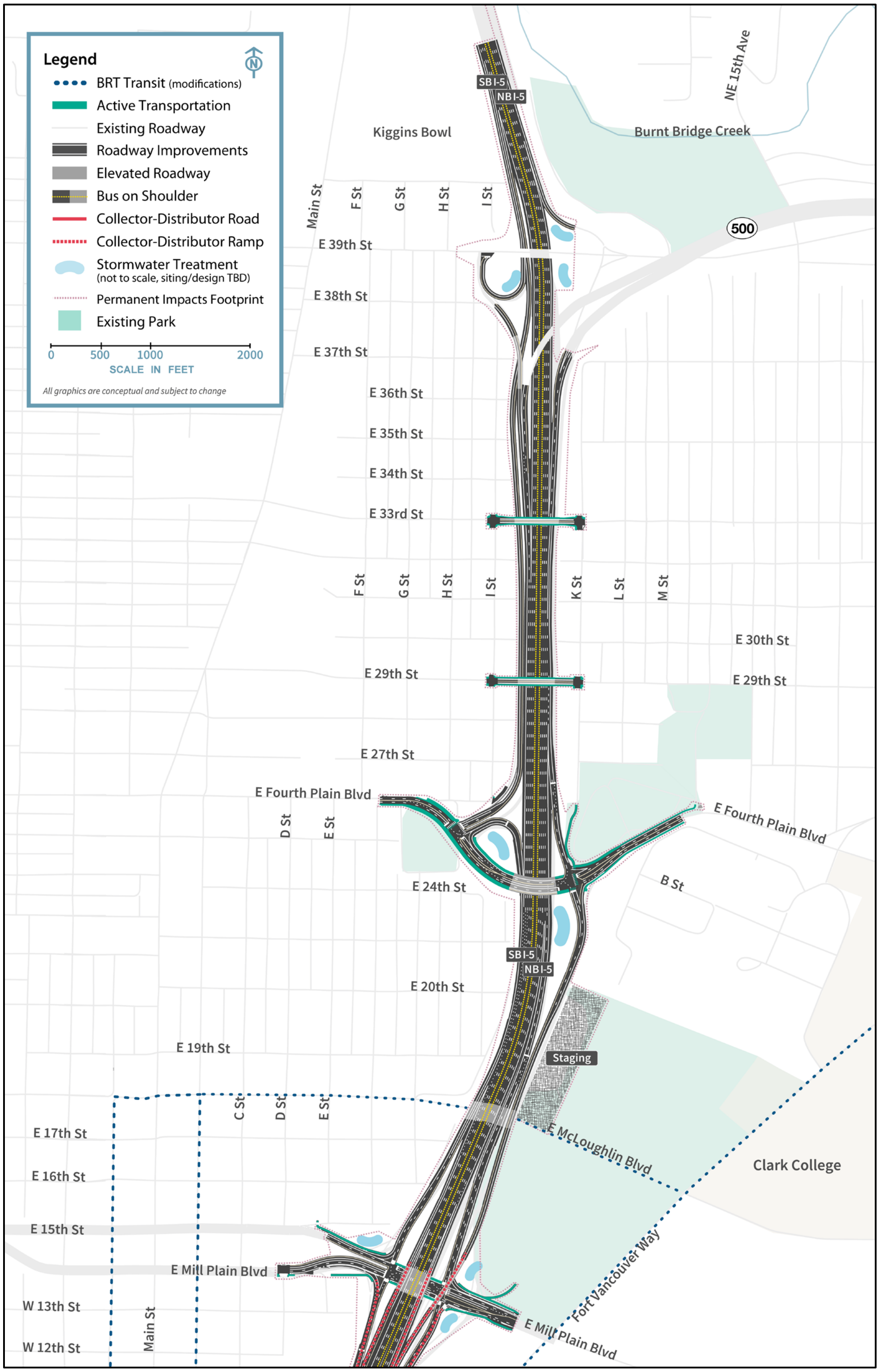
MILL PLAIN BOULEVARD INTERCHANGE

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.

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.

Figure 1-24. Upper Vancouver (Subarea D)



BRT = bus rapid transit; TBD = to be determined

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

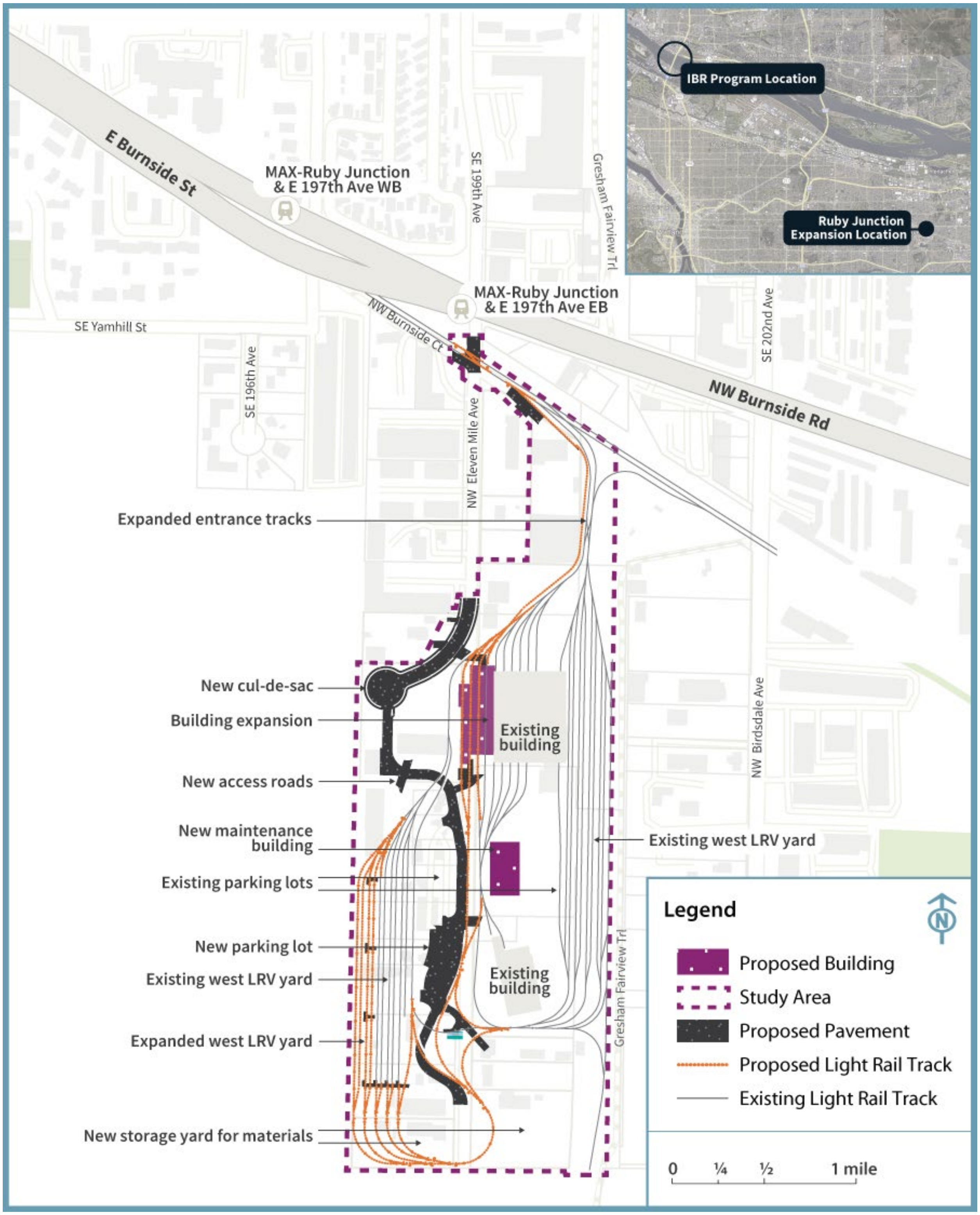
Several active transportation improvements would be made in Subarea D consistent with City of Vancouver plans and policies. At the Fourth Plain Boulevard interchange, there would be improvements to provide better bicycle and pedestrian mobility and accessibility; these include bicycle lanes, neighborhood 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.

Figure 1-25. Ruby Junction Maintenance Facility Study Area



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

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.

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.
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.

Bus Route	Existing Route	Changes with Modified LPA
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.

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

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 prepare this Hazardous Materials Technical Report to support the IBR Program environmental evaluation. This chapter outlines the proposed approach to evaluate the beneficial and adverse impacts of the Modified LPA.

This report includes a description of the study area, relevant laws and regulations, and methods for collecting data, assessing impacts, and evaluating possible mitigation measures. The analysis is 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 (ROD) in 2011. The CRC project was discontinued in 2014, and the ROD has been evaluated three times since it was issued. Re-evaluations in 2012 and 2013 (addressing vertical clearance and phased development, respectively) did not indicate any changes to impacts to hazardous materials sites discussed in the CRC Final EIS. The re-evaluation completed in 2021 (IBR 2021) indicated that changes in land use and transportation in the vicinity of the project could likely lead to changes in the location and number of acquisitions. The IBR Program has updated the methods (based on changes in regulations, policy, and physical conditions) that were used to evaluate the potential environmental impacts associated with the Modified LPA.

The establishment of existing conditions through the identification and analysis of hazardous materials sites in the study area allows the IBR Program team to identify potential impacts resulting from the Modified LPA. Sites identified as having a high potential impact were evaluated in terms of nature and extent of contamination and the potential for mitigation before, during, and after construction. These sites are discussed individually in this report. The methods used in this report have been updated for the IBR Program in the following ways:

- Updated ASTM International, formerly American Society for Testing Materials, (ASTM) Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process (ASTM E1527-21).
- Updated and/or amended state and federal laws and requirements as listed in Section 2.3.
- Adherence of data collection methods to updated guidance and methods from the Washington State Department of Transportation (WSDOT) and the Oregon Department of Transportation (ODOT) as noted in Section 2.4.
- Consideration of Federal Transit Administration (FTA) Environmental Standard Operating Procedure (SOP) 19, Consideration of Contaminated Properties including Brownfields. This document provides guidance on assessment and acquisition of potentially contaminated properties for FTA-funded projects.

2.2 Study Area

The IBR Program study area (sometimes referred to in this report as the area of potential impact, or API) runs along a 5-mile segment of I-5, from just north of the SR 500 interchange in Washington to just north of the I-5/Columbia Boulevard interchange in Oregon. Most physical changes associated with the Modified LPA 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 project 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 being used for this analysis.

The hazardous materials study area was used to place constraints on where the evaluation of hazardous materials and hazardous materials sites was conducted. The boundaries of the study area were set using the project limits plus the maximum standard 1-mile database search radius established by ASTM E1527-21 for conducting environmental site assessments.

2.3 Relevant Laws and Regulations

Rules and regulations concerning recognized environmental conditions (RECs) include the federal and state laws discussed below. RECs are defined in ASTM E1527-21:

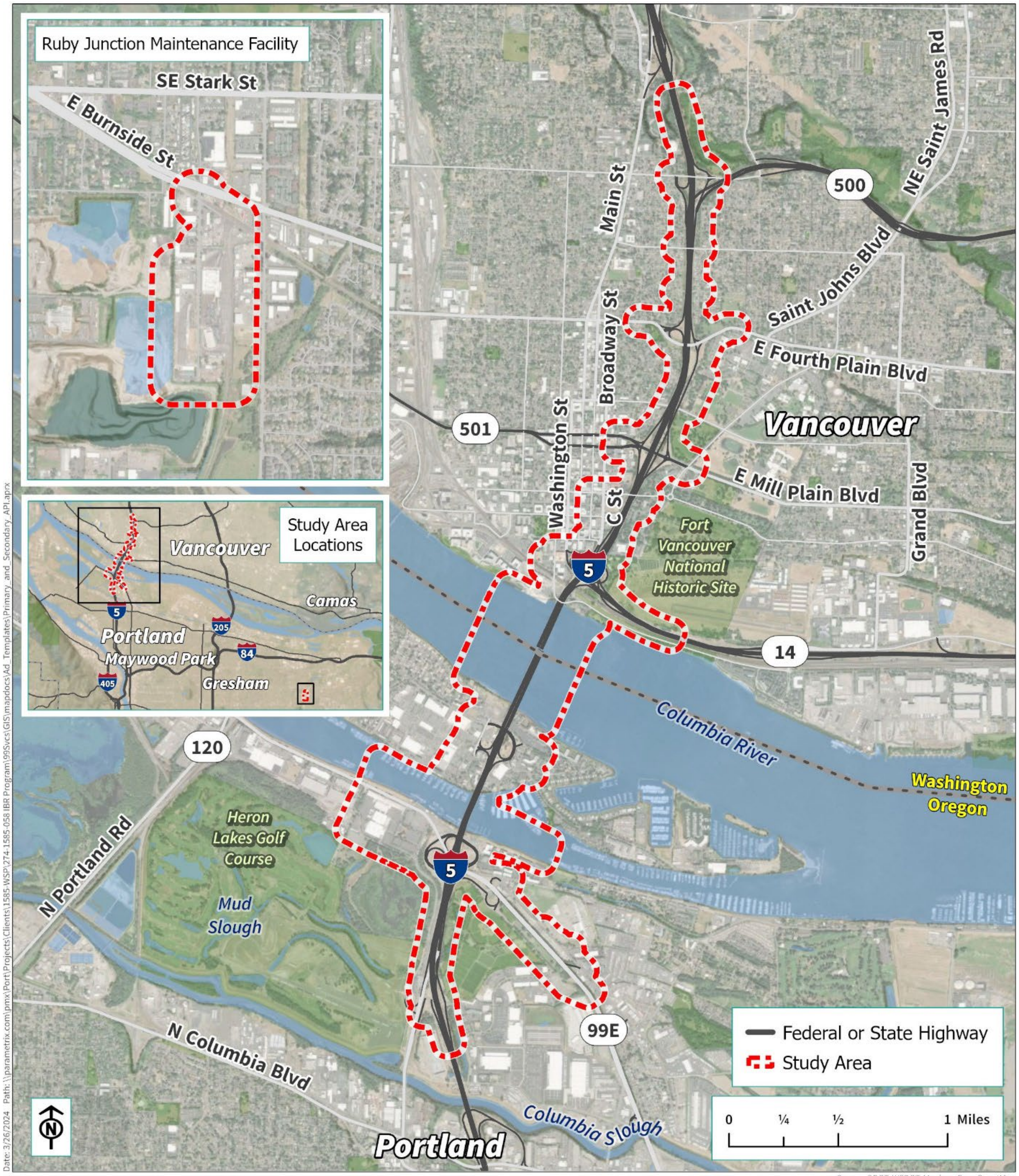
> (1) the presence of *hazardous substances* or *petroleum products* in, on, or at the *subject property* due to a release to the *environment*; (2) the likely presence of *hazardous substances* or *petroleum products* in, on, or at the *subject property* due to a *release* or likely *release* to the *environment*; or (3) the presence of *hazardous substances* or *petroleum products* in, on, or at the *subject property* under conditions that pose a *material threat* of a future *release* to the *environment*.

These laws establish regulatory records for sites that are known or suspected to contain hazardous materials. Projects that include or intersect such sites must follow these guidelines. These records are made available to the public and indicate site location, type of hazardous materials used at the site, nature of the contamination (if present), and any conditions at the site that may result or may have resulted in contamination. Sections 2.3.1 and 2.3.2 provide details on the relevance of these rules and regulations, which form the basis for data collection. No local regulations regarding RECs were identified.

2.3.1 Federal

The following federal rules and regulations provide a basis for data collection and data sources for identifying hazardous material sites in the study area. These rules and regulations are implemented and enforced by the U.S. Environmental Protection Agency (EPA).

Figure 2-1. Hazardous Materials Study Area



2.3.1.1 The Comprehensive Environmental Response, Compensation, and Liability Act of 1980. 42 USC 9601 et seq.

CERCLA, commonly known as Superfund, created a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites, provided for liability of persons responsible for releases of hazardous materials at these sites, and established a trust fund to provide for cleanup when no responsible party could be identified.

2.3.1.2 The Superfund Amendments and Reauthorization Act of 1986. 42 USC 9601 et seq.

The Superfund Amendments and Reauthorization Act amended CERCLA by stressing the importance of permanent remedies, requiring Superfund actions to consider the standards and requirements found in other state and federal environmental laws and regulations, thereby increasing the focus on human health problems posed by hazardous waste sites.

2.3.1.3 The Resource Conservation and Recovery Act of 1976. 42 USC 6901 et seq.

RCRA authorizes the EPA to control hazardous waste from creation to disposal. This includes the generation, treatment, storage, transportation and disposal of hazardous wastes.

2.3.1.4 The Clean Air Act of 1990. 42 USC 50-99 et seq.

The Clean Air Act authorizes the EPA to regulate the amount of pollution that can be emitted into the air.

2.3.1.5 Innocent Landowners, Standards for Conducting All Appropriate Inquiries. 40 CFR 312.

This subcharter and part of the Superfund Regulations describes, defines, and establishes standards and practices for establishing environmental conditions of properties and the liabilities of potential purchasers of those sites.

2.3.2 State

The following state rules and regulations provide a basis for data collection and data sources for identifying hazardous material sites in the study area or that affect the execution of the IBR Program. These rules and regulations are implemented and enforced by the Oregon Department of Environmental Quality (DEQ) and the Washington State Department of Ecology (Ecology).

2.3.2.1 Oregon (State and Local Regulations)

HAZARDOUS WASTE AND HAZARDOUS MATERIALS I AND HAZARDOUS WASTE AND HAZARDOUS MATERIALS II. 2020 OREGON REVISED STATUTES (ORS) 465 AND 466, AS AMENDED

This is Oregon's equivalent of CERCLA. It establishes the relevant laws that define the identification of, liability for, and remediation or removal of hazardous materials and/or waste in the state of Oregon. Standards for cleanup of contaminated sites are also provided. Sites with known contamination and sites that are undergoing cleanup are recorded in the environmental cleanup site information (ECSI) and leaking underground storage tank (LUST) databases. These statutes also include provisions and guidelines for the reduction of use of toxic substances and hazardous waste generation; bulk petroleum product withdrawal regulations; environmental cleanup assistance; cleanup of contamination resulting from dry cleaning facilities; chemical agents and storage; treatment and disposal of hazardous waste and polychlorinated biphenyl (PCBs); notice of environmental hazards; use of PCBs; spill response and cleanup of hazardous materials and oil storage tanks; and removal of or remedial action for contaminated sites.

SOLID WASTE MANAGEMENT. 2019. ORS 459 AND OREGON ADMINISTRATIVE RULES (OAR) 340-093

These rules describe requirements, limitations and procedures for the storage, collection, treatment and disposal of solid waste and constitute the Oregon State Solid Waste Plan. Prohibited and permitted wastes are described, as well as the handling and disposal of cleanup materials contaminated with hazardous substances (petroleum-contaminated media and other non-hazardous waste). The design and permitting of facilities that receive these and other wastes are regulated under these statutes.

UNDERGROUND STORAGE TANK RULES. 2019. OAR 340-150

This rule provides for the regulation of underground storage tanks (USTs) to protect the public health, safety, and welfare—and the environment—from the potential harmful effects of spills and releases from USTs used to store regulated substances.

RESIDENTIAL HEATING OIL UNDERGROUND STORAGE TANKS. 2019. OAR 340-177

These rules outline specific requirements for the cleanup of releases of petroleum from underground heating oil tanks (HOTs), technical standards for the voluntary decommissioning of HOTs, and requirements for submittal of technical reports that have been certified by licensed service providers. Construction activities necessitating the removal, decommissioning, and/or cleanup of HOTs in the impact area are regulated under these rules.

ASBESTOS REQUIREMENTS. 2019. OAR 340-248

Rules for identification and disposal of asbestos-containing materials (ACMs) that are contained in building and structures. Asbestos abatement must be completed prior to demolition of the building or structure, pursuant to ORS Master Asbestos Management Plan, ORS 283.415.

GROUNDWATER QUALITY PROTECTION. 2019. OAR 340-040

Establishes mandatory groundwater quality protection requirements for federal, state, and local levels. Unless specifically exempted by statute, groundwater quality protection requirements must meet or be equivalent to these rules, pursuant to Groundwater Contaminants, ORS 468B.165.

ENVIRONMENTAL HAZARDS NOTICE. 2018. OAR 340-130

Pursuant to Notice of Environmental Hazards, ORS 466.360, this notice recognizes that,

> *sites with waste or contamination exist in a state that, if altered, are potentially hazardous to the health, safety and welfare of Oregon's community members. The Commission declares that (1) locations of potentially hazardous sites should be made known to local governments, property owners and occupants, and neighbors and future purchasers of property; (2) use restrictions implemented through city and county comprehensive plans and land use regulations may be necessary on potentially hazardous sites to protect the public health, safety and the environment; (3) changes in uses of potentially hazardous sites should be reviewed; and (4) an environmental hazard notice is a long-term tool to ensure a potentially hazardous site is not altered without first considering the impacts of the activity on the public health, safety and the environment.*

STANDARDS APPLICABLE FOR DRY CLEANING STORES FACILITIES AND DRY STORES. 2019 OAR 340-124

This rule establishes the process by which dry cleaning sites are ranked and inactive sites will be listed.

ILLEGAL DRUG LAB CLEANUP ASSISTANCE. 2018. OAR 340-140

Establish the policies of the DEQ for responding to requests made by a law enforcement agency for assistance with the cleanup of hazardous materials and chemicals related to the production of illegal drugs, pursuant to Illegal Drug Cleanup, ORS 475.415.

HAZARDOUS WASTE MANAGEMENT SYSTEM. 2019. OAR 340-100 TO 110, 120, 124, AND 142

The purpose of this management program is to control hazardous waste from the time of generation through transportation, storage, treatment, and disposal. Toxic use reduction, hazardous waste reduction, hazardous waste minimization, beneficial use, recycling, and treatment are given preference to land disposal.

HAZARDOUS SUBSTANCE REMEDIAL ACTION RULES. 2019. OAR 340-122

Establishes standards and procedures for the determination of remedial action associated with releases of hazardous substances or petroleum hydrocarbons. The rules establish procedures for implementing a site discovery program for hazardous substance releases, including a process for the evaluation and preliminary assessment of releases of hazardous substances. The rules also define a process for developing and maintaining a statewide list of confirmed releases and establish an inventory of sites requiring investigation, removal, remedial action, or related long-term engineering or institutional controls.

2035 CITY OF PORTLAND COMPREHENSIVE PLAN

- Policy 3.77: River management and coordination. Coordinate with federal, state, regional, special districts, and other agencies to address issues of mutual interest and concern, including economic development, recreation, water transportation, flood and floodplain management and protection, regulatory compliance, permitting, emergency management, endangered species recovery, climate change preparation, Portland Harbor Superfund, brownfield cleanup, and habitat restoration.
- Policy 6.14: Brownfield redevelopment. Overcome financial-feasibility gaps to cleanup and redevelop 60% of brownfield acreage by 2035.
- Policy 7.15: Brownfield remediation. Improve environmental quality and watershed health by promoting and facilitating brownfield remediation and redevelopment that incorporates ecological site design and resource enhancement.

CITY OF PORTLAND BUREAU OF PLANNING AND SUSTAINABILITY 2009 HAYDEN ISLAND PLAN

Establishes the plan for future use of the land to the west of I-5, in the area of the former Hayden Island Landfill as parks and open space.

2.3.2.2 Washington (State and Local Regulations)

MODEL TOXICS CONTROL ACT. REVISED CODE OF WASHINGTON 70.105D.010 AND WASHINGTON ADMINISTRATIVE CODE (WAC) 173.340

The Model Toxics Control Act (MTCA) outlines a comprehensive system for identifying, investigating, and cleaning up contaminated sites that are or could become a threat to human health or the environment. MTCA is the state counterpart to the federal CERCLA, except that under MTCA, petroleum is regulated as a hazardous substance. Washington tracks these sites via the Confirmed and Suspected Contaminated Sites List (CSCSL) database.

UNDERGROUND STORAGE TANK REGULATIONS. 2018. WAC 173.360A

These regulations address the threat posed to human health and the environment by LUSTs containing petroleum and other regulated substances.

SOLID WASTE HANDLING STANDARDS, 2020 WAC 173-350

These regulations apply to the management of solid waste, setting standards for the proper handling and storage of solid waste with a focus on reduction and recycling. These standards are applied in conjunction with the Dangerous Waste Regulations, WAC 173-303, detailed below.

DANGEROUS WASTE REGULATIONS. 2020 WAC 173-303

This regulation has the following purposes:

3. Designate those solid wastes that are dangerous or extremely hazardous to the public health and environment. Note that asbestos waste is not regulated as a hazardous waste.
4. Provide for surveillance and monitoring of dangerous and extremely hazardous wastes until they are detoxified, reclaimed, neutralized, or disposed of safely.
5. Provide the form and rules necessary to establish a system for manifesting, tracking, reporting, monitoring, recordkeeping, sampling and labeling dangerous and extremely hazardous wastes.
6. Establish the siting, design, operation, closure, post-closure, financial, and monitoring requirements for dangerous and extremely hazardous waste transfer, treatment, storage, and disposal facilities.
7. Establish design, operation and monitoring requirements for managing the state's extremely hazardous waste disposal facility.
8. Establish and administer a program for permitting dangerous and extremely hazardous waste management facilities; and
9. Encourage recycling, reuse, reclamation and recovery to the maximum extent possible.

These regulations affect the generation, management, handling, and disposal of dangerous wastes within the study area.

WATER QUALITY STANDARDS FOR GROUNDWATER. 1990. WAC 173-200

Establishes groundwater quality standards that provide for the protection of existing and future beneficial uses of ground waters.

ASBESTOS REMOVAL AND ENCAPSULATION STANDARDS. 2020. WAC 296-65

This standard regulates asbestos removal and encapsulation, requires contractor certification, specifies minimum training for supervisors and workers on asbestos projects, requires notification of asbestos projects, and establishes a training course approval program. This standard applies to the removal or encapsulation of any materials containing more than 1% asbestos.

GENERAL OCCUPATIONAL HEALTH STANDARDS, ASBESTOS, TREMOLITE, ANTHOPHYLLITE, AND ACTINOLITE. 2020. WAC 296-62-077

This standard applies to all occupational exposures to asbestos under the Washington Industrial Safety and Health Act, defines permissible exposure limits, and outlines requirements related to hazard communication to potentially exposed employees/workers. Good faith inspections must be conducted to determine whether the materials to be worked on or removed contain asbestos prior to any construction, renovation, remodeling, maintenance, repair or demolition.

SOUTHWEST CLEAN AIR AGENCY, STANDARDS FOR ASBESTOS CONTROL, DEMOLITION, AND RENOVATION. 2020. SWCAA 476

The purpose of this regulation is to control asbestos emissions from the removal, salvage, disposal or disturbance of ACMs to protect public health.

SAFETY STANDARDS FOR CONSTRUCTION WORK. 2020. WAC 296-155

The standards for construction include a section of standards for demolition in Part S 296-155 (755 830). Some requirements are an engineering survey, a written demolition plan or method of operation, and a determination of whether asbestos, lead paint, or other hazardous materials are present at the work site. Apparent or suspected ACMs, lead paint, or other hazardous substances must be removed prior to demolition. Interim Interpretive Memorandum #99-1-C, January 19, 1999, Demolition of Buildings with Asbestos-Containing Materials provides policy and alternate procedures when a building's structural integrity is damaged, and asbestos cannot be removed before demolition.

2.4 Data Collection Methods

Procedures for this assessment were developed to comply with applicable state and federal environmental policy legislation and guidance. These include the FTA SOP 19, WSDOT Guidance and Standard Methodology for Hazardous Material Discipline Reports (WSDOT 2017), ODOT *HazMat Program Manual* (ODOT 2020), and most aspects of ASTM E1527-21. In accordance with SOP 19, Phase I Environmental Site Assessments (ESAs) were conducted on each parcel proposed for acquisition.

IBR Program staff conducted this assessment in accordance with generally accepted industry practices and procedures within the authorized scope of work. Information in this report is based on the Phase I ESAs conducted for each proposed acquisition. The Phase I ESAs included review of regulatory environmental database reviews, literature, observed site conditions, and the best available information known or made available by the IBR Program team and applicable agencies.

2.4.1 Phase I Environmental Site Assessments

Phase I ESAs are intended to help identify potential liability issues associated with purchasing a facility or property in fee or for construction purposes. Completion of a Phase I ESA to establish the environmental baseline condition of the property is the first step in the due diligence process. This allows the purchaser to be in a legally defensible position if financial and legal liabilities are incurred. Under ASTM E1527-21, parameters are presented that define how Phase I ESAs are to be performed.

FTA SOP 19 (FTA 2016) recommends that all properties to be acquired or that have substantial associated construction activities be subject to minimum due diligence in the form of a Phase I ESA prior to publication of a draft NEPA document. The IBR Program prepared Phase I ESAs for all such properties prior to the completion of the Draft SEIS. For properties where access could not be obtained in a timely fashion, the Program relied on information derived from visual observations completed from public right of way, environmental database searches, and historical land use review while continuing to seek access.

Conclusions from Phase I ESAs were used to determine the need for a Phase II ESA on individual parcels. The findings of Phase II ESAs, as required, would be included in the Final SEIS and ROD.

2.4.1.1 Database Search

In accordance with ASTM E1527-21, federal and state environmental database listings were searched to identify potential hazardous materials sites on or within prescribed search distances of each proposed acquisition. In general, the database listings are compiled and maintained by agencies for properties and facilities that generate, store, use, transport, or dispose of hazardous substances, and for properties and facilities that are known or suspected to have soil, sediment or groundwater contamination.

For the purposes of this report, a hazardous materials site is a location or facility that potentially contains a REC. The term “recognized environmental condition” is defined by ASTM E1527-21 as:

> *...the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include de minimis conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be de minimis are not recognized environmental conditions.*

The database search was conducted in part by an outside data vendor for each acquisition. State agency databases were searched independently by Program staff to ensure completeness of the search. Additional databases were used where necessary and applicable to fully evaluate the potential for hazardous materials sites to exist on each property proposed for acquisition. Primary and supplemental federal and state databases are listed in Table 2-1 through Table 2-4.

Table 2-1. Primary Federal Databases

Abbreviation	Title
NPL	National Priority List
Proposed NPL	Proposed National Priority List
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CERC-NFRAP	CERCLIS No Further Remedial Action Planned
CORRACTS	Corrective Action Report

Abbreviation	Title
RCRIS-TSDF	Resource Conservation and Recovery Information System – Transportation, Storage, or Disposal Facility
RCRIS-LQG	Resource Conservation and Recovery Information System – Large Quantity Generator
RCRIS-SQG	Resource Conservation and Recovery Information System – Small Quantity Generator
ERNS	Emergency Response Notification System

Table 2-2. Supplemental Federal Databases

Abbreviation	Title
CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Record of Decision
Delisted NPL	National Priority List Deletions
FINDS	Facility Index System/Facility Identification Initiative Program Summary Report
HMIRS	Hazardous Materials Information Reporting System
MLTS	Material Licensing Tracking System
MINES	Mines Master Index File
NPL Liens	Federal Superfund Liens
PADS	PCB Activity Database System
DOD	Department of Defense Sites
RAATS	RCRA Administrative Action Tracking System
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
SSTS	Section 7 Tracking Systems
FTTS	Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA)/ Toxic Substances Control Act Tracking System
UMTRA	Uranium Mill Tailings Remedial Action
US BROWNFIELDS	Brownfields projects
US ENG CONTROLS	Engineering Controls in Place

Abbreviation	Title
US INSTITUTIONAL CONTROLS	Institutional Controls Site List
ODI	Open Dump Inventory
FUDS	Formerly Used Defense Sites
INDIAN RESERV	Indian Reservations

Table 2-3. Primary State Databases

Abbreviation	Title
OR SHWS-ECSI	Oregon Environmental Cleanup Site Information
OR SWF/LF	Oregon Solid Waste Facilities List/Landfill Sites
OR-LUST	Oregon Leaking Underground Storage Tank Database
OR-UST	Oregon Underground Storage Tank Database
OR VCS	Oregon Voluntary Cleanup Program Sites
OR CRL	Oregon Confirmed Release List
OR INDIAN UST	Oregon Underground Storage Tank Database on Indian Land
OR BROWNFIELDS	Oregon Brownfields Sites Listing
WA-CSCSL	Washington Confirmed and Suspected Contaminated Sites List
WA-CSCSL NFA	Washington Confirmed and Suspected Contaminated Sites List No Further Action
WA HSL	Washington Hazardous Sites List
WA SWF/LF	Washington Solid Waste Facilities List/ Landfill Sites
WA LUST	Washington Leaking Underground Storage Tank Database
WA-UST	Washington Underground Storage Tank Database
WA VCP	Washington Voluntary Cleanup Program
WA ICR	Washington Individual Cleanup Report
WA PFAS	Washington PFAS (per- and polyfluoroalkyl substances) Contamination Site Listing
WA PTAP	Washington Petroleum Assistance Program Site Listing
WA INDIAN UST	Washington Underground Storage Tank Database on Indian Land

Abbreviation	Title
WA INDIAN LUST	Washington Leaking Underground Storage Tank Database on Indian Land
WA BROWNFIELDS	Washington Brownfields Sites Listing

Table 2-4. Supplemental State Databases

Abbreviation	Title
OR SPILLS	Oregon Spill Data
OR AST	Oregon Aboveground Storage Tank Sites
OR HIST LF	Oregon Old Closed Solid Waste Disposal Sites
OR HSIS	Oregon Hazardous Substance Information Survey
OR AOC COL	Oregon Columbia Slough
OR ENG CONTROLS	Oregon Engineering Controls in Place
OR DRYCLEANERS	Oregon Registered Dry Cleaning Facilities
OR-HAZMAT	Oregon Spills Reported to Fire Marshal
OR UIC	Oregon Underground Injection Control
OR CDL	Oregon Uninhabitable Drug Lab Properties
WA AST	Washington Aboveground Storage Tank Sites
WA ALLSITES	Washington Facility/Site Identification System Listing
WA DRYCLEANERS	Washington Dry Cleaner List
WA INST CONTROL	Washington Institutional Control Site List
WA SPILLS	Washington Reported Spills
WA UIC	Washington Underground Injection Wells Listing

2.4.1.2 Historical Land Use Review

The objective of the historical land use information review was to develop an understanding of the previous uses of the properties and surrounding area to help identify the likelihood of past uses having led to RECs in connection with the subject property. The IBR team researched the historical land use, occupancy, and ownership of each property proposed for acquisition and adjacent properties to evaluate historical uses that are known to be associated with RECs. Historical records reviewed include aerial photographs, fire insurance maps (Sanborn maps), and local agency records.

Sanborn Fire Insurance Maps were originally intended to assist insurance companies in assessing fire risk associated with discrete properties. Map information typically includes site address and location, property boundaries and size, building size and construction materials, utility line types and locations, material types stored in the building, building use/function, boiler locations, fuel and oil storage locations, or other details about use.

2.4.1.3 Site Reconnaissance

Site reconnaissance within the study area consisted of in-person surveys where access was permitted or achievable from public right of way and drive-by surveys when no right-of-entry could be obtained. Site surveys were conducted at each property proposed for acquisition. The IBR Program team recorded the following evidence, if observed:

- A UST or aboveground storage tank (AST).
- Evidence of a spill or release.
- Poor housekeeping practices, such as improper management of potentially hazardous materials containers, visible garbage, or waste debris.
- Dead or distressed vegetation.
- The use or storage of petroleum products or hazardous materials.

Additionally, site representative or site owner interviews in the form of a questionnaire were given to each property owner or representative with the request for right-of-entry. The interviews were conducted to identify potential environmental conditions and to address information data gaps during the Phase I ESA process.

2.4.2 Program-Wide Evaluation of Environmental Conditions

A study area–level environmental review was completed to evaluate hazardous materials sites outside of the proposed acquisition parcels that could impact the Modified LPA or the parcels proposed for acquisition. This review also informed a more complete understanding of historical land use within the study area and helped to determine the order in which the Phase I ESAs were conducted. Parcels containing regulatory sites with a known or suspected release of a hazardous substance or petroleum product were completed first, followed by the remainder of the partial or full acquisitions. The Program-wide environmental review consisted of a federal and state database review, a review of historical land use using historical aerial photographs and Sanborn maps, and a site reconnaissance. Methods of data collection for the Program-wide environmental review were generally the same as those used for the Phase I ESAs, as discussed in Section 2.4.1.

Federal and state environmental database listings, procured by Environmental Data Resources, were searched to identify potential hazardous materials sites outside of the project footprint that could influence the properties proposed for acquisition or the Program during construction. For each site, information pertaining to status, type and quantity of contaminant released, as well as affected media was reviewed. When necessary, the DEQ ECSI database and Ecology's Environmental Information Management System online data resources were reviewed. In addition, DEQ and Ecology project managers for the identified site were contacted as necessary to document relevant and available information.

Historical aerial photos for the study area were reviewed in chronological order to establish changes in land use over time. Documented changes in land use are generally on a scale that includes large portions of the study area, although it is possible to discern the appearance of smaller sites such as mills and other industrial sites, and on occasion, smaller sites such as gas stations. Major land use observations include agricultural use of property, a change from rural or agricultural use to residential or commercial use, or any change to or from an industrial use.

Sanborn Fire Insurance Maps were used to identify historical sites within the hazardous materials study area that are suspected of having potential for contamination from the generation, storage, use, or disposal of hazardous substances or petroleum products.

Site reconnaissance within the study area consisted of surveys from public right of way and drive-by surveys. Site surveys were conducted near sites and areas that were identified by the database search or historical land use review as having a potential REC.

2.5 Guidelines for Evaluating Potential Effects

Applicable state and federal guidelines were used to collect and screen data and to evaluate potential direct effects on the Program from hazardous materials. These guidelines include:

- ODOT HazMat Program Manual (ODOT 2020).
- Guidance on Standard Methodology for WSDOT Hazardous Material Discipline Report (WSDOT 2017).
- WSDOT Environmental Manual, Chapter 447 (WSDOT 2022).
- Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process (ASTM 2021).
- Hazardous Waste Guide for Project Development (AASHTO 1990).
- FTA SOP 19, Consideration of Contaminated Properties including Brownfields (FTA 2016).

2.6 Data Screening Methods

2.6.1 Phase I ESAs

In accordance with FTA SOP 19 (FTA 2016), a Phase I ESA was completed for each property to be acquired as part of the IBR Program. The Phase I ESAs were conducted in general accordance with ASTM Standard E1527-21, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, which defines the generally accepted industry practices and procedures currently applicable at the time and place of this report. The Phase I ESA is intended to permit the user to satisfy the requirements to qualify for the bona fide prospective purchaser limitation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and as such constitutes "all appropriate inquiries in the previous ownership and uses of the property consistent with good commercial or customary practice" as defined at 42 USC §9601 (35)(B).

The purpose of the Phase I ESAs was to identify recognized RECs on or near each property proposed for acquisition by the Program. The term recognized environmental conditions is defined in ASTM Standard E1527-21, see Section 2.4.1.1. In accordance with ASTM Standard E1527-21, some RECs may be further defined as historical recognized environmental conditions (HRECs) or controlled recognized environmental conditions (CRECs).

An HREC is defined as:

> "…*a past release* of any *hazardous substances* or *petroleum products* that has occurred in connection with the *property* and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted use criteria established by a regulatory authority, without subjecting the *property* to any required controls."

A CREC is defined as:

> "…*a recognized environmental condition* resulting from a past *release of hazardous substances* or *petroleum products* that has been addressed to the satisfaction of the applicable regulatory authority, with *hazardous substances* or *petroleum products* allowed to remain in place subject to the implementation of required controls."

The Phase I ESAs were conducted to identify RECs, HRECs, and/or CRECs at the subject property. Conclusions from Phase I ESAs were used to determine the need for a Phase II ESA or other additional assessment on individual parcels. The findings of Phase II ESAs, as required, would be included in the Final SEIS and ROD.

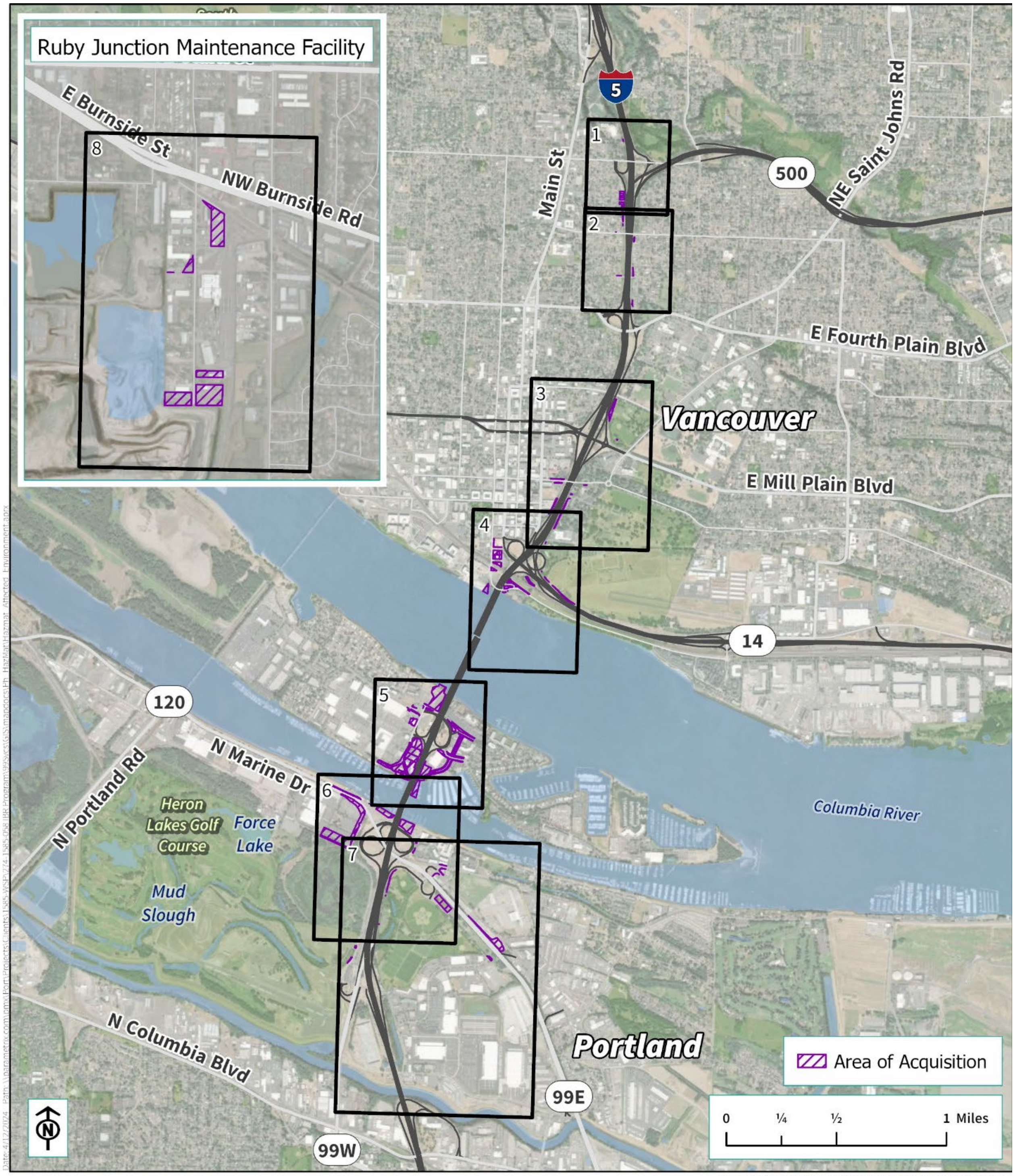
2.6.2 Full and Partial Acquisitions

The IBR engineering team determined the general extent of the required right of way by parcel to enable the hazardous materials team to estimate the extent of the permanent impacts and determine the type of acquisition—full or partial acquisition of the parcel, with or without the displacement of the use—that could be required. The team also identified the temporary construction easements that would be needed to construct the Modified LPA, as well possible staging areas that could also be required depending on construction methods. Phase I ESAs were completed for each parcel proposed for full or partial acquisition. Some parcels, within the same geographic location and with similar land uses and/or ownership were consolidated into one Phase I ESA report. The focus of these reports is the area of acquisition; however, each parcel was still evaluated for potential RECs that could impact the area of acquisition on parcel. Parcels and acquisition areas are displayed on Figure 2-2 through Figure 2-10.

2.6.3 Program-Wide Evaluation of Environmental Conditions

Evaluation of RECs and data screening for the Program-wide evaluation of environmental conditions was conducted using the same methods as described above in Section 2.6.1.

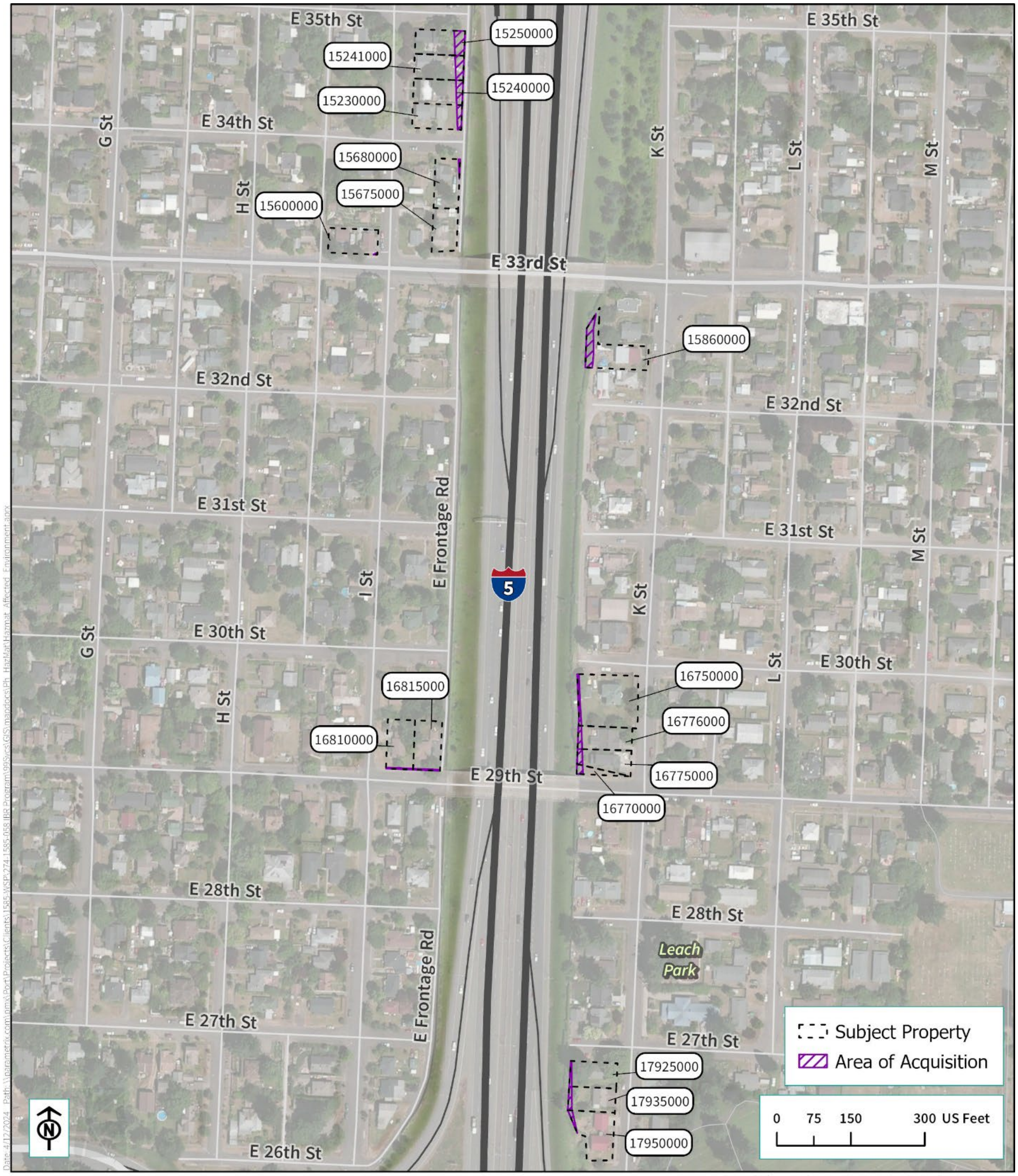
Figure 2-2. Areas of Acquisition



Source: Sanborn Map Company, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

Figure 2-3. Areas of Acquisition – Map 1

Figure 2-4. Areas of Acquisition – Map 2



Source: Sanborn Map Company, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

Figure 2-5. Areas of Acquisition – Map 3

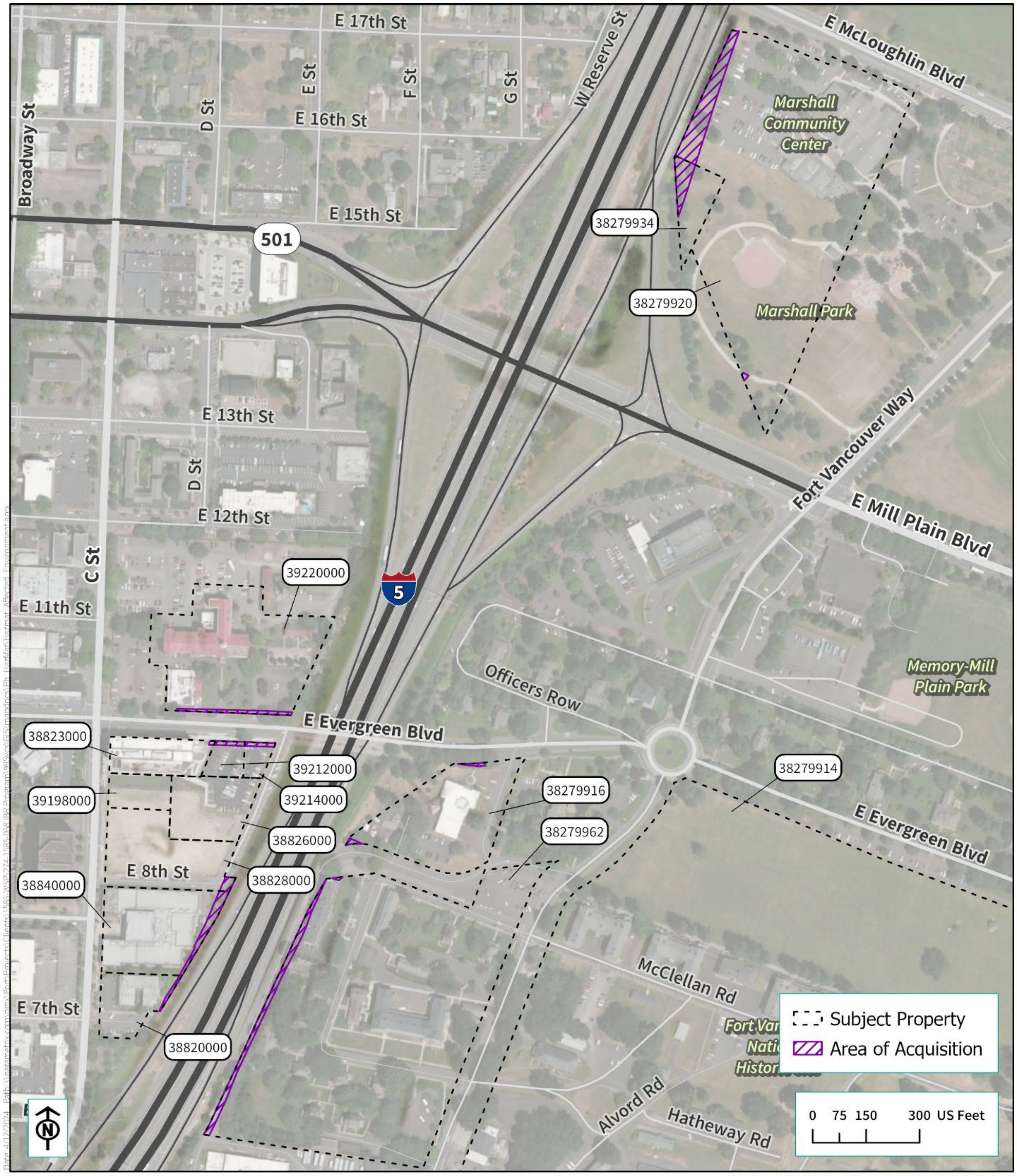
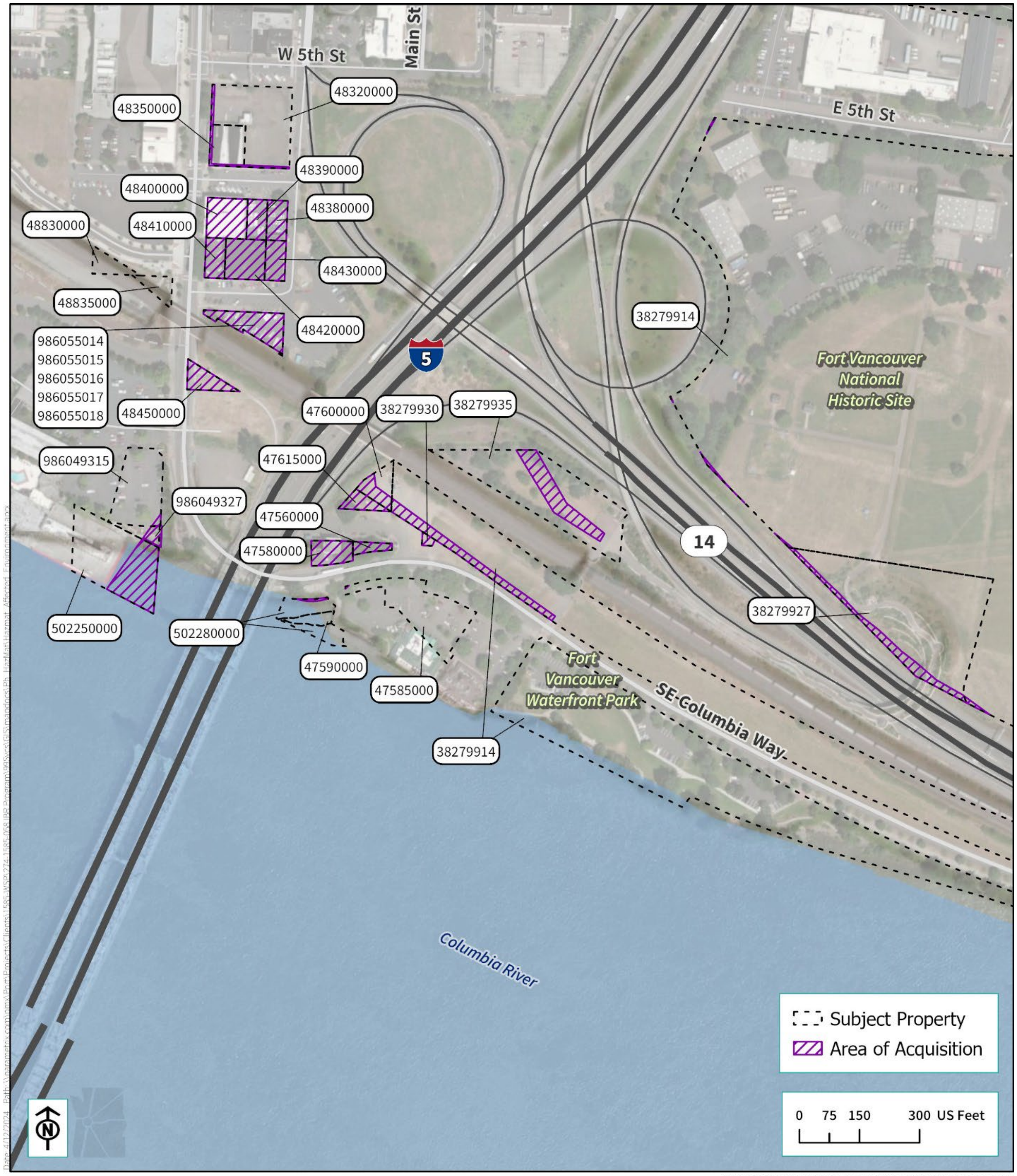
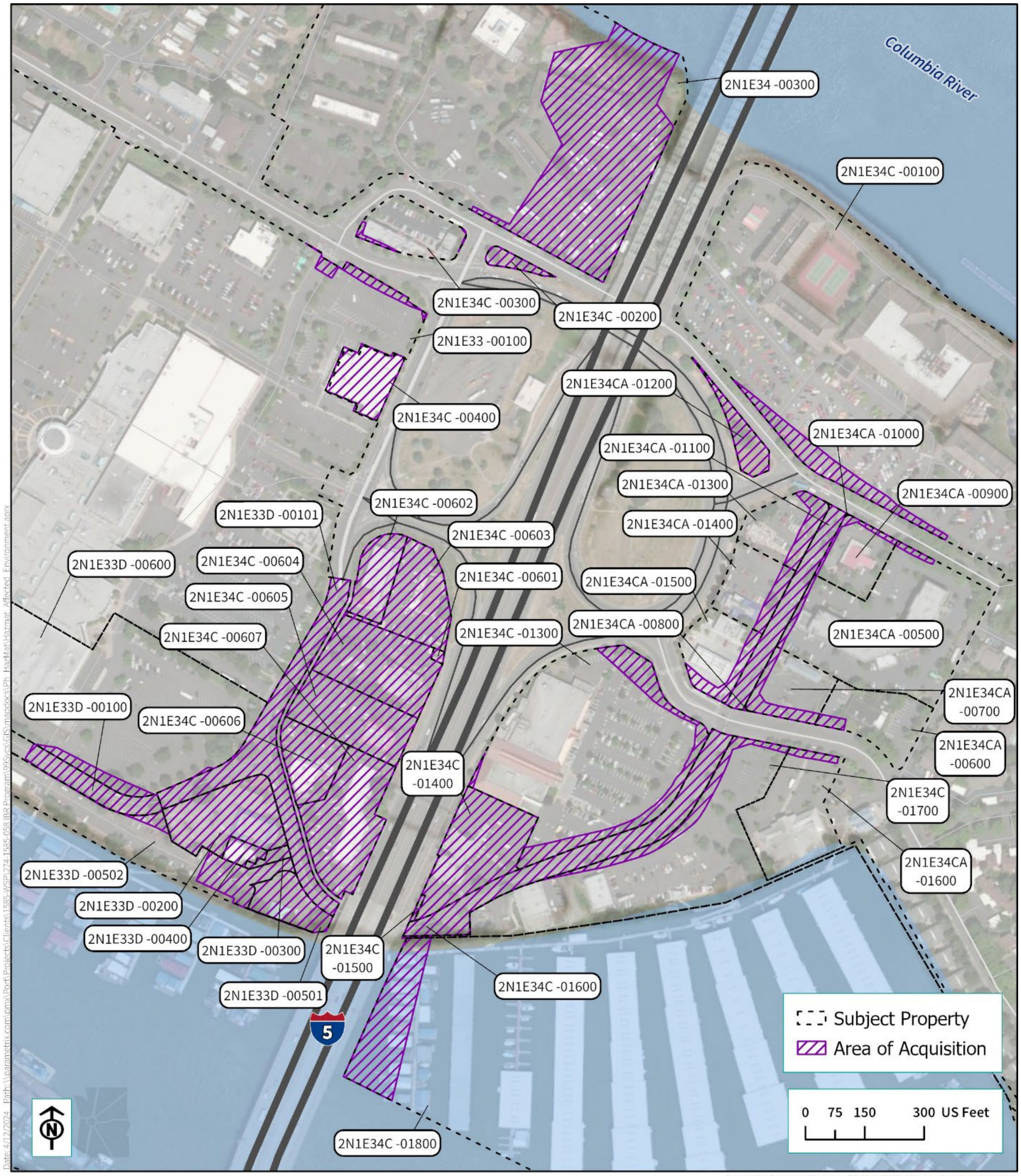


Figure 2-6. Areas of Acquisition – Map 4



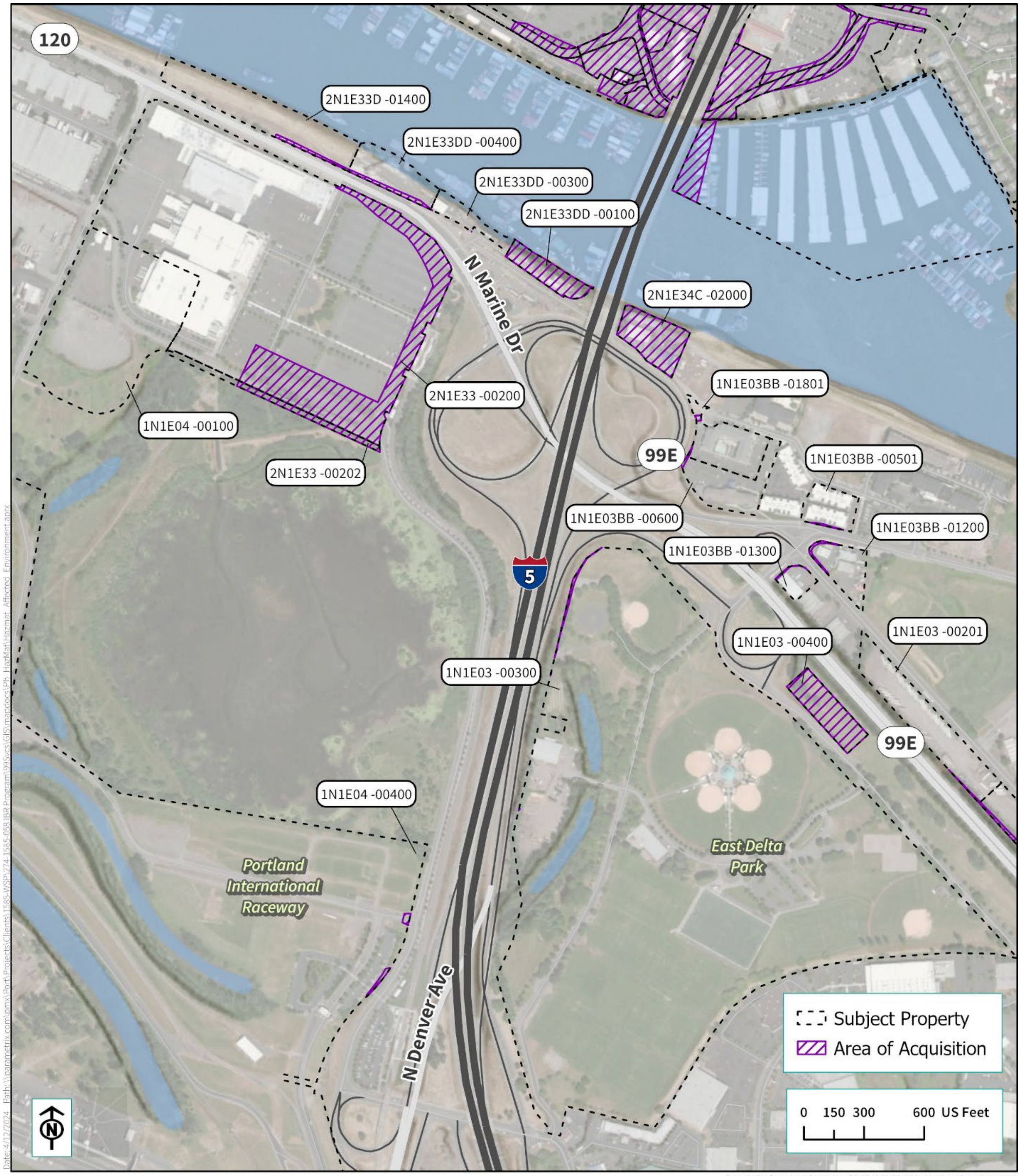
Source: Sanborn Map Company, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

Figure 2-7. Areas of Acquisition – Map 5



Source: Sanborn Map Company, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

Figure 2-8. Areas of Acquisition – Map 6



Source: Sanborn Map Company, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

Figure 2-9. Areas of Acquisition – Map 7

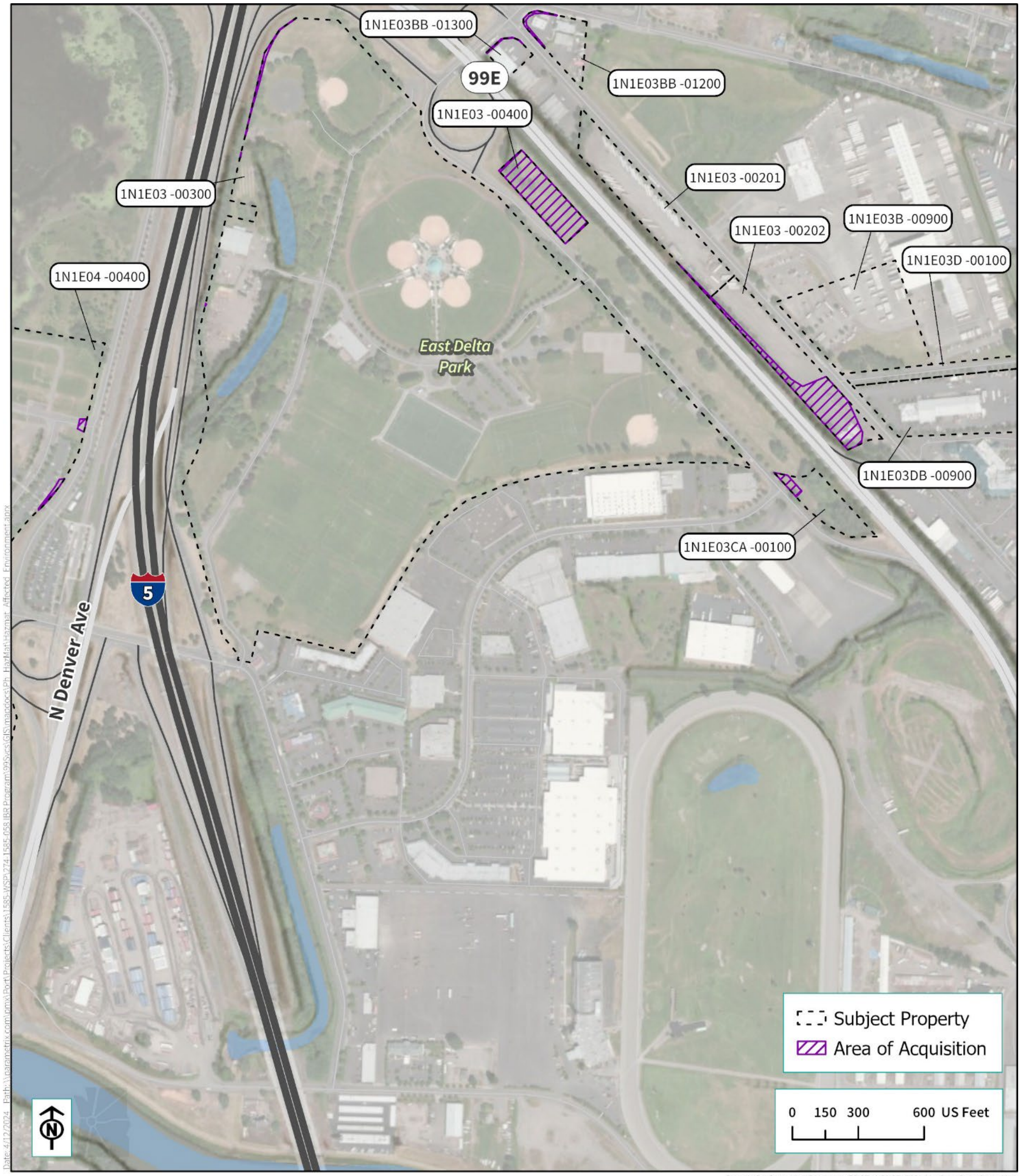
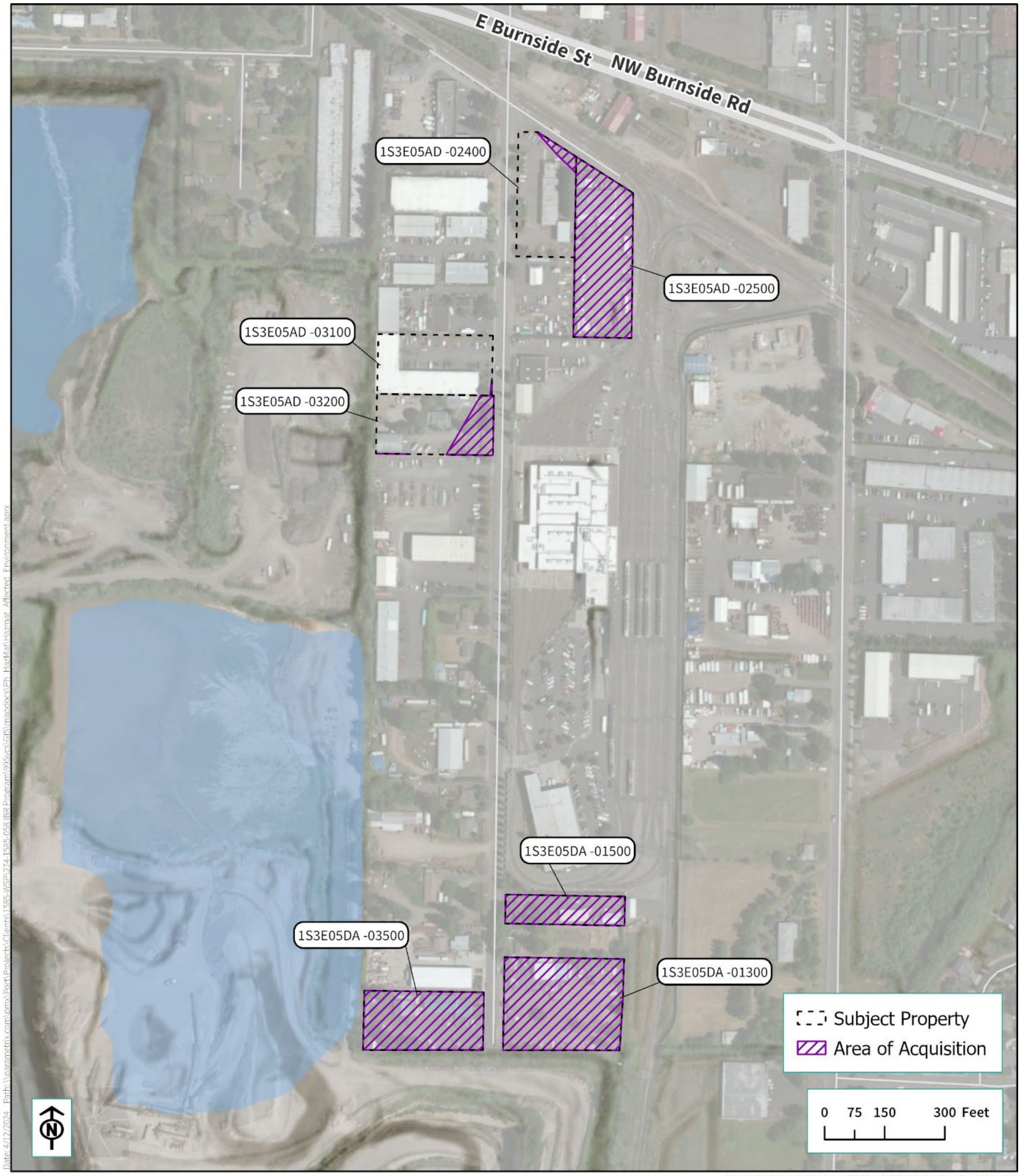


Figure 2-10. Areas of Acquisition – Map 8



Source: Sanborn Map Company, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

2.7 Methods for Evaluating Short-Term and Long-Term Effects

2.7.1 Short-Term Effects from Construction Activities

Short-term effects that may result from the Modified LPA were evaluated qualitatively by comparing the location of identified hazardous materials sites and historical land use with the location and activities associated with:

- Construction of proposed structures, including bridges, interchanges, retaining walls, tunnels, utility corridors, and stormwater treatment facilities.
- Construction activities, including excavation, grading, soil stabilization, dredging, and the storing and use of hazardous substances.

In general, the potential for adverse impacts was identified in areas where construction activities are intensive and where hazardous materials sites are or were located. In addition, short-term effects are discussed in regard to the liability associated with acquisition of property with RECs.

2.7.2 Long-Term Effects from Operation and Maintenance

Long-term effects that may result from the Modified LPA were evaluated qualitatively by assessing activities associated with the long-term operation and maintenance of the Modified LPA. Activities include hazardous materials response to roadway spills and treatment and discharge of stormwater. If contaminated properties are acquired as part of the Program, long-term effects could also include the need to conduct or maintain remedial actions associated with contamination that may remain on a property after construction is complete. Long-term remedial actions could include deed restrictions, engineering controls, placement of soil caps, groundwater treatment systems, or similar technologies and approaches.

2.8 Mitigation Measures

Mitigation measures for short-term adverse effects from hazardous materials initially consist of avoidance of identified hazardous materials sites. In cases where Modified LPA construction cannot avoid an identified hazardous material site, the approach for mitigation may include conducting additional due diligence on the property prior to acquisition; coordination and communications with the state environmental agencies and potentially responsible parties; conducting site investigations (Phase II ESA); and remediation or abatement of contaminated media. To minimize temporary effects related to hazardous materials during construction, standard mitigation measures such as best management practices (BMPs) would be implemented to reduce the risk of spills, leaks, or other releases during construction activities. Measures could include the following:

- Fueling, conducting maintenance, and cleaning in areas that are contained by measures such as berms or other containment.
- Minimizing the production or generation of hazardous materials.
- Labeling and storing hazardous waste according to federal regulations.
- Locating hazardous waste storage away from storm drains or surface water.

- Recycling materials such as used motor oil and water-based paint as appropriate.
- Handling potential spills of hazardous materials in conformance with applicable regulatory requirements.

Mitigation measures for long-term adverse effects from hazardous materials include instituting hazardous materials emergency responses to releases or spills on roadways and bridges; conducting maintenance and cleaning of roadways, bridges, and tracks; and conducting long-term monitoring of stormwater facilities to ensure they are functioning as intended.

2.9 Coordination

IBR Program coordination and communication—during preparation, review, and finalization of this report with the WSDOT Hazardous Materials and Solid Waste Program—was initially conducted with Ben Wilkinson and Trent Ensminger and more recently with Patrick Svoboda. The IBR Program also coordinated with Shawn Rapp, ODOT Geotechnical Engineering and Engineering Geology Section, during preparation, review, and finalization of this report.

3. AFFECTED ENVIRONMENT

3.1 Physical Setting

3.1.1 Current Land Use

Current land use in the vicinity of the Modified LPA is displayed in Figure 3-1. An understanding of both current and historical land use is important in assessing the occurrence and types of hazardous materials. For example, agricultural land is more likely to have a higher occurrence of pesticides and herbicides than residential land, and commercial or industrial land is more likely to have a higher occurrence of petroleum products and other hazardous materials.

3.1.1.1 Portland

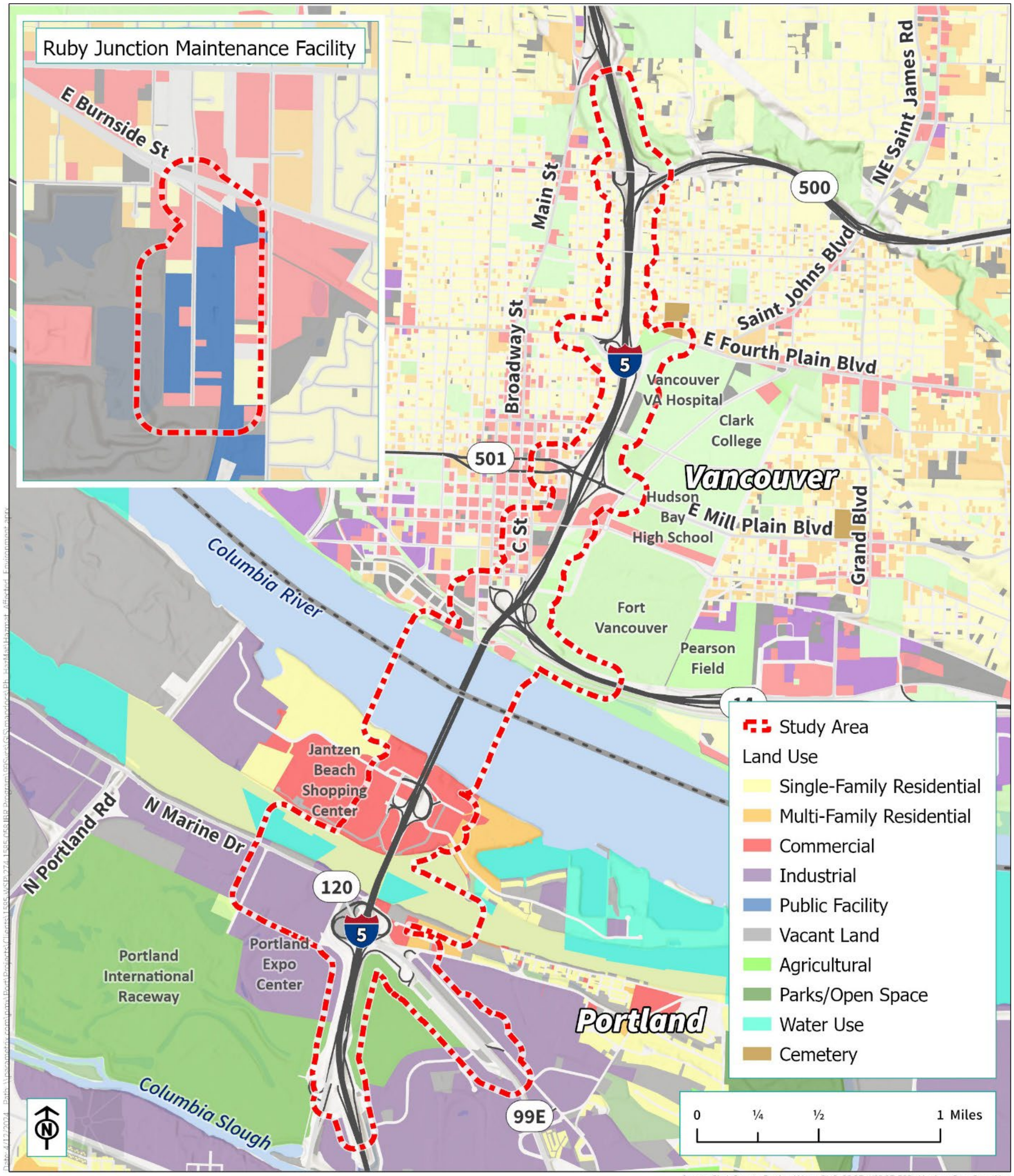
The Marine Drive interchange area land use is a mix of commercial, industrial, and residential properties. Hayden Island east of I-5 is predominantly commercial and residential. Hayden Island west of I-5 is commercial, including the Jantzen Beach Center (a large shopping mall) and surrounding retailers. Residential uses in the area include condominiums, manufactured homes, and floating homes associated with small marinas.

3.1.1.2 Vancouver

The downtown area of Vancouver is located west of I-5 and south of Mill Plain Boulevard and includes the residential areas and the Uptown Commercial district. The large Central Park district, east of I-5, contains the Vancouver National Historic Reserve, which includes the National Park Service's Fort Vancouver National Historic Site along with other historic districts and structures. Aside from the Vancouver National Historic Reserve, land uses in this area are primarily commercial but include retail, offices, industrial, and residential uses. Commercial uses are concentrated in the downtown area, while industrial uses are generally located near the Columbia River. Some portions of the industrial areas in the vicinity of the western landing of the Interstate Bridge have been recently redeveloped into commercial/retail use with a park and substantial public access.

North of Mill Plain Boulevard, the land uses and zoning are predominantly residential, with commercial uses along the major transportation corridors—primarily Fourth Plain Boulevard and Main Street. Residential neighborhoods are located west of I-5. The east side of I-5 includes more multi-family housing and has a more suburban layout. Clark College, Fort Vancouver, and the Veterans Administration campus occupy the majority of property adjacent to the eastern side of I-5. The current municipal boundaries of the city of Vancouver are at the railroad bridge just south of 63rd Street on Highway 99.

Figure 3-1. Existing Land Use Location Map



Source: Clark County, Portland Metro RLIS, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

3.2 Environmental Setting

3.2.1 Topography and Drainage

The Columbia River dominates the topography of the study area. The project corridor lies within the main Columbia River valley, with the exception of a small area north of the SR 500 interchange located in the Burnt Bridge Creek watershed (Figure 3-2). Burnt Bridge Creek flows into Vancouver Lake before discharging to the Columbia River. Study area elevations vary from approximately 10 feet North American Vertical Datum 1988 (NAVD 88) in the Columbia River floodplain to about 220 feet NAVD 88 at the drainage divide between the Columbia River and Burnt Bridge Creek valleys. A small area of the southern portion of the study area in Portland drains to the Columbia Slough. The Columbia Slough runs parallel to the Columbia River to the south and discharges to the Willamette River approximately 5.5 miles west of the study area.

3.2.2 Fluvial Setting

The Columbia River drains almost 259,000 square miles in seven states and Canada, with land in forest, agricultural, residential, urban, and industrial uses. The Lower Columbia River, the section of the river most pertinent to the impact analysis, flows from Bonneville Dam at River Mile (RM) 146 to the mouth of the river, and drains an area of 18,000 square miles. Adjacent to the study area, Hayden Island divides the Columbia River into the mainstem to the north and a side channel called North Portland Harbor to the south. The I-5 highway crosses both channels near RM 106.5.

3.2.2.1 Columbia River

Figure 3-3 displays Columbia River bathymetry within the study area. The figure indicates that depth of water in the study area extends from the ordinary high-water line[9][10] at 21.2 feet NAVD 88 to approximately -50 feet NAVD 88. Shallow water environments (less than 20 feet of water column) are present in North Portland Harbor and in proximity to Hayden Island.

Geotechnical borings and bathymetric surveys completed within the footprint of the proposed crossing indicate that the depth of unconsolidated sediments (alluvial and/or catastrophic flood deposits) in the study area ranges from -40 to -230 feet NAVD 88 (DEA 2006; Shannon and Wilson 2008). Underlying these sediments is the top of the Troutdale Formation, which slopes downward from north to south in the study area.

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[9] Normally, this is the point on a stream bank to which the presence and action of surface water is so continuous as to leave a district marked by erosion, destruction or prevention of woody terrestrial vegetation, predominance of aquatic vegetation, or other easily recognized characteristics, but may be modeled based on stream elevation gage data to be the elevation of the 2-year flow. In this area of the Columbia River, the ordinary high-water line has been modeled.

[10] The ordinary high-water line, as defined by ORS 247.005, in this document is interchangeable with the term *ordinary high-water mark* as defined by the Washington State Department of Ecology and USACE.

Figure 3-2. Topography and Drainage

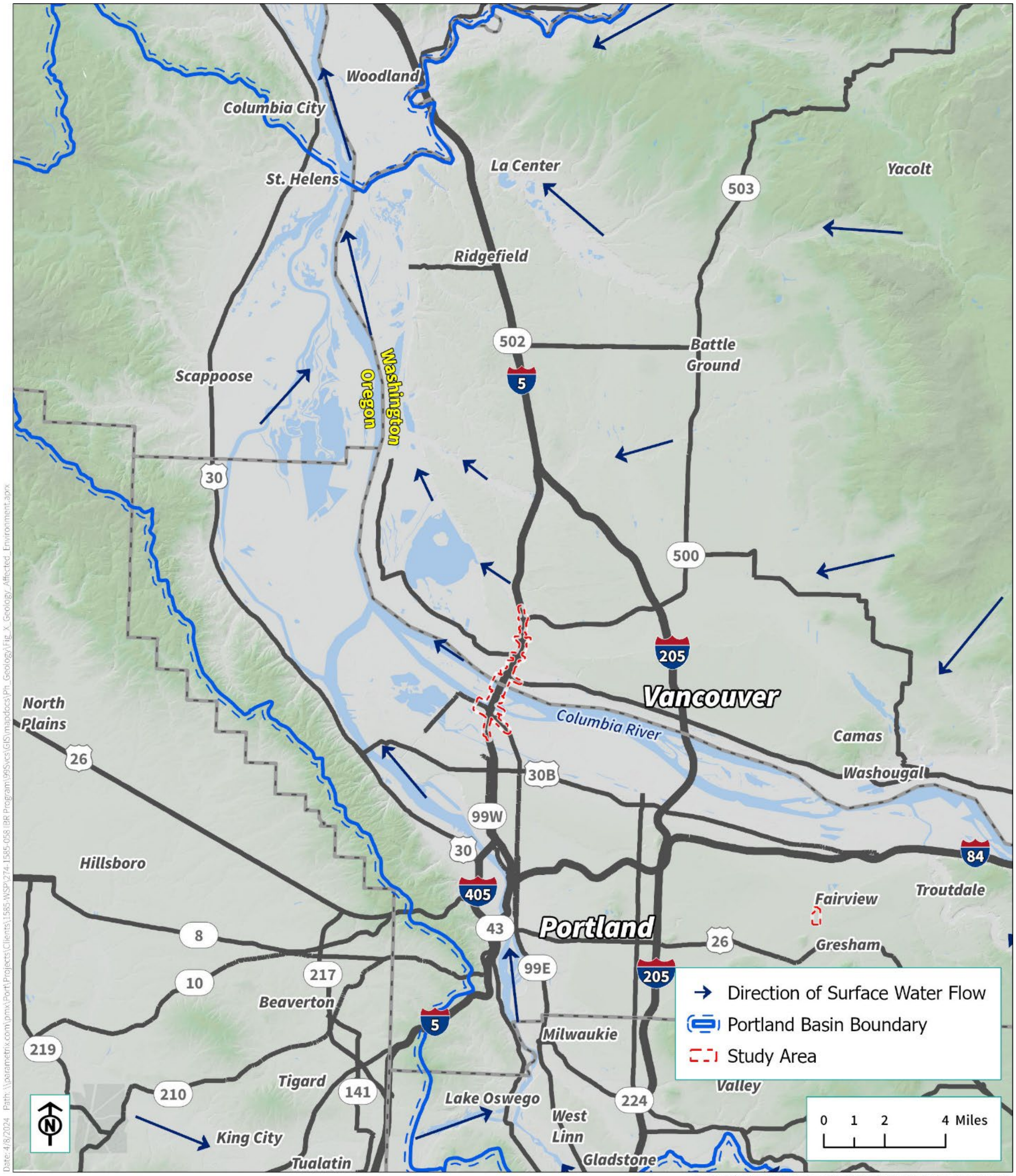
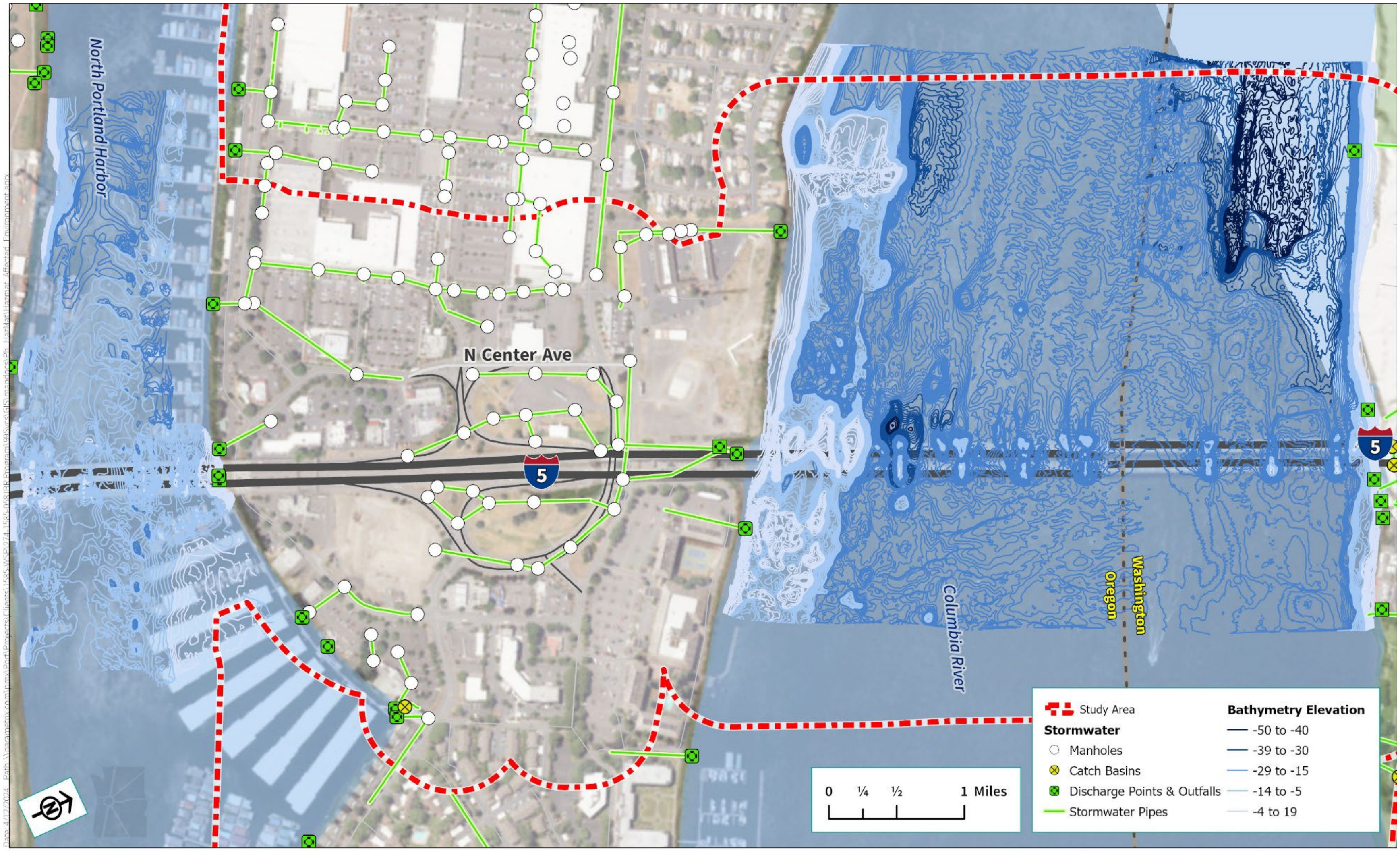


Figure 3-3. Columbia River Bathymetry Map



Source: Columbia River Crossing, US Army Corps of Engineers, ODOT, WSDOT, Mapbox, OpenStreetMap

The top layer of river substrate is composed of loose to very dense alluvium (primarily sand, gravel and trace fines). The alluvium is underlain by dense gravel, which in turn is underlain by the Troutdale Formation. Additional information regarding the characteristics of in-water sediment material in proximity to the study area has been compiled by the USACE and geotechnical investigations conducted for the project (USACE 2009; Shannon and Wilson 2008).

Federal, state, and local databases were reviewed for sediment evaluations performed in proximity to the existing Interstate Bridge. The EPA Environmental Management and Assessment Program database (containing data through 2006) was searched for sediment evaluations in the study area. Ecology's Environmental Information Management database was also queried for recent sediment sampling and analyses performed under the State of Washington's jurisdiction. For evaluations performed under State of Oregon jurisdiction, the USACE Portland District was contacted.

As part of the Columbia River Bi-State Survey Program, sediment sampling and analysis were performed in 1991 and 1993 (Tetra Tech 1991, 1993). Bi-State Program sample collection stations were located within the navigation channel and within one mile of the Interstate Bridge. Based on the data collected, the concentrations of chemicals of concern in sediment samples were below screening levels established for evaluating the suitability of open water disposal.

The USACE conducted a study (USACE 2009) to characterize the river sediment for dredging as part of the Columbia River Channel Improvement Project. In June 1997, 89 stations were sampled from the Columbia River channel, between RM 6 and RM 106.2, for physical analysis. Samples from 23 of the 89 stations were further analyzed for chemical contaminants. Analyses for inorganic total metals, polycyclic aromatic hydrocarbons (PAHs), total organic carbon, acid-volatile sulfide, pesticides, polychlorinated biphenyls (PCBs), pore water tributyltin (TBT), and the P450 reporter gene system (a dioxin/furan screen) were performed on selected samples. Two sample collection stations (CR-BC-88 and CR-BC-89) were within 0.5 miles of the Interstate Bridge (Table 3-1). All sample results for these stations were below or not detected above their respective screening level values.

Table 3-1. Columbia River Sediment Quality

Analyte	Analysis	Units	Sample Location CR-BC-88	Sample Location CR-BC-89	Screening Levels [a]
Physical Analysis	Water Depth [b]	feet	39.1	34.1	N/A
	River Mile	miles	106.2	106.2	N/A
	Grain Size – Mean	mm	0.89	0.59	N/A
	Grain Size – Median	mm	0.73	0.51	N/A
	Sand	%	1.1	2.9	N/A
	Very Fine Sand	%	0.1	0.3	N/A
	Silt	%	0.0	0.3	N/A
	Clay	%	0.0	0.0	N/A
	Volume of Solids	%	0.5	0.6	N/A
	Solids	%	88.9	N/A	N/A
	Total organic carbon	%	<0.05	N/A	N/A
Metals	Arsenic	mg/kg	1.0	N/A	14/120
	Cadmium	mg/kg	<0.8	N/A	2.1/5.4
	Chromium	mg/kg	3.0	N/A	72/88
	Copper	mg/kg	5.0	N/A	400/1,200
	Lead	mg/kg	2.0	N/A	350/>1,300
	Mercury	mg/kg	<0.05	N/A	0.66/0.8
	Nickel	mg/kg	6.0	N/A	26/210
	Silver	mg/kg	<0.6	N/A	0.57/1.7
	Zinc	mg/kg	31.0	N/A	3,200/>4,200
	AVS	%	<0.7	N/A	N/A

Analyte	Analysis	Units	Sample Location CR-BC-88	Sample Location CR-BC-89	Screening Levels [a]
Pesticides and PCBs	Aldrin	µg/kg	<2	N/A	N/A
	DDT	µg/kg	<2	N/A	100/8,100
	DDE	µg/kg	<2	N/A	21/39
	DDD	µg/kg	<2	N/A	310/860
	Total DDT	µg/kg	ND	N/A	N/A
	Aroclor 1254	µg/kg	<10	N/A	N/A
	Aroclor 1260	µg/kg	<10	N/A	N/A
	Total PCBs	**µg/kg**	**ND**	N/A	**110/2,500**
Low Molecular Weight PAHs (LPAHs)	Napthalene	µg/kg	0.7	N/A	N/A
	2-Methylnapthalene	µg/kg	0.6	N/A	N/A
	Acenaphthylene	µg/kg	<5	N/A	N/A
	Acenaphthene	µg/kg	<5	N/A	N/A
	Fluorene	µg/kg	0.7	N/A	N/A
	Phenanthrene	µg/kg	2.0	N/A	N/A
	Anthracene	µg/kg	0.8	N/A	N/A
	Total LPAHs	**µg/kg**	**6.0**	N/A	N/A
High Molecular Weight PAHs (HPAHs)	Fluoranthene	µg/kg	2.0	N/A	N/A
	Pyrene	µg/kg	<5	N/A	N/A
	Benz(a)anthracene	µg/kg	2.0	N/A	N/A
	Chrysene	µg/kg	2.0	N/A	N/A
	Benzo(b,k)fluoranthene	µg/kg	5.0	N/A	N/A
	Benzo(a)pyrene	µg/kg	2.0	N/A	N/A
	Ideno(1,2,3-cd)pyrene	µg/kg	2.0	N/A	N/A
	Dibenz(a,h)anthracene	µg/kg	1.0	N/A	N/A
	Benzo(g,h,i)perylene	µg/kg	5.0	N/A	N/A
	Total HPAHs	µg/kg	21.0	N/A	N/A
	Total PAHs	µg/kg	27.0	N/A	17,000/30,000

Analyte	Analysis	Units	Sample Location CR-BC-88	Sample Location CR-BC-89	Screening Levels [a]
P450 Reporter Gene Assay (Dioxin/Furan Screen)	6-Hour B(a)P Eq	µg/g	0.60	N/A	N/A
	6-Hour TEQ	ng/g	0.03	N/A	N/A
	16-Hour B(a)P Eq	µg/g	0.10	N/A	N/A
	16-Hour TEQ	ng/g	0.01	N/A	N/A
	Ratio	N/A	7	N/A	N/A
	Primary Contaminates [c]	N/A	PAHs	N/A	N/A

AVS – acid-volatile sulfide

PAH – polycyclic aromatic hydrocarbon

PCB – polychlorinated biphenyl

TEQ – toxicity equivalent

DDT – dichlorodiphenyltrichloroethane

a No effect anticipated/Minor effect anticipated, from Table 6-2, Benthic toxicity screening levels (RSET 2018).

b Corrected to river datum.

c Based on ratio of 6 hr/16 hr where ratio > 5 = PAHs; ration 5 to 1 = both PAHs and chlorinated compounds; and ratio < 1 = chlorinated compounds.

< - Denotes a non-detect at the numerical level listed.

Units:

mg/kg – milligrams per kilogram

mm – millimeters

µg/kg – micrograms per kilogram

µg/g – micrograms per gram

ng/g – nanograms per gram

Following the June 1997 sampling event, the Columbia River mile segment nearest the Interstate Bridge (RM 99 to 106) was given an "exclusionary" ranking in accordance with the Dredge Material Evaluation Framework for the Lower Columbia River Management Area. Exclusionary rank is given to coarse-grained material (greater than 80% retained on a No. 230 sieve or approximately 0.063 mm in diameter) with total volatile solids less than 5% and sufficiently removed from sources of sediment contamination. Under the framework guidelines, this ranking authorizes dredged sediment to be suitable for unconfined aquatic disposal without further testing.

Deep-draft federal navigation maintenance dredging in the main Columbia River near the Interstate Bridge was completed in 2007 using a hopper dredge. The main channel dredging was authorized from RM 3 to 106.5, but actual dredging extended to only RM 105.5. Mechanical excavation near RM 105 in front of the Port of Vancouver docks was completed in 2008.

In August 2008, a sediment sampling study was conducted in the mainstem Columbia River, similar to the June 1997 sampling effort. The final data and completed data report concluded that based on sampling results all sediment sampled was considered acceptable for open in-water placement without further characterization (Siipola 2009).

There have been no further sediment sampling events characterizing contaminants in the vicinity (within a half-mile upstream and downstream) of the Interstate Bridge since 2008.

3.2.2.2 Burnt Bridge Creek

Burnt Bridge Creek defines a portion of the northern boundary of the study area. The creek originates in East Vancouver from field ditches that drain a large wetland area between NE 112th Avenue and NE 164th Avenue. The creek is approximately 12.9 miles in length and alternates between ditches and natural channels. Except for floodplains, parks, and wetlands, nearly the entire basin is urbanized. In the study area, the creek flows through a small canyon with a narrow floodplain. The creek passes under the existing highway in a culvert north of the study area.

3.2.3 Existing Stormwater Conveyance Systems

The existing stormwater drainage systems in the study area are closed conveyance systems that discharge runoff to either the Columbia River or Burnt Bridge Creek watersheds or to stormwater drywells that infiltrate into the subsurface soil. These watersheds are highly urbanized within the study area. The existing drainage systems are described below based on their receiving waterbody.

3.2.3.1 Columbia River Watershed (including the Columbia River Slough)

Approximately 240 acres of the Columbia River Watershed within the study area is comprised of impervious surfaces that include highways, streets, parking lots, and alleys. The area extends north from the Columbia River to just south of SR 500. The drainage area includes I-5, the western end of SR 14, and downtown Vancouver. With the exception of SR 14, runoff from this drainage area receives no water quality treatment prior to being released to the Columbia River. Runoff from the eastbound lanes of SR 14 (about 3 acres) sheds to the shoulder where it disperses and/or infiltrates to groundwater.

Runoff from the Interstate Bridge drains directly from the bridge decks through scuppers to the Columbia River or ground below. North of the Columbia River, conveyance systems collect runoff from I-5, SR 14, and streets in downtown Vancouver. The runoff is discharged directly to the river via several outfalls located from about 0.5 miles east (upstream) of the Interstate Bridge to about 0.5 miles west. Over 80% of the total drainage area is served by a single conveyance system that discharges to the Columbia River via a 60-inch-diameter outfall located immediately east of the Interstate Bridge. Runoff also discharges to the Columbia River via several outfalls located in the immediate vicinity of the existing Interstate Bridge (Figure 3-3) (Clark County 2022). A small portion of stormwater runoff is captured by basins that drain into dry wells and/or dry well systems. In general, storm drainage from the Ruby Junction portion of the study area drains to Fairview Creek.

3.2.3.2 Burnt Bridge Creek Watershed

Approximately 17 acres of the Burnt Bridge Creek Watershed is comprised of impervious surfaces including highway, streets, parking lots, and alleys. The area includes SR 500, the I-5/SR 500 interchange, I-5 north of the interchange, and adjacent neighborhoods. Runoff from approximately 15 acres of impervious surface is directed to an infiltration pond located immediately south of the

I-5/Main Street interchange. Runoff from the remaining area flows to a pond located east of the I-5/SR 500 interchange. A small portion of stormwater runoff is captured by catch basins that drain into dry wells.

3.2.4 Stormwater Quality

Impacts to stormwater quality can occur when precipitation encounters a pollutant-generating impervious surface (PGIS). PGIS is defined as surfaces that are considered a significant source of pollutants in stormwater runoff and include, for example:

- Highways, including non-vegetated shoulders
- Streets, including contiguous sidewalks, and driveways
- Bus layover facilities, surface parking lots, and the top floor of parking structures

Runoff from PGIS is typically associated with a suite of pollutants, including suspended sediments, nutrients (nitrogen and phosphorus), PAHs, oils and grease, road salt and deicing agents, antifreeze from radiator leaks, cadmium, copper, lead and zinc from tires, engine parts, and brake pad wear.[11] Fecal coliform, while not a product of roadway surfaces or activities, is known to be conveyed in road runoff.[12] The concentration and load of these pollutants are affected by a number of factors, including traffic volumes, adjacent land uses, air quality, and the frequency and duration of storms. Additional information on pollutant loading is provided in the Water Quality and Hydrology Technical Report.

3.2.5 Geologic Setting

Geologically recent deposits that fill in the Portland Basin consist of conglomerate, gravel, sand, silt, and some clay from volcanic, fluvial, and lacustrine material (Pratt et al. 2001). Late Pleistocene catastrophic flood deposits cover much of the surface within the study area. Deposits originating from an ancestral Columbia River underlie the catastrophic flood deposits. These sedimentary deposits overlie Miocene basalt flows of the Columbia River Basalt Group (CRBG) (Swanson et al. 1993). The CRBG overlies lava flows and volcanic breccias of Oligocene age.

Geologic units within the study area are described below by increasing age. Further discussion on the geologic setting is provided in the Geology and Groundwater Technical Report.

3.2.5.1 Artificial Fill

Artificial fill material was used to modify existing topographic relief and typically consists of sand and silt, with some gravel and debris and local areas of sawdust and mill ends. Fill material ranges in thickness up to 45 feet in Oregon and 25 feet in Washington and is common in developed areas of the Willamette River and Columbia River floodplains. However, thickness and distribution are highly variable (Wells et al. 2020).

[11] The Columbia River Slough is on the Oregon DEQ 303(d) list for several pollutants, including lead, iron, and manganese.

[12] Burnt Bridge Creek is on the 303(d) list for fecal coliform.

3.2.5.2 Alluvium

Alluvial deposits include material derived from present-day streams and rivers, their floodplains, and abandoned channels. These deposits are typically Holocene to upper Pleistocene in age. Alluvial material consists of unconsolidated gravel, medium to fine sand, silt, and organic-rich clay. Cobble-sized material may be present within existing or abandoned stream channels. Thickness is typically less than 45 feet but may be up to 150 feet thick locally. Alluvium is exposed at the surface from just south of the Columbia Slough in Oregon to approximately 0.25 miles north of the Columbia River in Washington (Beeson et al. 1991; Phillips 1987).

3.2.5.3 Missoula Flood Deposits

Fine- and coarse-grained catastrophic flood deposits are a result of the Pleistocene-aged Missoula Floods, which derived from the repeated failure of ice dams located on the Clark Fork River in northwestern Montana (Bretz et al. 1956). The flood deposits underlie much of Portland and the Tualatin and Willamette Valleys and form an undulating, low-relief surface (Wells et al. 2020).

3.2.5.4 Troutdale Formation

The Troutdale Formation (Miocene to Pliocene in age) underlies the catastrophic flood deposits and consists of fine- to coarse-grained fluvial sedimentary rock derived from the ancestral Columbia River (Trimble 1963). The unit is a friable to moderately strong conglomerate with minor sandstone, siltstone, and mudstone. Pebbles and cobbles are composed of CRBG and exotic volcanic, metamorphic, and plutonic rocks. The matrix and interbeds are composed of feldspathic, quartzo-micaceous, and volcanic lithic and vitric sediments. The formation exhibits cementation mantling on some of the grains (Beeson et al. 1991).

3.2.5.5 Miocene and Older Rocks

The CRBG (late Miocene and early Pliocene in age) consists of numerous basaltic lava flows which cover approximately 63,000 square miles and extend to thicknesses greater than 6,000 feet. The CRBG is composed of dark gray to black, variably vesicular, aphyric to sparsely plagioclase-phyric tholeiitic flood basalt and basaltic andesite flows. The flows were deposited during the eruption of fissure vents east of the Cascade Range predominantly between 16.7 and 15.9 million years ago (Kasbohm and Schoene 2018). The lava then flowed down an ancestral Columbia River drainage into the Portland area (Wells et al. 2020).

Beneath the CRBG are upper Eocene to lower Miocene volcanic and marine sedimentary rocks. The volcanic rocks typically consist of altered basalt, basaltic andesite, and pyroclastic rocks. The marine sedimentary rocks typically consist of fossiliferous tuffaceous shale and sandstone with minor conglomerate lenses (Madin 1994).

3.2.6 Hydrogeologic Setting

The API lies above eight major hydrogeologic units of varying age and depth. The two uppermost units together make up the Troutdale Aquifer, which is an important source of water for municipal, industrial, and irrigation use. Within the API, the most commonly accessed groundwater (within the upper sedimentary subsystem of the aquifer) in the Troutdale Aquifer is located to depths of approximately 300 feet below ground surface, and generally flows toward the Columbia River or municipal and industrial production wells. The Geology and Groundwater Technical Report provides more information on hydrogeology, groundwater flows, and current and future beneficial uses of groundwater in the API.

Groundwater flows in the aquifer are influenced by pumping from a number of production wells, in particular municipal water supply wells for the city of Vancouver, which relies on the Troutdale Aquifer (as defined by EPA) for its entire supply. In 2006, the EPA designated the Troutdale Aquifer system as a sole source aquifer, defined as "an aquifer or aquifer system which supplies at least 50% of the drinking water consumed to the area overlying the aquifer and for which there is no alternative source or combination of drinking water sources which could physically, legally and economically act to supply those dependent upon the aquifer" (EPA 2006). In recognition of the importance of protecting the aquifer, the entire area within Vancouver's city limits has been designated a Critical Recharge Protection Area.

3.2.7 Groundwater Quality

Contaminants from historical commercial and industrial activities within both the city of Vancouver and the city of Portland have resulted in diminishing groundwater quality. Information available from Oregon DEQ and Washington Ecology indicates that contaminants such as chlorinated solvents, petroleum products, and metals are found in groundwater throughout the study area. Details are available in the Geology and Groundwater Technical Report.

As stipulated in the Safe Drinking Water Act and WAC Chapter 290, suppliers of drinking water must monitor for and meet primary and secondary drinking water standards. From approximately January 1979, the City of Vancouver has sampled and analyzed groundwater from its wells for the following classes of compounds: inorganics, volatile organic compounds, herbicides, pesticides, insecticides, radionuclides, fumigants, dioxins, and nitrate. Analytical results for all City of Vancouver water stations are tabulated on the Washington State Department of Health website.[13]

A review of water quality data by the Washington State Department of Health indicates that no analytes have been detected at or above their respective maximum contaminant limit (MCL) or secondary maximum contaminant limit (SMCL) in groundwater at any City of Vancouver water stations, since tetrachloroethene (PCE) was detected at WS-4 in 2005.

3.3 Phase I Environmental Site Assessments

The Phase I ESA analysis of sites proposed for acquisition under the Modified LPA and design options were completed during the fall of 2023. The approach to the Phase I analysis is detailed in Section 2.4.1. A summary of Phase I ESAs completed is in Table 3-2 and Table 3-3.

For the Modified LPA, 137 properties are proposed for acquisition, including 52 full parcels and 85 partial parcels. The partial acquisition parcels, within the same geographic location and with similar land uses and/or ownership, were consolidated into 43 groups. One Phase I ESA report was completed for each group.

[13] https://fortress.wa.gov/doh/eh/portal/odw/si/SingleSystemViews/SourceSingleSys.aspx

RECs identified through the Phase I ESA process are displayed in Figure 3-4 through Figure 3-12.

Figure 3-4. Recognized Environmental Conditions

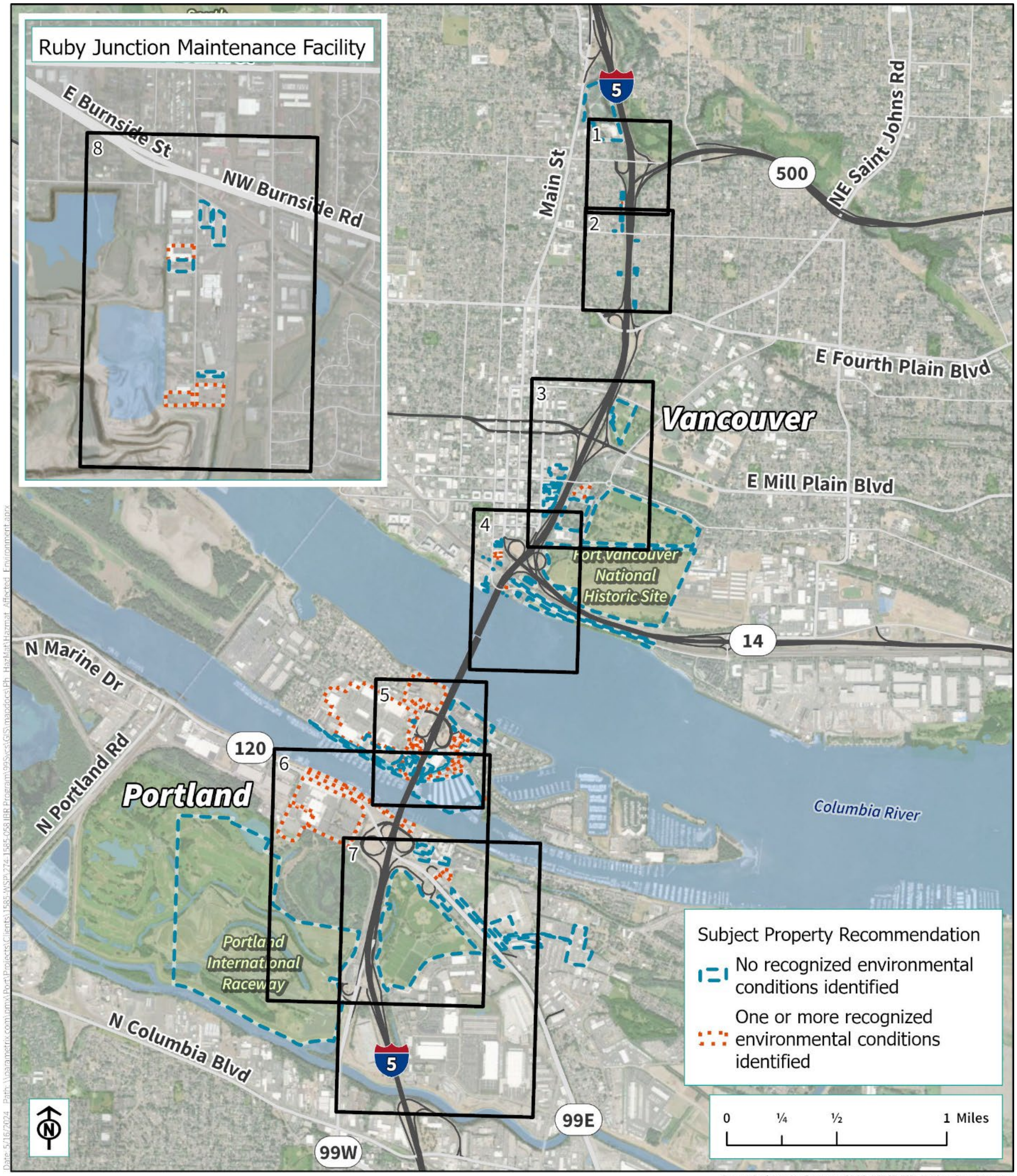
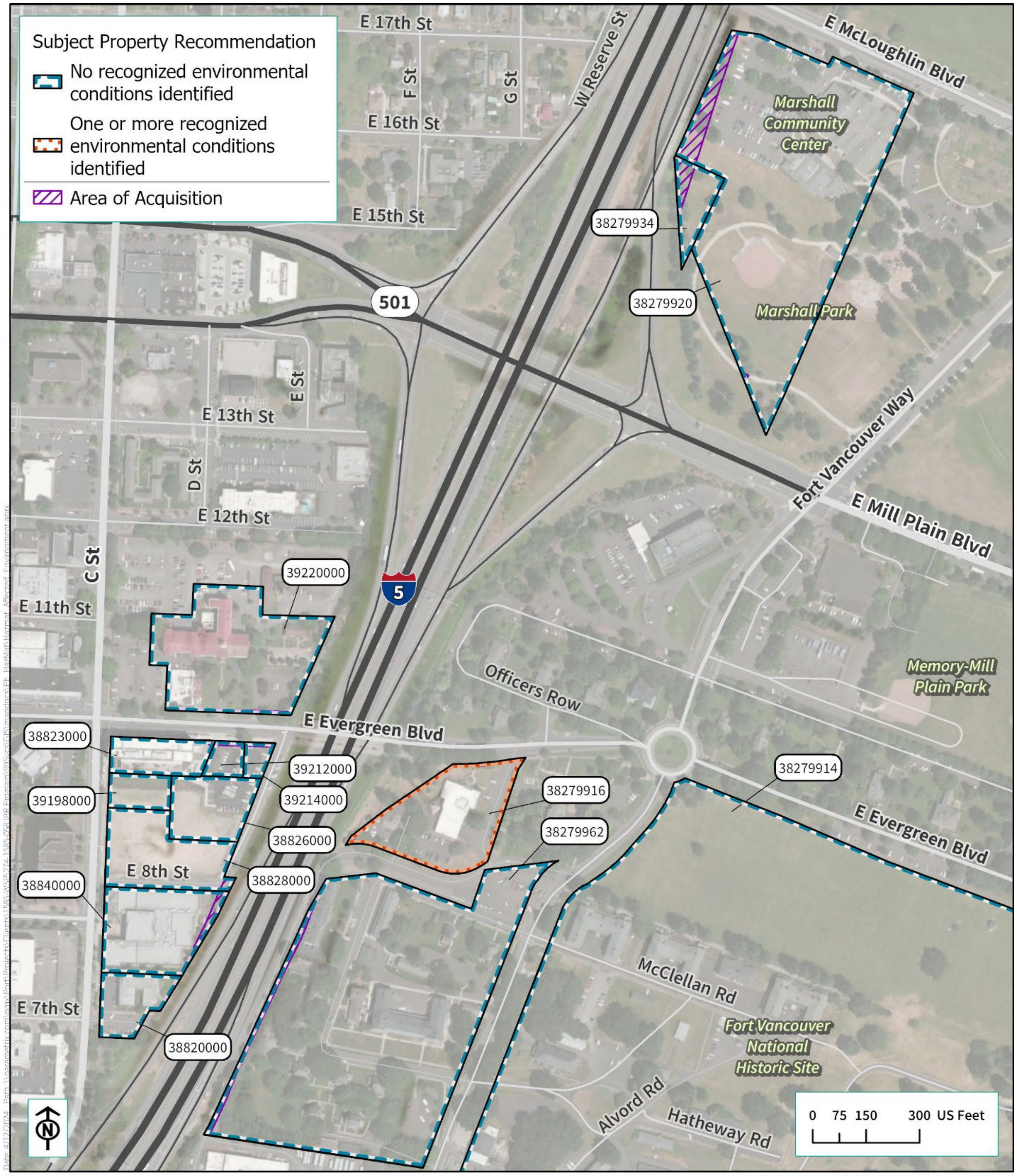


Figure 3-5. Recognized Environmental Conditions – Map 1

Figure 3-6. Recognized Environmental Conditions – Map 2

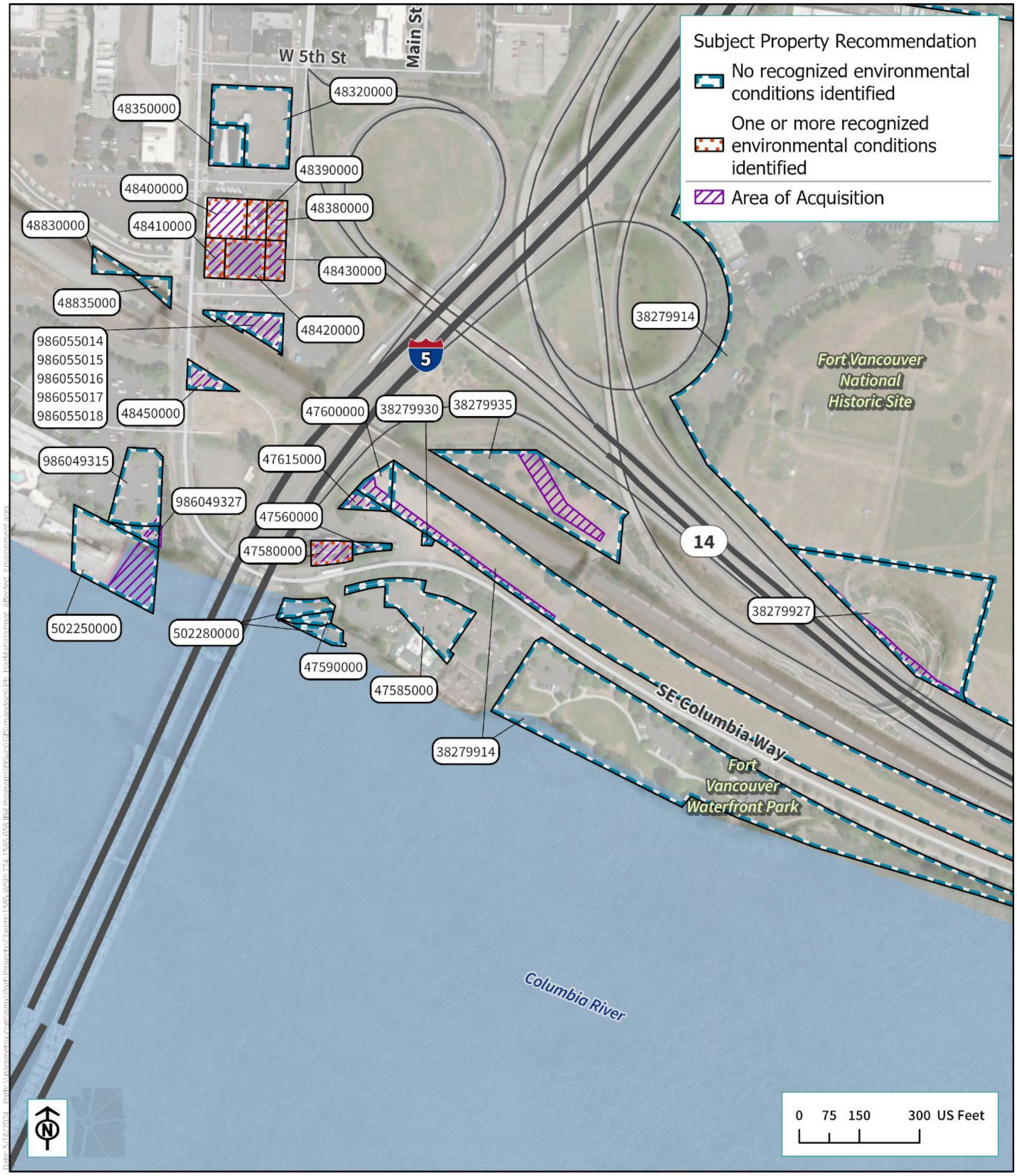
Source: Sanborn Map Company, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

Figure 3-7. Recognized Environmental Conditions – Map 3



Source: Sanborn Map Company, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

Figure 3-8. Recognized Environmental Conditions – Map 4



Source: Sanborn Map Company, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

Figure 3-9. Recognized Environmental Conditions – Map 5

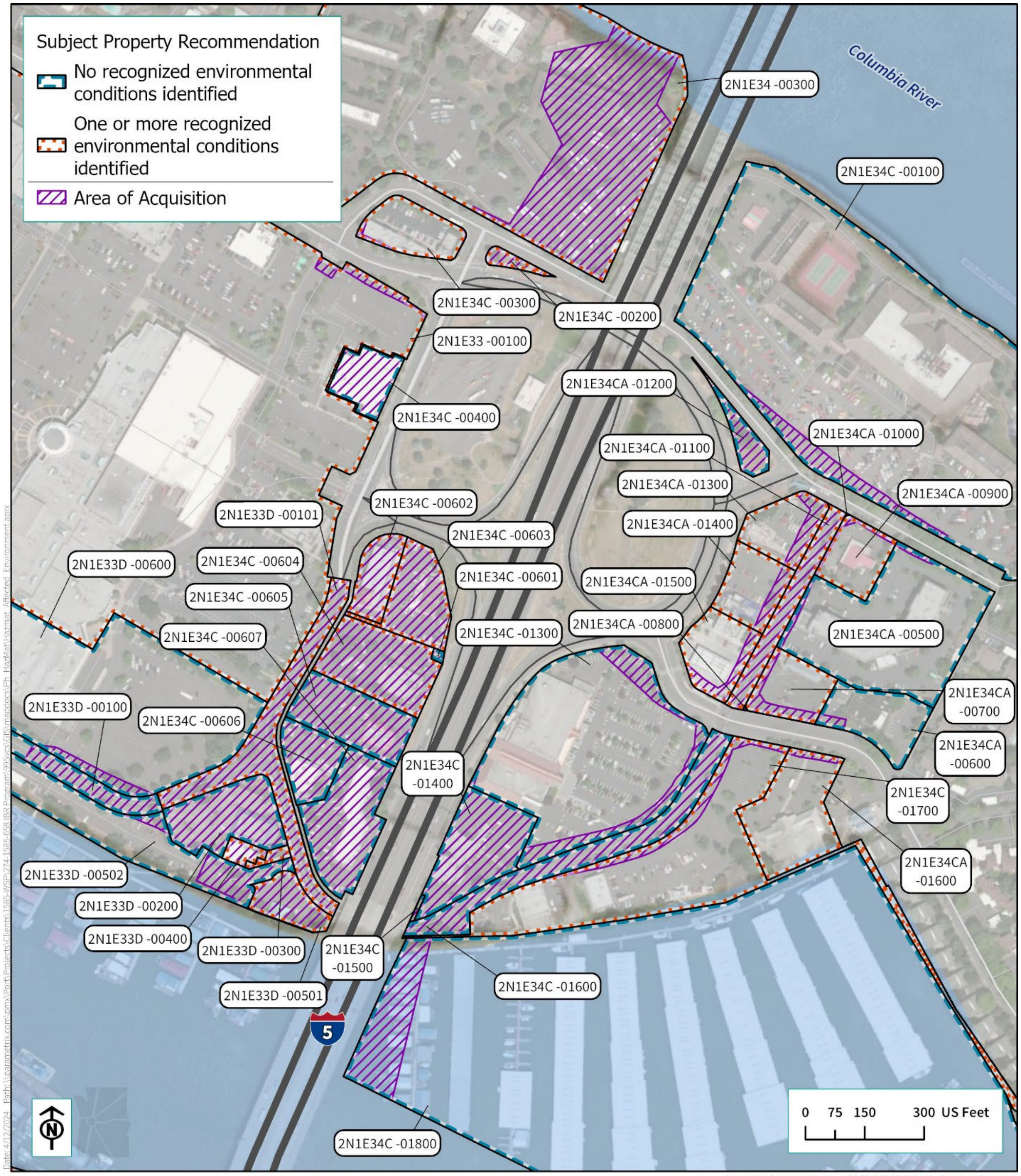
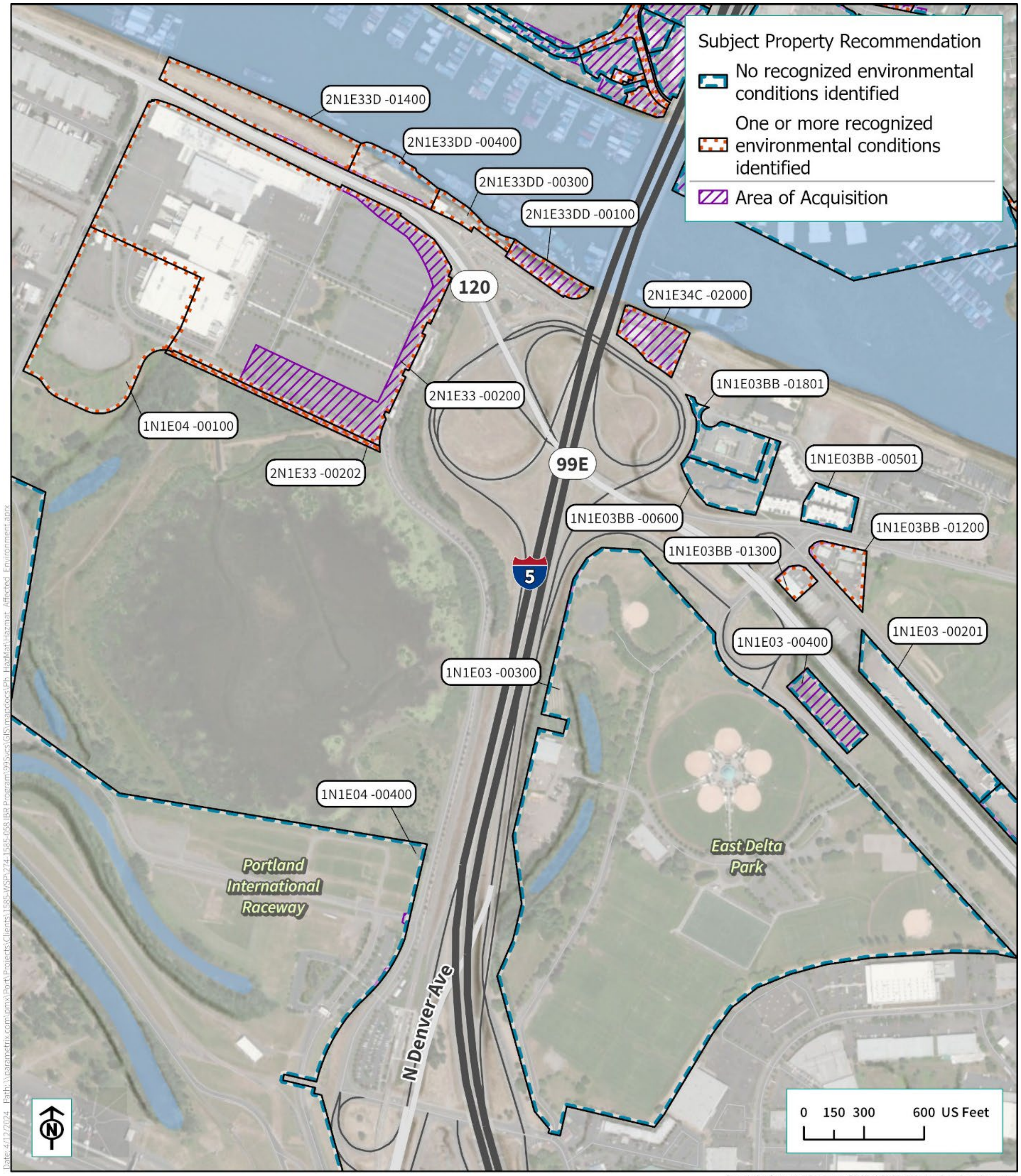


Figure 3-10. Recognized Environmental Conditions – Map 6



Source: Sanborn Map Company, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

Figure 3-11. Recognized Environmental Conditions – Map 7

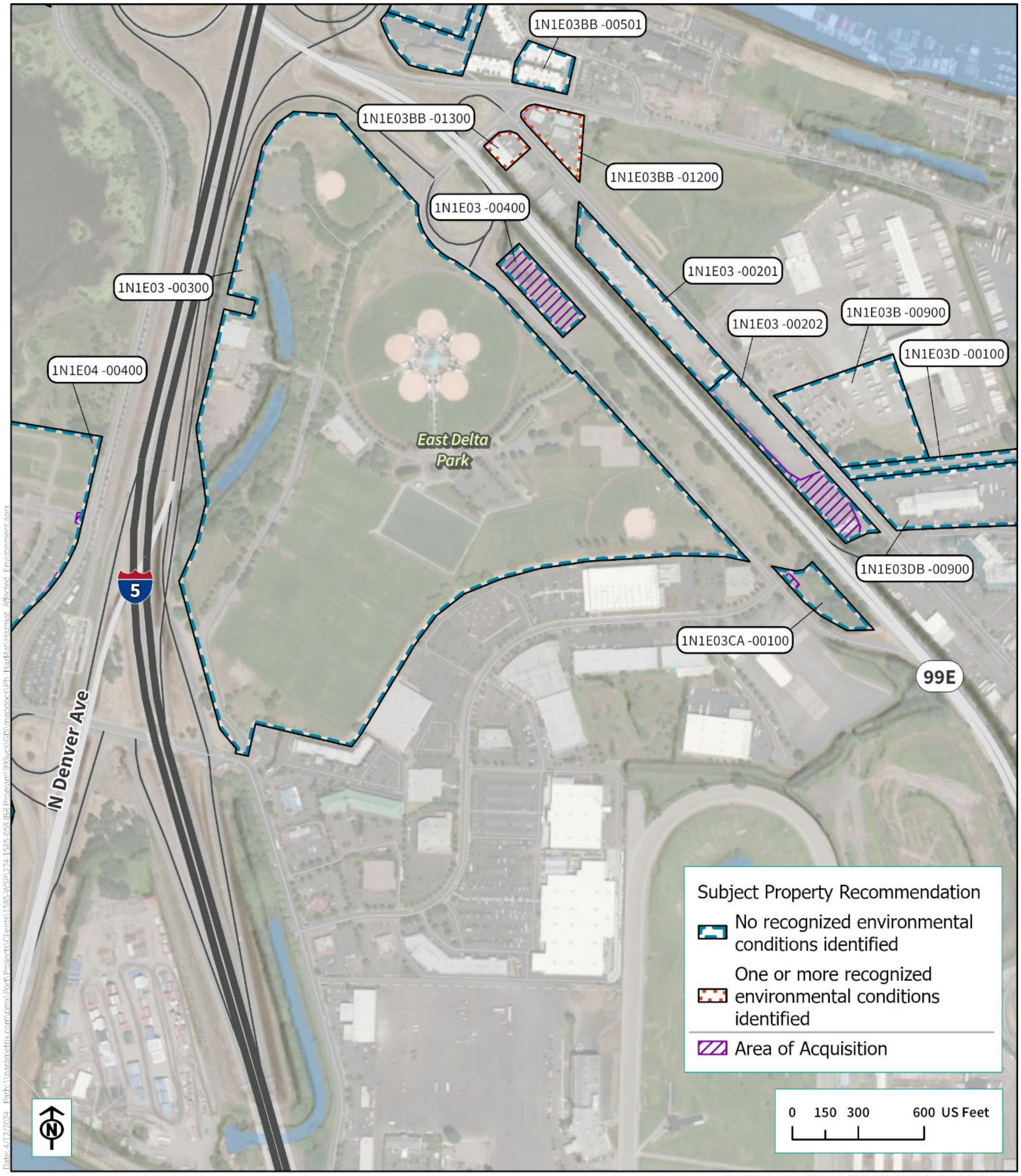
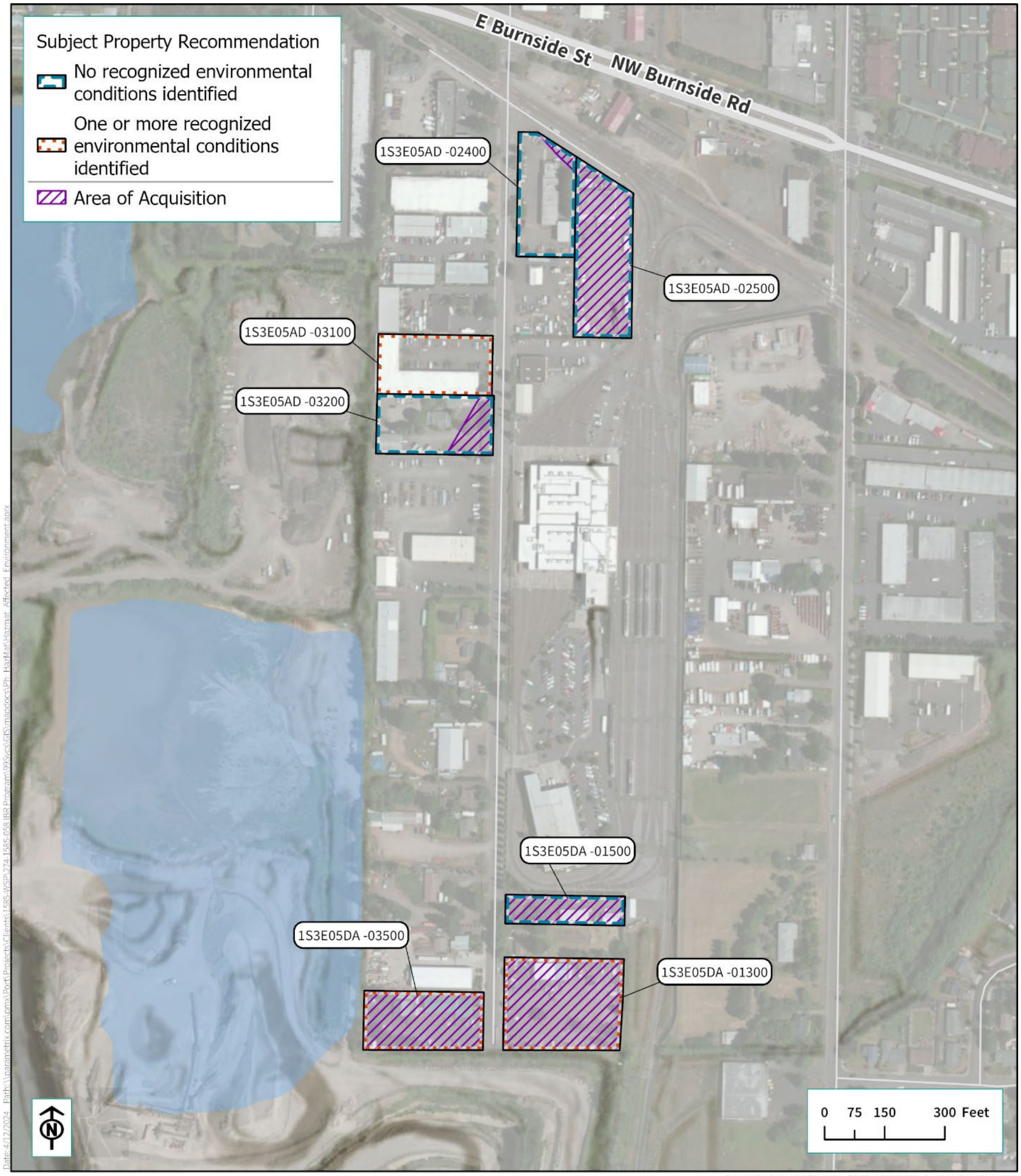


Figure 3-12. Recognized Environmental Conditions – Map 8



Source: Sanborn Map Company, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

Table 3-2. Summary of Recommendations – Washington

Tax Lot Number	Site Address	Owner	Total Area (Acres)	Permanent Acquisition Impact (square feet)	Acquisition Extent	Phase I ESA Recognized Environmental Conditions Identified	Phase I ESA Recommendations
38826000	N/A	Evergreen Investors LLC	0.921624	N/A	Full	None	None
38828000	N/A	Evergreen Investors LLC	1.461039	1,146	Full	None	None
39198000	N/A	Evergreen Investors LLC	0.392613	N/A	Full	None	None
39212000	N/A	Evergreen Investors LLC	0.229786	961	Full	None	None
39214000	411 E Evergreen Blvd	Evergreen Investors LLC	0.161318	933	Full	None	None
48380000	N/A	K2SM Investments LLC	0.115591	5,036	Full	One or more	CMMP
48390000	N/A	K2SM Investments LLC	0.113326	4,937	Full	One or more	CMMP
48400000	215 W 4th St	Columbia Fourth Building LLC	0.230046	10,022	Full	One or more	Building survey, Phase II complex
48410000	N/A	Columbia Fourth Building LLC	0.114527	4,989	Full	One or more	CMMP
48420000	210 W 3rd St	K2SM Investments LLC	0.345335	10,020	Full	One or more	Building Survey; CMMP
48430000	210 W 3rd St	K2SM Investments LLC	N/A	N/A	Full	One or more	CMMP
48450000	201 Columbia St	Burlington Northern INC (SP&S)	0.116022	5,054	Full	None	None
986055014	275 W 3rd St Unit 200	Ten Talents Investments 20 LLC	0.236295	10,294	Full	None	None
986055015	275 W 3rd St Unit 300	Ten Talents Investments 20 LLC	0.236295	10,294	Full	None	None
986055016	275 W 3rd St Unit 400	Ripple Effect Properties LLC	0.236295	10,294	Full	None	None
986055017	275 W 3rd St Unit 500	Ripple Effect Properties LLC	0.236295	10,294	Full	None	None
986055018	275 W 3rd St Unit 600	Ripple Effect Properties LLC	0.236295	10,294	Full	None	None
502250000	100 Columbia St	Port of Vancouver	0.812155	13,613	Partial	None	None
986049315	N/A	Port of Vancouver	0.482038	345	Partial	None	None
986049327	N/A	Port of Vancouver	0.073822	1,609	Partial	None	None
48830000	N/A	Burlington Northern INC (SP&S)	0.097538	N/A	Partial	None	None
48835000	304 Columbia St	Vancouver Public Facilities DIS	0.092248	N/A	Partial	None	None
48320000	412 Washington St	Ten Talents Investments 9 LLC	0.724358	1,076	Partial	None	None
48350000	210 W 4th St	Ten Talents Investments 9 LLC	0.204323	917	Partial	None	None

Tax Lot Number	Site Address	Owner	Total Area (Acres)	Permanent Acquisition Impact (square feet)	Acquisition Extent	Phase I ESA Recognized Environmental Conditions Identified	Phase I ESA Recommendations
38820000	318 E 7th St	The Normandy LLC	0.682171	705	Partial	None	None
38840000	801 C St	WPC Broadway LLC	1.610182	4,242	Partial	None	None
39220000	400 E Evergreen Blvd Unit 1	Providence Academy LLC	3.124879	2,602	Partial	None	None
38823000	901 C St	Fort Vancouver Regional Library	0.64814	170	Partial	None	None
47560000	102 SE Columbia Way	Public Utility District #1 of Clark County	0.053035	2,310	Full	None	None
47580000	100 SE Columbia Way	Clark Public Utilities	0.137723	6,000	Full	One or more	Building survey; Phase II complex
47615000	N/A	City of Vancouver	0.07782	3,390	Full	None	None
47590000	N/A	Clark Public Utilities	0.062923	N/A	Partial	None	None
502280000	N/A	Clark Public Utilities	0.223143	330	Partial	None	None
38279930	No Address	Burlington Northern Inc (SP&S)	0.017141	747	Partial	None	None
47600000	No Address	Burlington Northern Inc (SP&S)	0.140731	3,299	Partial	None	None
38279914	1105 E 5th St	National Park Service	192.423046	10,129	Partial	None	None
38279927	N/A	National Park Service	2.037284	7,655	Partial	None	None
38279935	112 SE Columbia Way	City of Vancouver	1.236497	10,655	Partial	None	None
38279916	605 E Evergreen Blvd	City of Vancouver	2.05628	794	Partial	One or more	Phase II simple
38279962	605 Barnes St	City of Vancouver	10.89965	8,803	Partial	None	None
38279920	1009 E Mcloughlin Blvd	City of Vancouver	9.035643	15,835	Partial	None	None
38279934	N/A	City of Vancouver	0.508769	5,063	Partial	None	None
47585000	101 SE Columbia Way	Renaissance Boardwalk Ventures LLC	0.583377	27	Partial	None	None
14763000	3601 I St	Bob Snyder Real Estate LLC	0.114773	5,000	Full	None	Building survey
14765000	3605 I St	Davis Marcus A & Aiken Shareece	0.114773	5,000	Full	None	Building survey
14766000	3609 I St	Cheyney Aaron	0.114773	5,000	Full	None	Building survey
14768000	3615 I St	Dolbey John R	0.114774	5,000	Full	None	Building survey
15080000	904 E 35th St	Schaub DanieL & Schaub Elizabeth	0.11477	5,000	Full	One or more	Building survey; Phase II simple

Tax Lot Number	Site Address	Owner	Total Area (Acres)	Permanent Acquisition Impact (square feet)	Acquisition Extent	Phase I ESA Recognized Environmental Conditions Identified	Phase I ESA Recommendations
15095000	N/A	Schaub Daniel & Schaub Elizabeth	0.057387	2,500	Full	One or more	Building survey; Phase II simple
15105000	3515 I St	Walters Aaron M	0.114773	5,000	Full	None	Building survey
17925000	2614 K St	Ceh-Cocom Perla A & Taylor Franklin E	0.112146	178	Partial	None	None
17935000	2610 K St	Curry Jason	0.106344	328	Partial	None	None
17950000	2600 K St	Flores Deborah A	0.155818	209	Partial	None	None
16750000	2914 K St	Weathers-Govan Rosie L & Govan Bobby N	0.292892	409	Partial	None	None
16770000	N/A	City of Vancouver	0.025104	231	Partial	None	None
16775000	2900 K St	Zambrano-Trujillo Ana C	0.103777	329	Partial	None	None
16776000	2904 K St	Martinez Rolando J	0.116625	356	Partial	None	None
16810000	900 E 29th St	Hahn Jacob I & Hahn Cynthia A	0.12625	122	Partial	None	None
16815000	904 E 29th St	Teas Michael & Teas Darlene	0.12625	119	Partial	None	None
15860000	3204 K St	Jones Connie	0.170204	1,381	Partial	None	None
15600000	814 E 33rd St	Filipelli Santino & Filipelli Lois	0.114774	15	Partial	None	None
15675000	904 E 33rd St	Costa James J Jr & Costa Julie K	0.099609	N/A	Partial	None	None
15680000	905 E 34th St	Palmer Gilford Dean Jr & Palmer Brenda L	0.115582	58	Partial	None	None
15090000	900 E 35th St	Sierra Victor I & Ward Trillium	0.172157	N/A	Partial	None	None
15230000	900 E 34th St	Mammenga 34th Street LLC	0.114766	466	Partial	None	None
15240000	3405 I St	Winchester Jennifer	0.114773	651	Partial	None	None
15241000	3409 I St	Carter Jennifer K & Borden Adam J	0.114773	829	Partial	None	None
15250000	3415 I St	Durovchic Frank & Durovchic Julie	0.114773	1,014	Partial	None	None
12454005	800 E 40th St	Vancouver School Dist #37	22.440718	80	Partial	None	None

Table 3-3. Summary of Recommendations – Oregon

Tax Lot Number	Site Address	Owner	Total Areas (Acres)	Permanent Acquisition Impact (square feet)	Acquisition Extent	Phase I ESA Recognized Environmental Conditions Identified	Phase I ESA Recommendations
1S3E05DA-01300	1702 NW Eleven Mile Ave	Suran Rick P	1.560328	67,967.90009	Full	One or more	Phase II simple
1S3E05DA-01500	1806 NW Eleven Mile Ave	VR Group LLC	0.496084	21,609.41882	Full	None	Building survey
1S3E05DA-03500	1709 NW Eleven Mile Ave	Wagoner Properties LLC	1.003298	43,703.67322	Full	One or more	Phase II simple
2N1E33DD-00100	1610 N Pier 99 St	Pier West LLC	1.017992	44,343.72651	Full	One or more	Building survey; Phase II complex
2N1E34C-02000	1415 N Pier 99 St	Pier 99 LLC	1.592716	69,378.72258	Full	One or more	Building survey; Phase II complex
1N1E04-00100	2060 WI/ N Marine Dr	Metro	10.81126158	N/A	Partial	One or more	Phase II complex
2N1E33-00200	2060 N Marine Dr	Metro	38.02263774	244,768.0689	Partial	One or more	Phase II complex
2N1E33-00202	10799 WI/ N Expo Rd	The Port of Portland	0.728812658	21,145.84096	Partial	One or more	Phase II complex
1N1E03-00201	10725 N Vancouver Way	The Fazio Tip Vancouver Way Property LLC	3.322286923	850.004547	Partial	None	None
1N1E03-00202	10615 N Vancouver Way	Fazio TV LLC	3.333629932	58,213.86321	Partial	None	None
1N1E03BB-00501	1000 N Anchor Way	NAW Associates LLC-6% & Pho LLC-70% & PDHI LLC-24%	1.088948143	695.189766	Partial	None	None
1N1E03BB-00600	1200 N Anchor Way	BRE Rose Property Owner LLC	1.898110607	662.085136	Partial	None	None
1N1E03BB-01801	1250 N Anchor Way	BRE Rose Property Owner LLC	1.872033209	1,041.664993	Partial	None	None
2N1E33D-01400	Levy Code 710	Metro	3.634831967	4,953.610524	Partial	One or more	Building survey; Phase II complex
2N1E33DD-00300	1801-1809 N Pier 99 St	Whitecap Cove INC	0.783617393	13.269412	Partial	One or more	Building survey; Phase II complex
2N1E33DD-00400	1835 WI/ N Marine Dr	Redd Shores LLC	1.623943486	6,493.692674	Partial	One or more	Building survey; Phase II complex
2N1E33D-00101	N Center Ave	Columbia Crossing LLC et al	1.30398	56,801.37987	Full	One or more	Building survey, Phase II simple
2N1E33D-00200	11950 N Center Ave	N/A	0.968067	42,169.01578	Full	None	Building survey
2N1E33D-00300	N Center Ave	Portland City of	0.064011	2,788.303516	Full	One or more	Building survey; Phase II simple
2N1E33D-00400	N Center Ave	Portland City of	0.116175	5,060.593671	Full	One or more	Phase II simple
2N1E33D-00501	11850 N Center Ave	1521/1523 N Jantzen Beach Property LLC	0.421582	18,364.10501	Full	One or more	Building survey; Phase II simple
2N1E34C-00200	1401 WI/ N Hayden IS Dr	Thunderbird Hotel LLC	0.112638	4,906.494663	Full	One or more	Phase II complex

Tax Lot Number	Site Address	Owner	Total Areas (Acres)	Permanent Acquisition Impact (square feet)	Acquisition Extent	Phase I ESA Recognized Environmental Conditions Identified	Phase I ESA Recommendations
2N1E34C-00601	N Center Ave	Buena-Hayden LLC	0.020297	884.156779	Full	None	Building survey
2N1E34C-00602	12229 N Center Ave	Buena-Hayden LLC	0.456181	19,871.2569	Full	One or more	CMMP
2N1E34C-00603	12235 N Center Ave	Buena-Hayden North LLC	0.782624	34,091.10826	Full	One or more	CMMP
2N1E34C-00604	12105 N Center Ave	Buena-Hayden LLC	1.099799	47,907.24963	Full	One or more	Building survey; CMMP
2N1E34C-00605	12005 N Center Ave	Buena-Hayden LLC	0.934398	40,702.39175	Full	None	Building survey
2N1E34C-00606	12055 N Center Ave	Buena-Hayden LLC	0.553	24,088.6605	Full	None	Building survey
2N1E34C-00607	11915 N Center Ave	Buena-Hayden LLC	1.19962	52,255.42742	Full	None	Building survey
1N1E03B-00900	10510 WI/ N Vancouver Way	YRC INC	5.005370356	N/A	Partial	None	None
1N1E03D-00100	10400 N Vancouver Way	Richardson Land & Investment Company LLC	12.28553719	N/A	Partial	None	None
1N1E03DB-00900	10360 N Vancouver Way	OR-10360 N Vancouver Way LP	5.135571651	N/A	Partial	None	None
1N1E03BB-01200	1014 N Marine Dr	The Webster Family LTD Prtnrshp	1.239179378	2,614.209713	Partial	One or more	Phase II complex
1N1E03BB-01300	11051 N Vancouver Way	Georgia 01 LLC	0.487415053	649.893057	Partial	One or more	Phase II complex
2N1E33D-00100	N Jantzen Ave	Columbia Crossing LLC et al	1.864487625	17,372.10835	Partial	None	None
2N1E33D-00502	1525-2055 N Jantzen Ave	Jantzen Beach Moorage Inc	5.293980082	18,210.03607	Partial	None	None
2N1E33-00100	1555 N Tomahawk IS Dr	Jantzen Beach Center 1767 LLC	56.19442635	6,075.455369	Partial	One or more	Phase II complex
2N1E33D-00600	12045 N Parker Ave	Jantzen Beach Center 1767 LLC	7.783771819	7,510.669577	Partial	None	None
2N1E34-00300	1401 N Hayden IS Dr	Thunderbird Hotel LLC	13.56992331	162,170.4506	Partial	One or more	Phase II complex
2N1E34C-00300	1321-1337 N Hayden IS Dr	Hayden's Corner LLC	0.649744129	1,273.422826	Partial	One or more	Building Survey; Phase II complex
2N1E34C-01400	11875 N Jantzen Dr	DKoop Properties LLC	1.155933	50,352.42424	Full	None	Building survey
2N1E34C-01500	N Jantzen Ave	DKoop Properties LLC	0.016344	711.964705	Full	None	Building survey
2N1E34C-01600	N Jantzen Dr	Columbia Crossing LLC et al	1.165348	50,762.5581	Full	None	None
2N1E34CA-00800	N Jantzen Ave	Taco Bell Corp et al	0.002113	92.02664	Full	None	None
2N1E34CA-01200	909 WI/ N Hayden IS Dr	JBH Property Acquisitions LLC	0.271354	11,820.20135	Full	None	None
2N1E34C-01700	12050 N Jantzen Dr	Columbia Crossings LLC	3.825138306	13,583.67998	Partial	One or more	Building survey; Phase II simple

Tax Lot Number	Site Address	Owner	Total Areas (Acres)	Permanent Acquisition Impact (square feet)	Acquisition Extent	Phase I ESA Recognized Environmental Conditions Identified	Phase I ESA Recommendations
2N1E34C-01800	Levy Code 201	Oregon State of	25.29047369	39,376.84937	Partial	None	None
2N1E34CA-01600	900 N Tomahawk IS Dr	(503) Real Estate LLC	1.249104441	2,234.06147	Partial	One or more	Building survey; Phase II simple
2N1E34C-01300	11901-11919 N Jantzen Dr	Safeway INC	4.669240298	28,410.2733	Partial	None	None
2N1E34CA-01000	N Jantzen Ave	Taco Bell Corp et al	0.001055041	45.957604	Partial	One or more	Phase II complex
2N1E34CA-01100	N Jantzen Ave	Taco Bell Corp et al	0.58949556	25,678.42658	Partial	One or more	Phase II complex
2N1E34CA-01300	12237 N Jantzen Dr	Weber Coastal Bells LP	0.629057238	8,380.948765	Partial	One or more	Phase II complex
2N1E34CA-01400	12225 N Jantzen Dr	Jantzen/Angel LLC	0.63451554	5,580.221826	Partial	One or more	Phase II complex
2N1E34CA-01500	12105 WI/ N Jantzen Dr	Chevron USA Inc	0.697307599	7,846.096472	Partial	One or more	Phase II complex
2N1E34CA-00500	12226 N Jantzen Dr	Baney Corp	2.965088437	3,679.267959	Partial	None	None
2N1E34CA-00600	909 N Tomahawk IS Dr	Wen LLC	0.786991798	1,977.143736	Partial	None	None
2N1E34CA-00700	12118 N Jantzen Dr	Sage Property Holdings LLC	0.630547303	7,888.716493	Partial	One or more	Phase II complex
2N1E34CA-00900	12240 N Jantzen Dr	Umatilla Inc	0.584856821	2,745.984469	Partial	One or more	Phase II complex
2N1E34C-00100	909 N Hayden IS Dr	JBH Property Acquisitions LLC	13.81710369	20,187.37134	Partial	None	None
1S3E05AD-02400	2450 NW Eleven Mile Ave	Powerstrip Investments LLC	0.972198682	13,375	Partial	None	None
1S3E05AD-02500	2410 NW Burnside Ct	2410 NW Burnside Ct LLC	1.347214	58,684.62138	Full	None	Building survey
1S3E05AD-03100	2303-2363 NW Eleven Mile Ave	Nyhof Gordon L TR	0.981424272	97	Partial	One or more	Phase II complex
1S3E05AD-03200	2227 NW Eleven Mile Ave	Dodd Joseph M	0.998814437	11,201	Partial	None	None
1N1E04-00400	1940 N Victory Blvd	Portland City of	356.4916581	5,556	Partial	None	None
1N1E03-00300	10850 N Denver Ave	Portland City of	85.83680332	3,122.127259	Partial	None	None
1N1E03-00400	N Denver Ave	Portland City of	1.446662379	63,016.61325	Partial	None	None
1N1E03CA-00100	125-233 N Hayden Meadows Dr	Hayden Meadows	1.237822385	4,580.857569	Partial	None	None
2N1E34C-00400	12300 North Parker Avenue	PortArthur LLC	0.514988522	22432.9	Full	None	Building survey

3.4 Program-Wide Evaluation of Environmental Conditions

This study area–level environmental review was completed to evaluate hazardous materials sites outside of the proposed acquisition parcels that could impact the Modified LPA or any of the parcels proposed for acquisitions. Additionally, the overall study area environmental review was completed to inform a more complete understanding of historical land use within the project area and to determine the order in which the Phase I ESAs would be conducted. Parcels containing regulatory sites with a known or suspected release of a hazardous substance or petroleum product were completed first, followed by the remainder of the partial or full acquisitions. The Program-wide environmental review consisted of a federal and state database review, a review of historical land use using historical aerial photographs and Sanborn maps, and a site reconnaissance.

3.4.1 Database Review

The federal and state database review was used to identify hazardous materials sites outside of the parcels proposed for acquisition including adjacent parcels, right-of-way areas, and large cleanup sites that could impact the Program or the parcels to be acquired. No hazardous materials sites were found during the database review that were not identified during the Phase I ESA effort.

3.4.2 Historical Land Use Review

Historical aerial photographs of the analysis area were obtained from the University of Oregon Map Library for the years 1939, 1948, 1955, 1964, 1973, 1980, 1990, 1998, 2009, and 2020. Observations are listed below. Historical review for Ruby Junction area is contained in the Phase I ESAs for the local acquisitions.

1939 The earliest available aerial photograph shows little development on Hayden Island except for an amusement park located west of the highway. The portion of the study area located between North Portland Harbor and the Columbia Slough is primarily used for agriculture, with a few rural residences. Logs are visible in North Portland Harbor on the east side of the highway, with a possible sawmill immediately southeast of the bridge over North Portland Harbor. Sawmills typically use petroleum products and wood treatment chemicals during operation. Therefore, the sawmill site represents a potential REC. Other industry is also visible south of North Portland Harbor. The Vancouver area has well-established commercial, residential, and industrial development, with industry focused near the Columbia River.

1948 The 1948 aerial photograph shows that large portions of the area between the Columbia River (North Portland Harbor) and the Columbia Slough are inundated with water, likely a result of the Vanport Flood of 1948. Many residences and other structures appear to have been moved off of their foundations, with many of them possibly destroyed. The structures destroyed by the flood may represent RECs because asbestos-containing building materials, lead paint, or HOTs associated with residences may not have been removed from affected sites. Commercial sites affected by the flood, such as service stations, may also be RECs, as gasoline and other petroleum products stored at the sites may have spilled or leaked into soil or groundwater on the properties. Increased commercial development is apparent in the Hayden Island area east and west of the highway. Residential development has increased on Hayden Island as well as south of Columbia Boulevard. Industrial development is apparent along the Columbia Boulevard corridor.

1956 Little appreciable change has occurred in the area since the 1948 aerial photograph. Streets and some of the destroyed residences are still visible in the Vanport Flood area, with little other development noted.

1964 In this photograph, I-5 and the second span of the Interstate Bridge are under construction to the east of the previous roadway alignment. Floating homes are docked at the south shore of Hayden Island, and a possible automobile junkyard is located west of I-5 immediately after it crosses the Columbia Slough.

1973 The amusement park on Hayden Island has been replaced by a shopping mall in the 1973 aerial photograph. The construction of the I-5 realignment shown in the 1964 aerial photograph is complete.

1980–1998 A considerable increase in residential and commercial development is evident in the Hayden Island area east and west of I-5 in the 1980 through 1998 aerial photographs.

2009–2020 Apparent development has slowed in the 2009 and 2020 aerial photographs. Two notable changes are the redevelopment of the property to the east of the Marine Drive interchange just south of North Portland Harbor prior to the 2009 photo and the evident removal of the Thunderbird Hotel (due to fire) between 2009 and 2020.

Sanborn maps were used to identify historical sites that may have had land uses that increase the potential for surface and subsurface contamination. For the purposes of this report, suspected sites fall into the three general categories: (1) automotive services (service stations, auto repair facilities, gas stations), (2) industrial services (e.g., machine shops), and (3) commercial properties (e.g., dry cleaners). In general, these types of businesses use or store hazardous substances or petroleum products and/or generate and dispose of hazardous wastes. A majority of the sites are located in downtown Vancouver and Hayden Island. The Program-wide Sanborn Map review ultimately did not identify additional sites outside of the proposed acquisitions for the Program.

3.4.3 Site Reconnaissance Results

Drive-by surveys were conducted on November 23 and December 3, 2021, to identify hazardous material sites or potential environmental conditions that were not identified in either the environmental databases or historical land use review. No additional hazardous materials sites were identified. Derelict and burned vehicles were noted along N Union Court next to Delta Park and between N Whitaker Road and I-5 in Portland.

3.4.4 TriMet Ruby Junction Maintenance Facility

Planned increases in light-rail service are anticipated as part of the Modified LPA. These increases in service would necessitate the expansion of the Ruby Junction Maintenance Facility, which would require land acquisition and modification to the existing facility. Therefore, this site, which is located in Gresham, Oregon, has been added to the IBR hazardous materials evaluation as part of property acquisition activities.

Review of state and federal environmental database information for this site indicated that the Ruby Junction property completed cleanup activities for LUSTs in 1994 and 1998. The facility is also a small quantity generator for hazardous wastes, including solvents, batteries, and paints. Seven properties adjacent to the current Ruby Junction facility are planned for partial or full acquisition for the project. Phase I ESAs were completed for these properties and the results and recommendations are included in Table 3-3.

3.4.5 Staging Areas

As described in Chapter 1 of this report, staging of equipment and materials would occur in many areas along the project corridor throughout construction, generally within existing or newly purchased right of way 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. Three potential major staging sites were identified in the CRC Final EIS. Of these, two sites have since been developed or are in the process of being developed. The third site is the vacant 5.6-acre Thunderbird Hotel site on Hayden Island. A large portion of this parcel is already required for new right of way for the Modified LPA, and it is therefore discussed in Chapter 4. Other major staging sites may be identified during the design process or by the contractor.

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 including either a slip or a dock capable of handling heavy equipment and material, a large area suitable for a concrete batch plant and associated heavy machinery and equipment, and access to a highway or railway for delivery of materials. As with the staging sites, casting or staging yard sites may be identified during the design process or by the contractor. Several potential sites were identified in the CRC Final EIS; however, the current availability of suitable sites has not yet been determined.

4. ENVIRONMENTAL SITE ASSESSMENT AND HAZARDOUS MATERIALS SITE IDENTIFICATION EVALUATION

This section evaluates the results and recommendations of the Phase I ESAs completed for proposed acquisitions and additional hazardous materials sites identified that are not coincident with a proposed acquisition but may still have an impact on the project. Its intent is to evaluate information on existing conditions provided in Chapter 3 as a means to help assesses potential future effects to the environment and to construction from the No-Build Alternative and the Modified LPA.

4.1 Phase I Environmental Site Assessments

4.1.1 Overview of Identified Recognized Environmental Conditions and Recommendations

4.1.1.1 Recognized Environmental Conditions

Recognized environmental conditions identified during the Phase I ESA process as part of the IBR Program are related to a number of historical and current land uses on the potentially acquired properties. These land uses have generally been confirmed by the Program-wide evaluation of environmental conditions. A noncomprehensive summary of land uses that resulted in the recognition of RECs on potentially acquired properties within the study area include:

- Automobile maintenance and repair.
- Boat maintenance and repair.
- Vehicle fueling (gas stations).
- Waste disposal (landfills).
- Chemical/hazardous materials storage (UST/LUST/AST).
- Military use.

RECs identified as related to these land uses have resulted in the recommendations described in Section 4.1.1.2. A summary of Phase I ESA RECs can be found in Table 3-2 and Table 3-3.

4.1.1.2 Phase I ESA Recommendations

Recommendations for the Phase I ESAs completed as part of the IBR Program generally range from no additional investigation to excavation mitigation to complex Phase II ESAs. Though individual Phase I ESAs recommend more specific actions, general categories that the actions fall into include:

- No further environmental Investigation.
- Hazardous building materials survey (HBMS) – sites with structures that may require demolition (it should be noted that a recommendation for a HBMS does not reflect the identification of an REC on the relevant property).
- Contaminated media management plan – sites with known but well-characterized contamination that can be managed during construction.
- Simple Phase II ESA – sites with known or suspected contamination that is not fully characterized but is not expected to be significant based on the Phase I ESA.
- Complex Phase II ESA – sites with known contamination which is not completely characterized and has the potential to extend to additional media or adjacent parcels.
- Additional recommendations outside of those described above may be recommended based on specific site conditions.

Recommendations were made for 137 properties in 78 separate reports for inclusion in this technical report. These recommendations would be implemented, and results would be included as part of the Final SEIS and ROD. A summary of Phase I ESA recommendations can be found in Table 3-2 and Table 3-3.

4.1.2 Washington

Among 69 proposed acquisitions in Clark County, 59 received a recommendation of no further investigation (though five of those acquisitions had HBMS recommendations for impacted structures). Ten properties were recommended for further subsurface investigation (Phase II ESA) or contaminated media management plans, and two of these ten properties were assumed to need more complex investigation. Recommendations for these properties are displayed on Figure 4-1 through Figure 4-5.

The potential acquisitions requiring more complex investigation include the Clark Public Utilities property at 100 SE Columbia Way and a former industrial building at 215 W 4th Street.

Figure 4-1. Phase I ESA Recommendations Overview

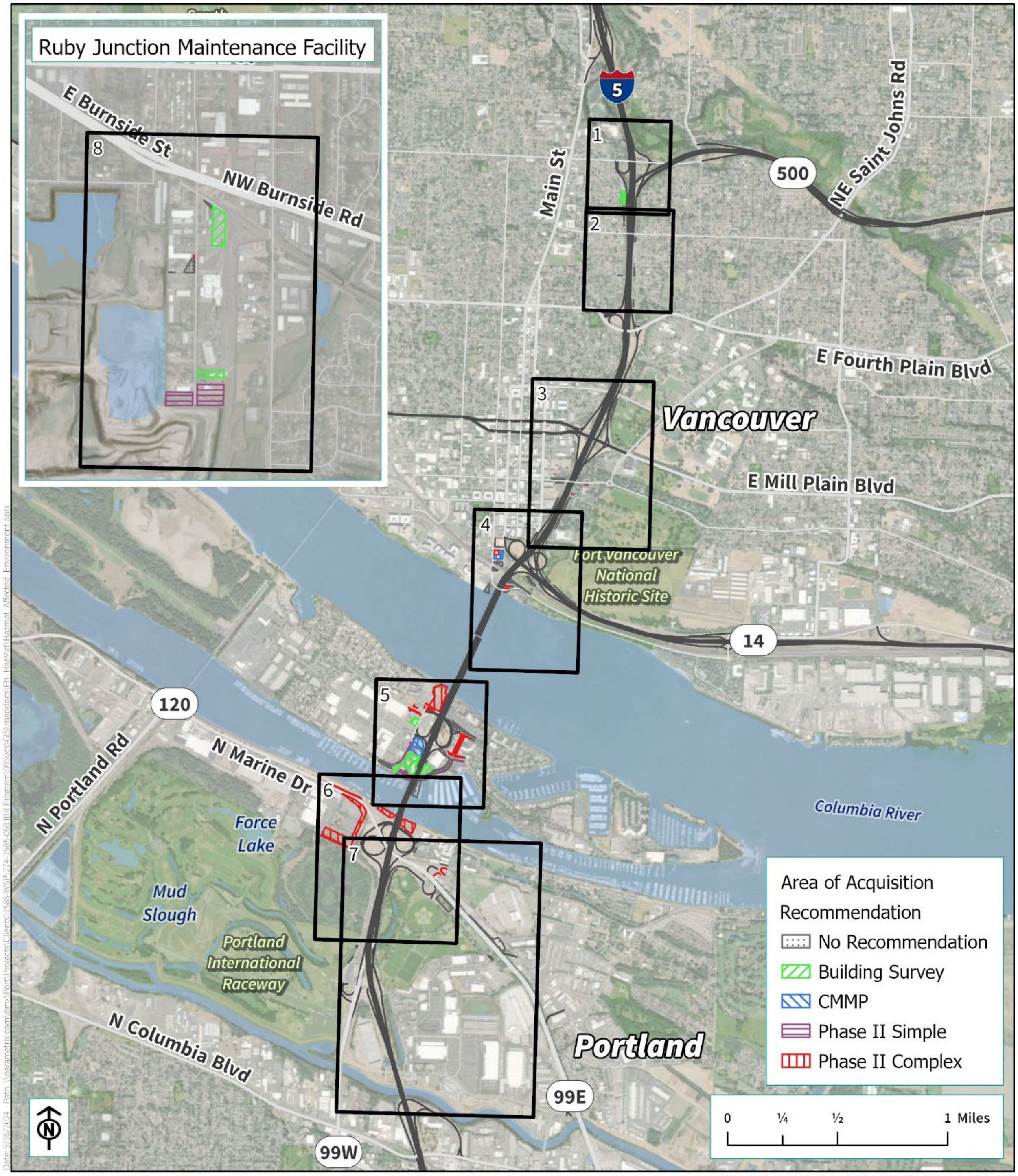


Figure 4-2. Phase I ESA Recommendations – Map 1

Source: Sanborn Map Company, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

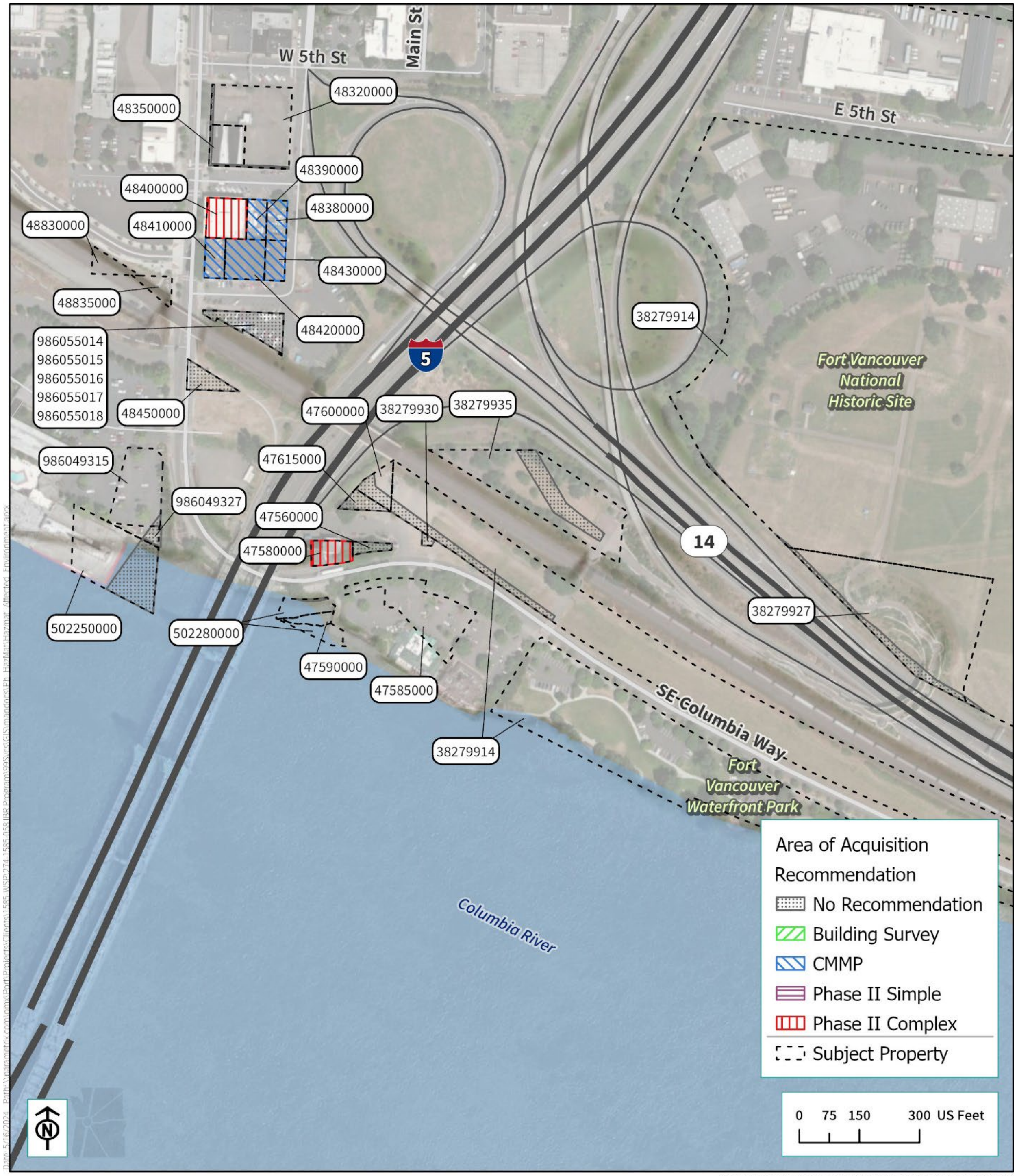
Figure 4-3. Phase I ESA Recommendations – Map 2

Source: Sanborn Map Company, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

Figure 4-4. Phase I ESA Recommendations – Map 3

Source: Sanborn Map Company, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

Figure 4-5. Phase I ESA Recommendations – Map 4



4.1.3 Oregon

Among 68 proposed acquisitions in Multnomah County, 35 received a recommendation of no further investigation (though 12 of those acquisitions had HBMS recommendations for impacted structures). Twenty-nine properties were recommended for further investigation, and 23 of the 29 were recommended for more complex investigation. In addition to these properties, some of these acquisitions were recommended for potential subsurface cleanup. These properties will be included in mitigation and cleanup discussions in the Final SEIS. Recommendations for these properties are displayed on Figure 4-1 and Figure 4-6 through Figure 4-9.

The potential acquisitions that are likely to require more complex subsurface investigation and future cleanup are associated with the Pier 99 and Diversified Marine properties on North Portland Harbor, the Expo Center, the former Thunderbird Hotel and Hayden Island Landfill, and properties near former gas stations on Hayden Island east of I-5.

Figure 4-6. Phase I ESA Recommendations – Map 5

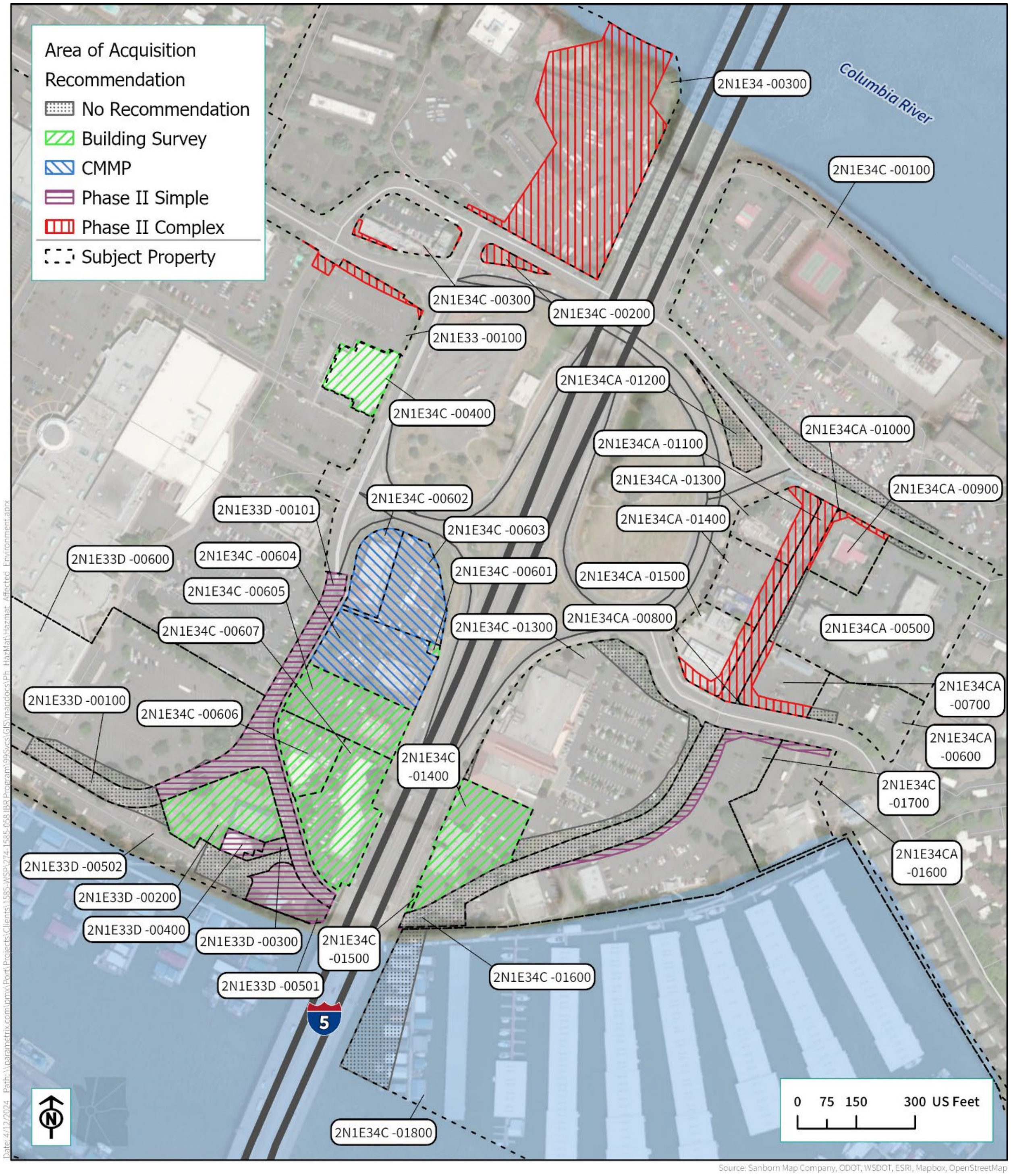


Figure 4-7. Phase I ESA Recommendations – Map 6

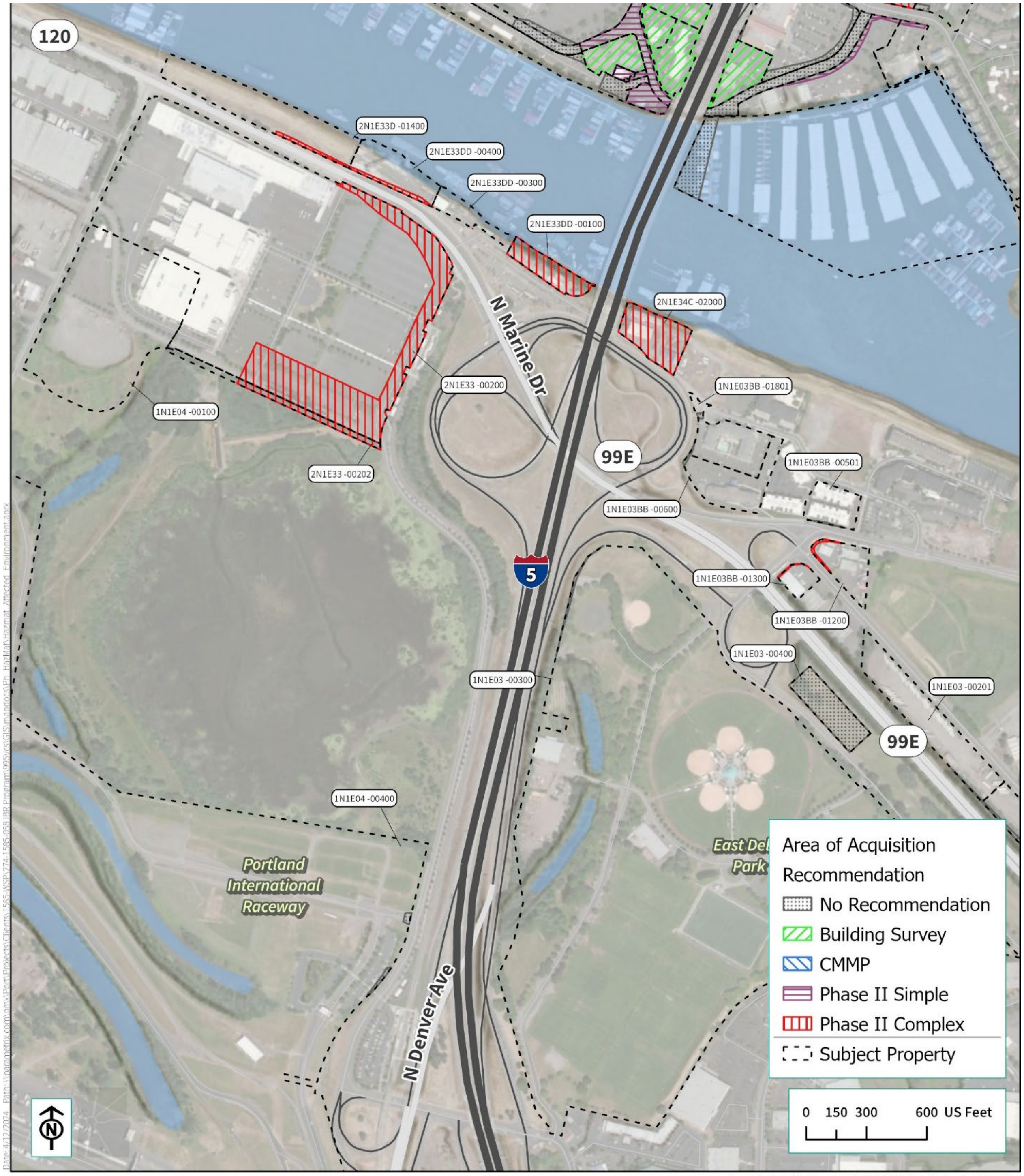
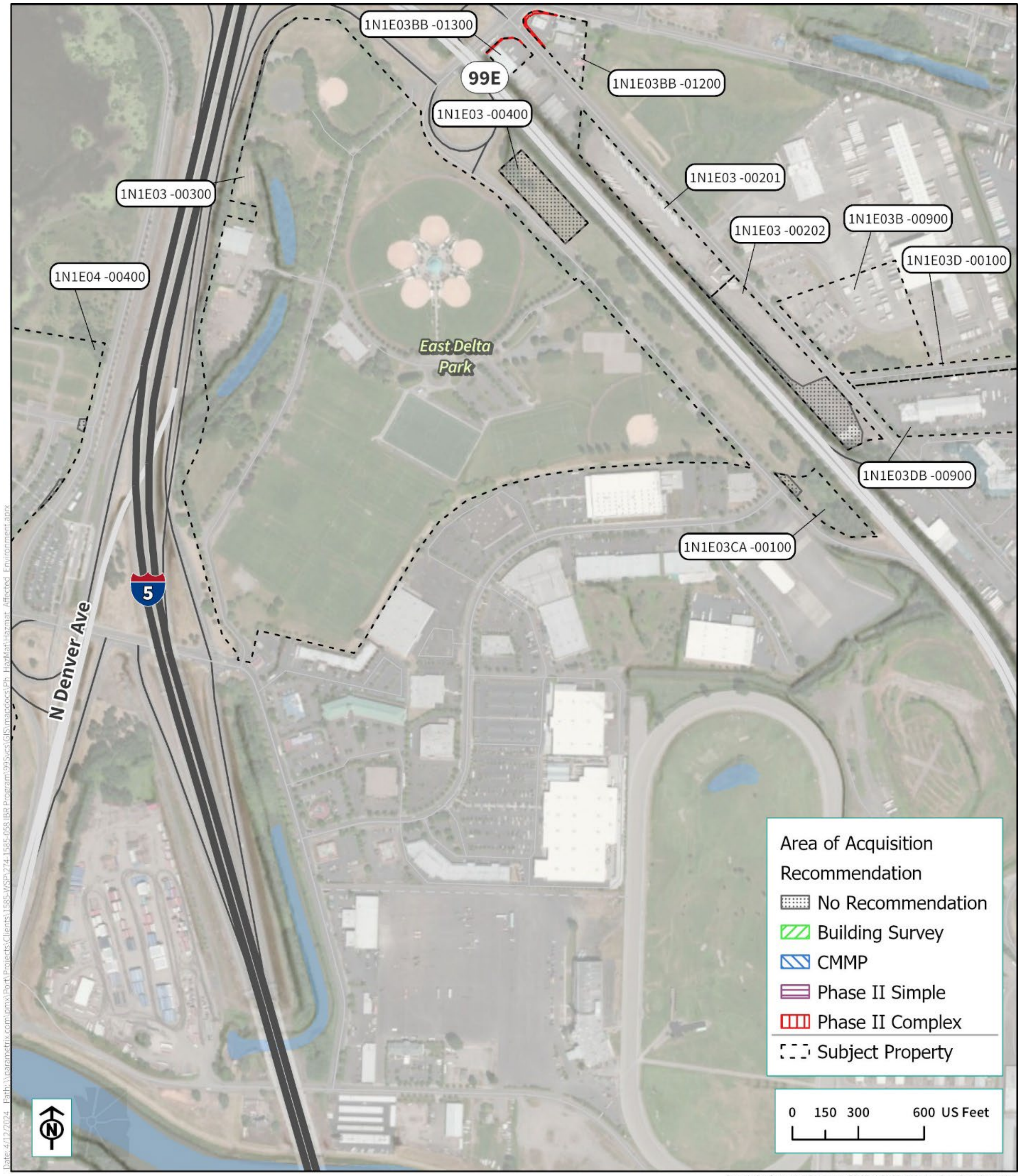
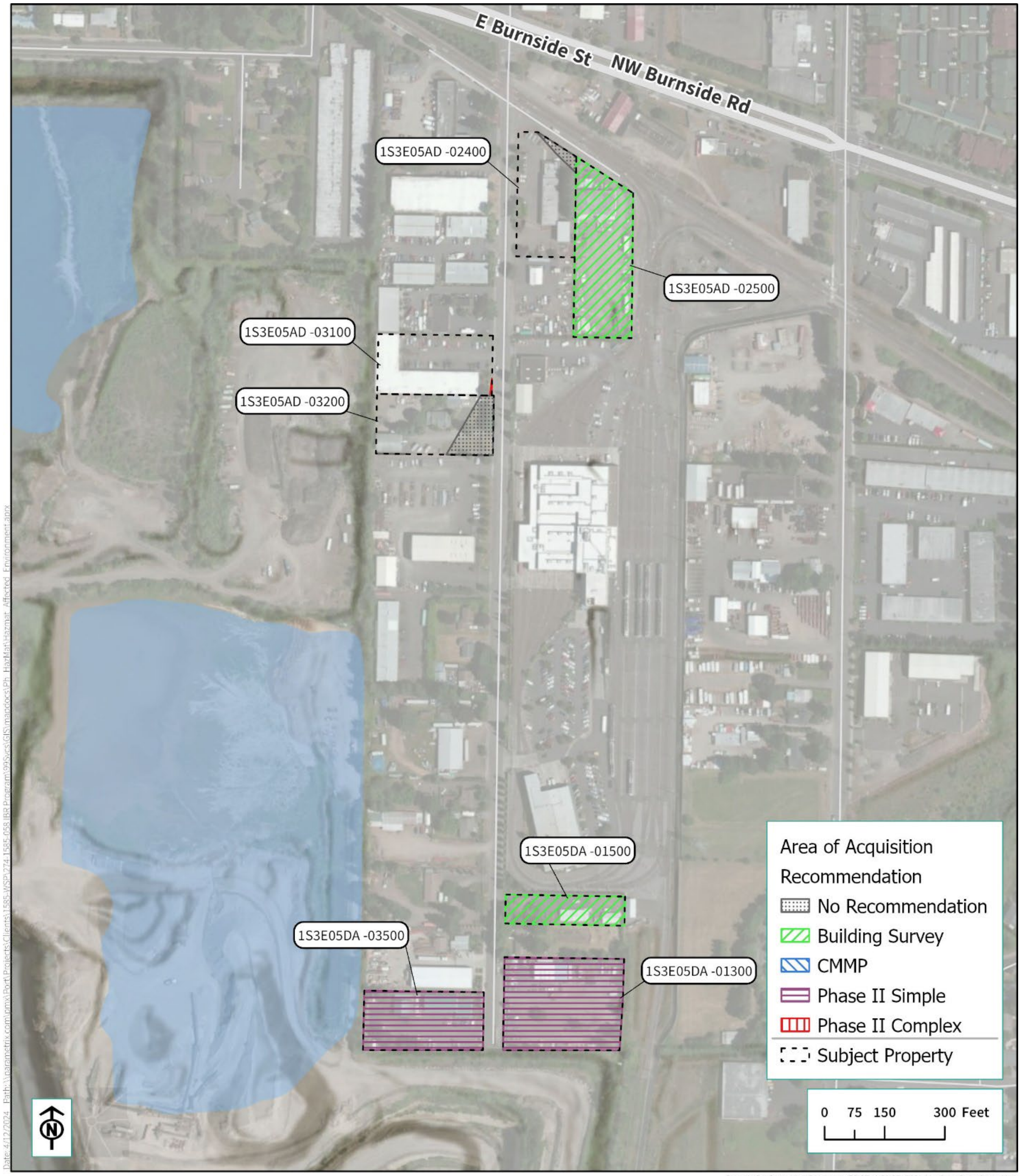


Figure 4-8. Phase I ESA Recommendations – Map 7



Source: Sanborn Map Company, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

Figure 4-9. Phase I ESA Recommendations – Map 8



4.2 Program-Wide Evaluation of Environmental Conditions

Based on the review of current and historical land use through environmental database evaluation, historical documents, and site reconnaissance, no RECs were identified in the study area outside of those identified in the course of the Phase I ESAs.

4.3 Evaluation of Results

4.3.1 No-Build Alternative

Under the No-Build Alternative, I-5 and its interchanges and local street connections would remain as they are today. There would be no potential for encountering hazardous materials as a result of project development. The IBR Program would not assume liability for cleanup of contaminated sites. However, there would be no Program-related opportunities to improve existing contamination levels through the cleanup of acquired contaminated sites; existing contaminated sites would remain in their current conditions and pollutants may migrate off those sites.

The No-Build Alternative would include no improvements to roadways and bridges, which currently have limited controls in place to contain spills or releases that could migrate to environmental media. As such, the potential for adverse effects from spills or accidental releases is higher for the No-Build Alternative than it would be under the Modified LPA. Spills of hazardous materials from collisions as a result of traffic congestion would be assumed to continue at current levels or worsen as congestion increases over time. Stormwater would continue to be untreated on the existing Interstate Bridge and most other portions of I-5 within the study area; pollutants on roadways, such as oil from vehicles or heavy metals in brake dust, would continue to enter nearby surface water bodies and groundwater.

4.3.2 Modified LPA

Because the project design is still being refined, a detailed evaluation of the potential effects of specific project features is not feasible at this time. However, in general, the impact potential for the Modified LPA is expected to be similar to that of the CRC LPA. The CRC Final EIS assigned a moderate rating for potential adverse effects on the Marine Drive, North Portland Harbor, Hayden Island, and Interstate Bridges and to the bridge structures at SR 14, Mill Plain Boulevard, and 33rd Street. The ratings for these bridges were based on:

- The installation of numerous permanent and temporary piles.
- Deep installation depths relative to groundwater depth.
- Substantial amount of excavation anticipated.
- Higher-priority hazardous materials sites within 500 feet of the structures.

The Evergreen, SR 500, and 39th Street bridges were given a low rating for potential adverse effects. The ratings for these bridges were based on:

- Low number of piling installations
- Shallow pile-installation depths relative to the depth of groundwater

- Moderate amount of excavation anticipated
- No higher-priority hazardous materials sites within 500 feet of the structures

Stormwater treatment facilities at the Mill Plain, SR 14, Hayden Island, and Marine Drive interchanges may be located near priority hazardous material sites. Excavation for these facilities has the potential to encounter contaminated soil, and/or stormwater from the ponds could infiltrate into contaminated soil.

4.3.3 Design Options

The Modified LPA design options were evaluated for temporary and long-term effects on hazardous materials sites. Other than those discussed below, no impacts were identified that varied from those described in the Modified LPA.

Shifting the I-5 mainline to the west would require two additional full acquisitions compared to the Modified LPA: the Normandy Apartments property (318 E 7th Street) and the Regal City Center property (801 C Street). Neither property is listed on the Environmental Data Resources data or in Ecology's databases as a hazardous materials site, and no evidence was found of a release or storage of hazardous materials on the properties. Thus, the impact potential rating of "moderate" for the interchange area is the same for this design option as for the Modified LPA.

The two auxiliary lane design option and both of the single-level configuration options would require the acquisition of a slightly larger area of property at the Fort Vancouver property (U.S. Army Vancouver Barracks) than the other design options. This site has a No Further Action determination for the possible presence of unexploded ordnance after a remedial investigation found no unexploded ordnance Program activities on the site are therefore not expected to impact human health and safety. The site has been recommended for further hazardous materials investigations.

The Hannah Motor Company site (a documented cleanup site), located at 300 and 400 Washington Street in Vancouver, is located in the area where the transit bridge would enter Vancouver after crossing the Columbia River. One of the potential park-and-ride sites for the Waterfront Station would occupy this property. The other potential park-and-ride site for the Waterfront Station is located to the west of this property; however, surface road construction would require full acquisition of this property. Bridge construction in this area may require a foundation below the water table to support the anticipated vertical loads, which could also require excavation of the site. Thus, the site would be affected under either of the waterfront park-and-ride locations. None of the potential sites identified for the Evergreen Station park-and-ride facility has documented contamination.

5. TEMPORARY EFFECTS

Temporary effects are those that could result from the construction of the Modified LPA. Three general categories of temporary effects have the potential to occur:

1. Liability to the purchaser in acquiring property with RECs.
2. Effects on the environment and resources from construction in areas where hazardous materials exist.
3. Effects on construction from hazardous materials.

These potential effects are assessed qualitatively, based on the project team's current understanding of the natural and built environments. Full environmental evaluations of property acquisitions associated with the Modified LPA have not yet been completed. (Phase II ESAs will be completed along with the Final SEIS, and therefore assessments of temporary effects related to potentially acquired properties are subject to change.)

Many of the types of impacts related to hazardous materials have the potential to be significant if they are not fully mitigated. This potential is noted in the discussion below as appropriate. However, the identification of contaminated sites and their relationship to the project footprint, as presented in this report, provides project designers and contractors with the opportunity to avoid, minimize, and/or mitigate impacts to protect public and environmental health. In many cases, impacts can be avoided, minimized, and/or mitigated through compliance with federal, state, and local regulations governing the handling of hazardous materials, as enumerated in Chapter 2 of this report. A summary of mitigation measures by category is provided in Chapter 8.

5.1 Property Acquisition Liability

Acquisition of property where RECs have been identified can result in potential liability for the purchaser (i.e., ODOT, WSDOT, or TriMet). Liability issues for acquired property in fee are addressed in different ways under Oregon and Washington state laws.

In Oregon, the standard for liability for remedial actions (cleanup) of a property is pursuant to ORS 465.255. This statute states that "the owner/operator is strictly liable for those remedial action costs incurred by the state or any other person that are attributable to or associated with a facility and for damages for injury to or destruction of any natural resources caused by a release." This statute extends to limit the state's legal liability for an acquired facility or property through condemnation. If no viable owner/operator is located, liability may be decided on a case-by-case basis. Per ORS 465.255 (1b), if a specific state entity becomes the "owner or operator after the time of the acts or omissions that resulted in the release, and who knew or reasonably should have known of the release," the state entity may be considered liable for the costs of remedial actions.

In Washington, the standard of liability is pursuant to the Revised Code of Washington (RCW) 70A 305 040. The code states that "the owner/operator of the facility is liable for remedial cost." Provisions in the code thus allow for the state to inherit legal liability when acquiring the property/facility.

Liability issues can include (1) restriction in current or future property use; (2) incurring costs for cleanup; (3) schedule delays; (4) worker and public safety; and/or (5) increased resource agency oversight. Conducting an *all appropriate inquiries*[14] investigation into the previous ownership and uses of the property prior to a property transaction is a means of safeguarding and managing potential liability issues. In this way RECs are disclosed prior to the sale of the property and potential issues can be mitigated prior to construction activities. Inquiry may result in responsibility for cleanup by the owner/operator and/or reduction in the property's value. Further discussion of mitigation measures for property acquisition is provided in Chapter 8.

Because FTA funding would be used for the IBR Program, environmental due diligence adheres to FTA SOP 19 (FTA 2016), which is discussed further in Section 8.1, Long-Term Effects. In general, FTA SOP 19 provides guidance on methods and work products to be completed as part of the evaluation of impacts.

5.2 Effects on the Environment from Construction

5.2.1 Acquisitions

Prior to property acquisition and construction of the Modified LPA, adherence to FTA SOP 19 (FTA 2016) to complete individual property evaluations (including Phase I ESAs completed as part of this Draft SEIS) and assessments would be achieved, including characterizing the nature and extent of soil, sediment, and groundwater contamination and defining the specific measures and applicable regulatory agency approvals needed to address the contamination. Where contamination exists that may pose a risk to people or the environment if mobilized by construction activities, a remediation plan would be developed and executed for each property. The remediation or cleanup of hazardous material sites affected by the Modified LPA would occur prior to or during construction.

The properties requiring more complex investigation identified in Chapter 4 mostly include gas stations, automotive and marine repair and service facilities, landfills, and commercial or industrial operations with commercial LUSTs or other sources of hazardous releases. In accordance with FTA SOP 19 and applicable regulations for hazardous materials sites, actions to address this type of contamination would be defined in more detail at the individual property level. However, such sites would typically be addressed with soil excavation and disposal or the use of technologies such as in-situ chemical injection, bioremediation, or air-sparge/soil vapor extraction. A period of groundwater monitoring during and after remediation may also be required if groundwater is contaminated. Overall, the Modified LPA would include actions to identify and remediate contamination on acquired properties, resulting in beneficial effects.

5.2.1.1 Acquisition of Staging and Casting Areas

As described in Chapter 1, one or more staging or casting areas could be temporarily acquired or leased for the construction of the Modified LPA. The site may be obtained by the respective state department of transportation, or, if a contractor chooses to use a different site, they would become responsible for obtaining the site and conducting all environmental evaluation and permitting

[14] https://www.epa.gov/sites/default/files/2015-05/documents/aai_reporting_factsheet.pdf

necessary to use the site. A full list of staging and/or casting sites is still under development; environmental review for these sites will be completed during the Final SEIS.

5.2.1.2 Findings

The Modified LPA has a potential for adverse effects as a result of Program-related activities at staging and casting areas that would be acquired for project construction. The final locations of easements are still being identified at the time of writing; when these areas are identified, their locations with respect to hazardous material sites will be updated in subsequent versions of this report.

5.2.2 Permanent and Temporary Easements

Permanent and temporary easements would be used to support the project, including (but not limited to) subsurface easements, airspace easements, and property easements. Permanent easements would be necessary to construct subsurface utility lines (storm drain, telephone, electrical), roadways, sidewalks, or access. Permanent easements grant the state a limited interest in a property. Temporary easements allow the state the right to the property for short-term ground improvements or staging purposes. After fulfilling their intended purpose, temporary easements are typically returned to the landowner.

Easements where RECs have been identified can result in potential liability. Liability issues can come in the form of (1) incurring cleanup costs; (2) schedule delays; and (3) worker and public safety.

5.2.2.1 Findings

The Modified LPA has a potential for adverse effects as a result of Program-related activities within permanent and temporary easements that ODOT and WSDOT would acquire for project construction. These easements are still being identified at the time of writing; once final easements are identified, their locations with respect to hazardous material sites will be updated in subsequent versions of this report.

5.3 Environmental Impacts on the Modified LPA

Environmental media—soils, sediments, surface water, stormwater, and groundwater—can be adversely affected by the exacerbation of existing contamination or the release of hazardous substances during construction activities. Effects from hazardous materials may cause a risk to human health and/or the environment, raise liability issues, increased project costs, and/or cause schedule delays.

The degree to which existing contamination can migrate into the environment depends on the type, intensity and duration of construction activities and the nature and extent of the contamination. Types of construction activities include, but are not limited to excavation, grading, dewatering, drilling, dredging, utility line trenching, and installation of stormwater conveyance and retention systems and retaining walls; installation of piles and shafts for bridge and interchange foundations; soil stabilization; and demolition. The type, intensity, and duration of these activities would be further defined during the design phase and contractor procurement.

Documented contaminants at identified hazardous materials sites include chlorinated solvents, petroleum hydrocarbons, pollutant metals, pesticides, and PCBs. However, unidentified contamination from historical land use likely exists within the study area. Impacts are most likely associated with commercial and industrial properties that may have generated or improperly disposed of hazardous materials. The nature and extent of contamination in areas where below-grade construction would be conducted will be evaluated on a site-by-site basis prior to preparing plans, specifications, and estimates. Site-by-site evaluation may take the form of physical investigation, sampling, and analysis.

Contaminants that are encountered during construction can migrate into the environment along a variety of pathways (Chapter 3). Shallow soil contamination can migrate downward into subsurface soils and/or groundwater through drag-down from excavation, utility work and drilling, and/or infiltration of stormwater. Groundwater impacts can be exacerbated by dewatering activities. Impacted stormwater can migrate to surface water and sediments. Impacted sediments can be re-suspended into the water column and/or re-deposited from scour or dredging activities.

Alternatively, hazardous substances or petroleum products have the potential to be released into the environment during construction activities. Construction equipment can release petroleum products into the environment from the improper transfer of fuel or from spills. Other pollutants such as paints, acids for cleaning masonry, solvents, raw concrete, paving, striping products, and concrete-curing compounds are present at construction sites and may enter the environment if not managed correctly.

Adverse effects to the environment from contamination creates concern in areas important to human and ecological health, such as wetlands, floodplains, residential areas, and/or in wellhead protection zones. Within the study area these include, but are not limited to, the Columbia Slough, Vanport Wetlands, North Portland Harbor, Hayden Island, the Columbia River, areas within the city of Vancouver, and the Burnt Bridge Creek drainage. Potential staging and casting areas could also be located along waterways.

The following summarizes potential effects from temporary construction by media type.

5.3.1 Surface and Subsurface Soils

Surface and subsurface soils often are the most likely media to be affected by an initial contaminant release. Common contaminant release mechanisms include spills, subsurface disposal, LUSTs, and soil leaching. Contaminated soil can migrate to other environmental media such as sediments, surface water and groundwater from secondary release mechanisms during construction activities (e.g., excavation, grading, and drilling). Secondary release mechanisms include, but are not limited to, drag-down, smearing, groundwater leaching, airborne particulates, stormwater runoff and erosion.

5.3.1.1 Findings

The Modified LPA has the potential for adverse effects to the environment from the exacerbation of existing contaminated soils or accidental releases during construction. These adverse effects could have the potential to be significant if not mitigated correctly. Construction activities for the Modified LPA are relatively intensive and complex, with extensive excavation and grading activities required on properties in the expanded right of way to support the installation of bridge abutments, interchanges, roadway grading, cut and cover tunnels, retaining walls, and utility corridors (Figure 4-1 through Figure 4-8). It is likely that construction activities would encounter existing contamination. A portion of the construction activities would occur within the Columbia River floodplain, which is considered a sensitive area for aquatic organisms. Of particular concern is the exacerbation of potential existing soil contamination from sites North Portland Harbor and Hayden Island from the construction of Marine Drive and along the Columbia River from construction of the SR 14 interchanges.

Although construction in contaminated areas poses potential concerns, it is also recognized that beneficial effects to the environment can be realized by the cleanup of residual soil contamination during construction. This potential cleanup of contaminated soil would not otherwise be realized within the timeline of the Modified LPA.

5.3.2 Stormwater

Precipitation events can generate stormwater runoff at construction sites. Without adequate stormwater management and treatment, stormwater quality can be diminished, and soil erosion can occur. Stormwater quality can also be affected by a direct release/spill of a hazardous substance to stormwater lines during construction. Impacts to stormwater quality can further degrade surface water, groundwater and sediment quality.

In addition, hazardous material sites have been identified in the proximity of stormwater treatment facilities located at the Mill Plain interchange, the SR 14 interchange, Hayden Island interchange, and Marine Drive interchange (Figure 4-1 through Figure 4-8). Adverse effects to groundwater could occur in these areas if stormwater is infiltrated into contaminated subsurface soils to the water table.

5.3.2.1 Findings

The Modified LPA has a potential for adverse effects to stormwater quality during construction activities. This may result from erosion of exposed contaminated soil surfaces during precipitation events where stormwater is not controlled or adequately treated, and/or release to stormwater during construction. Adverse effects from diminished stormwater quality could be significant if not correctly mitigated.

5.3.3 Surface Water

Surface water quality can be adversely affected by near-water or in-water construction activities. Near-water activities such as embankment modifications have the potential to allow contaminated soils to migrate to surface water. In-water activities such as barge support, pier installation, temporary pile installation and removal, dredging, and scour have the potential to re-suspend contaminated sediments into the water column. Overwater activities such as bridge demolition and construction, and lead abatement could also adversely affect surface water quality. Surface water features that could be impacted by construction include the Vanport wetlands, North Portland Harbor, and the Columbia River.

5.3.3.1 Findings

The Modified LPA has a potential for adverse effects to the environment from impacts to surface water quality. These impacts could be significant if not correctly mitigated. Surface water quality can be diminished from the disturbance of soils and sediments during construction of the Modified LPA exacerbating current extent of contamination. These effects are of most concern in the areas of Marine Drive, North Portland Harbor, and Hayden Island, where modifications to the embankments and pile installation and removal are proposed (Figure 4-1 through Figure 4-3). These construction activities are in proximity to sites recommended for additional investigation in Chapter 4, where known or suspected releases of contamination have occurred in soil, sediment and/or groundwater. Unidentified contamination may also be present in these areas due to historical land use.

Installation of pier structures within the main channel of the Columbia River is not thought to have adverse effects on surface water quality outside of potential turbidity issues associated with the placement of cofferdams (see the Water Quality Technical Report). Analysis of sediment samples collected downriver of the Interstate Bridge either did not detect chemicals of concern and/or detected these in concentrations below Sediment Evaluation Framework screening levels (USACE 2009). However, a supplemental sediment evaluation should occur within the footprint of the pier structures to confirm that sediment quality is acceptable. This is particularly the case near City of Vancouver outfalls, where stormwater discharge from PGIS may have locally impacted sediments near proposed nearshore bents.

Potential adverse surface water quality effects to the Columbia Slough and Burnt Bridge Creek from the construction of the Modified LPA are not anticipated to be significant. Construction activities in the area of the Columbia Slough and Burnt Bridge Creek are minimal in extent and intensity (Figure 4-1 through Figure 4-8).

Surface water quality impacts to the Vanport wetlands from construction could be significant if not correctly mitigated. Construction activities near the wetlands would include soil excavation and grading, and installation of the Marine Drive interchange. The wetlands are also considered sensitive habitat.

5.3.4 Sediment

Sediment quality can be adversely affected by the exacerbation of existing sediment contamination through construction activities. These activities include pier installation, pile installation and removal, dredging, and barge support. Scour from cofferdams and/or piers could also exacerbate contaminated sediment. Exacerbation can occur from re-depositing contaminated sediments or exposing residual contaminated surfaces. Exacerbation of sediment contamination can also lead to impacts to surface water quality through re-suspension into the water column.

Sediment quality within North Portland Harbor is suspected of being impacted from historical industrial, commercial, and residential activities. These activities include boat moorage, boat maintenance and fueling, freight hauling, and miscellaneous activities associated with floating homes. Contaminants including PCBs, TBT, and pollutant metals have been detected in sediments at hazardous materials sites along Marine Drive. In addition, stormwater from upland sources and the Interstate Bridge might contribute to sediment contamination.

Shallow water environments occur in North Portland Harbor and in proximity to Hayden Island. These environments have a higher likelihood of retaining contaminants due to the prevalence of fine-grained materials (sands and silts) and the low-energy fluvial setting. The shallow water environments of North Portland Harbor and Hayden Island have been identified as sensitive environments for fish habitat, migration, and rearing.

Sediments within the main channel of the Columbia River are not thought to be significantly impacted by contaminants (Table 3-1). This is based on sediment samples collected downgradient of the Interstate Bridge. However, localized impacts to nearshore sediment may have potentially occurred from stormwater discharge.

No in-water construction activities are anticipated to occur within the Columbia Slough, Vanport wetlands, and/or Burnt Bridge Creek.

5.3.4.1 Findings

The Modified LPA has a potential for adverse effects to the environment from the exacerbation of sediment contamination. These effects could be significant if not correctly mitigated. Exacerbation of existing sediment contamination is of most concern in nearshore environments (water column less than 20 feet) along North Portland Harbor, Hayden Island, and the Columbia River where pier installation, pile installation and removal, existing pier demolition and removal, dredging, and barge support could occur (Figure 4-1 through Figure 4-8). These construction activities can re-suspend contaminants into the water column, redeposit contaminated sediments, or expose residual sediment contamination. Construction activities are in proximity to properties along Marine Drive where known and/or suspected releases of contamination occur in soil, sediment, and/or groundwater. Impacts to sediments may have also occurred from discharge of stormwater affected by point and non-point pollutant sources. Nearshore environments are typically more sensitive for aquatic organisms and fish due to their importance in habitat, migration, and rearing.

Potential adverse effects associated with pier installation within the deeper water environment of the Columbia River are assumed to be minimal. This is due to the likelihood that contaminated sediments within the deeper water environment are not present due to the high-energy fluvial environment and presence of coarse-grained sediments that tend to not retain contaminants.

5.3.5 Groundwater

The Troutdale Aquifer extends throughout the Portland Basin and is used as a municipal water source. It is designated by the EPA as a sole source aquifer in Clark County, Washington. The City of Vancouver recognized its dependence on the aquifer and the importance of protecting it as a resource by designating the area within its boundaries as a Critical Aquifer Recharge Area.

Areas most sensitive to adverse effects on groundwater quality are those where beneficial use of groundwater occurs (see Figure 3-9 in the Geology and Groundwater Technical Report). Drinking water, irrigation, and process water are generally derived from zones approximately 100 to 300 feet below ground surface. As such, proposed construction activities that extend into these zones from which water is derived have a higher potential to cause adverse effects to the well head. This is particularly the case for municipal wells at water stations WS-1 and WS-3, which hydraulically influence the direction of groundwater flow within the city of Vancouver. Groundwater within these wells' zone of influence is thought to be captured by water stations WS-1 and WS-3 (see Figure 3-8 in the Geology and Groundwater Technical Report). Municipal wells at these stations are currently tested and treated to meet state and federal primary and secondary water quality standards. For WS-1, this includes treatment of groundwater using an air stripping system to remove low-level solvent contamination. In general, groundwater flow on the Vancouver side of the river is influenced by municipal well extraction. On the Portland side, groundwater flow is variable, but in general it flows toward the Columbia River. Groundwater flow direction is discussed in more detail in Section 3.6.2.3 in the Geology and Groundwater Technical Report.

Existing groundwater contamination from legacy hazardous materials sites is present within the study area. The nature and extent of these impacts are not fully understood, but likely consist of low-concentration dissolved-phase solvents, metals, and petroleum products within two components of the Troutdale Aquifer known as the Unconsolidated Sedimentary Aquifer (USA) and the Troutdale Gravel Aquifer (TGA). Construction activities that encounter dissolved-phase groundwater contamination at depth would not likely exacerbate these impacts. Conditions that help limit this type of impact are:

- The USA and TGA are hydraulically connected and are not separated by confining units within the study area. Therefore, the formation of conduits or preferential pathways from construction activities would be limited, as existing dissolved-phase contamination can migrate advectively throughout the saturated zone.
- The presence of sand material in the USA would limit drag-down of contaminants from driven pile and drilled shaft techniques. Friction between steel conductor casings and sand or fine material along the borehole wall would limit contaminant drag-down.
- Drilled or driven steel casing would remain in the subsurface for a majority of foundation elements. This would limit the potential of these installations to serve as conduits or preferential pathways.

5.3.5.1 Findings

The Modified LPA has a potential for adverse effects on groundwater quality from the exacerbation of existing contamination during construction activities. These effects could be significant if not correctly mitigated. Construction activities for the Modified LPA would be intense and complex, with a high occurrence of activities that extend to or below the water table in areas where hazardous materials sites were identified and/or where unidentified contamination may exist.

The Troutdale Aquifer could be adversely affected by the exacerbation of existing contamination during construction. Construction activities would include but are not limited to (1) excavation to accommodate roadway grade changes, tunneling, utility lines, stormwater conveyance systems, and retaining walls; (2) installation of piles and shafts for bridge and interchange foundations; (3) earth stabilization using techniques such as placement of stone columns; and (4) dewatering activities for the placement of retaining walls and tunnels.

Mechanisms that could cause existing contamination to migrate to or below the water table during project construction are (1) drag-down of surficial contamination; (2) downward or lateral migration of mobile contamination along conduits or preferential pathways; (3) leaching of exposed contamination; (4) migration of contamination from dewatering activities; (5) infiltration of impacted stormwater and/or infiltration of stormwater into impacted subsurface materials; and (6) accidental release of hazardous substances or petroleum products.

The most substantial effects on groundwater quality during construction could occur in areas where (1) abundant or gross contamination is present in saturated or unsaturated soils; (2) contaminants are soluble in water and/or are in a dense nonaqueous form; (3) the depth to water table is shallow; and/or (4) construction activities extend to or below the water table. These conditions or a combination of these conditions could allow contamination to migrate downward and adversely affect groundwater quality if not mitigated correctly.

Migration of contamination to groundwater is of concern at the Mill Plain interchange, the SR 14 interchange, the Hayden Island bridges, the North Portland Harbor interchange, and the Marine Drive interchange. The construction of these project elements requires a high degree of excavation work, the deep installation of piles and shafts, and dewatering. Construction would occur in areas where the water table is fairly shallow, and contamination may be present from historical land use. Groundwater in this area is beneficially used for drinking water, process water, and/or irrigation.

Construction activities that encounter dissolved-phase groundwater contamination at depth during deep foundation construction would not likely result in adverse effects. The drag-down of dissolved-phase contaminants during drilled shaft or driven pile construction is thought to be minimal, if any. The potential of downward migration due to the creation of preferential pathways would only be significant if dense nonaqueous phase liquids were encountered.

Groundwater quality can be adversely affected by the infiltration of stormwater that is not adequately managed and/or treated, that infiltrates into contaminated subsurface soils, or that migrates laterally along utility corridors. Potential adverse effects from stormwater infiltration would be the greatest in areas where the water table is shallow (less than 20 feet) and/or subsurface soil contamination exists.

5.4 Potential Effects on Construction Activities

5.4.1 Worker Safety and Public Health

Adverse effects to worker safety and public health from hazardous materials during construction can occur if not correctly mitigated. Potential exposure routes include dermal contact and ingestion of contaminated soil and water, and inhalation of contaminated vapors or particulates. Exposure is thought to be highest during excavation work, demolition, or application of materials that contain hazardous substances. Potential receptors include construction workers, excavation workers, the traveling public, transients, and nearby residents. Health effects are dependent on the type of contaminants, duration, dosage, exposure route, and age of those exposed.

Identified contaminants such as chlorinated solvents, metals, petroleum hydrocarbons, PAHs, pesticides, asbestos, and PCBs are mainly associated with long-term chronic effects to human health. However, these contaminants and/or other, unidentified contaminants have the potential to cause acute effects to human health. EPA, DEQ and Ecology provide generic health-based screening concentrations to define acceptable exposure concentrations.

5.4.1.1 Findings

The Modified LPA has a potential for adverse effects to worker safety and public health from construction activities. These effects could be significant if not mitigated correctly, but would be addressed through compliance with federal, state, and local regulations governing construction safety and containment and handling of hazardous materials (see Chapter 8). The potential for adverse effects to worker safety and public health during construction of the Modified LPA is higher than for the No-Build Alternative because of the intensity and complexity of construction activities and the number of potential exposure pathways.

5.4.2 Hazardous and Non-Hazardous Wastes

Waste can be generated during construction activities when contaminated materials are encountered or generated by construction and demolition. Waste can consist of contaminated soils, sediments, water, and/or building material.

Non-hazardous wastes are those categorized as not hazardous waste and are exempted from or do not apply to Resource Conservation Recovery Act (RCRA) Subtitle C regulations. They are typically called “solid waste.” Non-hazardous wastes likely to be encountered during construction are fill, debris, soil, and wood, and lead-based paint associated with bridge structures. Non-hazardous wastes require management in accordance with applicable federal and state regulations. Characterizing, managing, storing, and disposing of hazardous waste would likely be a common component of project construction.

A solid waste that is dangerous and/or potentially harmful to human health is considered a hazardous waste. Hazardous waste can have characteristics of toxicity, corrosivity, reactivity, and/or ignitability that are governed by RCRA Subtitle C regulations. Listed hazardous wastes are wastes from common manufacturing and industrial processes and specific industries and can be generated from discarded commercial products. Universal wastes include batteries, pesticides, and mercury-containing light bulbs. In addition, wastes that contain PCBs are managed under the Toxic Substance Control Act and under 40 CFR Part 761.

Hazardous wastes and universal wastes require management in accordance with applicable federal and state regulations. Hazardous wastes likely to be encountered are treated timbers, impacted soil, sediment and groundwater, transformers, and abandoned waste. Characterizing, managing, storing, and disposing of hazardous waste would likely be a small component of project construction. However, if not mitigated correctly, hazardous wastes can increase project costs and cause schedule delays, and are a source of liability to the project.

5.4.2.1 Findings

Under the Modified LPA, construction activities would be relatively intensive and complex, and they would generate significant quantities of materials that would need to be managed, stored, and characterized for the presence of contamination. The Modified LPA has a high potential to manage, characterize, and dispose of non-hazardous wastes.

If any material is determined to be a hazardous waste, the material would need to be properly disposed of at a registered facility according to state and federal guidelines. The Modified LPA has a low potential of managing, characterizing, and disposing of hazardous waste. However, adverse effects from the hazardous waste could be significant for the Modified LPA if not mitigated correctly.

5.4.3 Underground Storage Tanks

USTs are used to store petroleum products and are regulated in Washington and Oregon to prevent releases of petroleum and related contamination to soil and/or groundwater. Many USTs installed before 1980 consisted of bare steel pipes, which corrode over time, and may eventually result in leakage. Faulty installation and inadequate handling may also cause leaks.

5.4.3.1 Findings

Records for 45 UST sites and 26 LUSTs were identified in the study area. These numbers will be updated as the design of the Modified LPA is refined. The Modified LPA has a potential to encounter identified or unidentified USTs and LUSTs. If a UST is encountered, it will need to be decommissioned properly following state rules and guidelines, pursuant to WAC 173.360A and OAR 340-150. USTs have the potential for significant adverse effects on the project in terms of financial liability and schedule delays during construction if UST conditions are not correctly mitigated. Mitigation would include proper due diligence prior to property acquisition.

5.4.4 Lead and Asbestos-Containing Materials

Wastes that contain lead and ACMs are managed and disposed of as non-hazardous wastes under 40 CFR Part 261. Lead has the potential to be a hazardous waste if it fails toxic characteristic leaching procedures. Asbestos is treated as an industrial waste and requires special packaging and handling pursuant OAR 340-248, WAC 269-65, and 40 CFR Part 61 Subpart M.

The existing Interstate Bridge, buildings, and other structures that contain lead and/or ACMs would need to have proper abatement conducted prior to any demolition, renovation, or repair activities. Abatement must follow state guidelines and be conducted by licensed abatement firms. Abatement materials must be properly disposed of at authorized solid waste facilities. EPA issued a ban and phaseout of asbestos in 1989.

5.4.4.1 Findings

The Modified LPA has a potential for adverse effects to the project from the disturbance of lead and ACM during construction. These effects are anticipated to be significant if not mitigated correctly. However, it is recognized that the proper removal of lead and ACMs is beneficial to human health and the environment.

At least 31 of the properties that would be acquired for the Modified LPA have structures built prior to 1980 that may contain asbestos and that are planned for demolition. In a similar fashion, materials that contain lead (such as some types of paint) must be handled carefully during demolition and must be disposed of at an approved facility.

5.4.5 Other Areas to Address for the Modified LPA

5.4.5.1 Ruby Junction Maintenance Facility

The Modified LPA includes expansion of the light-rail maintenance facility at Ruby Junction. Expansion would require the acquisition of several properties, as well as potential modifications to the existing building structure. Review of environmental databases indicates that there are no apparent unaddressed releases to the subsurface on properties to be acquired or adjacent properties. Properties to be acquired are undergoing the same level of environmental due diligence as other properties being acquired for the Modified LPA.

5.4.5.2 Staging and Casting Areas

Potential off-site staging areas to support construction are currently being evaluated. Staging areas would be used for material laydown yards, equipment storage, and fabrication. Activities at the staging areas that could result in ground disturbances include regrading, updates to stormwater management and treatment systems, soil stabilization, and installation of underground utility lines.

The former Thunderbird Hotel property, identified as a potential staging area, has associated RECs. This location is the site of the former Hayden Island Landfill and a former automotive service station. Activities at this site may have resulted in contamination of subsurface soils and groundwater, which if disturbed during construction as a result of staging activities, could mobilize into the surrounding environment. However, most construction staging activities would occur on the ground surface, and excavation at this site is unlikely.

If the river crossing is built using precast concrete sections, an off-site casting yard would be required. One potentially available casting yard site has been identified to date: the former Thunderbird Hotel site on Hayden Island. Preliminary review of the site has identified existing RECs, as noted above.

6. LONG-TERM BENEFITS AND EFFECTS

Long-term effects are future effects from the operation and maintenance of the No-Build Alternative or the Modified LPA on environmental resources, or future effects to the operation and maintenance of the No-Build Alternative or Modified LPA from hazardous materials sites. Long-term effects could occur in three general categories: (1) property acquisition, (2) effects on the environment from operation, and (3) effects on operation from hazardous materials. These potential effects are assessed qualitatively based on the project team's current understanding of the natural and built environments.

Many of the types of impacts related to hazardous materials have the potential to be significant if they are not fully mitigated. This potential is noted in the discussion below as appropriate. However, the identification of contaminated sites and their relationship to the project footprint, as presented in this report, provides project designers and contractors with the opportunity to avoid, minimize, and/or mitigate impacts to protect public and environmental health. In many cases, impacts can be avoided, minimized, and/or mitigated through compliance with federal, state, and local regulations governing the handling of hazardous materials, as enumerated in Chapter 2 of this report. Chapter 8 describes potential mitigation measures for hazardous materials.

6.1 Property Acquisition Liability

Long-term liability can result from acquisition of a contaminated property or from becoming legally and/or financially obligated to a property that is undergoing or will be requiring investigation, remediation, and/or is subject to requirements associated with long-term operation of a cleanup action.

6.1.1 No-Build Alternative

The potential for adverse effects from property acquisition liability is low for the No-Build Alternative. No acquisitions and displacements would occur as a result of this alternative. As such, there is no potential for adverse effects from property acquisition liability for the No-Build Alternative. There are also no beneficial effects from the cleanup of contaminated sites.

6.1.2 Modified LPA

The Modified LPA would require the acquisition of properties or portions of properties that have been identified as hazardous materials sites. Thirty-six properties identified for potential acquisition have been recommended for further subsurface investigation of potential or known contamination as part of the Phase I ESAs described in Section 4.1 above. Depending on the nature and extent of contamination encountered, long-term adverse effects from property acquisitions may be significant because state and federal policies require due diligence prior to property acquisition and construction. Properties with contamination in excess of regulatory standards would be subject to remediation and cleanup prior to construction. These effects also have the potential to affect the costs and schedule of project construction. It would have beneficial effects on human health and safety and surface and groundwater quality from cleanup and remediation of contaminated areas on acquired sites and limiting the possible off-site migration of contamination. If residual contamination would remain on acquired hazardous materials sites after cleanup, there would be moderate potential for adverse effects on human health and safety if encountered during construction or with the possible off-site migration of contamination.

6.1.3 Design Options

For effects from hazardous materials, the bridge configuration options, the SR 14 interchange without C Street ramps design option, the I-5 westward shift design option, and the park-and-ride site options would have the same effects as the Modified LPA as discussed in Chapter 4 because they would require the acquisition of the same hazardous materials sites, would provide the same stormwater treatment, and would provide the same improvements to roadways and congestion that would reduce spills of contaminated materials. Therefore, these options are not described below.

6.1.3.1 Two Auxiliary Lane Design Option and Single-Level Fixed- and Movable-Span Configurations

The two auxiliary lane design option and the single-level configuration options would require the acquisition of a slightly larger area of the Fort Vancouver property, which is listed as former U.S. Army Vancouver Barracks. The site has a No Further Action determination for the possible presence of unexploded ordnance; a remedial investigation found no unexploded ordnance, and it is therefore not expected to impact human health and safety. The site has been recommended for further hazardous materials investigation.

In addition, the single-level movable-span configuration would require increased in-water work area due to the larger bridge foundations, increasing the likelihood of impacts to potential hazardous materials.

6.2 Adverse Effects on the Environment from Operation and Maintenance

6.2.1 Spills and Releases

Roadway and transportation operations can result in the release of hazardous substances or petroleum products into the environment from accidental spills. These releases could migrate to surface water or groundwater and could affect properties outside of the right of way. Adverse effects include road closures and delays, cleanup costs, and regulatory fines applied to the responsible party.

6.2.1.1 No-Build Alternative

The potential for adverse effects from spills or releases of hazardous substances or petroleum products are high for the No-Build Alternative. The No-Build Alternative would include limited updates to the roadway and bridge designs. Limited controls are currently in place to contain spills or releases which could migrate to environmental media. For example, an accidental spill of gasoline from a fueling truck on the Interstate Bridge could result in impacts to surface water through release via stormwater scuppers. As such, the potential for adverse effects from spills or accidental releases is high for the No-Build Alternative compared to the Modified LPA.

6.2.1.2 Modified LPA

The Modified LPA also has the potential for adverse effects from spills or releases of hazardous substances or petroleum products from operation. However, these effects are anticipated to be less than under the No-Build Alternative. The Modified LPA would be constructed with updated road and bridge designs. Updates would include controls associated with the stormwater system to contain and/or better manage releases on roadways and bridges. In addition, emergency response to such accidents would likely be quicker due to updates in roadway access and traffic safety. As such, the potential for adverse effects from spills or releases is lower for the Modified LPA compared to the No-Build Alternative.

The operation and maintenance of light-rail trains at the Ruby Junction Maintenance Facility requires the use of hazardous substances and the generation and disposal of hazardous waste. The facility currently has DEQ-approved plans and systems in place to control spills and manage hazardous materials. Operation of the expanded facility for light-rail maintenance would continue, and this existing use could create an incremental increase in existing risks; however, existing hazardous materials management plans and systems would be evaluated and adjusted as appropriate for the expanded scale of the facility. Therefore, expansion of the Ruby Junction Maintenance Facility would not be expected to result in substantial additional hazardous materials effects.

6.2.1.3 Design Options

The long-term effects of the proposed design options related to spills and releases would not differ substantially from those of the Modified LPA. Each design option has the potential for adverse effects from spills or releases of hazardous substances or petroleum products from operation, similar to the Modified LPA.

6.2.2 Stormwater Conveyance System and Treatment Facilities

Stormwater quality can be affected by pollutants contained in stormwater runoff from roadways and bridges and by erosion and runoff of contaminated soils exposed during excavation and grading activities. Typical stormwater pollutants include petroleum products, metals (copper, cadmium, and lead), salts, fecal coliform, and suspended solids. Contaminants in stormwater can migrate to surface water, groundwater, and sediments.

Long-term operation and maintenance of the stormwater conveyance system and treatment facilities is necessary to meet discharge and water quality regulatory standards. Treatment technologies rely on reduction of stormwater flow velocity to allow for the settling out of suspended solids and pollutant uptake by plants. Pollutant uptake by plants and accumulation of pollutant loading at soil horizons may be limited or diminished over time. Long-term evaluation of the effectiveness and performance of the treatment systems would be conducted to ensure that the systems are functioning as intended.

6.2.2.1 No-Build Alternative

Adverse effects on the environment could occur from the operation and maintenance of the existing stormwater conveyance and treatment facilities under the No-Build Alternative. Since few to no improvements to the stormwater system would occur, stormwater would continue to be untreated on the Interstate Bridge and within the study area; pollutants on roadways, such as oil from vehicles or heavy metals in brake dust, would continue to enter nearby surface waterbodies and groundwater. As such, the potential for adverse effects from the operation and maintenance of the existing stormwater conveyance system is higher for the No-Build Alternative compared to the Modified LPA.

6.2.2.2 Modified LPA

Compared to the No-Build Alternative, the Modified LPA would have a lower potential for adverse effects from contaminants in stormwater. The Modified LPA is anticipated to have substantial beneficial effects because it would provide management and treatment of stormwater from PGIS (details regarding management and treatment of stormwater can be found in the Water Quality and Hydrology Technical Report). Updates to and enhancement of the stormwater conveyance system and treatment facilities are anticipated to result in locally improved surface water, sediment, and groundwater quality (see the Water Quality and Hydrology Technical Report). This is a potentially significant positive effect due to the beneficial uses of the Columbia River and Troutdale Aquifer. In addition, groundwater recharge to the Troutdale Aquifer should increase due to direct infiltration of stormwater into bioswales and the management and storage of overflow volumes in retention ponds. The Modified LPA stormwater conveyance system and treatment facilities would be monitored and maintained to ensure they are performing as intended.

6.2.2.3 Design Options

The long-term effects of the proposed design options related to stormwater conveyance and treatment would not differ substantially from those of the Modified LPA. There are not significant design differences related to stormwater conveyance and treatment between each design option and the Modified LPA.

6.3 Adverse Effects on Operation and Maintenance from Hazardous Materials

6.3.1 Legacy Hazardous Material Sites

Legacy sites are hazardous materials sites that are or should be undergoing long-term cleanup actions by the owner, where additional investigation and cleanup may be required but where the responsible party has not yet complied, or are “orphan” sites which are being managed by regulatory agencies. In special cases, site cleanup activities may coincide with the operation and maintenance of the No-Build Alternative or Modified LPA. These activities could potentially interfere with the long-term operation and maintenance of the project and result in financial liability or access restrictions.

6.3.1.1 No-Build Alternative

No legacy hazardous materials sites would be affected by the operation and maintenance of the No-Build Alternative. As such, the potential for adverse effects to the operation and maintenance of the No-Build Alternative is low compared to the Modified LPA.

6.3.1.2 Modified LPA

The Modified LPA has a potential for adverse effects from legacy sites during operation. Hazardous materials sites of particular concern within the study area include former marine operations along North Portland Harbor, the former Hayden Island Landfill (Thunderbird Hotel), as well as other former gas stations and industrial sites evaluated in Chapter 4. A number of these sites have not been fully characterized, and cleanup actions for them have not been determined. Potential legacy issues associated with potential acquisitions along Marine Drive include cleanup actions for soil and sediment along the North Portland Harbor embankment and/or for in-water sediments. Potential future remedial activities that could affect the operation and maintenance of the Modified LPA include soil removal, sediment dredging, and capping. In addition, other potential legacy sites could be discovered during project construction activities. ODOT and WSDOT, as owners of the sites, would comply with all applicable federal, state, and local requirements for managing and mitigating contamination.

6.3.1.3 Design Options

The long-term effects of the proposed design options related to legacy hazardous materials sites would not differ substantially from those of the Modified LPA. Additional legacy hazardous materials sites were not identified in the design options that differed from the Modified LPA, and no design option would avoid legacy hazardous materials sites identified in the Modified LPA.

7. INDIRECT EFFECTS

The Modified LPA could indirectly facilitate development and redevelopment of existing buildings and/or paved areas as opposed to development in natural areas in accordance with local land use plans. Local governments have adopted land use plans that support increased development densities in areas served by high-capacity transit, particularly in light-rail station areas. Redevelopment of properties in older urban areas, such as downtown Vancouver or Hayden Island, is more likely to encounter existing contamination. As a result, the Modified LPA, compared to the No-Build Alternative, has a somewhat greater potential for indirect adverse effects related to contaminated soils during construction. However, new development and redevelopment would be required to remediate known or discovered hazardous materials, including lead or ACM, in order to be in compliance with local land use plans; therefore, indirect land use changes resulting from the Modified LPA would be more likely to have long-term beneficial effects on hazardous materials than the No-Build Alternative.

Health effects have been documented from materials containing lead and asbestos. To the extent that land use changes involved the demolition, renovation, or repair of buildings and structures that have lead or ACM, proper abatement would be required. Although the risks are no greater for transit-oriented development than other residential and commercial construction, construction equipment can release fuels or vehicle fluids from spills. Other pollutants such as paints, acids for cleaning masonry, solvents, and concrete-curing compounds can be present at construction sites and have the potential to be released to the environment. These releases can migrate to soil, surface water, sediments, or groundwater. Developers would be required to comply with federal, state, and local requirements for managing hazardous materials and wastes, thereby minimizing the risks of releases to the environment.

8. PROPOSED MITIGATION MEASURES FOR THE MODIFIED LPA

8.1 Long-Term Effects

8.1.1 Regulatory Requirements

In accordance with FTA and FHWA standard procedures, the IBR Program has prepared Phase I ESAs to identify existing environmental issues on properties to be acquired. The results and recommendations of the Phase I ESAs have been incorporated into the Draft SEIS.

- Prepare Phase II ESAs for properties where identified RECs indicate that a subsurface investigation is necessary to confirm the nature and extent of contamination and define the specific measures and applicable regulatory agency approvals needed to address the contamination. Incorporate the Phase II ESA results into the Final SEIS and ROD to provide decision-makers with a more detailed understanding of cleanup obligations and associated costs.
- Develop detailed hazardous materials management plans during final design and as part of the property acquisition process. Obtain necessary regulatory approvals to address areas where cleanup and remediation are needed. The remediation or cleanup of hazardous material sites affected by the Modified LPA would be required prior to construction.
- In accordance with Safety Standards for Construction Work: Lead (WAC 296-155) and General Occupational Health Standards: Asbestos (WAC 296-62 Part I-1), conduct HBMSs on structures proposed for demolition prior to demolition to identify ACM, lead-based paint, and other hazardous materials. Based on the survey results, conduct necessary abatement prior to demolition. Dispose lead-based paint, ACM, and other hazardous materials at facilities permitted to receive these materials in accordance with federal, state, and local agency regulations.
- Prepare a Program-wide construction health and safety plan, as required by federal Occupational Safety and Health Act regulations and state regulations, to minimize the potential for exposure of construction workers to hazardous materials and the risk to human health and the environment.
- Prepare a site-specific contaminated media management plan to ensure proper characterization, management, storage, disposal, and reporting of contaminated materials encountered during construction activities. The plan would outline the roles and responsibilities of personnel; health and safety requirements; methods and procedures for characterizing, managing, storing, and disposing of waste; and reporting requirements.

8.1.2 Program-Specific Mitigation

No Program-specific mitigation measures are proposed for long-term effects related to hazardous materials.

8.2 Temporary Effects

8.2.1 Regulatory Requirements

To minimize temporary effects related to hazardous materials during construction, standard mitigation measures such as BMPs would be implemented. Construction BMPs applicable to the Modified LPA are discussed in the Water Quality and Hydrology Technical Report and adherence to the Program spill prevention, control, and countermeasure plan. Other required measures to reduce the risk of spills, leaks, or other releases during construction activities include:

- Conduct fueling, maintenance, and cleaning in areas that are contained berms or other containment.
- Minimize the production or generation of hazardous materials, both upland and during demolition and replacement of overwater spans.
- Label and store hazardous waste according to federal regulations.
- Locate hazardous waste (including contaminated spoils) storage away from storm drains or surface water.
- Recycle materials such as used motor oil and water-based paint as appropriate.
- Handle potential spills of hazardous materials in conformance with applicable regulatory requirements and adhere to the Program spill prevention, control, and countermeasure plan.

8.2.2 Program-Specific Mitigation

No Program-specific mitigation measures are proposed for temporary effects related to hazardous materials.

9. PERMITS AND APPROVALS

This section provides a summary of potential permits and approvals needed for the Modified LPA for hazardous materials. Permit and/or approvals may overlap between federal, state and local requirements.

9.1 Federal

Federal acts that may pertain to the approval process include:

- The Comprehensive Environmental Response, Compensation, and Liability Act of 1980. 42 USC 9601 et seq.
- The Superfund Amendments and Reauthorization Act of 1986. 42 USC 9601 et seq.
- The Resource Conservation and Recovery Act of 1976. 42 USC 6901 et seq.
- The Toxics Substance Control Act of 1976. 15 USC 2601 et seq.
- The Occupational Safety and Health Act of 1970. 29 USC 15 et seq.

In addition, EPA requires an NPDES permit for stormwater discharge.

9.2 State of Oregon

ORSs and OARs that may apply to the approval process include:

- Hazardous Waste and Hazardous Materials I and Hazardous Waste and Hazardous Materials II. ORS 465 and 466, as amended
- Underground Storage Tank Rules, OAR 340-150
- Asbestos Requirements, OAR 340-248
- Groundwater Quality Protection, OAR 340-040
- Construction and Use of Waste Disposal Wells, OAR 340-044
- Environmental Hazards Notice, OAR 340-130
- Hazardous Waste Management System, OAR 340-100 to 110, 120, 124, and 142
- Hazardous Substance Remedial Action Rules, OAR 340-122
- Water Resource Department, OAR 690-220

9.3 State of Washington

WACs that may apply to the approval process include:

- Underground Injection Program, WAC 173-218
- Water Well Construction, WAC 173-160, Chapter 18.104
- Model Toxics Control Act, WAC 173-340 and RCW 70.105D, as amended
- Underground Storage Tank Regulations, WAC 173.360
- Dangerous waste regulations, WAC 173–303

- Water Quality Standards for Groundwater, WAC 173-200
- Asbestos Removal and Encapsulation Standards, WAC 296-65
- Safety Standards for Construction Workers, WAC 296-155
- Southwest Clean Air Agency, Standards for Asbestos Control, Demolition, and Renovation, SWCAA 476

9.4 City of Portland

The City of Portland requires that all projects conduct permit applications following City of Portland Code (CPC) Title 24.10.070, Application for Permits.

The City of Portland requires that grading, cut, fill and stockpiling be conducted under CPC Title 24.10.109, Grading Permit Fees, and CPC Title 24.70, Clearing Grading and Erosion Control.

The City of Portland requires that erosion prevention and sediment control be conducted under CPC Title 10, Erosion and Sediment Control Regulations.

The City of Portland requires that stormwater be controlled under CPC Title 17.38, Drainage and Water Quality.

The City of Portland requires that groundwater resources be protected under CPC Title 21.35, Well Head Protection.

The City of Portland requires that the handling, storage, use and transportation of hazardous waste be conducted under CPC Title 21.35.

9.5 City of Vancouver

The City of Vancouver requires a pre-application conference for all projects subject to Vancouver Municipal Code (VMC) Chapter 20.210, Decision Making Procedures, unless waived by the planning office.

The City of Vancouver requires a permit for grading, cut, fill, and stockpiling under VMC Chapter 20.210., Decision Making Procedures.

The City of Vancouver requires that construction must conform to VMC Chapter 14.26.135, Water Resources Protection – Well Head Protection.

The City of Vancouver requires that construction must conform to VMC Chapter 20.740.120, Critical Areas Protection – Frequently Flooded Areas.

The City of Vancouver requires that erosion prevention and sediment control be conducted under (VMC) Chapter 14.24, Water and Sewers – Erosion Control.

The City of Vancouver requires that stormwater control be conducted under VMC Chapter 14.25, Water and Sewers – Stormwater Control.

The City of Vancouver requires that groundwater resources be protected under VMC Chapter 14.26, Water and Sewers – Water Resource Protection.

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