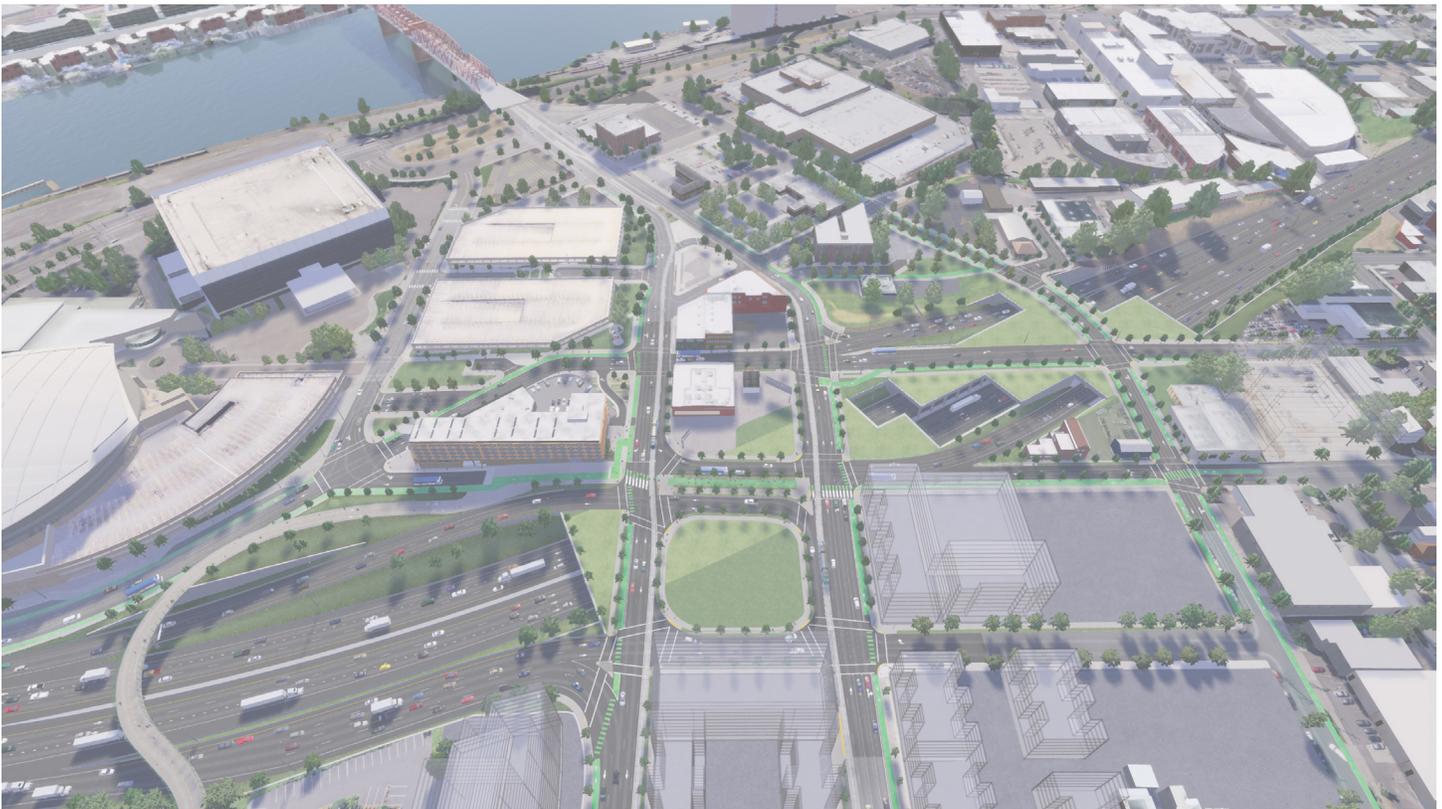




I-5 ROSE QUARTER IMPROVEMENT PROJECT

I-5 Rose Quarter Improvement Project Environmental Assessment



Federal Highway Administration
Oregon Department of Transportation

February 15, 2019



U.S. Department
of Transportation
**Federal Highway
Administration**



**Oregon
Department
of Transportation**

I-5 Rose Quarter Improvement Project

Multnomah County, Oregon

Key Number 19071

ENVIRONMENTAL ASSESSMENT

Submitted pursuant to 42 U.S.C. Section 4332(2)(C) and 49 U.S.C. Section 303

U. S. Department of Transportation, Federal Highway Administration

and

Oregon Department of Transportation

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Abstract: The Oregon Department of Transportation is proposing improvements to Interstate 5 (I-5) through the Rose Quarter district in downtown Portland. The proposed improvements would extend existing auxiliary lanes in the northbound and southbound directions to improve safety and operations on I-5 between Interstate 84 and Interstate 405. Improvements to local streets include two new highway covers to improve multimodal connections over I-5 and a new bicycle and pedestrian bridge over the highway at NE Clackamas Street. This Environmental Assessment (EA) evaluates the benefits and impacts of two alternatives: one in which the Project would move forward as planned (the Build Alternative), and one in which the Project would not be built (the No-Build Alternative). The EA provides the public, businesses, interest groups, and agencies at all levels of government an opportunity to understand the Project's benefits and impacts. The EA also provides transportation officials with information that will allow them to make informed decisions about the Project that balance engineering and transportation needs with social, economic, and natural environmental factors, such as noise, air quality, and traffic patterns.

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Appendix B.	Environmental Technical Reports
Appendix C.	Federal Aid Highway Programmatic Agreement for Endangered Species Act Section 7 Consultation (Signature in Progress; FAHP PA to be incorporated following signature)
Appendix D.	Section 106 Programmatic Agreement between FHWA, ODOT, and SHPO (Signature in Progress; PA to be incorporated following signature)
Appendix E.	Community Presentations and Events
Appendix F.	Summary of Mitigation Measures
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This Environmental Assessment and associated documents were prepared in compliance with Section 508 of the Rehabilitation Act of 1973. Additionally, an appendix containing detailed figure descriptions is provided for reference. Requests for descriptions or clarifications regarding items such as technical drawings or maps should be directed to the ODOT Senior Environmental Project Manager at (503) 731-4804.

¹ Appendix G includes written descriptions of all figures referenced in this Technical Report. If needed, additional figure interpretation is available from the ODOT Senior Environmental Project Manager at (503) 731-4804.

Acronyms and Abbreviations

ACBM	asbestos-containing building materials	NMFS	National Marine Fisheries Service
ACS	American Community Survey	NOx	oxides of nitrogen
ADA	Americans with Disabilities Act	NPDES	National Pollutant Discharge Elimination System
APE	Area of Potential Effect	NRHP	National Register of Historic Places
API	Area of Potential Impact	ODOT	Oregon Department of Transportation
BES	City of Portland Bureau of Environmental Services	OHWM	Ordinary High Water Mark
BMP	best management practices	ORS	Oregon Revised Statute
CFR	Code of Federal Regulations	PA	Programmatic Agreement
CH4	methane	PBO	Programmatic Biological Opinion
CO	carbon monoxide	PCB	polychlorinated biphenyl
CO2	carbon dioxide	PM10	particulate matter less than or equal to 10 micrometers in diameter
CO2e	carbon dioxide equivalent emissions	PM2.5	particulate matter less than or equal to 2.5 micrometers in diameter
dBA	A-weighted decibel	ROW	right of way
DBE	Disadvantaged Business Enterprise	RTP	Regional Transportation Plan
DEQ	Oregon Department of Environmental Quality	SAC	Stakeholder Advisory Committee
DPM	diesel particulate matter	SB	southbound
EA	Environmental Assessment	SHPO	State Historic Preservation Office
EB	eastbound	SO2	sulfur dioxide
EJ	Environmental Justice	sq. ft.	square feet
ESA	Endangered Species Act	TMDL	total maximum daily load
FAHP	Federal-Aid Highway Program	TMOS	transportation management and operation strategies
FEMA	Federal Emergency Management Agency	TNM	Traffic Noise Model
FHWA	Federal Highway Administration	TSM	Transportation System Management
GHG	greenhouse gas	TSP	Transportation System Plan
I-405	Interstate 405	TDM	Transportation Demand Management
I-5	Interstate 5	USACE	United States Army Corps of Engineers
I-84	Interstate 84	U.S.C.	United States Code
LBP	lead-based paint	USCG	United States Coast Guard
Leq	hourly equivalent sound pressure level	URA	Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970
MSA	Portland-Vancouver-Hillsboro Metropolitan Statistical Area	VOC	volatile organic compound
MSAT	mobile source air toxics	WB	westbound
MT	million tons		
N2O	nitrous oxide		
NAAC	Noise Abatement Approach Criteria		
NAAQS	National Ambient Air Quality Standard(s)		
NB	northbound		
NEPA	National Environmental Policy Act of 1969		
NHPA	National Historic Preservation Act of 1966		

1 Introduction

The I-5 Rose Quarter Improvement Project (Project) would create a safer and more reliable Interstate 5 (I-5) with enhanced multimodal facilities and improved bicyclist/pedestrian safety in the vicinity of the Broadway/Weidler interchange in Portland, Oregon. The segment of I-5 between Interstate 405 (I-405) and Interstate 84 (I-84) experiences some of the highest vehicle crash rates in Oregon. The Broadway/Weidler interchange and the surrounding area is characterized by frequent traffic congestion and numerous pedestrian and bicyclist injuries. To address these issues, the City of Portland and the Oregon Department of Transportation (ODOT) engaged in a collaborative multi-year transportation/urban planning process to develop a design concept for the I-5 Broadway/Weidler interchange that would complement the land use, urban design, and transportation system envisioned for the planning districts of Lower Albina and Lloyd in the City's Adopted Central City 2035 Plan.

A key element of the Central City 2035 Plan was the acknowledgment of the role the construction of I-5 and other past public infrastructure projects had in fragmenting the community of Lower Albina and the resulting displacement of large numbers of its predominantly Black population. For example, as stated in the N/NE Quadrant Plan: "The goals, policies and actions included in the N/NE Quadrant Plan are in many ways intended to help repair a neighborhood that has been done substantial harm by large public projects of the past." The design concept for the Project includes transit, bicycle, and pedestrian facility enhancements and surface street improvements in and around the Broadway/Weidler interchange.

These improvements reflect a commitment on the part of ODOT and the City of Portland to restore connectivity between the neighborhoods of Lower Albina and Lloyd that were harmed by actions of the past.

This Environmental Assessment (EA) is organized into four major sections:

- Chapter 1 introduces the Project and includes details on the Project location and the transportation needs the Project has been designed to address as well as a summary of the transportation and urban design goals that have influenced the Project design.
- Chapter 2 presents the two alternatives being analyzed in the EA (the No-Build Alternative and the Build Alternative) and includes a detailed description of the improvements along I-5 and on City surface streets in and around the Broadway/Weidler interchange (including improvements for transit, bicyclists, and pedestrians) that would be realized with construction of the Build Alternative.
- Chapter 3 describes the potential environmental impacts and potential benefits that could occur under the No-Build and Build Alternatives along with a variety of measures that ODOT and the City could implement to address those adverse impacts.
- Chapter 4 summarizes the activities that ODOT and the City have undertaken to engage the public in the decision-making process and the environmental review.

Additional sections detail anticipated permits and approvals, technical specialists involved in the preparation of this assessment, and references.

The I-5 Rose Quarter Improvement Project would create a safer and more reliable I-5 with enhanced multimodal facilities and improved safety for people who walk and ride bicycles in the vicinity of the Broadway/Weidler interchange in Portland, Oregon.

1.1 Project Location

The Project would be located along the 1.7-mile segment of I-5 between I-405 to the north (milepost 303.2) and I 84 to the south (milepost 301.5). The Project Area includes the interchange of I-5 and N Broadway and NE Weidler Street (Broadway/Weidler interchange) and the surrounding transportation network, from approximately N/NE Hancock Street to the north, N Benton Avenue to the west, N/NE Multnomah Street to the south, and NE 2nd Avenue to the east.

Figure 1-1 illustrates the Project Area in which the proposed improvements would be located. The Project Area represents the estimated area within which improvements are proposed, including where permanent modifications to adjacent parcels may occur and where potential temporary impacts from construction activities could result.

1.2 Project Purpose

The purpose of the Project is to improve the safety and operations on I-5 between I-405 and I-84, of the Broadway/Weidler interchange, and on adjacent surface streets in the vicinity of the Broadway/Weidler interchange and to enhance multimodal facilities in the Project Area.

In achieving the purpose, the Project also would support improved local connectivity and multimodal access in the vicinity of the Broadway/Weidler interchange and improve multimodal connections between neighborhoods located east and west of I-5.

The purpose of the Project is to improve safety and operations on I-5 and the local network, and to enhance multimodal facilities in the Project Area.

1.3 Project Need

The Project would address the following primary needs:

I-5 Safety: I-5 between I-405 and I-84 has the highest crash rate on urban interstates in the State of Oregon. Crash data from 2011 to 2015 indicate that I-5 between I-84 and the merge point from the NE Broadway ramp on to I-5 had a crash rate (for all types of crashes¹) that was approximately 3.5 times higher than the statewide average for comparable urban interstate facilities (ODOT 2015). Between 2011 and 2015, there were 881 crashes on the highway and ramps in the Project Area. Most of the crashes were in the southbound (SB) direction, most frequently between 11:00 AM and 6:00 PM. Between 2011 and 2015, there were 268 crashes on the local street network in the Project Area.

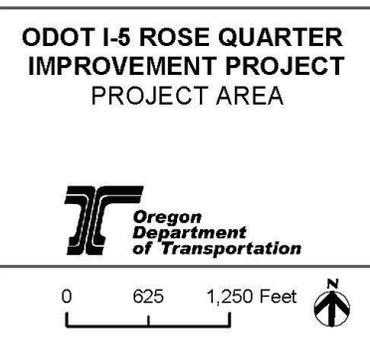
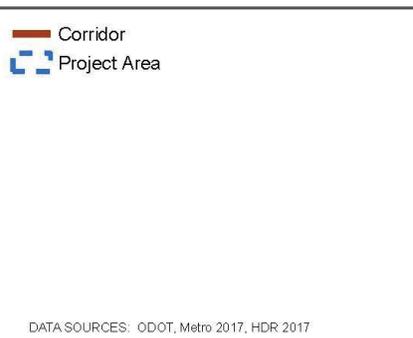
I-5 Operations: The Project Area is at the crossroads of three regionally important freight and commuter routes: I-5, I-84, and I-405. As a result, I-5 in the vicinity of the Broadway/Weidler interchange experiences some of the highest traffic volumes in the State of Oregon, carrying approximately 121,400 vehicles each day (ODOT 2017), and experiences 12 hours of congestion each day (ODOT 2012a).

Broadway/Weidler Interchange Operations: The complexity and congestion at the I-5 Broadway/Weidler interchange configuration is difficult to navigate for vehicles (including transit vehicles), bicyclists, and pedestrians, which impacts access to and from I-5 as well as to and from local streets. The high volumes of traffic on I-5 and

The Project would address the following needs: I-5 Safety and Operations, Broadway/Weidler Interchange Operations, and Travel Reliability.

¹ Motor vehicle crashes are reported and classified by whether they involve property damage, injury, or death.

Figure 1-1. Project Area



Broadway/Weidler in this area contribute to congestion and safety issues (for all modes) at the interchange ramps, the Broadway and Weidler overcrossings of I-5, and on local streets in the vicinity of the interchange.

Travel Reliability: Travel reliability on the transportation network decreases as congestion increases and safety issues expand. The most unreliable travel times tend to occur in congested areas and at the beginning and end of the peak periods. Due to these problems, reliability has decreased on I-5 between I-84 and I-405 for most of the day. Periods of congested conditions on I-5 in the Project Area have grown over time from morning and afternoon peak periods to longer periods throughout the day.

1.4 Project Goals

In addition to the Purpose and Need, which focus on the state's transportation system, the Project includes related goals developed through the joint ODOT and City of Portland N/NE Quadrant and I-5 Broadway/Weidler Interchange Plan process, which included extensive coordination with other public agencies and citizen outreach. Goals may be carried forward beyond the National Environmental Policy Act (NEPA) process to help guide final design and construction of the Project. Project goals are as follows:

- Enhance pedestrian and bicycle safety and mobility in the vicinity of the Broadway/Weidler interchange.
- Address congestion and improve safety for all modes on the transportation network connected to the Broadway/Weidler interchange and I-5 crossings.
- Support and integrate the land use and urban design elements of the Adopted N/NE Quadrant Plan (City of Portland et al. 2012) related to I-5 and the Broadway/Weidler interchange, which include the following:
 - Diverse mix of commercial, cultural, entertainment, industrial, recreational, and residential uses, including affordable housing
 - Infrastructure that supports economic development
 - Infrastructure for healthy, safe, and vibrant communities that respects and complements adjacent neighborhoods
 - A multimodal transportation system that addresses present and future needs, both locally and on the highway system
 - An improved local circulation system for safe access for all modes
 - Equitable access to community amenities and economic opportunities
 - Protected and enhanced cultural heritage of the area
 - Improved urban design conditions
- Improve freight reliability.
- Provide multimodal transportation facilities to support planned development in the Rose Quarter, Lower Albina, and Lloyd.
- Improve connectivity across I-5 for all modes.

The Project would also support current and future land use and urban design, and improve neighborhood connectivity.

2 Project Alternatives

This section describes the two alternatives being evaluated in detail in this EA, the No-Build Alternative and the Build Alternative, as well as the alternatives that were considered but not advanced for detailed analysis in this EA.

2.1 No-Build Alternative

NEPA regulations require an evaluation of the No-Build Alternative to provide a baseline for comparison with the potential impacts of the Build Alternative. The No-Build Alternative consists of existing conditions and any planned actions with committed funding in the Project Area (see Oregon Metro 2014 Regional Transportation Plan [RTP] financially constrained project list¹). As described in the City of Portland's Broadway/Weidler Corridor Plan, I-5 is the primary north-south highway serving the West Coast of the United States from Mexico to Canada. At the northern portion of the Project Area, I-5 connects with I-405 and the Fremont Bridge; I-405 provides the downtown highway loop on the western edge of downtown Portland. At the southern end of the Project Area, I-5 connects with the western terminus of I-84, which is the primary east-west highway for the State of Oregon. Because the Project Area includes a crossroads of three regionally important freight and commuter routes, the highway interchanges within the Project Area experience some of the highest traffic volumes found in the state (approximately 121,400 average annual daily trips). The existing lane configurations consist primarily of two through lanes (NB and SB) with one auxiliary lane between interchanges. I-5 SB between I-405 and Broadway includes two auxiliary lanes.

I-5 is part of the National Truck Network, which designates highways (including most of the Interstate Highway System) for use by large trucks. In the Portland-Vancouver area, I-5 is the most critical component of this national network because it provides access to the transcontinental rail system, deep-water shipping and barge traffic on the Columbia River, and connections to the ports of Vancouver and Portland, as well as to most of the area's freight consolidation facilities and distribution terminals. Congestion on I-5 throughout the Project Area delays the movement of freight both within the Portland metropolitan area and on the I-5 corridor. I-5 through the Rose Quarter is ranked as one of the 50 worst freight bottlenecks in the United States (ATRI 2017).

Within the approximately 1.5 miles that I-5 runs through the Project Area, I-5 NB connects with five on- and off-ramps, and I-5 SB connects with six on- and off-ramps. Drivers entering and exiting I-5 at these closely spaced intervals, coupled with high traffic volumes, slow traffic and increase the potential for crashes. Table 2-1 presents the I-5 on- and off-ramps in the Project Area.

¹ Metro Regional Transportation Plan ID 11646. Available at: https://www.oregonmetro.gov/sites/default/files/Appendix%201.1%20Final%202014%20RTP%20%20Project%20List%208.5x11%20for%20webpage_1.xls

Table 2-1. I-5 Ramps in the Project Area

I-5 Travel Direction	On-Ramps From	Off-Ramps To
Northbound	<ul style="list-style-type: none"> I-84 NE Broadway/N Williams Avenue 	<ul style="list-style-type: none"> NE Weidler Street/N Victoria Avenue I-405 N Greeley Avenue
Southbound	<ul style="list-style-type: none"> N Greeley Avenue I-405 NE Wheeler Avenue/N Ramsey Way 	<ul style="list-style-type: none"> NE Broadway/N Vancouver Ave I-84 Morrison Bridge/Highway 99E

Table 2-2 shows distances of the weaving areas between the on- and off-ramps on I-5 in the Project Area. Each of the distances noted for these weave transitions is less than adequate per current highway design standards (ODOT 2012b). In the shortest weave section, only 1,075 feet is available for drivers to merge onto I-5 from NE Broadway NB in the same area where drivers are exiting from I-5 onto I-405 and the Fremont Bridge.

Table 2-2. Weave Distances within the Project Area

I-5 Travel Direction	Weave Section	Weave Distance
Northbound	I-84 to NE Weidler Street/NE Victoria Avenue	1,360 feet
	N Broadway/N Williams Avenue to I-405	1,075 feet
Southbound	I-405 to N Broadway	2,060 feet
	N Wheeler Avenue/N Ramsay Way to I-84	1,300 feet

As described in Section 1.3, the high volumes, closely spaced interchanges, and weaving movements result in operational and safety issues, which are compounded by the lack of standard highway shoulders on I-5 throughout much of the Project Area.

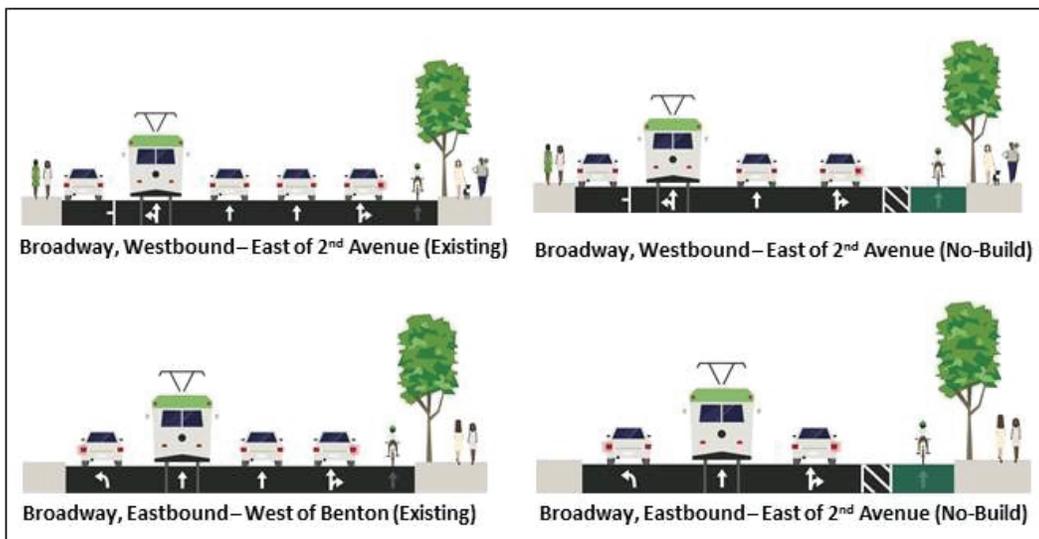
Under the No-Build Alternative, I-5 and the Broadway/Weidler interchange and most of the local transportation network in the Project Area would remain in its current configuration, with the exception of those actions included in the Metro 2014 RTP financially constrained project list (Metro 2014). Generally, future traffic conditions under the No-Build Alternative would continue to deteriorate through 2045, resulting in increased congestion. Under the No-Build Alternative, the growing traffic demand on I-5 creates more severely congested travel conditions, heavier weaving density, and potentially worse peak spreading. This congestion would extend beyond the Project Area. The No-Build Alternative would also result in less overall travel time reliability, longer travel times, traffic diversion to other routes, and potential shifts to other modes compared to existing conditions. It is estimated that there would be approximately 10 percent more highway crashes under the No-Build Alternative as compared to existing conditions (ODOT 2019a).

As described in the City of Portland’s Broadway/Weidler Corridor Plan update, one action includes improvements to the local street network on the Broadway/Weidler corridor within the Project Area. The proposed improvements include changes to N/NE Broadway and N/NE Weidler from the Broadway Bridge to NE 7th Avenue. The current design concept would remove and reallocate one travel lane on both N/NE Broadway and N/NE Weidler to establish protected bike lanes and reduce pedestrian crossing distances (Figure 2-1). Proposed improvements also include changes to turn lanes and transitions to minimize pedestrian exposure and improve safety. The improvements are expected to enhance safety for people walking, bicycling, and driving through the Project Area. Implementation is expected in 2018-2027.

The Broadway multimodal improvements project, an independent City of Portland project, would improve pedestrian safety in the Broadway/Weidler couplet by addressing several curb deficiencies and would provide greater separation between users but could introduce increased potential of right-hook collision potential for bicyclists where the protected bike lane would be added. Outside of the Broadway/Weidler couplet, pedestrian and bicycle safety would generally be the same as existing conditions.

The level of service and travel delay per vehicle and volume-to-capacity ratios on the local street system is expected to worsen with the No-Build Alternative at most key intersections and locations analyzed for traffic conditions. Worsening conditions are expected to occur during both the morning and afternoon peak periods.

Figure 2-1. Local Street Network Improvements: (A) N/NE Broadway Westbound, East of NE 2nd; (B) N/NE Broadway Eastbound, West of N Benton



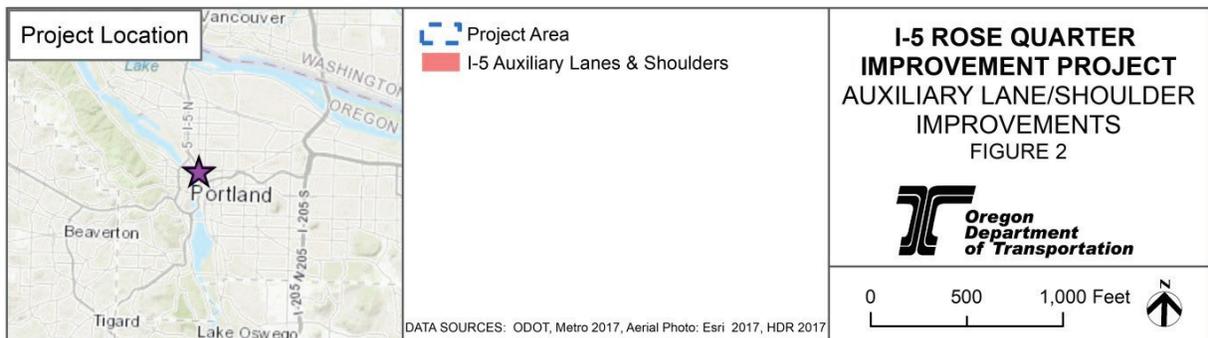
2.2 Build Alternative

The Build Alternative includes I-5 mainline improvements and multimodal improvements to the surface street network in the vicinity of the Broadway/Weidler interchange.

The proposed I-5 mainline improvements include the construction of auxiliary lanes (also referred to as ramp-to-ramp lanes) and full shoulders between I-84 to the south and I-405 to the north, in both the NB and SB directions. See Section 2.2.1 for more detail.

The Build Alternative would add auxiliary lanes and full shoulders on I-5 between I-84 and I-405 (in both the NB and SB directions) and multimodal improvements to the surface street network in the vicinity of the Broadway/Weidler interchange.

Figure 2-2. Auxiliary Lane/Shoulder Improvements



Construction of the I-5 mainline improvements would require the rebuilding of the N/NE Weidler, N/NE Broadway, N Williams, and N Vancouver structures over I-5. With the Build Alternative, the existing N/NE Weidler, N/NE Broadway, and N Williams overcrossings would be removed and rebuilt as a single highway cover structure over I-5 (see Section 2.2.2). The existing N Vancouver structure would be removed and rebuilt as a second highway cover, including a new roadway crossing at N Hancock and N Dixon Streets.

The existing N Flint Avenue structure over I-5 would be removed. The I-5 SB on-ramp at N Wheeler would also be relocated to N/NE Weidler at N Williams, via the new Weidler/Broadway/Williams highway cover. A new bicycle and pedestrian bridge over I-5 would be constructed at NE Clackamas Street, connecting Lloyd with the Rose Quarter (see Section 2.2.4.3).

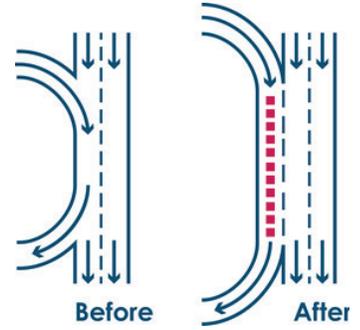
Surface street improvements are also proposed, including upgrades to existing bicycle and pedestrian facilities and a new center-median bicycle and pedestrian path on N Williams between N/NE Weidler and N/NE Broadway (see Section 2.2.4.4).

2.2.1 I-5 Mainline Improvements

The Build Alternative would modify I-5 between I-84 and I-405 by adding safety and operational improvements. The Build Alternative would extend the existing auxiliary lanes approximately 4,300 feet in both NB and SB directions and add 12-foot shoulders (both inside and outside) in both directions in the areas where the auxiliary lane would be extended.

Figure 2-2 illustrates the location of the proposed auxiliary lanes. Figure 2-3 illustrates the auxiliary lane configuration, showing the proposed improvements in relation to the existing conditions. Figure 2-4 provides a cross section comparison of existing and proposed conditions including the location of through lanes, auxiliary lanes, and highway shoulders.

A new NB auxiliary lane would be added to connect the I-84 westbound (WB) on-ramp to the N Greeley Avenue off-ramp. The existing auxiliary lane on I-5 NB from the I-84 WB on-ramp to the NE Weidler off-ramp and from the N Broadway on-ramp to the I-405 off-ramp would remain.



What are Ramp-to-Ramp or Auxiliary Lanes?

Ramp-to-Ramp lanes provide a direct connection from one ramp to the next. They separate on-and-off-ramp merging from through traffic, and create better balance and smoother maneuverability, which improves safety and reduces congestion.

Figure 2-3. I-5 Auxiliary (Ramp-to-Ramp) Lanes - Existing Conditions and Proposed Improvements

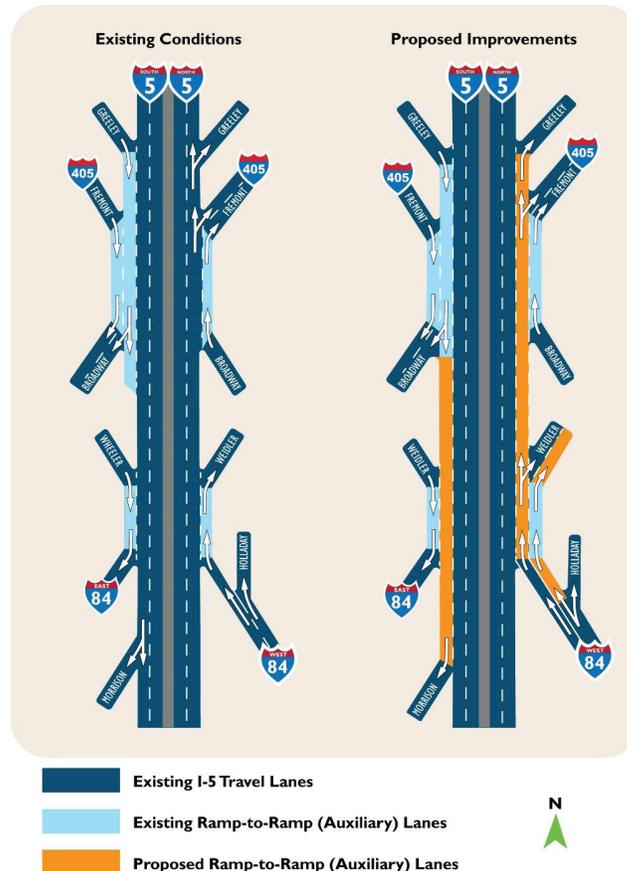
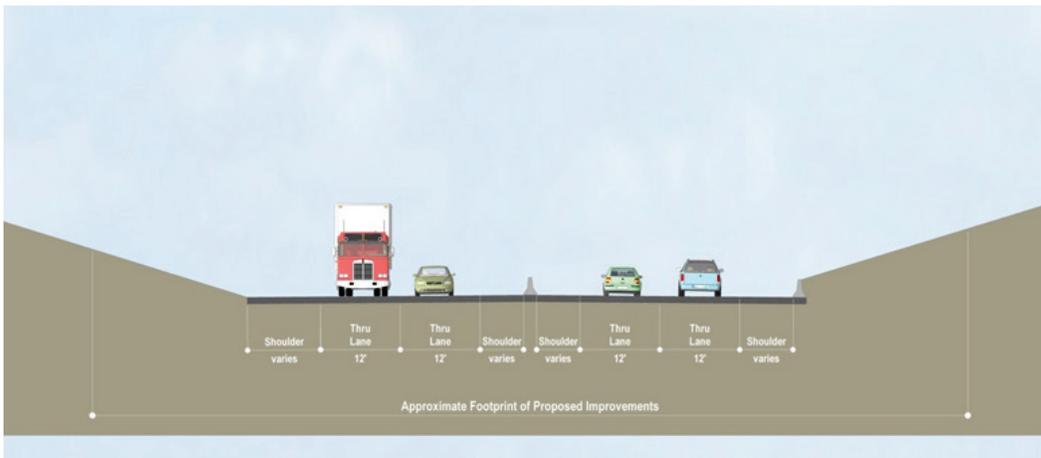
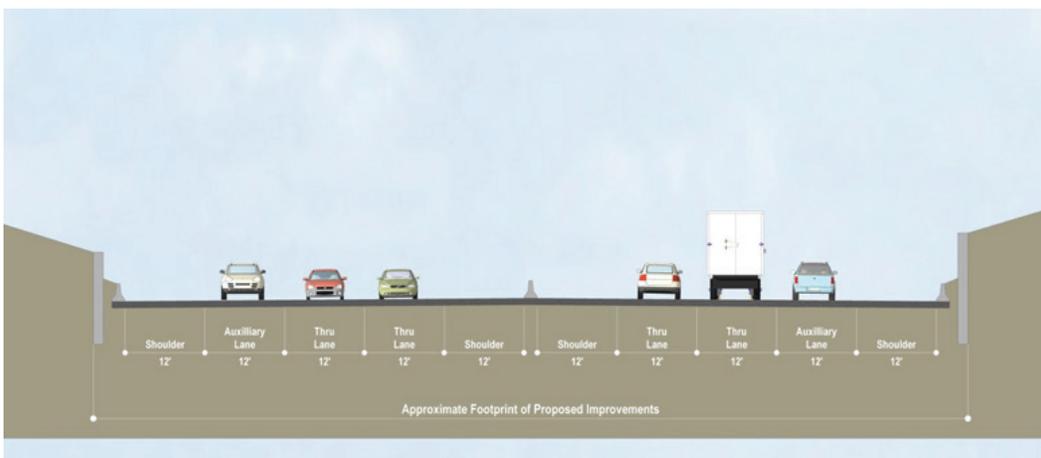


Figure 2-4. I-5 Cross-Section (N/NE Weidler Street Overcrossing) – Existing Conditions and Proposed Improvements



Existing Lane Configuration



Proposed Lane Configuration

The new SB auxiliary lane would extend the existing auxiliary lane that enters I-5 SB from the N Greeley on-ramp. The existing SB auxiliary lane currently ends just south of the N Broadway off-ramp, in the vicinity of the Broadway overcrossing structure.

Under the Build Alternative, the SB auxiliary lane would be extended as a continuous auxiliary lane from N Greeley to the Morrison Bridge and the SE Portland/Oregon Museum of Science and Industry off-ramp. Figure 2-4 presents a representative cross section of I-5 (south of the N/NE Weidler overcrossing within the Broadway/Weidler interchange area), with the proposed auxiliary lanes and shoulder, to provide a comparison with the existing cross section.

The addition of 12-foot shoulders (both inside and outside) in both directions in the areas where the auxiliary lanes would be extended would provide more space to allow vehicles that are stalled or involved in a crash to move out of the travel lanes. New shoulders would also provide space for emergency response vehicles to use to access an incident within or beyond the Project Area.

No new through lanes would be added to I-5 as part of the Build Alternative; I-5 would maintain the existing two through lanes in both the NB and SB directions.

2.2.2 Highway Covers

2.2.2.1 Broadway/Weidler/Williams Highway Cover

To complete the proposed I-5 mainline improvements, the existing structures crossing over I-5 must be removed, including the roads and the columns that support the structures. The Build Alternative would remove the existing N/NE Broadway, N/NE Weidler, and N Williams structures over I-5 to accommodate the auxiliary lane extension and new shoulders described in Section 2.2.1.

The structure replacement would be in the form of the Broadway/ Weidler/Williams highway cover (Figure 2-5). The highway cover would be a wide bridge that spans east-west across I-5, extending from immediately south of N/NE Weidler to immediately north of N/NE Broadway to accommodate passage of the Broadway/ Weidler couplet. The highway cover would include design upgrades to make the structure more resilient in the event of an earthquake.

Highway covers would connect both sides of I-5, reducing the physical barrier of I-5 between neighborhoods to the east and west of the highway while providing additional surface area above I-5.

Figure 2-5. Broadway/Weidler/Williams and Vancouver/Hancock Highway Covers (Existing and Build Alternative)



The highway cover would connect both sides of I-5, reducing the physical barrier of I-5 between neighborhoods to the east and west of the highway while providing additional surface area above I-5. The added surface space would provide an opportunity for new and modern bicycle and pedestrian facilities and public spaces when construction is complete, making the area more connected, walkable, and bike friendly.

2.2.2.2 N Vancouver/N Hancock Highway Cover

The Build Alternative would remove and rebuild the existing N Vancouver structure over I-5 as a highway cover (Figure 2-5). The Vancouver/Hancock highway cover would be a concrete or steel platform that spans east-west across I-5 and to the north and south of N/NE Hancock. Similar to the Broadway/Weidler/Williams highway cover, this highway cover would provide additional surface area above I-5. The highway cover would provide an opportunity for public space and a new connection across I-5 for all modes of travel. A new roadway connecting neighborhoods to the east with the Lower Albina area and connecting N/NE Hancock to N Dixon Streets would be added to the Vancouver/Hancock highway cover (see element "A" in Figure 2-6).

2.2.3 Broadway/Weidler Interchange Improvements

Improvements to the Broadway/Weidler interchange to address connections between I-5, the interchange, and the local street network are described in the following subsections and illustrated in Figure 2-6.

2.2.3.1 Relocate I-5 Southbound On-Ramp

The I-5 SB on-ramp is currently one block south of N Weidler near where N Wheeler, N Williams, and N Ramsay Way come together at the north end of the Moda Center. The Build Alternative would remove the N Wheeler on-ramp and relocate the I-5 SB on-ramp north to N Weidler. Figure 2-6 element "B" illustrates the on-ramp relocation.

2.2.3.2 Modify N Williams between Ramsay and Weidler

The Build Alternative would modify the travel circulation on N Williams between N Ramsay and N Weidler. This one-block segment of N Williams would be closed to through-travel for private motor vehicles and would only be permitted for pedestrians, bicycles, and public transit (buses) (Figures 2-6 and 2-8). Private motor vehicle and loading access to the facilities at Madrona Studios would be maintained.

2.2.3.3 Revise Traffic Flow on N Williams between Weidler and Broadway

The Build Alternative would revise the traffic flow on N Williams between N/NE Weidler and N/NE Broadway. For this one-block segment, N Williams would be converted from its current configuration as a two-lane, one-way street in the NB direction with a center NB bike lane to a reverse traffic flow two-way street with a 36-foot-wide median multi-use path for bicycles and pedestrians. Development of a new 36-foot-wide multi-use path on N Williams between Broadway and NE Weidler would allow movement of people walking, biking, and rolling in both directions and would be physically separated from motor vehicle travel lanes. These improvements are illustrated in Figure 2-6 (element "D"), Figure 2-7, and Figure 2-8.

The proposed configuration would provide WB Broadway left-turning traffic a

Figure 2-6. Broadway/Weidler Interchange Area Improvements



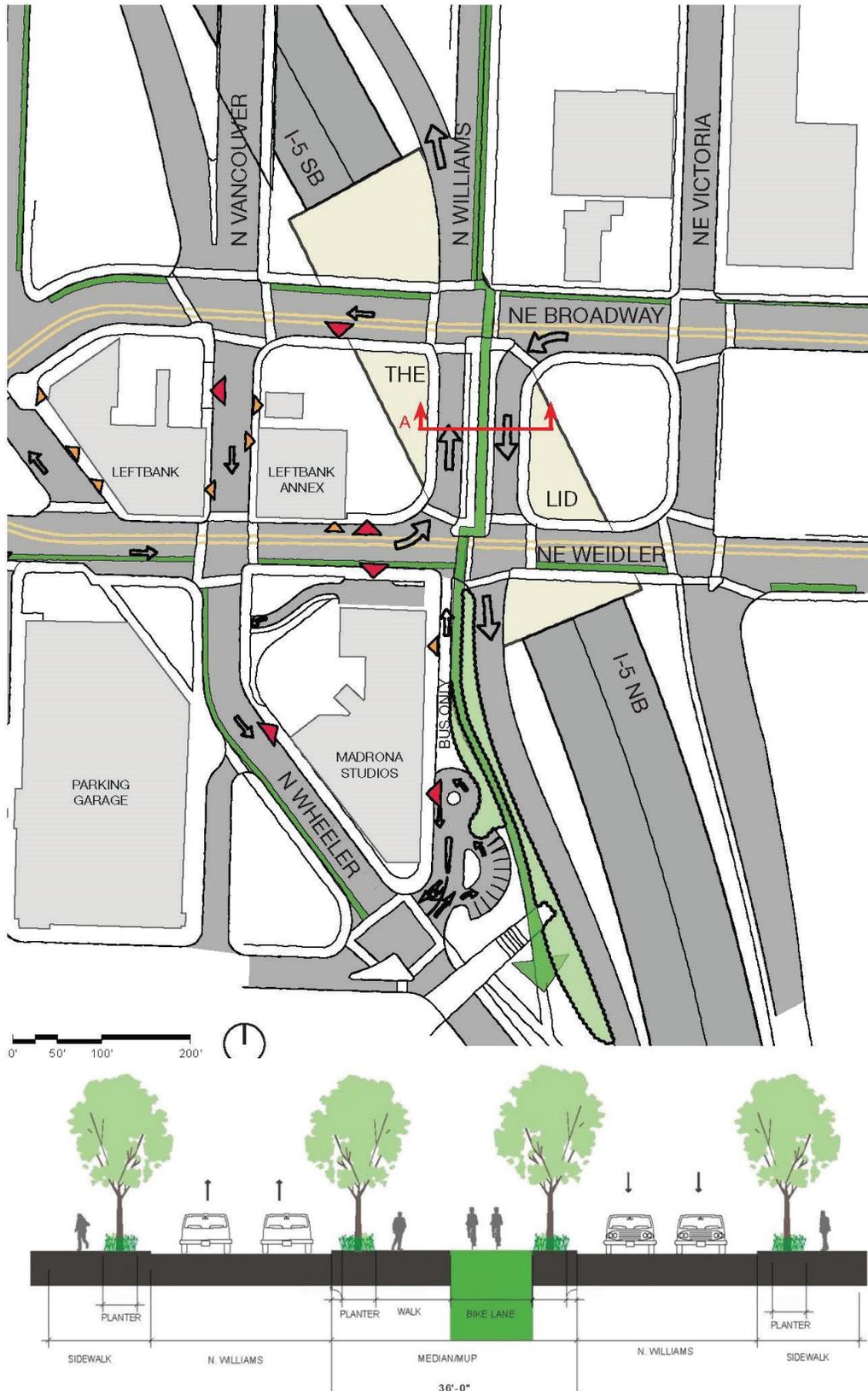
Figure 2-7. Conceptual Illustration of Proposed N Williams Multi-Use Path and Revised Traffic Flow (Existing and Build Alternative)



direct access to the realigned SB on-ramp without going through the signalized intersections on N Vancouver. Under the existing configuration, the SB on-ramp-destined traffic from NE Broadway must travel further on NE Broadway, turn left to N Vancouver, and then travel further SB through on N Vancouver across NE Weidler and N Ramsay to the on-ramp to I-5 south. This current circuitous route through congested local streets would be eliminated in the reverse traffic flow configuration, substantially facilitating operation in the local intersection area. At the NE Broadway and N Vancouver intersection, the proposed reverse flow releases traffic pressure of serving both the I-5 SB off-ramp traffic and on-ramp traffic, resulting in improved intersection operation.

Conflicting zones created because of the reversed flow are resolved under signal control and yield signing. At the NE Broadway/N Williams intersection, the WB left-turn traffic would yield to pedestrians on the south crosswalk. Bicycles WB on NE Broadway crossing Williams would have their own protected signal phase. At the NE Weidler/N Williams intersection, the EB through and right-turn movements would not move concurrently with the SB reversed flow. Bicycles eastbound on NE Weidler

Figure 2-8. Proposed Modifications to N Williams Between Broadway and Weidler



crossing Williams and NB crossing NE Weidler would have their own protected signal phase.

The revised N Williams configuration would be designed as follows:

- Two NB travel lanes along the western side of N Williams to provide access to the I-5 NB on-ramp, through movements NB on N Williams, and left-turn movements onto N Broadway.
- A 36-foot-wide center median with a multi-use path permitted only for bicycles and pedestrians. The median multi-use path also would include landscaping on both the east and west sides of the path.
- Two SB lanes along the eastern side of N Williams to provide access to the I-5 SB on-ramp or left-turn movements onto NE Weidler.

2.2.4 Related Local System Multimodal Improvements

Primary pedestrian and bicycle routes would continue to follow relatively direct paths through the Project Area. Increased route options would be provided by the new Hancock-Dixon crossing, the Clackamas bicycle and pedestrian bridge, a bi-directional protected bike lane on N/NE Broadway and N/NE Weidler, and improved bicycle and pedestrian facilities on N Vancouver and Broadway.

2.2.4.1 New Hancock–Dixon Connection

A new roadway crossing would be constructed to extend N/NE Hancock west across and over I-5, connecting it to N Dixon (see Figure 2–6, element “E”). The new crossing would be constructed on the Vancouver/Hancock highway cover and would provide a new east–west crossing over I-5. Traffic calming measures would be incorporated east of the intersection of N/NE Hancock and N Williams to discourage use of NE Hancock by through motor vehicle traffic. Bicycle and pedestrian through travel would be permitted (see Figure 2–6, element “F”). Figure 2–8 illustrates the proposed cross–section for the Hancock–Dixon connection and the associated multi–use path. The new crossing would create improved connectivity between Lower Albina, Lloyd, and the N/NE neighborhoods, provide greater east-west multimodal access across I-5, and provide multimodal route alternatives to the congested Broadway/Weidler corridor. Given the existing topography and need to maintain clearances over I-5, the western-most portion of the Hancock-Dixon crossing would have a grade of approximately 9 percent. A new multi-use path with a lower grade would be added to provide an accessible route, described in Section 2.2.4.2 below.

2.2.4.2 Removal of N Flint South of N Tillamook and Addition of New Multi–Use Path

The existing N Flint structure over I-5 would be removed, and N Flint south of N Russell Street would terminate at and connect directly to N Tillamook Street (see Figure 2–6, element “G”). The portion of Flint between the existing I-5 overcrossing and Broadway would be closed as a through street for motor vehicles. Driveway access would be maintained on this portion of N Flint to maintain local access. The removal of N Flint would eliminate the high volume of cut-through auto and freight traffic that currently use N Flint to access the Broadway Bridge or to avoid the Broadway/Weidler interchange.

A new multi–use path would be added between the new Hancock–Dixon connection and Broadway at a grade of 5 percent or less to provide an additional travel route

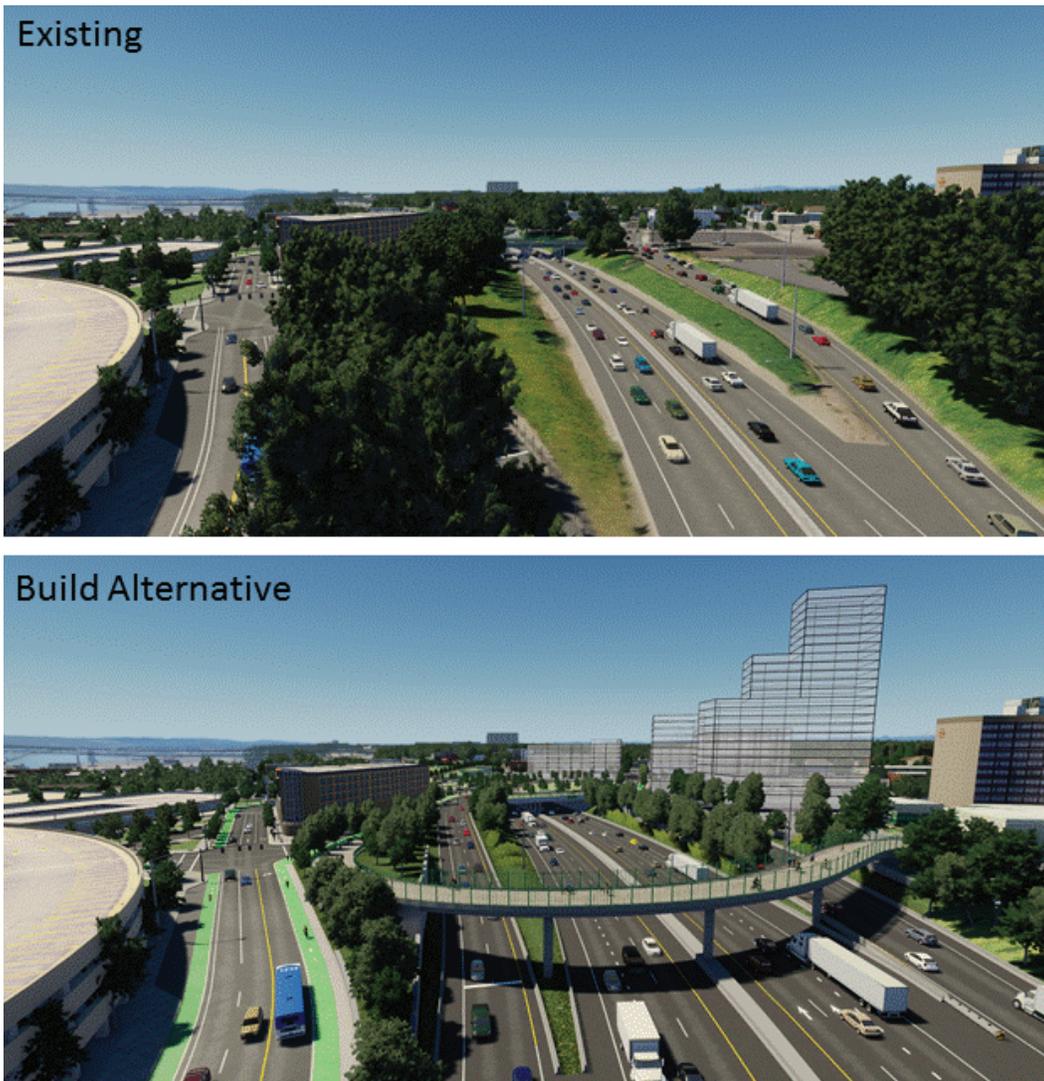
Additional travel route options for people walking and biking would include: a new crossing to extend N/NE Hancock west across I-5, a new multi-use path between the new Hancock-Dixon connection and Broadway, and a new pedestrian- and bicycle-only bridge over I-5 to connect NE Clackamas Street near NE 2nd Avenue to the N Williams/N Ramsay area.

option for people walking and biking. The Hancock-Dixon crossing would include a new bicycle and pedestrian path between the new road and Broadway at a grade of 5 percent or less to provide an accessible route option for people walking and biking. This route would provide an option to the approximately 9 percent grade required for safe operation of a portion of the new Hancock-Dixon crossing. The new multi-use path would follow the configuration of the existing N Flint alignment between N Hancock and N Broadway (see Figure 2-6, element "G").

2.2.4.3 Clackamas Bicycle and Pedestrian Bridge

South of N/NE Weidler, a new pedestrian- and bicycle-only bridge over I-5 would be constructed to connect NE Clackamas Street near NE 2nd Avenue to the N Williams/N Ramsay area (see Figure 2-6, element "H" and Figure 2-9). The Clackamas bicycle and pedestrian bridge would provide a new, lower-stress, physically separated connection over I-5, would offer an alternative route for people walking or riding a bike through the Broadway/Weidler interchange, and would provide a direct link between Lloyd and the Rose Quarter.

Figure 2-9. Proposed Clackamas Bicycle and Pedestrian Crossing (Existing and Build Alternative)



2.2.4.4 Other Local Street, Bicycle, and Pedestrian Improvements

The Build Alternative would include new widened and well-lit sidewalks, Americans with Disabilities Act (ADA)-accessible ramps, high visibility and marked crosswalks, widened and improved bicycle facilities, and stormwater management on the streets connected to the Broadway/Weidler interchange.²

A new two-way cycle track would be implemented on N Williams between N/NE Hancock and N/NE Broadway. A two-way cycle track would allow bicycle movement in both directions and would be physically separated from motor vehicle travel lanes and sidewalks. This two-way cycle track would connect to the median multi-use path on N Williams between N/NE Broadway and N/NE Weidler.

The bicycle lane on N Vancouver would also be upgraded between N Hancock and N Broadway, including a new bicycle jug-handle at the N Vancouver and N Broadway intersection to facilitate right-turn movements for bicycles from N Vancouver to N Broadway.

Existing bicycle facilities on N/NE Broadway and N/NE Weidler within the Project Area would also be upgraded, including replacing the existing bike lanes with wider, separated bicycle lanes. New bicycle and pedestrian connections would also be made between the N Flint/N Tillamook intersection and the new Hancock-Dixon connection.

Approximately 800 feet of existing sidewalk gaps along portions of N Wheeler and N Williams would be filled. These improvements would improve walking connections in the vicinity of the Moda Center and increase pedestrian convenience, comfort, and safety by allowing for direct ADA-accessible crossings.

These improvements would be in addition to the new Clackamas bicycle and pedestrian bridge, upgrades to bicycle and pedestrian facilities on the new Broadway/Weidler/Williams and Vancouver/Hancock highway covers, and new median multi-use path on N Williams between N/NE Broadway and N/NE Weidler described above and illustrated in Figure 2-6. Figure 2-8 illustrates the proposed cross-sections of the local streets in the vicinity of the Broadway/Weidler interchange.

2.3 Build Alternative: Transportation Operations and Safety

As described in Sections 1.2 and 1.3, the purpose of the Project is to improve safety and operations in three key locations: on I-5 between I-405 and I-84, at the Broadway/Weidler interchange, and on adjacent surface streets near the interchange. The Project is needed to:

- reduce the high crash rate that currently occurs on the segment of I-5 between I-405 and I-84;
- address a major bottleneck that currently hinders the efficient movement of people and freight through the corridor; and
- reconfigure the Broadway/Weidler interchange to improve traffic flow at interchange ramps, on the Broadway and Weidler I-5 overcrossings, and on local surface streets near the interchange.

² Additional details on which streets are included are available at <http://i5rosequarter.org/local-street-bicycle-and-pedestrian-facilities/>

Changes to the transportation infrastructure proposed under the Build Alternative have allowed for new opportunities to partner with the City of Portland to enhance pedestrian and bicycle safety and mobility in the vicinity of the Broadway/Weidler interchange and to address congestion and improve safety for all modes at the Broadway/Weidler interchange and I-5 overcrossings. The benefits and impacts of these Project elements are discussed in Section 3.

A summary of the operational and safety outcomes under the Build Alternative is presented below. Details on the operations of the existing transportation system and potential impacts to that system under the No-Build and Build Alternatives over the approximately 20-year life of the Project (or through year 2045) are presented in Section 3.14.

2.3.1 Traffic Operations

Over the life of the Project, the Build Alternative is projected to improve traffic operations on I-5 in both the AM and PM analysis periods. Weaving operations would improve on the following highway segments:

- I-5 NB between the I-84 on-ramp and NE Weidler off-ramp
- I-5 NB between the N Broadway on-ramp and I-405 off-ramp
- I-5 SB between the NE Weidler/Williams on-ramp and I-84 off-ramp

The weaving segment on I-5 between the I-405 on-ramp and N Broadway off-ramp would operate slightly worse in the future if the Build Alternative is not constructed; however, the segment would carry more volume through the area compared to the No-Build Alternative.

Potential queue length for I-5 in the Project Area would be improved over both existing conditions and the No-Build Alternative, and speed and travel times would be improved for all segments compared to the No-Build Alternative. Travel times for the AM peak hours (Table 2-3) and PM peak hours (Table 2-4) are shown below.

Table 2-3. AM Travel Times (minutes) on Interstate 5

Route	7-8 AM			8-9 AM		
	Existing Conditions (2017)	No-Build (2045)	Build (2045)	Existing Conditions (2017)	No-Build (2045)	Build (2045)
I-5 SB, north of N Going on-ramp to N Broadway off-ramp (Rose Quarter)	4.4	7.3	5.4	7.1	9.0	5.2
I-5 SB, north of N Going on-ramp to south of Morrison Bridge off-ramp (end to end)	6.2	9.2	5.3	9.1	11.5	5.2
I-5 SB, north of N Going on-ramp to I-84 EB off-ramp	6.9	10.2	8.7	9.9	12.5	8.7
I-5 NB, south of Morrison on-ramp to NE Weidler off-ramp (Rose Quarter)	1.5	1.5	1.0	1.8	1.7	1.0
I-5 NB, south of Morrison on-ramp to north of N Going off-ramp (end to end)	4.0	3.9	2.9	4.6	4.3	2.9
I-5 SB, N Wheeler on-ramp to south of Morrison off-ramp	1.1	1.1	0.7	1.1	1.2	0.7

Notes: NB = northbound; SB = southbound

Table 2-4. PM Travel Times (minutes) on Interstate 5

Route	4-5 PM			5-6 PM		
	Existing Conditions (2017)	No-Build (2045)	Build (2045)	Existing Conditions (2017)	No-Build (2045)	Build (2045)
I-5 SB, north of N Going on-ramp to N Broadway off-ramp (Rose Quarter)	6.1	6.9	3.7	10.8	10.6	4.6
I-5 SB, north of N Going on-ramp to south of Morrison Bridge off-ramp (end to end)	9.2	10.1	3.6	14.4	13.9	4.5
I-5 SB, north of N Going on-ramp to I-84 EB off-ramp	12.2	13.0	10.1	17.3	16.9	12.1
I-5 NB, south of Morrison on-ramp to NE Weidler off-ramp (Rose Quarter)	1.0	1.3	1.0	1.6	1.3	1.0
I-5 NB, south of Morrison on-ramp to north of N Going off-ramp (end to end)	8.0	3.4	3.0	10.8	3.4	3.0
I-5 SB, N Wheeler on-ramp to south of Morrison off-ramp	1.4	1.4	1.1	1.4	1.4	1.2

Notes: NB = northbound; SB = southbound

Intersection performance on local streets during the AM peak hour under the Build Alternative would be acceptable. During the PM period, most local intersections would operate better compared to the No-Build Alternative, with all intersections meeting local operating standards.

Delay would increase at the following intersections with the Build Alternative due to increased traffic volumes, signal-phasing, and the provision of separated bicycle and pedestrian facilities; however, all intersections would continue to operate at acceptable levels of service:

- N Broadway and N Larrabee Avenue
- N/NE Weidler and N Williams
- NE Weidler/NE Victoria Avenue/I-5 NB Ramp
- NE Broadway and NE 2nd
- NE Broadway and NE Victoria
- N/NE Broadway/N Williams/I-5 SB Ramp
- N Williams and N/NE Hancock

2.3.2 Transportation Safety

The Build Alternative would result in safety benefits from upgrading shoulders to full standard width on both sides of the highway and by providing auxiliary lanes that give drivers more time and space to merge. Additionally, the Build Alternative would substantially reduce emergency braking events for both directions on I-5 during both morning and afternoon peak hours, reducing the number of rear-end crashes. It is estimated that the crash rate under the Build Alternative would be lower than under the No-Build Alternative, providing an overall safety benefit in the corridor.

Numerous improvements to the local street network are expected to increase safety for all road users by providing safer connections for pedestrians and bicyclists. By changing the character of the local road system (and therefore the behavior of drivers), reducing driver speeds, and simplifying ramp configurations, safety conditions for all modes are expected to improve.

2.4 Alternatives Considered but Not Advanced

Since the Project's inception in 2010, ODOT has worked closely with the City of Portland, and a Stakeholder Advisory Committee (SAC), and the public to evaluate more than 70 design concepts for the Project during a multi-step screening process (see Appendix A). The design concepts ranged from doing nothing (2035 No-Build) to operational improvements on the highway (such as adding safety shoulders, braiding on- and off-ramps, and extending auxiliary lanes) to new interchange types that would be new to the Portland area (such as a roundabout-controlled diamond interchange or a diverging-diamond interchange). Some concepts also included decoupling either the Broadway/Weidler or Vancouver/Williams couplets to simplify the interchange configuration.

The 70 initial design concepts were evaluated by ODOT, the City of Portland, SAC members, and the public during Step 1 of the screening process, which resulted in the elimination of 57 design concepts and the retention of 13 design concepts for further evaluation. Certain elements that were included in the initial concepts were not recommended to be studied further because they were either beyond the scope of the Project, did not address the Project goals and objectives adopted by the SAC, would reduce the lengths of the weaving sections on I-5, or required unconventional engineering solutions that would not be feasible or would be very costly. The remaining 13 concepts are listed in Table 2-5 below.

ODOT worked closely with the City of Portland, the Stakeholder Advisory Committee, and the public to evaluate more than 70 design concepts for the Project during a multi-step screening process.

Table 2-5. 13 Concepts for Further Study, Step 1 Screening (June 2011)

Concepts by Category	Overall Concept Count
1. 2035 No Build	1
2. Mainline Operational Improvements (which eliminate or shift weave movements off mainline of highway)	
2a. Braided Ramps	2
2b. Collector-Distributor Roads	3
3. Rebuild the Structures with Mainline Operational Improvements (which may include extending auxiliary lanes and adding shoulders but may not necessarily include eliminating or shifting eaves off mainline)	4
4. Enhance the Broadway/Weidler Interchange with Mainline Operational Improvements (including extending auxiliary lanes and adding shoulders in all options)	
4a. Split Diamond Interchange	5
4b. Folded Diamond Interchange	6
4c. Three-Point Interchange (maintain Broadway/Weidler couplet)	7
5. New Concepts for the Broadway/Weidler Interchange with Mainline Operational Improvements (including extending auxiliary lanes and adding shoulders in all options)	
5a. Standard Diamond Interchange (decouple Broadway/Weidler)	8
5b. Single-Point Urban interchange (decouple)	9
5c. Diverging Diamond Interchange	10
5d. Roundabout-Controlled Diamond Interchange	11
5e. Three-Point interchange (decouple Broadway/Weidler)	12
6. TSM/TDM/Operations Management	13

Notes: TDM = Transportation Demand Management; TSM = Transportation System Management

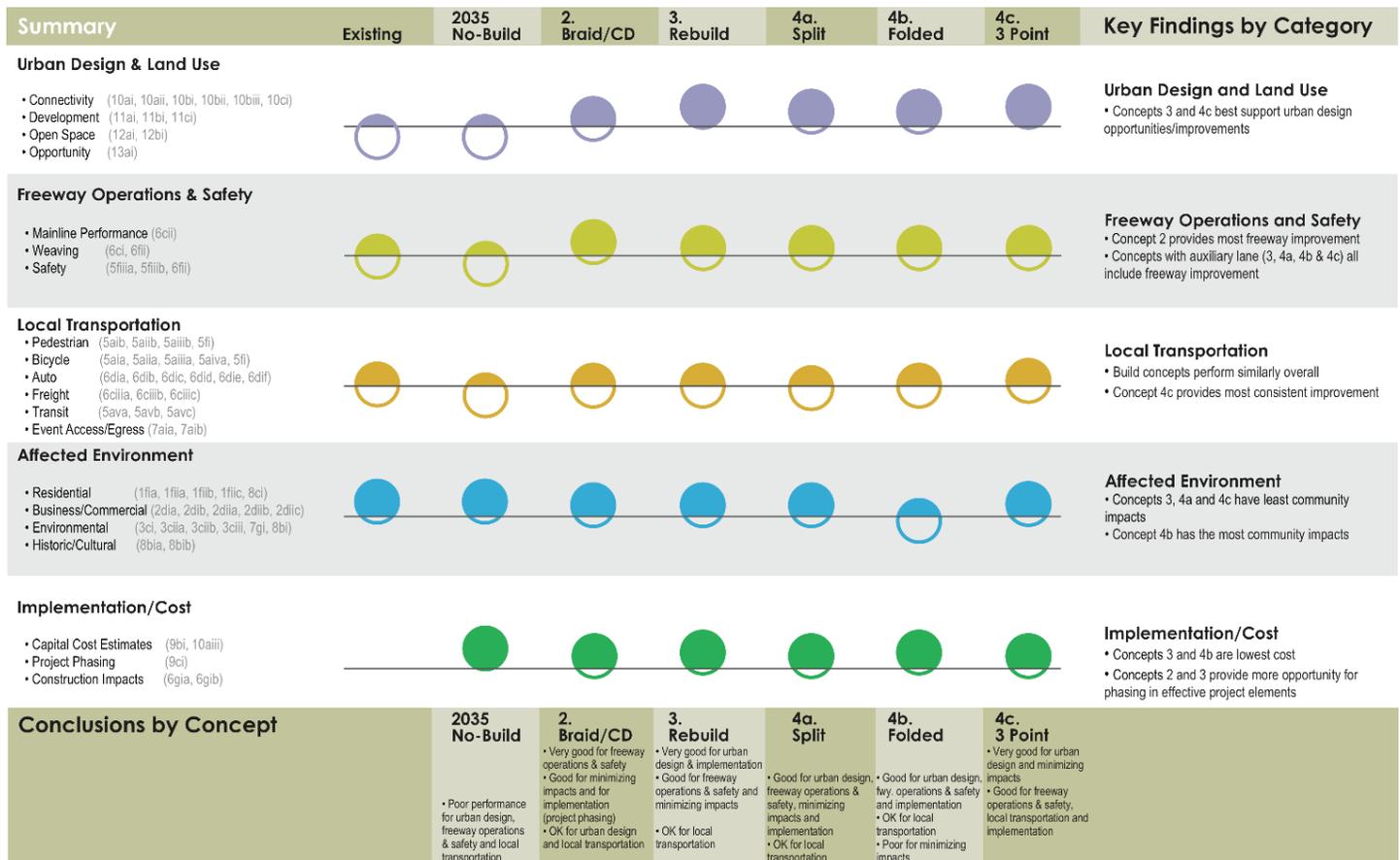
During Step 2 of the screening process, the 13 design concepts identified during Step 1 were evaluated further using an expanded set of criteria focused on the operational performance of the highway system and local street network; safety considerations for pedestrians, bicyclists, transit riders, and motorists; and several factors related to social equity and urban design.

During Step 3 of the screening process, the subcommittee recommended that concepts be merged by synthesizing the strongest qualities of each (Figure 2–10). The committee also recommended discontinuation of concepts 4a (Split Diamond) and 4b (Folded Diamond) for the following reasons:

Concept 4a – Split Diamond

- Similar in many ways to 4c (Three-Point Interchange) but not as good for urban design or local transportation
- Increased traffic volumes adjacent to important community properties (e.g., Leftbank Building, Paramount Apartments)
- Traffic queuing issues and increase average intersection delay in the Broadway/ Weidler interchange
- Impacts to bike, transit, and freight connections, including increased out-of-direction travel

Figure 2–10. Step 3 Overall Findings Summary



Source: Central City 2035: N/NE Quadrant Plan (City of Portland et al. 2012)

Concept 4b – Folded Diamond

- Largest overall Project footprint relative to other concepts
- Most impacts to businesses and residences near the loop ramps, including the Leftbank Building, the Paramount Apartments, and the Crowne Plaza Hotel

The remaining design concepts were altered and combined in various ways to improve operational performance, enhance safety, and more aggressively promote Transportation System Management (TSM)/Transportation Demand Management (TDM) measures as alternatives to single-occupant vehicles. This process reduced the number of design concepts from eight to three, with the ultimate objective of taking the best elements of each and creating a single "Hybrid" concept.

At its February 2012 meeting, the SAC was presented with a Hybrid Base Concept that incorporated elements of the three build concepts that remained after Step 3 of the analysis. The SAC supported the joint staff recommendation to move forward with the Hybrid Base Concept and directed staff to continue to refine the concept to enhance bicycle and pedestrian operations, urban design/land use potential, traffic operations, and safety.

These efforts culminated in a single recommended design concept that was approved by the Portland City Council and the Oregon Transportation Commission in 2012. This recommended design concept has subsequently been incorporated into the City's Adopted Central City 2035 Plan and Metro 2014 RTP and has been carried forward as the Build Alternative for analysis in this EA. A detailed discussion of the concept screening and alternatives development process is presented in the I-5 Broadway/Weidler Facility Plan (ODOT 2012a).

In addition to various build alternatives considered during the alternatives development process, it is important to note that a TSM/TDM Operations Management category was also added for consideration. As stated in the N/NE Quadrant and Broadway/Weidler Plans' Freeway/Local Transportation Interface: Concepts for Further Study (City of Portland and ODOT 2011) document: "TDM refers to strategies and policies that can reduce the demand for a transportation facility using tools such as tolling, transit pass subsidies, carpool programs, parking costs, high occupancy vehicle lanes, etc." That document stated that elements of the TSM/TDM alternative to be analyzed for the N/NE Quadrant Plan would "build on existing state, regional and local TSM/TDM strategies in the study area." As a result, value pricing (also called tolling) was not included within the TSM/TDM alternative because value pricing, as a tool for transportation demand management, was not among the existing strategies at use in the study area at that time.

The analysis of value pricing (or tolling) in the I-5 corridor will be considered in the future. The potential termini for value pricing in the I-5 corridor is not determined and is not currently included on any adopted transportation fiscally constrained list. Therefore, value pricing is also not considered a reasonable and foreseeable action. Potential impacts associated with value pricing are not evaluated within this NEPA document. If value pricing seems feasible following the analysis and if the State of Oregon decides to pursue value pricing, a separate NEPA process to consider the potential impacts of value pricing in the corridor would be conducted at that time.

3 Affected Environment and Environmental Consequences

This section describes the affected environment (i.e., existing conditions) for the Project Area. Potential impacts to the affected environment are described for the two alternatives being evaluated in this EA: the No-Build Alternative and the Build Alternative.

The types of impacts that are evaluated in this section include “short-term” impacts that would occur during the construction phase and “long-term” impacts that would begin once the Build Alternative becomes operational and would continue over the approximately 20-year life of the Project or through year 2045. Short-term and long-term impacts include “direct impacts” (impacts that occur in the same place and at the same time) and “indirect impacts” (impacts that occur later in time or some distance from the activity causing the impact). Impacts of the No-Build Alternative are evaluated based on available information and the conceptual nature of projects that may occur within the Project Area through year 2045. A third type of impact (“cumulative impact”) is also described in this section. Cumulative impacts are the effects on environmental resources that result from the incremental direct and indirect impact of a proposed action when considered in tandem with other past, present, and reasonably foreseeable future actions affecting those same resources.

This section also describes a range of actions that can be taken by ODOT, the City of Portland, and the construction contractor to avoid, reduce, or remedy the impacts to environmental resources from the construction and operation of the Build Alternative. These actions, referred to as “mitigation measures,” are intended to minimize the harmful and disruptive effects of the proposed action on the natural and human environment.

The geographic area in which the environmental effects of the No-Build and the Build Alternatives were assessed is referred to as the “Area of Potential Impact” or API. For most resource topics, the API is the same as the Project Area shown in Figure 1–1. However, for some resources (e.g., Hazardous Materials, Land Use), the API was expanded beyond the Project Area to include additional locations that could experience effects from the construction and operation of the Build Alternative.

Additional information on the impacts and mitigation measures associated with the Build Alternative, beyond those summarized in this EA, can be found in separate environmental technical reports provided in Appendix B and available for public viewing on the Project website: <http://i5rosequarter.org/news-library>.

3.1 Resources Not Affected

This EA evaluates the potential for the Build Alternative to affect a wide variety of environmental resources. However, the following resource topics have not been included in the EA because they are not present in the Project Area or because the Project’s potential effects would be so minor as to not warrant a full evaluation in this EA:

- Agricultural Lands
- Coastal Zone Management

- Geology and Soils
- Terrestrial Biology
- Visual Resources
- Wetlands

3.2 Air Quality

The maintenance of clean air is an important component of a community's well-being. Air pollution contributes to physical discomfort and many illnesses, especially respiratory disease. Vehicle emissions are a primary influence on air quality in urban areas.

3.2.1 Existing Conditions

The API for air quality includes the Project Area and roadways outside the Project Area that could experience changes in congestion (e.g., traffic volumes and speed) that are sufficient enough to alter mobile source emissions. Air quality in the Portland metropolitan area currently meets all National Ambient Air Quality Standards (NAAQS) for pollutant concentrations of carbon monoxide (CO), nitrogen dioxide, ozone, particulate matter, lead, and sulfur dioxide (SO₂). The primary pollutants of concern for transportation projects are oxides of nitrogen (NO_x), volatile organic compounds (VOCs), CO, coarse and fine particulate matter (PM₁₀, PM_{2.5})¹ and mobile source air toxics (MSAT²).

3.2.2 Environmental Consequences

Air pollutant emissions were analyzed for existing conditions (2017) and future conditions (2045) for both the Build and No-Build Alternatives. While the Build Alternative would not create new capacity or add substantial capacity to the existing highway, it would affect an urban highway in a populated area. Therefore, a quantitative modeling analysis of MSAT emissions was conducted. NAAQS criteria pollutant emissions (i.e., CO, NO_x, ozone, PM₁₀, PM_{2.5}, lead, and SO₂) for the Build and No-Build Alternatives were also considered and are discussed qualitatively. Additional information on existing and future Project-related emissions is presented in the Air Quality Technical Report (ODOT 2019b).

3.2.2.1 No-Build Alternative

Under the No-Build Alternative, the estimated emissions for MSAT from vehicles operating on I-5 and surface streets in the API would be low and substantially lower in 2045 compared to the 2017 existing conditions. The concentrations of NAAQS criteria pollutants are also expected to decline over time due to increasingly tighter tailpipe emission standards. This reduction is consistent with national trends.

3.2.2.2 Build Alternative

Short-term air quality impacts during construction of the Build Alternative would

Air quality in the Project Area is expected to improve over the next 25 years as a result of tighter emissions standards and regional efforts to control emissions. Air quality would be slightly improved under the Build Alternative due to higher speeds, less stop-and-go traffic, and less idling on I-5.

¹ Particulate matter (PM) less than or equal to 10 or 2.5 micrometers in diameter, respectively.

² The U.S. Environmental Protection Agency has identified nine compounds with substantial contributions from mobile sources that are among the national- and regional-scale cancer risk contributors and noncancer hazard contributors from the 2011 National Air Toxics Assessment. These compounds are 1,3 butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (DPM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter.

include the release of small particulate emissions (fugitive dust³) generated by soil excavation, surface grading, hauling, and various other construction activities, as well as exhaust emissions from construction equipment. Exhaust from construction equipment typically includes CO, NO_x, VOCs, PM₁₀, PM_{2.5}, and DPM. Removal of existing concrete structures and construction of new structures (e.g., highway covers) may release dust during demolition, debris removal, and concrete-mixing operations. These construction-phase impacts would be temporary and limited to areas in the immediate vicinity of construction activity (including haul routes) and would end once construction is complete. If construction activities increase traffic congestion in the area, CO and other emissions from delayed vehicles may increase slightly. These emissions would also be temporary and are not expected to exceed NAAQS ambient air quality standards.

During long-term operations, the estimated MSAT emissions from highway operations for the Build Alternative in 2045 would be equal to or lower than the MSAT emissions for the No-Build Alternative. The estimated reduction in MSAT emissions compared to the No-Build Alternative is likely due to the higher speeds and reduced congestion that the Build Alternative would allow. MSAT emission estimates for surface street operations for the Build Alternative in 2045 also show a slight decrease or remain the same.

Overall, estimated long-term emissions of MSAT from the Build Alternative would be low and substantially lower in 2045 compared to existing conditions (2017). Emissions of NAAQS criteria pollutants under the Build Alternative would also be low and are not expected to exceed NAAQS ambient air quality standards.

Because of heightened public concern surrounding MSAT emissions near Harriet Tubman Middle School, a highway-only emissions analysis was conducted for I-5 comparing 2017 Existing, 2045 No-Build, and 2045 Build conditions within the API. The data showed a large decrease in estimated MSAT emissions over time for both alternatives and a slightly larger decrease for the Build Alternative in 2045. The average reduction in estimated MSAT emissions for the Build Alternative was 75 percent compared to 73 percent for the No-Build Alternative.

In summary, future air pollutant emissions in the API in 2045 are estimated to be substantially lower than existing conditions and nearly identical between the No-Build and Build Alternatives. Air quality within the API would improve slightly under the Build Alternative. Trends indicate that current concentrations of these pollutants, including in the vicinity of Harriet Tubman Middle School, will continue to decline over time as more restrictive tailpipe emission standards are implemented. Because direct impacts on air quality from the Build Alternative are expected to be low and to continue to decline in the future, long-term indirect air pollution effects from implementation of the Build Alternative are not anticipated.

3.2.2.3 Mitigation

Potential short-term impacts to air quality during the construction phase of the Build Alternative would be addressed by requiring construction contractors to implement a variety of mitigation measures to minimize dust and exhaust emissions from construction equipment and vehicles. ODOT would require the construction contractor to implement the following measures, as appropriate, to control dust emissions consistent with Oregon Administrative Rule 340-208-0210, *Requirements for Fugitive Emissions*:

³ Fugitive dust is an environmental air quality term that refers to very small particles suspended in the air, the source of which is primarily the Earth's soil.

- Use of water or chemicals, where possible, for dust control during demolition of existing buildings or structure, construction operations, grading of roads, or clearing of land.
- Application of asphalt, oil, water, or other suitable chemicals on unpaved roads, material stockpiles, and other surfaces that can create airborne dust.
- Full or partial enclosure of materials stockpiles in cases where application of oil, water, or chemicals is not sufficient to prevent particulate matter from becoming airborne.
- Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials.
- Adequate containment during sandblasting or similar operations.
- Using covers on open-bodied trucks during transport of materials that are likely to become airborne.
- Prompt removal of soil, dust, or other airborne-prone material from paved streets.

ODOT would also require construction contractors to comply with ODOT standard specifications Section 290, Environmental Protection, which limits the idling time of trucks and other diesel-powered equipment to 5 minutes when not in use or in motion, requires truck staging areas to be located in areas where emissions would have a minimum impact on sensitive populations (such as schools and residences), and requires the removal of all loose dirt and debris from trucks prior to leaving the construction areas. In addition, road or lane closures would be restricted to non-peak traffic periods, when possible, to reduce the impact of construction delays on traffic flow and resultant vehicle emissions. Assuming implementation of the mitigation measures described above, the Build Alternative would not have substantial adverse short-term or long-term impacts on air quality in the API.

3.3 Aquatic Biology

Aquatic environments within the Project Area include National Marine Fisheries Service (NMFS)-designated critical habitat. These areas also contain fish and aquatic mammals protected under the Endangered Species Act (ESA) and Marine Mammals Protection Act. These species use the waters within the site at various times throughout the year.

3.3.1 Existing Conditions

The API for aquatic resources includes the Willamette River under the I-5 SB exit to the Morrison Bridge and adjacent upland areas. The API is bounded on the west by the Willamette River and the flyover off-ramp bridge (SB I-5 to EB I-84) and on the east by railroad right of way (ROW) and elevated I-5.

Existing conditions include a mix of natural, landscaped, and developed impervious surfaces. The site includes a portion of open water along the Willamette River. The existing flyover off-ramp bridge extends over the river on the west side and is supported by concrete pilings located in the water. There is also a large concrete stormwater pipe that extends out into the flow of the river. The concrete pipe and pilings may influence shading, flow patterns, and affect scour and deposition patterns differently upstream and downstream of the existing structures.

The Willamette River within the API includes NMFS-designated critical habitat and multiple ESA-listed anadromous species of fish: Chinook salmon (*Oncorhynchus*

Temporary effects to Endangered Species Act-listed fish would be minimized by conducting work during times when fish are not present in work areas.

tshawytscha), coho salmon (*Oncorhynchus kisutch*), and steelhead salmon (*Oncorhynchus mykiss*). These species are present within the river at various times throughout the year. Additionally, this portion of the Willamette River is also used at times by the California sea lion and the Steller sea lion, both species under the jurisdiction of NMFS and regulated under the Marine Mammals Protection Act. A technical memorandum summarizing ESA considerations associated with potential in-water work is provided in Appendix B to the Water Resources Technical Report (ODOT 2019c).

3.3.2 Environmental Consequences

3.3.2.1 No-Build Alternative

Under the No-Build Alternative, no in-water work is anticipated. There would therefore be no potential for increased turbidity, hydroacoustic impacts, or contamination from equipment and materials used in construction. Existing alteration of natural river flow patterns, shading, and sediment movement and deposition would continue from existing columns.

3.3.2.2 Build Alternative

Under the Build Alternative, the following in-water construction activities⁴ would likely result in direct and indirect effects to fish and may cause indirect effects to California sea lions. These activities would be restricted to an in-water work window to avoid peak timing of species presence within proposed work areas.

- **Drilled Shafts:** Approximately eleven 6-foot-diameter drilled shafts would be installed below the the Ordinary High Water Mark (OHWM).⁵ Each drilled shaft includes oscillation of an outer steel canister to depth, followed by interior excavation (drill), followed by a rebar cage, and concrete pour. The noise levels associated with all activities have not been shown to generate injurious levels of sound. Avoidance of areas in close proximity to work areas by fish and California sea lions is assumed to be the indirect effect.
- **Temporary Structures:** Installation of the drilled shafts would be completed using up to two pile-supported temporary work bridges. The temporary work bridges would be constructed with pilings and short structural spans (50 to 60 feet in length). The piles supporting the work bridges would be installed using vibratory and impact pile driving. Sheet pile and or underwater wire-sawing would be used to remove one existing 6-foot-diameter pier. Sheet pile (uncertain construction use) will use vibratory techniques only. The pilings and temporary structures would be removed when the permanent structure is complete.

Impact pile driving can produce underwater sound levels ranging from disturbance, injury, and death for fish. Vibratory pile driving is capable of generating levels of sound associated with disturbance. Additionally, impact driving is capable of causing injury (hearing) and disturbance to sea lions. Following best management practices (BMPs) and use of a bubble curtain during pile installation would reduce potential impacts to fish and sea lions. Marine mammal observers would be used beginning in September, and the Project would employ shutdowns if sea lions are observed in close proximity to in-water work areas. However, the frequency and duration of such encounters within the observation zone are expected to be minimal given the overall

⁴ Anticipated in-water work has been refined since preparation of the ESA Memo (Appendix D of the *Water Resources Technical Report* [ODOT 2019c]); however, the same conclusions apply.

⁵ The OHWM 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 characteristic.

width of the channel and the expected migration of approximately five individual sea lions through the area upstream to Willamette Falls.

- **Temporary Barge:** A temporary barge is expected to be used year-round in areas of proposed in-water work. Minor disturbance to ESA fish (through avoidance behavior) would likely occur when barge anchoring is repositioned.

Minor turbidity would occur during the advancement of the drilled shaft casings and installation of the pilings for the temporary work bridges. Disturbance would be limited to their perimeters.

If underwater obstructions are encountered during in-water work, dredging may be required to facilitate casing and pile placement. Dredging, if necessary, commonly employs BMPs through the use of a clamshell bucket to grab and move the obstruction (thereby reducing water column impacts) or to remove the obstruction to a contained barge deck. Buckets must be allowed to drain free prior to barge transfer. These activities are considered brief, and their range of effects to ESA species have been documented through several previous NMFS consultations.

The Lower Willamette River sediments are considered to be contaminated. However, periods when these sediments would be suspended in the water column are expected to be minimal and brief and do not represent concentrations classified as hazardous. Such levels likely cause accumulative effects with chronic exposure and do not include the potential for sudden acute effects if encountered by listed species.

The Project would include several provisions to assure protection for adult and juvenile fish species and a Federal-Aid Highway Program (FAHP) ESA Programmatic Agreement (PA) has been prepared to address potential water quality and aquatic wildlife issues associated with construction activities in and near the Willamette River associated with the Project. These protective measures would ensure that direct and indirect impacts to aquatic resources would be minimized. When signed, the FAHP will be provided in Appendix C and as part of the NEPA decision document.

Proposed improvements to the stormwater management system under the Build Alternative described in Section 3.16 would have long-term beneficial effects for water quality and aquatic species in the Willamette River. Three new water quality treatment facilities would be constructed to treat stormwater runoff from approximately 30 acres of impervious area that is currently not treated for water quality prior to discharge to the Willamette River. ESA-listed species would benefit from the improved stormwater treatment, in compliance with the FAHP ESA PA.

3.3.2.3 Mitigation

Potential impacts to water quality during construction that could potentially harm aquatic species would be avoided by requiring contractors to follow standard best management and erosion control practices in the ODOT Erosion Control Manual (2005), ODOT Standard Specifications (2018a), ODOT Boilerplate Special Provisions (2018b), and City of Portland stormwater requirements.

Additional special provisions to protect sensitive species in and around areas of proposed in-water work areas are described in Appendix B (as an appendix to the Water Resources Technical Report (ODOT 2019c)). These provisions are consistent with requirements in the Federal Highway Administration (FHWA) FAHP Programmatic Biological Opinion (PBO) that would apply to construction and operation of the Build Alternative.

ODOT would implement the following additional measures to protect fish and marine

mammals:

- The Project would first avoid species presence by shortening the published in-water work window (i.e., July 1–October 31) by 25 days.
- Minimization via BMPs would comply with the FAHP through use of a bubble curtain to reduce sound levels generated by in-water work.
- Marine mammal observers would be used beginning in September, and the Project would employ shutdowns if sea lions are observed in close proximity to in-water work areas.

The installation of approximately eleven 6-foot-diameter piers would increase artificial fill within the functional floodplain or general scour defined within the FAHP and the ODOT FAHP User's Guide (ODOT and FHWA 2016). Per the FAHP, the Project must mitigate the artificial fill by removing an equivalent amount from the Project Area or an approved off-site location. To comply with this requirement, ODOT would remove, at minimum, an equivalent amount of fill from an off-site location within the lower Willamette River. Initial investigations demonstrate likely opportunities existing within that portion of the Willamette River that includes the Multnomah Channel. Otherwise ODOT would identify and seek approval from FHWA and NMFS for an off-site restoration project that would provide ecological function that meets or exceeds impacts to critical habitat, including its primary constituent elements, as defined by NMFS under ESA critical habitat designations.

3.4 Archaeology

Archaeological resources are often found beneath the surface of highways and other Project construction sites. These resources provide important information about the past and inform us about previous generations and our cultural heritage. Native Americans inhabited areas along the Willamette River for thousands of years. Euro-American began settling in the area in the early 1800s.

3.4.1 Existing Conditions

The API for archaeological resources is the same as the Project Area shown in Figure 1-1. Humans have been present in the API for many centuries. The Willamette River was an important resource for the Upper Chinookan, Multnomah, and Clackamas peoples who existed in the area for several thousand years. The banks of the Willamette River were also home to early to mid-nineteenth-century Euro-American settlers.

Throughout the nineteenth and twentieth centuries, the API underwent dramatic changes in the form of construction of residential, commercial, and industrial buildings and structures, along with infrastructure such as roads, bridges, rail lines, viaducts, and sewer and utility lines. The built environment has been erected, demolished, rebuilt, moved, improved upon, abandoned, and rebuilt again. Residential areas have been replaced by commercial and business districts, and large arterial roads have been constructed. Street car lines have been laid, removed, and reinstalled over the subsequent decades.

No archaeological resources have been identified to date within the Project Area. The potential for encountering archaeological material during construction is variable due to the intensive historic and modern use of the area, which has resulted in disturbances to the ground surface.

ODOT worked with the State Historic Preservation Office to develop an Inadvertent Discovery Plan to protect archeological resources if they are encountered during construction.

Detailed information on archaeological resources and artifacts potentially present in the Project Area can be found in the Archaeological Resources Technical Report (ODOT 2019d).

3.4.2 Environmental Consequences

3.4.2.1 No-Build Alternative

Under the No-Build Alternative, ground-disturbing activities associated with the City of Portland's proposed transportation improvements in the Broadway/Weidler corridor could encounter undiscovered archaeological resources. Such projects would be subject to a number of Oregon State laws that protect archaeological resources, including the Indian Graves and Protected Objects statutes (Oregon Revised Statute [ORS] 97.740–97.760) and the Archaeological Objects and Sites statutes (ORS 358.905–358.955). These laws prohibit damage to archaeological resources on public and private lands. If these projects were to qualify as a federal undertaking under 36 Code of Federal Regulations (CFR) Part 800, they would be subject to the requirements in Section 106 of the National Historic Preservation Act (NHPA).⁶ If other federal undertakings occur in the API under the No-Build Alternative, those projects would also be subject to the requirements in Section 106, including impact analyses and appropriate mitigation. Because these processes are designed to protect archaeological resources, impacts would be minimized under the No-Build Alternative.

3.4.2.2 Build Alternative

It is possible that archaeological resources could be discovered during construction of the Build Alternative. Most of the impacts to archaeological resources, if present, would occur during short-term construction activities. Archaeological resources could be altered, damaged, or destroyed by the operation of heavy equipment or during the compaction, excavation, or grading of soils. The range of potential short-term impacts to archaeological resources from construction of the Build Alternative is presented in Table 3-1.

During operation of the Build Alternative, it is possible that additional subsurface disturbance related to repairs and maintenance activities could encounter archaeological resources not previously identified, and these actions could result in diminished integrity of those properties. However, this outcome is unlikely, and any resources encountered would be protected by the Project's Inadvertent Discovery Plan. Indirect impacts to archaeological resources from the Build Alternative would not result in measurable changes to, and diminished integrity of, archaeological resources.

3.4.2.3 Mitigation

If impacts to archaeological resources discovered during construction of the Build Alternative are unavoidable and would diminish integrity of a site that is eligible for the National Register of Historic Places (NRHP),⁷ the impacts would be resolved through

⁶ Section 106 requires federal agencies to consider the effects of their actions on historic properties (36 CFR 800). Historic properties are any prehistoric or historic districts, sites, buildings, structures, or objects that are eligible for or already listed in the National Register of Historic Places. Also included are any artifacts, records, and remains (surface or subsurface) that are related to and located within historic properties and any properties of traditional religious and cultural importance to tribes.

⁷ The NRHP is a list maintained by the Secretary of the Interior of "districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering and culture" [36 CFR 60.1(a)].

Table 3-1. Potential Impacts to Archaeological Resources from the Build Alternative

Project Activity	Potential Impact
Widening I-5 Structures	New foundations or temporary construction requirements for excavations may impact buried archaeological resources, if present.
New I-5 Auxiliary Lanes	New retaining walls, retaining wall tieback anchors, widened roadway prisms, and stormwater and utilities installations may impact buried archaeological resources, if present.
Removal of Existing Local Street Overcrossings	Demolition activities and new grading may impact buried archaeological resources, if present.
Surface Street Modifications	New traffic signals and street lighting could have foundations that impact buried archaeological resources, if present.
New Bicycle and Pedestrian Facilities	New sidewalk ramps and bicycle facilities could have foundations that impact buried archaeological resources, if present.

implementation of an Inadvertent Discovery Plan and a Project-specific PA between the FHWA, the State Historic Preservation Office (SHPO), and ODOT that outlines protocol for identifying, evaluating, and resolving impacts pursuant to 36 CFR 800.13 and 36 CFR 800.14.

3.5 Climate Change

Climate change is the observed century-scale rise in the average temperature of the Earth's climate system and its related effects, including rising sea levels, drought, changes in local weather patterns, and increased severe storm events. Greenhouse gases from human activity are a primary cause of climate change through increased concentration of atmospheric carbon dioxide from the burning of fossil fuels.

3.5.1 Existing Conditions

The Intergovernmental Panel on Climate Change Fifth Assessment Report concluded that, "It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century." (IPCC 2013). The largest human influence has been the emission of greenhouse gases, such as carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) from the burning of fossil fuels. These gases, along with water vapor, trap heat in the atmosphere, causing a "greenhouse effect."

Because the transportation sector is a leading contributor to greenhouse gas (GHG) emissions, the potential impacts on climate change from these emissions are addressed in this section. While there are currently no federal or state regulations that control Project-level GHG emissions for transportation projects, the State of Oregon, Multnomah County, the City of Portland, and Metro have developed policies

A 22% reduction in greenhouse gas emissions is expected over the next 25 years, largely due to fuel efficiency standards and regional efforts to control emissions. The Build Alternative would contribute to this reduction due to higher speeds, less stop-and-go traffic, and less idling on I-5.

and strategies to aggressively reduce GHG emissions from motor vehicles. These efforts include promoting alternative fuels, encouraging transportation alternatives over single-occupancy vehicles, promoting compact multimodal and mixed-use communities, and improving the overall efficiency of the transportation system.

Although GHG reduction efforts are typically planned and implemented at the regional or state-wide level, a Project-level GHG analysis was conducted. GHG emission projections were modeled on a life-cycle basis for both alternatives using traffic data provided by the City of Portland and an assumed Project life of 30 years. Operational emissions for the Project include tailpipe emissions from vehicles operating on local roadways and upstream emissions from the fuel cycle to include emissions released during fuel extraction, refining, and transport, as well as emissions from equipment used during maintenance activities.

The API used for the GHG analysis is the same as the API used for the air quality analysis and includes the Project Area and roadways beyond the Project Area that could experience sufficient changes in traffic volumes and speeds to meaningfully change vehicle-sourced GHG emissions. For additional details on the GHG analysis, see the Climate Change Technical Report (ODOT 2019e).

3.5.2 Environmental Consequences

Transportation-related GHG emissions are by-products from the combustion of fuel and include CO₂, CH₄, and N₂O. To compare the effects between the No-Build and Build Alternatives, a single common descriptor referred to as “carbon dioxide equivalent emissions” or CO₂e was used.⁸ The GHG emissions analysis compares the estimated CO₂e emissions for 2017 to the projected CO₂e emissions for the No-Build and Build Alternatives in 2045.

3.5.2.1 No-Build Alternative

Estimated long-term operational GHG emissions for the No-Build Alternative for 2017 and 2045 are shown in Table 3-2. Annual GHG emissions in 2045 are projected to be approximately 22 percent lower than the 2017 annual emission total. The decrease in future annual GHG emissions can be attributed to federal, state, and local efforts to develop more stringent fuel economy standards and vehicle inspection and maintenance programs, as well as transition to cleaner, low-carbon fuels for motor vehicles.

The No-Build Alternative would also have on-going maintenance needs over time. GHG emissions would occur during routine maintenance activities, such as restriping, sweeping, snow removal, and vegetation management. In addition, roadways typically require resurfacing after 15 years. For the No-Build Alternative, it was assumed that roadways in the API would require resurfacing once within the first 5 years and again after 15 years (i.e., two resurfacings during the 30-year analysis period). Maintenance activities, including the two roadway resurfacings, would generate approximately 134 million tons (MT) of GHG emissions per year. Of that total, 97 MT (72 percent) would be emitted during materials production (i.e., mining and crushing of sand and gravel, asphalt and cement production, mixing processes, and transport) for roadway resurfacing.

⁸ CO₂e converts all the emitted GHGs to a common global warming potential expressed in terms of the equivalent amount of CO₂.

Table 3-2. Estimated Annual GHG Emissions for Existing Conditions and the No-Build and Build Alternatives

Source	GHG Emissions (MTs CO ₂ e per year)			Percent Change		
	2017 Existing	2045 No-Build	2045 Build	2017 to 2045 No-Build	2017 to 2045 Build	2045 No-Build to 2045 Build
Tailpipe	417,156	327,536	326,762	-22	-22	-0.2
Fuel Cycle	112,632	88,435	88,226	-22	-22	-0.2
Total	529,788	415,971	414,988	-22	-22	-0.2

Notes: CO₂e = carbon dioxide equivalent emissions; GHG = greenhouse gas; MT = million tons. The slight difference between the Build and No-Build Alternatives is masked by rounding.

3.5.2.2 Build Alternative

GHG emission estimates for construction of the Build Alternative would be 94 MT per year with approximately 67 MT (71 percent) emitted during materials production. Maintenance activities for the Build Alternative, including one roadway resurfacing mid-way through the 30-year analysis period (i.e., 15 years after Project opening) would generate an estimated 81 MT of GHG, of which 55 MT (68 percent) would be emitted during materials production.

Table 3-2 presents the estimated long-term operational emissions for both the No-Build and Build Alternatives in 2045 compared to the estimated emission totals for 2017. Like the No-Build Alternative, the 2045 operational emission total for the Build Alternative is projected to decrease by approximately 22 percent compared to the 2017 emission total.

The substantial decline in GHG emissions projected between 2017 and 2045 is due to a reduction in vehicle GHG emissions resulting from federal, state, and local efforts to develop more stringent fuel economy standards and vehicle inspection and maintenance programs and transition to cleaner low-carbon fuels for motor vehicles. Because GHG emissions have been identified as a primary cause of climate change effects, any potential decrease in these emissions would be expected to support emission-reduction efforts intended to reduce future climate-related impacts.

The indirect GHG emissions effects of the Build Alternative would be minor and are included in the estimates presented above to account for upstream emissions to produce and transport fuel.

3.5.2.3 Mitigation

Large reductions in GHG emissions are required to mitigate global climate change. The continued emphasis on increasingly stringent fuel economy standards, vehicle inspection and maintenance programs, and the continued transition to cleaner low-carbon fuels for motor vehicles will contribute to a reduction in vehicle GHG emissions over the life of the Build Alternative. No additional mitigation is proposed.

3.6 Environmental Justice

Environmental justice is a concept that refers to the equal treatment of all residents in the community regardless of race, color, national origin, or income. Consideration of environmental justice includes both fair treatment and meaningful involvement in participating and reviewing all public infrastructure projects.

3.6.1 Existing Conditions

The API for the Environmental Justice (EJ) analysis is generally defined by the boundaries of Census Tract 23.03. U.S. Census data⁹ were used to compare the proportion of minority and low-income populations located in the API with that of the City of Portland and the Portland–Vancouver–Hillsboro Metropolitan Statistical Area (MSA). The population within the API is predominantly white; however, a substantial number of Black residents live within the API. It is also notable that the percentage of Black residents within the API is higher than the percentage of Black residents living in the City of Portland and the Portland metropolitan area.

Most Black residents within the API live in the Albina neighborhood located north of NE Broadway and east of I-5. A number of notable Black-owned businesses and civic organizations are located in the API. The Urban League of Portland, one of the Portland Black community's principal advocacy and service organizations, is located at 10 N Russell. The Harriet Tubman Middle School is located adjacent to I-5 at 2231 N Flint. Harriet Tubman Middle School has important historical significance to the Black community in Portland, and its current enrollment includes a substantial number of students of color.

Residents in the Albina area have had a long history of experiencing adverse effects from major public infrastructure projects. Beginning in the late 1940s, and continuing into the early 1970s, a series of public infrastructure projects displaced hundreds of residents within the API, many of whom were Black and low-income. These projects included the widening of Interstate Avenue and the construction of ramps to the Broadway and Steel Bridges, construction of Veterans Memorial Coliseum and I-5 in the early 1960s, and construction of the Fremont Bridge and ramps connecting it to I-5 in the early 1970s. In all, public infrastructure projects displaced more than 900 dwelling units in and near the API during this period, mostly single-family homes. These projects also created substantial physical separations between historically connected Black neighborhoods in the API. Additional information on the effects of past projects on minority and low-income populations is presented in the *Environmental Justice Technical Report* (ODOT 2019f).

In addition to public infrastructure projects, the process of gentrification has had a substantial effect on the Albina neighborhood by displacing low-income Black residents (Bates 2013; Gibson 2007; Portland Housing Bureau n.d.–a). Remaining concentrations of minority residents in the API include the Urban Plaza Apartments at the corner of N Russell and N Williams and the Albina Corner Apartments at the corner of NE Martin Luther King Jr. Boulevard and NE San Rafael Street, where more than half of the current residents are racial minorities. A new apartment building on N Williams at NE San Rafael and recent infill housing on NE Hancock near its intersection with NE 3rd Avenue reflect a continuing strong demand for housing and

The Project would restore connectivity between neighborhoods separated when I-5 was constructed; and improve access to transit, safety and mobility for everyone moving through the area. The Project would also provide economic opportunities for local, and minority-owned businesses, in the historically Black neighborhoods impacted in the past.

⁹ Census data from the U.S. American Community Survey (ACS) from 2011 to 2015 provided the most current data for demographic characteristics in the API. ACS 2006 to 2010 data provided data for the same demographic categories and is included in this EJ analysis as a point of comparison for changes between 2010 and 2015.

suggests the process of gentrification in the Albina area is continuing.

The City of Portland has initiated a number of plans and programs to address past displacement and ongoing gentrification in the Albina area. One of the most recent is the N/NE Neighborhood Housing Strategy, which will invest over \$100 million over 10 years to build apartments, preserve buildings, and help residents stay in their homes or return to neighborhoods in North and Northeast Portland. A central feature of the N/NE Neighborhood Housing Strategy is the N/NE Preference Policy, which gives priority for the City's affordable housing investments in portions of the API to current and former residents of the N/NE Portland community (Portland Housing Bureau n.d.–b).

The percentage of Hispanic or Latino residents and other racial minorities (e.g., Asian Americans, American Indians, Alaskan Natives, Native Hawaiians, and other Pacific Islanders) in the API compared to the City of Portland and the MSA is relatively small. There are no known concentrations of these groups living at locations that could make them subject to disproportionate impacts from the Project. For these reasons, this EA does not further address impacts on minority residents other than the Black population.

The EJ analysis defines a person as being “low-income” if that individual is a member of a family with a median household income at or below the Department of Health and Human Services poverty guidelines (FHWA 2012). Table 3–3 shows these guidelines for 2010 and 2015.

Table 3–4 shows the median and mean household income and percentage of households living below poverty level in 2010 and 2015 for the API, the City of Portland, and the MSA. In 2015, approximately 27 percent of the households in the API had income below the poverty level compared to 12 percent in the MSA and 18

Table 3-3. U.S. Department of Health and Human Services Poverty Guidelines

Persons in Family	Household Income	
	2010	2015
1	\$10,830	\$11,770
2	\$14,570	\$15,930
3	\$18,310	\$20,090
4	\$22,050	\$24,250
5	\$25,790	\$28,410
6	\$29,530	\$32,570
7	\$33,270	\$36,730
8	\$37,010	\$40,890

Source: HHS (n.d.)

percent in the City of Portland. In 2010, the number of households living below the poverty level in the API was 14 percent, which was only slightly less than the City of Portland (16 percent), but greater than the MSA (11 percent). The number of households living below the poverty level in the API increased between 2010 and 2015 from 14 percent to 27 percent. This increase was likely due, in part, to the opening in 2010 of the 176-unit Madrona Studios apartment building at 10 N Weidler, of which at least 146 units are occupied by qualifying low-income residents. Additional

Table 3-4. Household Income and Poverty

	API 2010	API 2015	Portland 2010	Portland 2015	MSA 2010	MSA 2015
Median Household Income	\$35,096	\$38,450	\$48,831	\$55,003	\$56,275	\$60,286
Mean Household Income	\$52,272	\$46,764	\$67,266	\$76,685	\$73,217	\$79,370
Households below Poverty	14%	27%	16%	18%	11%	12%

Notes: API = Area of Potential Impact; MSA = Portland–Vancouver–Hillsboro Metropolitan Statistical Area

subsidized apartment buildings in the API include the Urban Plaza Apartments, the Albina Corner Apartments, and the Miracle Central Apartments at the corner of NE 2nd and NE Wasco Street. Because of the income limits to be eligible to live in these apartment buildings, many of the current occupants are likely to meet the definition of low-income.

3.6.2 Environmental Consequences

3.6.2.1 No-Build Alternative

Under the No-Build Alternative, short-term construction impacts such as temporary air emissions and noise from construction equipment, traffic and transit disruptions, temporary closures of pedestrian and bicyclist routes, and potential disruptions in utility service that could potentially affect EJ populations in the API would not occur. However, similar short-term construction impacts from other projects in the API could affect EJ populations, depending on where those projects are located and the durations of construction activities. Potential long-term benefits to EJ populations from the Build Alternative, such as expanded travel choices and improved mobility and safety for all modes of transportation, enhanced east-west connectivity across I-5, and improved traffic operations and safety on the I-5 mainline and surface streets in the API, would also not occur under the No-Build Alternative. However, the past and present effects of gentrification in the API (i.e., residential and business displacements resulting from rapidly rising property values and rents) would likely continue under the No-Build Alternative.

3.6.2.2 Build Alternative

Potential short-term impacts to EJ populations from construction of the Build Alternative could include temporary exposure to noise, exhaust, and dust emissions from various types of construction equipment, including the release of hazardous materials from spills and leaks from construction equipment or exposure to existing contamination that was previously not exposed; temporary disruptions in transit service, including changes to normal bus routes and schedules; temporary closures of key walking and biking routes; and potential short-term interruptions in utility service.

Under the Build Alternative, future noise levels on the interior of Harriet Tubman Middle School, which has a substantial number of students of color, would increase from the current level of 49 A-weighted decibel (dBA) to 50 dBA, which is the Oregon Noise Abatement Approach Criteria (NAAC) threshold for requiring noise

abatement. If a 22-foot-tall noise wall were installed between I-5 and the school, as recommended in the noise analysis conducted for the Project, noise levels on the interior of the school would decrease to 45 dBA, which would be 5 dBA below the Oregon NAAC. This would be a beneficial reduction in noise compared to existing noise levels at the school (ODOT 2019g).

The Build Alternative would provide substantial long-term direct and indirect benefits to EJ populations in the API in the form of improved access to transit; improved mobility and safety for pedestrians, bicyclists, and transit riders; and improved physical connections to areas east and west of I-5 provided by the new highway covers and the Clackamas bicycle/pedestrian overcrossing. Improved transit service within and near the API and the addition of transit boarding islands on N/NE Broadway, N/NE Weidler, and Multnomah would provide a more accessible, comfortable, and attractive transit stop environment, which would benefit all members of the community.

As in the No-Build Alternative, the past and present effects of gentrification in the API would likely continue under the Build Alternative as improved access, mobility, and development opportunities increase the desirability of living in a vibrant neighborhood close to downtown Portland.

While EJ populations in the API may experience some small adverse impacts during construction and operation of the Build Alternative, none of these impacts are expected to rise to the level of “disproportionately high and adverse effects” as defined in Executive Order 12898.

No short- or long-term adverse indirect impacts to EJ populations from the Build Alternative are anticipated.

3.6.2.3 Mitigation

Potential impacts to minority or low-income populations would be avoided or minimized by the following mitigation measures:

- ODOT would require construction contractors to follow ODOT standard construction specifications that limit vehicle and equipment idling time, prevent dirt and other materials from being tracked out of construction zones on vehicle tires, and minimize the release of fugitive dust to address the potential for short-term exposure of EJ populations to noise, exhaust, and dust emissions during construction of the Build Alternative.
- ODOT would coordinate with the City of Portland and TriMet to monitor the effects of relocated bus routes on EJ populations during the anticipated 4-year construction period. If it is determined that EJ populations are experiencing disproportionate impacts, ODOT, the City, and TriMet would coordinate with the community to identify alternative bus routes to better serve EJ populations, possibly including an increase in the frequency of service on those routes.
- ODOT would coordinate with the City of Portland and members of the community to identify alternative routes for pedestrians and bicyclists to use during periods when key walking and biking routes are closed during construction.
- ODOT would monitor the effects the temporary closure of key walking and biking routes could have on EJ populations. If it is determined that disproportionate impacts to EJ populations are occurring, ODOT would identify additional reasonable measures to reduce those impacts, including providing free shuttle service through areas of construction.

- ODOT would provide substantial opportunities for participation in design and construction of the Build Alternative to qualified Disadvantaged Business Enterprises (DBEs), including local small and minority-owned businesses.

Considering the mitigation measures described above and the fact that the Build Alternative would provide notable beneficial effects for EJ populations living and working in the API in terms of improved access to employment and services (for all modes) and enhanced public safety, it has been determined that the Build Alternative would not cause disproportionate high and adverse effects on any minority or low-income populations in accordance with the provisions of Executive Order 12898 and FHWA Order 6640.23A.

3.7 Hazardous Materials

Hazardous materials, such as oil and petroleum products or lead-based paints, may be encountered during the construction and operation of public highway projects. Proper care and handling can reduce exposure of these materials to people and prevent them from affecting the environment. Common sources of hazardous materials contamination in urban areas include releases from underground storage tanks and spills or chemical releases from commercial and industrial businesses.

3.7.1 Existing Conditions

Because of its urban location and varied history of industrial and commercial land use, the Project Area contains numerous sites where hazardous materials are present in existing structures, the soil, and groundwater. The API for hazardous materials extends approximately 1 mile beyond the boundary of the Project Area to include areas where existing subsurface contamination could potentially migrate to areas where Build Alternative construction activity or property acquisitions would occur. In general, contaminated sites located upgradient of the Project Area are more likely to affect the area's environmental conditions because soil and groundwater contamination generally spreads to downgradient locations.

The Project team identified 182 "Sites of Concern" within the API. Sites of Concern are properties with known or suspected hazardous materials contamination based on a search of state and federal databases. Many of these Sites of Concern are associated with former underground storage tanks or heating oil tanks that had released petroleum hydrocarbons into the soil and/or groundwater. Other common sources of contamination include past spills or chemical releases from commercial businesses, such as auto repair shops and dry cleaners. Of the 182 Sites of Concern, 43 (24 percent) are located within the Project Area and 139 (76 percent) are located outside of the Project Area, but within the API. For additional details, see the Hazardous Materials Technical Report (ODOT 2019h).

In addition to specific Sites of Concern, a field survey conducted by the Project team identified several area-wide sources of potentially hazardous materials, including transient camps, overhead powerlines, pole-mounted transformers, street and property lights, and traffic signal lights. It is also standard ODOT practice to assume that surface soil adjacent to major highways is contaminated with hazardous materials to a depth of 18 inches below ground surface.

Some Project work may also occur in, or near, the Willamette River. A portion of the Willamette River, downstream from proposed Project in-water work, is within the

Portland Harbor Cleanup Superfund site, an area of past contamination. The portion of the river where in-water work would occur is within an additional study area, identified as the Lower Downtown Reach, in which ODOT and the City of Portland have conducted additional contaminated sediment investigations.

Preliminary sediment sampling was conducted in April 2018 between River Miles 12.1 and 12.2 of the Willamette River, which includes the area of potential in-water work for the Project. Several contaminants were identified in this area including some that exceed Oregon Department of Environmental Quality (DEQ) screening levels for certain metals and pesticides, polychlorinated biphenyls (PCBs), phthalates, and polycyclic aromatic hydrocarbons. The preliminary conclusion based on recent sampling indicates that contamination in the River Mile 12.1 to 12.2 area is not substantial, and these results "do not alter Oregon Department of Environmental Quality's (DEQ's) prior conclusion that this subarea is of low priority, and additional investigation appears unwarranted at this time." (GSI Water Solutions Inc. 2018). These preliminary sampling results are undergoing DEQ review.

3.7.2 Environmental Consequences

3.7.2.1 No-Build Alternative

Under the No-Build Alternative, disturbance of existing soil or groundwater contamination in the API is not anticipated, and therefore, no releases or spills are expected to occur. Private redevelopment activity within and near the Project Area is anticipated to continue. As private development occurs, cleanup of some sites containing hazardous materials may occur, depending on the location of future development.

3.7.2.2 Build Alternative

Under the Build Alternative, hazardous materials impacts could result if existing contaminated soil is encountered during construction, if structures to be demolished contain hazardous materials, or if contaminated property is acquired for additional ROW. Eleven of the 182 Sites of Concern are located on properties that would be acquired by ODOT (in full or partially) to enable the construction of various components of the Build Alternative. Of these sites, six are reported to have soil contamination, one is reported to have both soil and groundwater contamination, and three are occupied by buildings that likely have lead-based paint (LBP) and asbestos-containing building materials (ACBM). Excavation near these sites could encounter contaminated soil or groundwater, and if existing structures were to be demolished, LBP and ACBM would likely be encountered.

The Build Alternative would include in-water work to install up to 11 columns beneath the I-5 highway at, or near, the OHWM, and up to six columns supporting the SB I-5. This action is not expected to impact the Portland Harbor Superfund Site. Impacts on water quality are addressed in the Water Resources section.

Impacts during construction could include potential spills or releases of oil and fuel from mechanical equipment and the mobilization or release of previously unexposed contamination in soil and groundwater. Encountering contaminated soil and groundwater during construction activities could also increase human health and safety hazards for construction workers and the general public.

Long-term beneficial effects from the Build Alternative include improved traffic safety, which would reduce the likelihood of spills related to vehicular crashes.

It is also possible that implementation of the Build Alternative would facilitate an increased rate of redevelopment within the Project Area, potentially including properties currently containing hazardous materials. Prior to development (or redevelopment) of potentially contaminated properties, remediation of the properties would likely be required. A potential increase in the rate of hazardous materials cleanup would be a long-term indirect benefit to the environment from the Build Alternative.

3.7.2.3 Mitigation

Prior to acquiring properties or commencing construction activities, ODOT would conduct a full Hazardous Materials Corridor Study. The study would review historical information and existing databases to identify potential hazardous materials in the Project Area and on surrounding properties. ODOT would conduct Phase I Environmental Site Assessments¹⁰ for any properties to be acquired to construct the Build Alternative, and Phase II Environmental Site Assessments¹¹ would be conducted on properties where the Phase I Environmental Site Assessment indicated that contamination may be present.

ODOT would require the construction contractor to implement the following mitigation measures to address hazardous materials concerns:

- Prior to any demolition or removal activities, all structures would be tested for LBP and ACBM with a Hazardous Building Materials Assessment by a qualified contractor in accordance with worker protection and material disposal regulations (refer to ODOT's 2010 Hazardous Materials Program Procedures Guidebook [ODOT 2010]). Potential PCB-containing hydraulic or electrical equipment would be tested for PCBs by a qualified contractor prior to handling or disposal.
- During construction, the contractor would be required to follow the applicable regulations regarding the transport, use, and storage of hazardous materials.
- The contractor would be required to develop a Health and Safety Plan for all construction activities consistent with applicable laws and best practices in effect at the time of construction.
- The contractor would be required to follow a Project-specific Pollution Control Plan to prevent spills and contain their potential spread.
- The contractor would be required to develop a Contaminated Media Management Plan that specifies the correct handling and disposal of hazardous materials encountered during construction and includes procedures to be used if encountering previously unexpected hazardous materials.

Implementation of the mitigation measures listed above would help ensure that adverse effects from hazardous materials would not occur during construction and operation of the Build Alternative. Additional mitigation measures related to water resources are provided in Section 3.16.2.3.

¹⁰ Phase I Environmental Site Assessments include on-site inspections and interviews with property owners and operators; review of historical aerial photos, Sanborn Fire Insurance Maps, and City directories; and review of state and federal regulatory databases to identify known or suspected hazardous materials.

¹¹ Phase II Environmental Site Assessments include surficial and subsurficial soil or groundwater analysis; monitoring well installation; or indoor-air, mold, asbestos, lead, and other similar material sampling.

3.8 Historic Resources

Historic resources include buildings and places that provide connections between present and past generations. These resources inform us about our past and provide an important context to our lives today. Section 106 of the NHPA of 1966 requires federal agencies (including the FHWA) to take into account the effects of their actions on historic properties (36 CFR 800).

3.8.1 Existing Conditions

The API for historic resources extends east beyond the boundary of the Project Area to include approximately 39 additional acres of residential and commercial land in the historic neighborhood of Albina that may be subject to Project impacts such as noise. A records search conducted by the Project team identified 53 historic resources within the API that were previously recorded.

During a subsequent field survey conducted by the Project team, 107 individual resources that would be at least 50 years old at the time construction on the Build Alternative would begin (estimated 2023) were identified in the API. Of these, 20 individual resources were identified as potentially meeting the NRHP Criteria for Evaluation¹² and requisite levels of historic integrity. Based on further evaluation, 14 of the 20 resources were recommended as eligible for the NRHP. One potential historic district (the Eliot District) was also recommended as likely eligible for the NRHP (with eight of its contributing resources being located within the API).

ODOT received concurrence from the Oregon SHPO on the recommended NRHP eligibility for the 14 individual historic properties and the Eliot Historic District on January 23, 2019. The remaining historic resources were determined to be not eligible for the NRHP. Additional details on historic resources within the API are described in the Historic Resources Technical Report (ODOT 2019i).

3.8.2 Environmental Consequences

Each identified historic property in the API was assessed for potential effects using the criteria of effect and adverse effect from 36 CFR 800.5. An adverse effect occurs when an activity alters, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP. Examples of adverse effects include the following:

- Physical destruction of or damage to all or part of the property.
- Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary's standards for the treatment of historic properties (36 CFR 68) and applicable guidelines.
- Removal of the property from its historic location.
- Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance.
- Introduction of visual, atmospheric, or audible elements that diminish the integrity

¹² If a site meets the NRHP Criteria and retains its historical integrity (a historic property), then the federal agency is required to avoid, minimize, or resolve adverse effects to the property under the National Historic Preservation Act of 1966. Federal transportation agencies (i.e., FHWA, Federal Transit Administration, and Federal Aviation Administration) are also required to pursue all reasonable and prudent alternatives if a transportation project adversely affects a historic property under Section 4(f) of the National Transportation Act.

Eliot Historic District and 14 properties in the Project vicinity are eligible for the National Register of Historic Places (NRHP). No short- or long-term impacts would adversely affect the characteristics that make these historic properties eligible for listing in the NRHP.

of the property's important historic features.

- Neglect of a property that causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization.
- Transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

3.8.2.1 No-Build Alternative

Under the No-Build Alternative, construction activities conducted by other public or private entities could affect known historic resources. If federal funds were used for these projects, then the applicable agency would be required to comply with Section 106 of the NHPA.

3.8.2.2 Build Alternative

Table 3-5 identifies nine historic properties in the API potentially impacted by construction of the Build Alternative. These historic properties could experience short-term impacts such as noise and vibration from nearby construction activities, increased truck traffic, traffic congestion and changes to access, increased dust, and temporary changes to the historic setting due to the presence of construction equipment, staging areas, and materials storage areas.

The only historic property that would be affected by temporary easements or permanent property acquisition is the Travelodge at the Coliseum. The Build Alternative would require a temporary easement of approximately 4,010 square feet (sq. ft.) and a small permanent acquisition of approximately 174 sq. ft. from this historic property. The easement and acquisition would only affect 3.6 percent and 0.1 percent, respectively, of the historic property's total area. The Travelodge building itself would not be physically affected by construction of the Build Alternative, and the characteristics that make the building eligible for the NRHP would not be adversely affected.

The Build Alternative also has the potential to impact underground sewer lines in the API, several of which may be eligible for the NRHP. Some of these lines may need to be relocated to avoid conflicts with structural support columns and footings for new elevated structures. While several of these sewer lines are likely over 50 years old, they are part of a larger sewer system that has been updated, selectively replaced, and maintained over the past 100 years. These changes may have altered the historic characteristics that would otherwise make the sewers eligible for the NRHP. As design of the Build Alternative progresses, efforts would be made to avoid conflicts with underground sewer lines, particularly those with potential historic significance.

Long-term impacts to historic properties from operation of the Build Alternative could include changes to the settings of historic properties by the introduction of new transportation structures, including highway covers, lane/shoulders, ramp improvements, a multimodal highway overcrossing, and long-term atmospheric or audible impacts. A noise analysis performed by the Project team estimated that the Travelodge at the Coliseum would experience a very small increase in operations-related noise generated by nearby vehicle traffic. None of the potential short- or long-term impacts described above would be expected to adversely affect the characteristics that make these historic properties eligible for listing in the NRHP. Indirect impacts to historic resources from the Build Alternative would not result in measurable changes to, and diminished integrity of, archaeological resources.

Table 3-5. Historic Properties Potentially Impacted by the Build Alternative

Historic Property Name	Property Address	Short-Term Impacts	Effect Determination
Serene Court Apartments	1130 NE 1st Avenue	Audible, Visual, Vibration	No Adverse Effect
Calaroga Terrace	1400 NE 2nd Avenue	Audible, Visual, Vibration	No Adverse Effect
Travelodge at the Coliseum	1441 NE 2nd Avenue	Audible, Visual, Vibration	No Adverse Effect
Mt. Olivet Baptist Church	1734 NE 1st Avenue	Audible, Visual, Vibration	No Adverse Effect
Charles E. and Emma E. Holzer House	2027 N Williams Avenue	Audible	No Historic Properties Affected
Beatrice Mott Reed House	2107 N Vancouver Avenue	Audible	No Historic Properties Affected
Sullivan Pumping Station	211 NE Everett Avenue	Vibration	No Adverse Effect
The Hazelwood/ The Dude Ranch	222–240 N Broadway	Visual, Vibration	No Adverse Effect
Paramount Apartment House	253 N Broadway	Audible, Visual, Vibration	No Adverse Effect

In determining the effects of the undertaking upon historic properties, the agency finding would be “No Historic Properties Affected” [36 CFR 800.4(d)(1)], “No Adverse Effect” [36 CFR 800.5(b)], or “Adverse Effect” [36 CFR 800.5(d)(2)].

3.8.2.3 Mitigation

The implementation of BMPs during construction would reduce the potential for Project-related noise and inadvertent impacts to historic properties.

ODOT construction specifications and BMPs would be followed to help minimize high noise levels during construction. Effect avoidance and minimization measures for potential construction-related vibration would include pre- and post-construction assessments, on-site monitoring during construction, and stop work authorization. If a resource is anticipated to be affected by vibration, a treatment plan consistent with the Secretary of the Interior’s Standards for the Treatment of Historic Properties, and thus consistent with the requirements of 36 CFR 800.5 (b), would be prepared to make the applicable repairs.

ODOT and FHWA have developed a PA in consultation with the Oregon SHPO and other consulting parties to avoid and/or minimize the potential for Project-related

vibration to seven historic properties as the extent of these potential effects would not be known prior to the implementation of the Build Alternative (Appendix D [signature in progress; PA to be incorporated following signature]). With the execution of the PA, and the avoidance and minimization measures contained therein and in the Historic Resources Technical Report (ODOT 2019i), the Project would result in no adverse effects to the characteristics that make historic properties within the API eligible for the NRHP. Thus, a finding of “no historic properties adversely effected” pursuant to 36 CFR 800.5(b) is appropriate. Additional details on the effects assessment for historic properties are included in the Historic Resources Technical Report (ODOT 2019i).

3.9 Land Use

Land use planning manages growth and change in our communities. It seeks to balance land and public resources with transportation and economic needs in a sustainable manner. Oregon and the City of Portland have been at the forefront of developing innovative ways to coordinate land use and transportation planning to achieve the desired balance between growth and environmental protection.

3.9.1 Existing Conditions

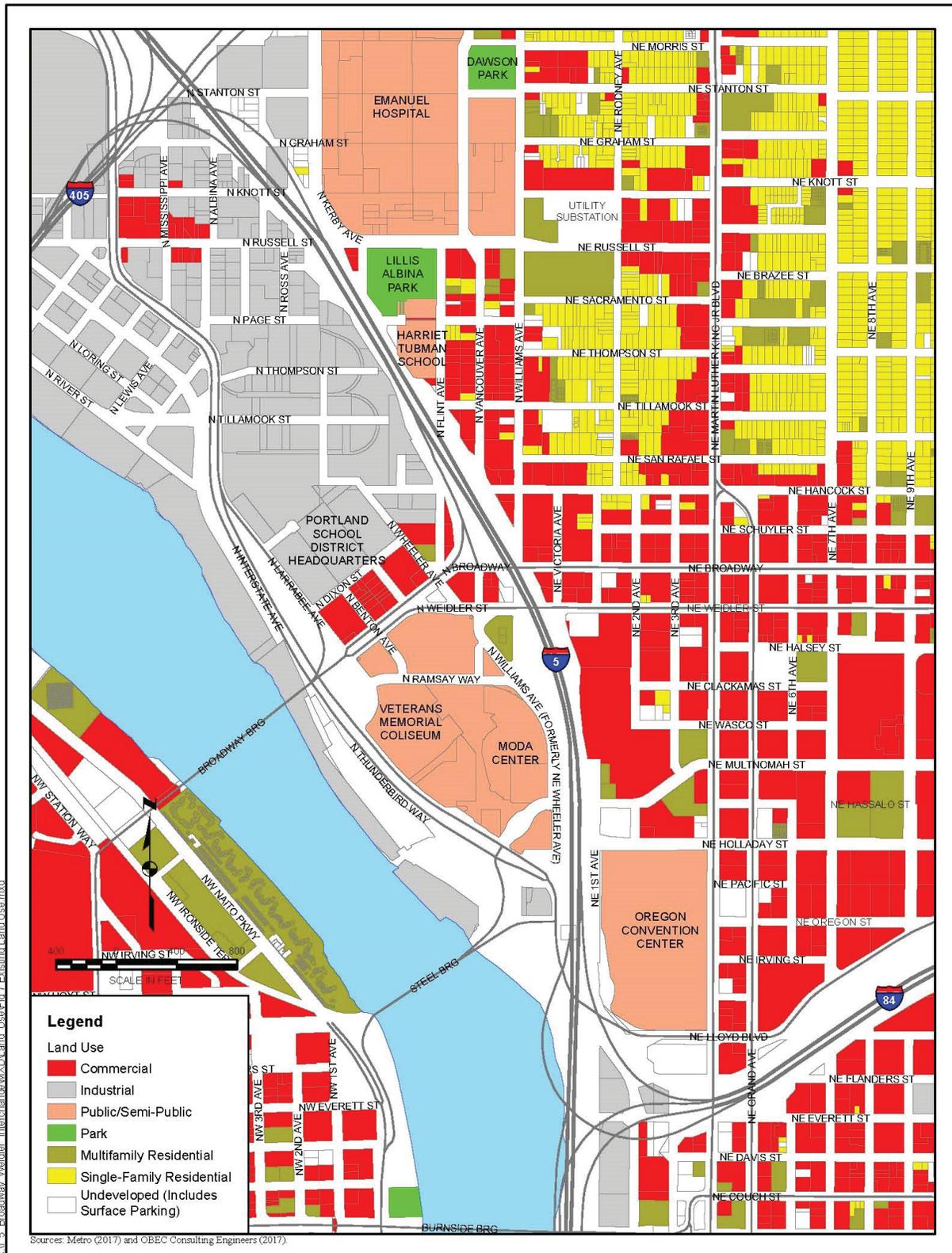
The land use API extends from the Willamette River east to NE 7th, north to NE Stanton Street, and south to the I-5 and I-84 interchange. Figure 3-1 shows existing land use within the API, and Figure 3-2 shows the current land use designations for parcels within the API from the City of Portland’s comprehensive plan. The City’s comprehensive plan generally calls for a continuation of the existing pattern of land uses within the API. Figure 3-2 also identifies the street classifications for roadways within the API from the City’s Transportation System Plan (TSP). Zoning in the API is consistent with the comprehensive plan land use designations.

- The API contains a diverse array of existing land uses, including:
- The region’s two major sports and entertainment arenas: the Moda Center and Veterans Memorial Coliseum;
- The region’s principal convention center;
- The central offices and maintenance facilities for Portland Public Schools;
- A mix of commercial and residential uses along and near the Broadway/Weidler corridor;
- Residential neighborhoods in the northeast portion of the area; and
- Industrial uses in the northwest portion of the area.

3.9.2 Environmental Consequences

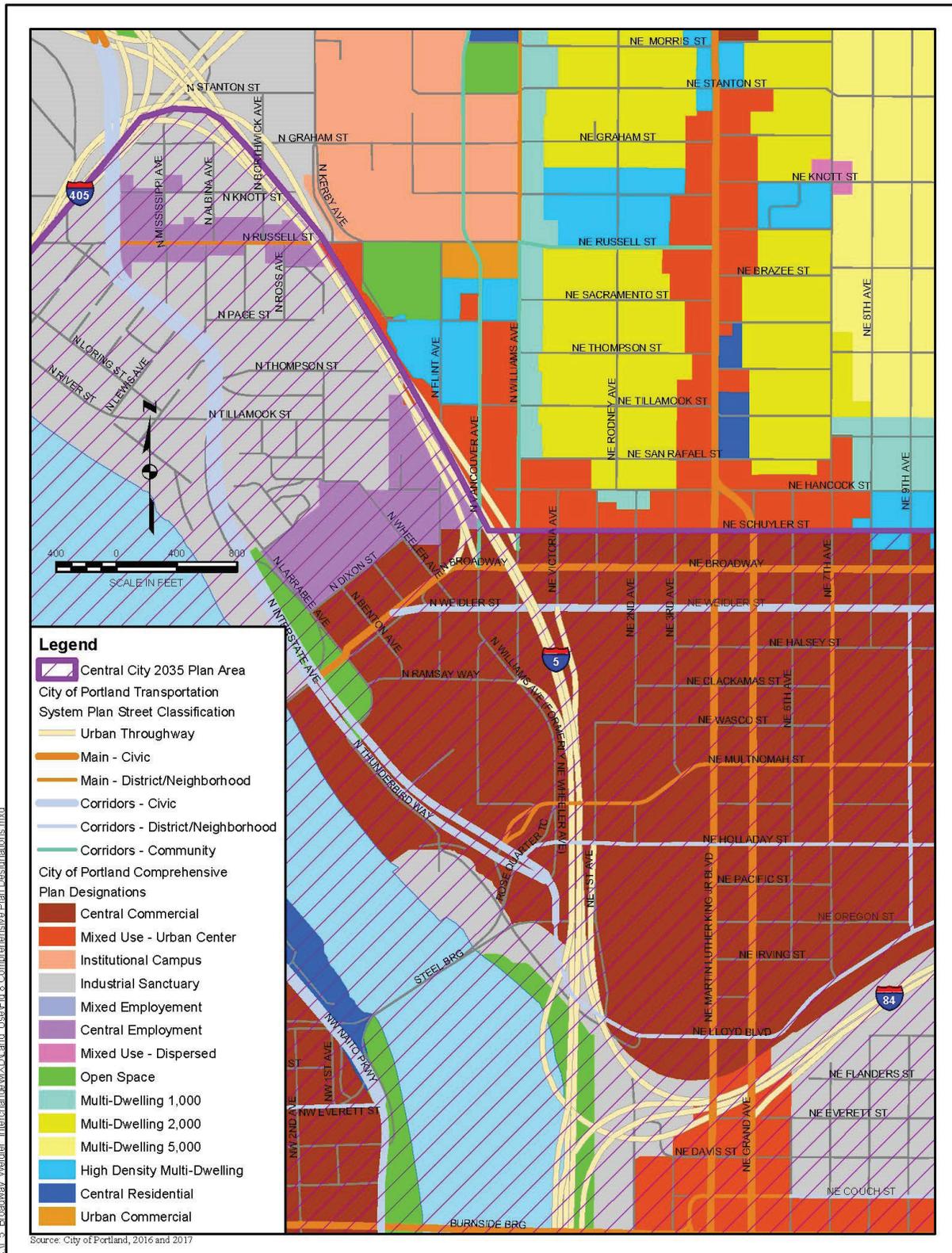
This section documents compliance or compatibility of the No-Build and Build Alternatives with state, regional, and local transportation and land use laws, plans, and policies; identifies direct land use impacts by quantifying the amount of land acquired and converted to ROW or transportation use; and demonstrates how ODOT and the City of Portland integrated land use considerations into the design of the Build Alternative.

Figure 3-1. Existing Land Use



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Figure 3-2. Comprehensive Plan Designations



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3.9.2.1 No-Build Alternative

Under the No-Build Alternative, no non-transportation land uses would be acquired or converted to ROW or transportation use; therefore, no direct land use impacts would occur. However, the No-Build Alternative would have an adverse effect on the City of Portland's long-term vision for land development within the API. The City of Portland's Adopted Central City 2035 Plan is based on a formal agreement between the City and ODOT that the plan will include the Build Alternative. The No-Build Alternative would have two major consequences for future land development in the API and other areas of the City. First, the City would be unable to implement some aspects of the land use components of the Central City 2035 Plan, as adopted. For example, some planned re-zonings to allow higher levels of employment or population density or land uses that generate high traffic volumes would not be allowed and the City would be required to amend the land use provisions of the Central City 2035 Plan. Second, ODOT would require the City to apply ODOT vehicle traffic mobility (congestion) standards and possibly amend land use designations, as defined in the Central City 2035 Plan, particularly near the Broadway/Weidler interchange. These changes would likely have the effect of limiting allowed development within the API.

3.9.2.2 Build Alternative

Most of the land in the API that would be affected by the Build Alternative is currently owned by ODOT or the City of Portland and is already in transportation use. However, based on the current design configuration, the Build Alternative would convert approximately 2.5 acres of land to transportation use. The amount of land by land use classification would be as follows:

- Commercial Use: 81,626 sq. ft.
- Industrial Use: 7,349 sq. ft.
- Public/Semi-Public Use: 17,468 sq. ft.
- Undeveloped: 4,356 sq. ft.

Approximately 15 percent of the land that would be converted to transportation use under the Build Alternative is owned by the City of Portland (Figure 3-3). Ownership of the converted land would be transferred to ODOT or become City of Portland street ROW. The exact amount of property converted to transportation use under the Build Alternative would be determined during final design and would be subject to negotiations between ODOT and affected property owners, pursuant to federal law and regulations. At present, no privately owned residential land would be converted to transportation use under the Build Alternative.

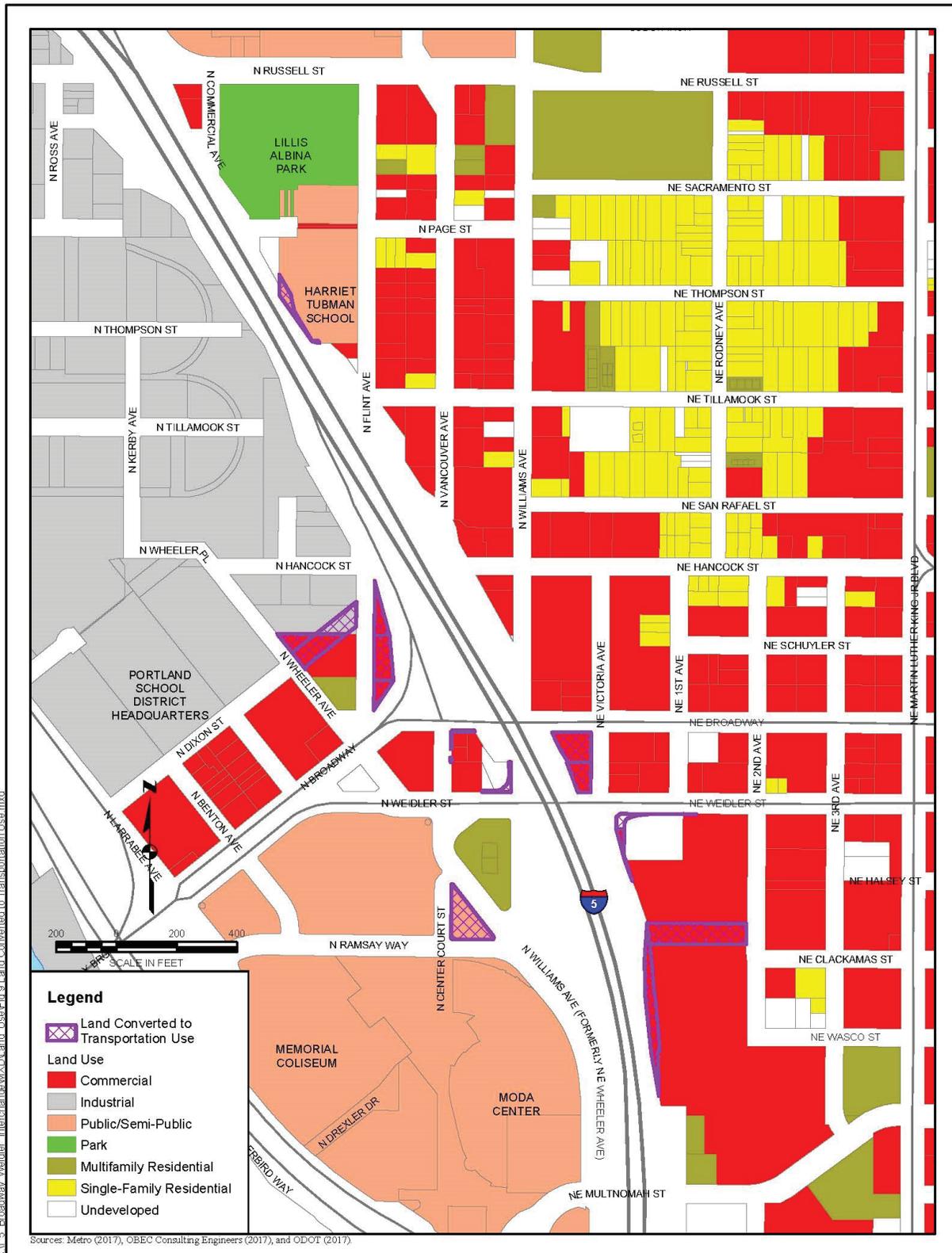
The conversion of land to transportation use under the Build Alternative would not cause any instances of non-conforming development but would require the relocation of four commercial retail or service-related businesses: a daycare center, a gas station/convenience store, a paint store, and a real estate/mortgage office. ODOT would assist these businesses in relocating to other suitable properties within the Project Area, if possible. In addition, a small permanent underground easement would be required from the Harriett Tubman Middle School to accommodate the construction of a retaining wall between the school property and I-5. Additional information on property acquisitions and business relocations is presented in the Right of Way Technical Report (ODOT 2019i).

Several parcels would be acquired under the Build Alternative but would not be converted to transportation use. For example, the block bounded by NE Victoria,

The No-Build Alternative would limit the City of Portland from implementing some aspects of long-term goals contained in the Adopted Central City 2035 Plan.

Under the Build Alternative, approximately 2.5 acres would be converted to transportation use. This estimate will be refined through future Project design.

Figure 3-3. Land Converted to Transportation Use



K:\I-5_Broadway_Weidler_Interchange\MXD\Land_Use\Fin 8_Land_Converted_to_Transportation_Use.mxd

NE 1st Avenue, NE Broadway, and NE Weidler would be acquired for construction staging (i.e., a designated area near a construction site where vehicles, supplies, and construction equipment are positioned for access and use). Land acquired and used temporarily for construction staging is not considered a conversion to transportation use. Similarly, three parcels located on NE Broadway between NE Victoria and N Williams would be acquired but not converted to transportation use following construction of the Build Alternative. These parcels would be sold after construction is completed and would likely be developed for commercial, residential, or mixed use.

Under Oregon's Statewide Planning Program, cities are obligated to ensure that land uses specified in comprehensive plans are supported by the existing and planned transportation facilities that serve them. The City has met this obligation by including the Build Alternative in its TSP. In addition, the Project is part of the Adopted Central City 2035 Plan, approved as part of the City of Portland's comprehensive plan.

Because the Build Alternative is identified as a planned transportation improvement in the City of Portland's comprehensive plan, and ODOT developed the Project in cooperation with the City of Portland as part of an integrated transportation and land use planning process, the Build Alternative would not be expected to result in unanticipated adverse direct or indirect land use impacts and would instead support existing and planned land use in the API. A detailed discussion of how the Build Alternative complies with applicable state, regional, and local transportation and land use laws, plans, and policies over the life of the Project is presented in the Land Use Technical Report (ODOT 2019k).

3.9.2.3 Mitigation

Because the Build Alternative complies with the City of Portland comprehensive plan, the RTP, and applicable state land use laws, plans, and policies, no additional avoidance, minimization, or mitigation measures are proposed.

If the Build Alternative is determined to be subject to the design overlay zone requirements of the Lloyd Subdistrict of the Central City Plan District or require review under the Willamette River Greenway provisions of the City of Portland zoning code, adjustments to its design may be necessary. Such design adjustments would be intended to help the Build Alternative comply with land use regulations, thus revisions to do so would not be expected to have adverse impacts on land use.

3.10 Noise

Noise may be considered exposure to unwanted or disturbing sound levels. Transportation projects may frequently be a source of noise, both during construction activities and as a result of traffic noise associated with proximity to roads and highways.

3.10.1 Existing Conditions

The API used to assess noise impacts includes the Project Area shown in Figure 1-1 and an additional 500-foot buffer beyond the perimeter of the Project Area to capture the full extent of existing traffic behavior and associated noise levels near the proposed construction area. Existing (2017) noise levels were monitored at six locations within the API to validate the computer model¹³ used to predict existing and

¹³ Existing and future traffic noise levels were calculated using FHWA's Traffic Noise Model (TNM). Inputs to the model include three-dimensional descriptions of road alignments, vehicle volumes in defined vehicle

future traffic noise levels, with and without the Build Alternative.

Following validation of the noise model runs developed for the Project, existing peak noise hour levels were modeled at 100 noise receivers¹⁴ (i.e., prediction sites) in the API selected based on their land use category, proximity and relative aspect to roadways affected by the Build Alternative, and/or the presence or absence of frequently used exterior areas. Predicted existing noise levels for these receivers ranged from 55 to 75 dBA¹⁵ for outdoor use areas and 34 to 49 dBA for interior areas. The applicable ODOT NAAC for residential land uses, parks, churches, day care centers, and medical facilities (exterior) is 65 dBA, while the NAAC¹⁶ for medical facilities (interior) and schools (interior) is 50 dBA.

The assessment of existing conditions determined that noise levels in exceedance of the NAAC presently occur throughout the API, particularly in areas east of the I-5 corridor. Seventy-one of the 100 receivers, representing 116 residential receptors, 2 medical facility outdoor use areas, 1 park, and 1 day care outdoor use area were predicted to have noise levels that meet or exceed the NAAC under existing conditions. Exceedances of the NAAC for existing conditions are not considered to be “impacts” as defined in the ODOT Noise Manual (ODOT 2011); therefore, consideration of noise abatement measures for existing conditions is not required. For detailed information on existing noise levels in the API, see the Noise Technical Report (ODOT 2019g).

3.10.2 Environmental Consequences

Pursuant to the federal noise standard (23 CFR 772), noise impacts are considered to occur when traffic noise levels approach or exceed the FHWA Noise Abatement Criteria for specific land use types or when the predicted traffic noise levels during the peak noise hour substantially exceed the existing noise levels. ODOT is responsible for implementing the FHWA regulations in Oregon and considers a traffic noise impact to occur if predicted noise levels are 2 dBA less than the FHWA criteria. ODOT considers a 10 dBA increase over existing noise levels to be a substantial increase. A 10 dBA increase over existing noise levels is typically required for an average listener to perceive a “doubling” of sound.

3.10.2.1 No-Build Alternative

Under the No-Build Alternative, the model predicted future (2045) noise levels in the API to range from 56 to 75 dBA for outdoor use areas and 34 to 49 dBA for interior areas. The predicted noise levels for the No-Build Alternative ranged from 1 dBA lower to 1 dBA higher than predicted existing noise levels. Sixty-nine receivers representing 112 residential receptors, 2 medical facility outdoor use areas, 1 park, and 1 day care outdoor use area were predicted to have noise levels that meet or exceed the NAAC of 65 dBA for residential land uses, parks, day care centers, and

Existing noise levels in the Project Area are worse than national standards for human health, and would worsen under the Build and No Build Alternatives due to increases in traffic volumes over time.

classes, vehicle speeds, traffic control devices, and data on the characteristics and locations of specific ground types, topographical features, and other features likely to influence the propagation of vehicle noise between the roadway and the receiver.

14 A “receiver” is a discrete point modeled in the TNM program, whereas a “receptor” is defined as a representative location of a noise-sensitive area for various land uses. In areas where there is a common noise environment, one modeled TNM receiver can be considered representative of many receptors.

15 All noise levels referred to in this EA are stated as hourly equivalent sound pressure levels (Leq) in terms of dBA. The equivalent sound pressure level is defined as the average noise level, on an energy basis, for a stated period of time (hourly). Noise levels stated in terms of dBA approximate the response of the human ear by filtering out some of the noise in the low and high frequency ranges that the ear does not detect well. A-weighting is used in most environmental ordinances and standards

16 ODOT’s noise levels for abatement consideration for noise sensitive receivers. The NAAC are 2 dBA less than the FHWA Noise Abatement Criteria levels.

medical facilities (exterior).

Noise levels in exceedance of the ODOT NAAC under the No-Build Alternative were predicted throughout the API and occur predominantly east of the I-5 corridor. Exceedances of the NAAC for the No-Build Alternative are not considered to be “impacts” as defined in the ODOT Noise Manual (ODOT 2011). Therefore, consideration of noise abatement measures for the No-Build Alternative is not required. For detailed information on future noise levels in the API under the No-Build Alternative, see the Noise Technical Report (ODOT 2019g).

3.10.2.2 Build Alternative

During construction of the Build Alternative, normal construction activities would generate noise levels in the range of 70 to 100 dBA at a distance of 50 feet. Typical noise levels associated with common construction equipment are listed in Table 3-6. These noise levels, although short-term in nature, can be disturbing. ODOT specifications would be followed to help minimize high noise levels during construction (see Section 3.10.2.3).

The long-term noise levels for the Build Alternative predicted by the noise model ranged between 56 to 76 dBA for outdoor use areas and 36 to 51 dBA for interior areas. Seventy-six receivers representing 117 residential receptors, 66 medical facility indoor use areas, 1 school indoor use area, 2 medical facility outdoor use areas, 1 park, and 1 day care outdoor use area were predicted to meet or exceed

Small increases in noise levels under the Build Alternative would occur due to changes in traffic patterns resulting from improvements to the roadway network and shifts in roadway alignment. These increases would be less than sound levels detectable by an adult with normal hearing.

Table 3-6. Typical Construction Equipment Noise (dBA)

Types of Activities	Types of Equipment	Range of Noise Levels at 50 Feet
Materials Handling	Concrete mixers	75–87
	Concrete pumps	81–83
	Cranes (movable)	76–87
	Cranes (derrick)	86–88
Stationary Equipment	Pumps	69–71
	Generators	71–82
	Compressors	74–87
Impact Equipment	Pneumatic wrenches	83–88
	Rock drills	81–98
Land Clearing	Bulldozer	77–96
	Dump truck	82–94
Grading	Scraper	80–93
	Bulldozer	77–96
Paving	Paver	86–88
	Dump truck	82–94

Source: U.S. Environmental Protection Agency 1971

Notes: dBA = A-weighted decibel

the NAAC. Noise levels in exceedance of the NAAC under the Build Alternative were predicted throughout the API, predominantly east of the I-5 corridor.

Compared to both existing conditions and the No-Build Alternative, long-term noise levels under the Build Alternative were predicted to decrease by up to 1 dBA or increase by up to 3 dBA. A 3 dBA increase in sound is barely perceptible to humans, but a 10 dBA increase is commonly perceived as a doubling in sound. Per the ODOT Noise Manual (ODOT 2011), a 10 dBA increase over existing noise levels is required for a noise level increase to be considered a substantial impact. Therefore, substantial long-term noise impacts in the API from the Build Alternative are not anticipated. This would also be the case for indirect noise impacts because the traffic data used in the noise analysis captures the indirect noise impacts that may result from the Build Alternative.

3.10.2.3 Mitigation

During the construction phase of the Build Alternative, ODOT would require the construction contractor to implement the following noise abatement measures to minimize the adverse effects of construction activity on the local community:

- No construction would be performed within 1,000 feet of an occupied dwelling unit on Sundays, legal holidays, or between the hours of 10:00 PM and 6:00 AM on other days, without the approval of the ODOT construction project manager.
- All equipment used would have sound-control devices no less effective than those provided on the original equipment. No equipment would have unmuffled exhaust.
- All equipment would comply with pertinent equipment noise standards of the U.S. Environmental Protection Agency.

If a specific noise impact complaint occurs during the construction of the Build Alternative, one or more of the following noise mitigation measures may be required at the construction contractor's expense as directed by the ODOT construction project manager:

- Stationary construction equipment would be located as far from nearby noise-sensitive properties as feasible.
- Idling equipment would be shut off when not in use.
- Construction operations would be rescheduled to avoid periods of noise annoyance identified in the complaint.
- Nearby residents would be notified whenever extremely noisy work would be occurring.
- Temporary or portable acoustic barriers would be installed around stationary construction noise sources.

Because a large number of properties in the API were predicted to meet or exceed the NAAC under the Build Alternative, noise abatement measures were considered and evaluated for feasibility and reasonableness per FHWA and ODOT guidelines. Seven noise wall alignments were evaluated to mitigate predicted noise impacts. Two of the noise walls were judged to be acoustically feasible by meeting the design goal of at least a 7 dBA reduction at one receiver, as well as achieving a better than 50 percent rate of benefits (i.e., at least a 5 dBA noise reduction) at impacted receivers. Both walls were found to be reasonable based upon the ODOT cost effectiveness requirements and have therefore been recommended for further consideration. The remaining five walls were not able to achieve the required noise reductions at adjacent properties

The Project proposes two sound walls that would reduce noise at Albina Park, Harriet Tubman Middle School, and residential neighborhoods near I-5.

because of challenges with complex traffic noise sources or because elevation issues precluded the breaking of the line-of-sight between noise sources and receivers. As a result, those walls were not recommended for further consideration. For detailed information on the evaluation of noise walls for the Build Alternative, see the Noise Technical Report (ODOT 2019g).

The two noise walls considered acoustically feasible and reasonable are described as follows:

- **Wall 2b:** Wall 2b would be 22 feet high and approximately 1,101 feet long, extending along the eastern edge of I-5 ROW from approximately N Russell to N Flint. The wall would be designed to shield Lillis-Albina Park, Harriet Tubman Middle School, and a single-family residence (and historic building) near the intersection of N Tillamook and N Vancouver from highway noise.
- **Wall 4:** Wall 4 would be 23 feet high and would extend approximately 1,715 feet along the eastern edge of the I-5 ROW between NE Weidler and a point approximately 265 feet south of NE Holladay Street. The wall would shield the following receptors from highway noise:
 - One outdoor recreational area (a basketball court) at the Crown Plaza hotel, which is also the historic Travelodge at the Coliseum.
 - One outdoor use area at a medical facility as well as five indoor uses.
 - 104 outdoor balconies at residential units at the Calaroga Terrace building on the northeast corner of the intersection of NE Clackamas and NE 2nd.
 - Twelve outdoor balconies at residential units at a new mixed-use building constructed on the northeast corner of the intersection of NE Wasco Street and NE 2nd.
 - Five outdoor balconies at residential units at the Milano Apartment Building located on the northeast corner of the intersection of NE Multnomah and NE 1st.

Further evaluation of feasibility and reasonableness of these two noise walls will be made during final design, including a more detailed analysis of constructability, as well as the potential visual impacts of these walls on affected property owners and residents. A final decision of the installation of the abatement measure(s) will be made upon completion of the Project's final design, a cost-estimating process, constructability review, and the public involvement processes. For more information on these two recommended noise walls, see the Noise Technical Report (ODOT 2019g).

3.11 Right of Way

ROW is a legal right of passage over a piece of land, especially as it relates to the space occupied by linear transportation features such as highways or roads. Where it does not already exist, this right can be achieved through property acquisition or establishing easements. Just compensation based on fair market value and highest and best use is paid to owners of private property taken for a public purpose.

3.11.1 Existing Conditions

The ROW API includes the Project Area shown in Figure 1-1 and extends beyond the Project Area in a few small areas based on the need for temporary and permanent easements. Most of the API is occupied by highway and other public ROWs. Much of the proposed Build Alternative would therefore be located on public-owned property and ROWs, including the highway itself and public-owned lots under and/or adjacent

to the highway corridor, the majority of which are used by public agency maintenance departments for access and parking due to the overhead highway structures. For more details on ROW in the API, see the Right of Way Technical Report (ODOT 2019j).

Most properties within the API would not be affected. Nearly all the affected properties within the API are currently zoned for commercial or industrial use and are slated for some type of mixed-use development, allowing greater densities and more intensive uses. The remaining few affected parcels that are zoned residential are currently used for either institutional or commercial purposes.

3.11.2 Environmental Consequences

The potential ROW impacts, just compensation, and benefits due to affected property owners and/or tenants as a result of the Build Alternative were estimated in accordance with the ODOT Right of Way Manual (ODOT 2016); ORS Volume 1, Chapter 35; Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (URA), as amended (42 USC 4601 et seq.); and 49 CFR 24.

3.11.2.1 No-Build Alternative

The No-Build Alternative consists of existing conditions and other planned and funded transportation improvement projects that would be completed in and around the Project Area by 2045. The No-Build Alternative would not require property acquisitions; therefore, there would be no direct impacts associated with ROW acquisitions or easements. Potential ROW impacts resulting from non-ODOT actions considered under the No-Build Alternative (i.e., those associated with the City of Portland's list of financially constrained projects under the current RTP) are considered negligible, and the existing ROW would remain the same aside from these non-ODOT actions. The proposed I-5 mainline and Broadway/Weidler interchange area improvements would not be constructed, and the current road system would remain in place.

Indirect impacts from the No-Build Alternative could include adverse effects on property values and the real estate market due to increasing congestion near the Broadway/Weidler interchanges and continuing safety concerns within the Project Area. Due to pedestrian, vehicular, and bicycle safety concerns, potential business or residential occupants might locate elsewhere, resulting in lower demand that would affect real estate development or sales with an unintended adverse economic impact.

3.11.2.2 Build Alternative

The ROW impact assessment is based on an approximate 5 percent conceptual design level. ROW impacts would be further clarified once the final design/construction phase is funded and the design progresses toward a 30 percent completion level.

Short-term impacts would include temporary construction-related actions both within the existing ROW and within the API, due to the staging of construction activities, diversion of traffic, and restricted access to local businesses. Measures such as construction BMPs, temporary traffic control plans, and temporary access plans would minimize ROW impacts to businesses, residents, community facilities, and services.

Long-term direct impacts occur when property and/or property rights need to be acquired for privately and publicly owned tax lots. A displacement occurs if relocation of persons or property results from a ROW acquisition. In addition to potential

property impacts, tree removal may occur within public ROW. Tree removal would be minimized through future design.

The Build Alternative would have the following approximate impacts to property and/or property rights: 3.5 to 4.0 acres in fee simple (permanent acquisition); 0.5 to 1.5 acres of permanent easement for surface and/or subsurface uses, primarily related to retaining walls and maintenance access; and approximately 1.5 to 2.5 acres of temporary easement for construction work areas, driveway reconnections, and staging. The estimated ROW impacts would consist of approximately 31 ROW Files (note that each ROW File is a collection of adjacent parcels/tax lots) (Table 3-7). The actual number of ROW Files would be determined during the ROW acquisition phase, which would follow completion of environmental review.

The Build Alternative would displace and relocate four commercial retail or service-related businesses, three landlord-only businesses, four outdoor advertising signs,

Table 3-7. Estimated ROW Needs

ROW Property Types	Total Number of ROW Files	Type of Acquisition or Easement	
		Number of Full Acquisition	Number of Partial Acquisition (Fee, PE, and/or TE)
Privately Owned Property	21	7	14
Publicly Owned Property	10	1	9
TOTAL	31	8	23

Notes: PE = permanent easement; ROW = right of way; TE = temporary easement

and eight personal-only properties. No residential displacements are anticipated. Displaced businesses are not "sole source" type businesses or unique to the surrounding community. Business relocations based on the conceptual layout would include a day care center, gas station/convenience store, paint store, and a real estate/mortgage office. Properties owned for the sole purpose of leasing to others are considered landlord-only businesses; relocations of this type may be triggered depending on the purpose of the property ownership. For those properties displaced by the Build Alternative, ODOT would provide a relocation assistance program. The URA ensures the fair and equitable relocation and re-establishment of persons, businesses, farms, and nonprofit organizations displaced as a result of federal or federally assisted programs. ODOT policy on relocations can be found in Chapter 6 of its Right of Way Manual (ODOT 2016).

Access (driveway) modifications are anticipated within the API to facilitate safer egress and ingress. Excluding the full acquisitions, five parcels have been identified that are likely to require driveway access modifications.

Beneficial impacts to real estate from the Build Alternative would include improved sidewalks, safe bicycle lanes, additional ADA-compliant street crossings, and safer ingress and egress to parcels. Such impacts would not require acquisition from most

parcels within the API. These types of improvements can eventually lead to increased property values.

The cost for these ROW impacts is estimated as at least \$50 to \$55 million in 2018 dollars. These ROW costs include the following: land acquired in fee and temporary construction easements (i.e., estimated value to acquire bare land), improvements within the acquisition area (i.e., estimated contributory value of any improvements to the bare land—buildings, structures, landscaping, fences, signs, retaining walls, asphalt, concrete, etc.), damages to the remainder property, relocation benefits, demolition, personnel and related costs, legal, and contingency. The ROW cost estimate excludes the cost of utility relocations, environmental investigations, and remediation that might be required for acquired properties.

The Build Alternative would not have adverse long-term and operational indirect impacts to the ROW associated with I-5 or City of Portland streets.

In summary, short- and long-term impacts would occur as a result of ROW considerations associated with the Build Alternative. However, these impacts would not be substantial.

3.11.2.3 Mitigation

ROW impact research for this EA was conducted and summarized in 2017 and 2018. During this time, there have been multiple workshops, community outreach efforts, and avoidance and minimization measures implemented to avoid or minimize impacts. These avoidance and minimization measures have reduced the number of initially projected property impacts from the Build Alternative and have been incorporated into the current Project design. No additional mitigation is proposed. Measures that would be considered by ODOT during ROW acquisition include the following:

- Ensure fair and equitable treatment of all persons affected by the Build Alternative by performing all ROW acquisition and relocation activities in accordance with the URA (49 CFR 24), ORS 35, and the ODOT Right of Way Manual (2016).
- Conduct relocation interviews early in the ROW acquisition process to identify and address any special needs.
- Provide interpreter and translation services for owners and tenants, as needed.
- Identify ways to minimize or mitigate impacts to individual properties through design and/or construction staging, such as through BMPs, temporary traffic control plans, and temporary access plans.
- Explore the use of alternative acquisition methods such as early or advance acquisition for full site acquisitions where design cannot be changed.
- Phase any work adjacent to schools, such as retaining wall and column work, to occur during summer months to avoid disruptions.
- When the design level is more advanced, revisit whether construction activities would have an effect on adjacent properties and businesses with sensitive patients, medical equipment, or machinery.
- Conduct early discussions with Oregon Department of State Lands and Union Pacific Railroad Company regarding ROW needs and processes for work near their lands, including new and existing structures over the Union Pacific Rail Corridor.

3.12 Section 4(f)

Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 United States Code [U.S.C.] 303[c]) protects historic properties, park and recreational facilities, and wildlife and waterfowl refuges (23 CFR 774). The Act provides a key safeguard to these important public resources that enhance communities and enrich the lives of local residents and visitors to these areas.

3.12.1 Existing Conditions

The API for the Section 4(f) analysis is the same as the API for historic resources and extends east beyond the boundary of the Project Area to include the historic neighborhood of Albina. The 14 individual historic properties and 8 historic resources contributing to the NRHP eligibility of the Eliot Historic District described in Section 3.8 are considered Section 4(f) resources.

Four public parks located in the API also qualify as Section 4(f) resources:

- Vera Katz Eastbank Esplanade
- Willamette River Greenway Trail
- Lillis–Albina Park
- Portland Peace Memorial Park

The Vera Katz Eastbank Esplanade is part of the Willamette River Greenway Trail and is located in the southern portion of the API. While a component of the Willamette River Greenway Trail, the Vera Katz Eastbank Esplanade is a City of Portland park. The Willamette River Greenway Trail is an interconnected network of trails managed and/or owned by a number of entities (including the City of Portland). Lillis–Albina Park is located at the northern end of the API, and the Portland Peace Memorial Park is located just east of the Vera Katz Eastbank Esplanade in the southern end of the API. Additional information on these Section 4(f) resources can be found in the Section 4(f) Technical Report (ODOT 2019).

3.12.2 Environmental Consequences

3.12.2.1 No–Build Alternative

No direct or indirect impacts to Section 4(f) properties would occur under the No–Build Alternative.

3.12.2.2 Build Alternative

Travelodge at the Coliseum

The Build Alternative would directly impact the property on which the Travelodge at the Coliseum is located. A permanent property acquisition of approximately 174 sq. ft. and a 4,010 sq. ft. temporary easement would be required to construct the Build Alternative near the NB I–5 off–ramp to NE Weidler. The historic hotel on the property would not be physically impacted, and no physical features that contribute to the building’s historical significance would be affected.

Additional impacts to historic properties in the API, including the Travelodge, would include noise and vibration impacts due to nearby construction activities, increased truck traffic, traffic congestion and changes to access, increased dust, and short–term visual changes due to construction equipment, staging areas, and material

The Build Alternative could result in potential temporary closures to the Vera Katz Eastbank Esplanade and the Willamette River Greenway Trail during construction.

storage. Short-term noise levels from construction activities could range from approximately 70 to 100 dBA.

A noise analysis performed by the Project team estimated that long-term operations-related noise generated by nearby vehicle traffic would increase noise levels at an outside recreation area (basketball court) near the historic hotel from the current 61 dBA to 62 dBA, which would be well below the NAAC threshold of 65 dBA for a Section 4(f) property. If a 23-foot noise wall were installed between I-5 and the Travelodge, as recommended in the *ODOT Noise Technical Report* (ODOT 2019g), the predicted noise levels at the Travelodge would be 57 dBA, which would be 8 dBA below the NAAC threshold for a Section 4(f) property.

The permanent property acquisition, temporary easement, noise effects, and potential for vibration from construction activities described above would not adversely affect the features, attributes, or activities qualifying the Travelodge at the Coliseum for protection under Section 4(f).

The small permanent acquisition and temporary easement from the Travelodge at the Coliseum would qualify as a "*de minimis*"¹⁷ use of a Section 4(f) property. The effect avoidance and minimization conditions contained in the *Historic Resources Technical Report* (ODOT 2019i), and in the PA described in Section 3.8.2.3, would ensure that potential construction-related vibration impacts to the Travelodge at the Coliseum do not exceed the *de minimis* impact threshold. In addition, the potential noise wall (Wall 4) described in Section 3.10.2.3 would shield the Travelodge at the Coliseum from future direct and indirect noise impacts from I-5 and further ensure that the Build Alternative would not result in noise impacts that would exceed ODOT's NAAC standard. There is no Section 4(f) "*constructive use*"¹⁸ of the Travelodge at the Coliseum.

Vera Katz Eastbank Esplanade

The Build Alternative could require temporary occupation of segments of the Vera Katz Eastbank Esplanade during the construction phase of the Project to ensure public safety for park visitors or to accommodate equipment staging and/or access. Portions of the Eastbank Esplanade, primarily along the western edge of I-5 and between the Steel Bridge to the north and the overwater portion of the Esplanade to the south, could periodically be closed to users during Project construction. Temporary occupancy of a Section 4(f) property (e.g., Vera Katz Eastbank Esplanade) to conduct construction activities is permitted when all of the conditions listed in 23 CFR 774.13(d) are satisfied.¹⁹ ODOT has identified a potential location where

17 A *de minimis* impact involves the use of Section 4(f) property that is generally minor in nature. For historic properties, a *de minimis* impact is one that results in a Section 106 determination of "no adverse effect" or "no historic properties affected."

18 "Constructive use" of a Section 4(f) property involves no actual physical use of the Section 4(f) property via permanent incorporation or temporary occupancy of land into a transportation facility. A constructive use occurs when a project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired and the resource can no longer perform its designated function (23 CFR 774.15).

19 A "temporary occupancy" of a Section 4(f) property does not constitute a Section 4(f) "use" when all of the conditions listed in 23 CFR 774.13(d) are satisfied:

Duration must be temporary, i.e., less than the time needed for construction of the project, and there should be no change in ownership of the land.

Scope of the work must be minor (i.e., both the nature and the magnitude of the changes to the Section 4(f) property are minimal).

There are no anticipated permanent adverse physical impacts, nor will there be interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis.

The land being used must be fully restored (i.e., the property must be returned to a condition which is at least

temporary detour routes could be located that would allow for continued use of the Eastbank Esplanade during construction, thereby meeting the Section 4(f) statute's temporary occupation exception criteria.

The Build Alternative would also require the acquisition of a 0.11-acre permanent surface easement from the Eastbank Esplanade along the western edge of the SB ramp from I-5 to I-84. The easement would be needed to provide potential intermittent access to the ramp by ODOT maintenance crews. Temporary, periodic closures of the park within the boundaries of the permanent easement may be required to accommodate ODOT maintenance activities.

The acquisition of a permanent surface easement across the Eastbank Esplanade would constitute a Section 4(f) use of the property because that portion of the trail would be permanently incorporated into the Build Alternative. By providing detours around closed areas of the park during maintenance activities, the features, attributes, and activities that qualify the property for protection under Section 4(f) would not be adversely affected by acquisition of the permanent surface easement. Because of this, the permanent surface easement constitutes a Section 4(f) de minimis use of the Eastbank Esplanade.

ODOT would execute an intergovernmental agreement with the City of Portland prior to preparing the NEPA decision document for the Project. The agreement would designate a temporary detour route that allows for the continued use of the park during Project construction thus ensuring that ODOT fulfills the five temporary occupancy conditions outlined in 23 CFR 774.13(d) during Project construction. In this intergovernmental agreement, ODOT would also agree to minimize impacts to park users from the permanent easement when it temporarily closes the Esplanade to perform maintenance on the structure after completion of the Project's construction.

The Build Alternative would not result in direct or indirect noise impacts to the Vera Katz Eastbank Esplanade such that the protected activities, features, or attributes that qualify the park for protection under Section 4(f) would be substantially impaired.

Willamette River Greenway Trail

The Build Alternative would also require the temporary occupation of segments of the Willamette River Greenway Trail along the western edge of I-5 and between the Steel Bridge to the north and the overwater portion of the trail to the south to ensure public safety or to accommodate equipment staging and/or access. A permanent surface easement across the trail near the western edge of the SB ramp from I-5 to I-84 would also be acquired to provide long-term access to ODOT maintenance crews.

The acquisition of a permanent surface easement across the Willamette River Greenway Trail would constitute a Section 4(f) use of the property because that portion of the trail would be permanently incorporated into the Build Alternative. By providing detours around closed areas of the park during maintenance activities, the features, attributes, and activities that qualify the property for protection under Section 4(f) would not be adversely affected by acquisition of the permanent surface easement. Because of this, the permanent surface easement constitutes a Section 4(f) de minimis use of the Willamette River Greenway Trail.

In a manner similar to what is described above for the Eastbank Esplanade, ODOT

as good as that which existed prior to the project).

There must be documented agreement of the official(s) with jurisdiction over the Section 4(f) resource regarding the above conditions.

would execute an intergovernmental agreement with the City of Portland prior to preparing the NEPA decision document for the project. The agreement would designate a temporary detour route that allows for the continued use of the trail during Project construction thus ensuring that ODOT fulfills the five temporary occupancy conditions outlined in 23 CFR 774.13(d) during Project construction. In this intergovernmental agreement, ODOT would also agree to minimize impacts to trail users from the permanent easement when it temporarily closes the trail to perform maintenance on the structure after completion of the Project's construction.

While construction and facility operation-related noise would occur in proximity to the east perimeter of the Willamette River Greenway Trail, the Build Alternative would not result in noise impacts such that a constructive use would occur. Similarly, the Build Alternative would not result in direct or indirect noise impacts to the Willamette River Greenway Trail such that the protected activities, features, or attributes that qualify the trail for protection under Section 4(f) would be substantially impaired.

Lillis–Albina Park

The Build Alternative would not entail any actions that would result in a Section 4(f) use of Lillis–Albina Park. While Project–related construction and operation noise would occur in proximity to the west perimeter of the park, noise levels would not exceed thresholds that would constitute a constructive use. If a 22–foot noise wall (Noise Wall 2a) were installed between I–5 and the Lillis–Albina Park, as recommended in the ODOT *Noise Technical Report* (ODOT 2019g), the predicted noise levels at the park would decrease from the current 72 dBA to 69 dBA. While this noise level would still be above the NAAC of 65 dBA for a public park, the noise wall would provide a 3 dBA reduction in noise levels at the park. The Build Alternative would not result in direct or indirect noise impacts to the Lillis–Albina Park such that the protected activities, features, or attributes that qualify the park for protection under Section 4(f) would be substantially impaired.

Portland Peace Memorial Park

The Build Alternative would not include any actions that would constitute a Section 4(f) use of Portland Peace Memorial Park. Project–related construction and operation noise would occur near the east perimeter of the park, but because sensitive receptors in the vicinity of the park would not experience a substantial increase in perceptible noise, no constructive use would occur. Similarly, the Build Alternative would not result in direct or indirect noise impacts to the Portland Peace Memorial Park such that the protected activities, features, or attributes that qualify the park for protection under Section 4(f) would be substantially impaired.

3.12.2.3 Mitigation

The following mitigation measures would be implemented to reduce the potential for adverse impacts to Section 4(f) resources:

- ODOT would require construction contractors to follow ODOT specifications and BMPs to minimize high noise levels in the vicinity of Section 4(f) properties during construction (ODOT 2019f).
- ODOT would coordinate with FHWA and the Oregon SHPO to implement the avoidance and minimization conditions contained in the *Historic Resources Technical Report* (ODOT 2019i) and the PA described in Section 3.8.2.3 to avoid and/or minimize the potential for Project–related vibration impacts to the Travelodge at the Coliseum.

- ODOT would execute an intergovernmental agreement between ODOT and the City of Portland to minimize impacts to the Eastlake Esplanade and Willamette River Greenway Trail from temporary closures during construction and the acquisition of the permanent surface easements. The public would have an opportunity to review and comment on the agreement, as well as the written concurrence received from the officials with jurisdiction over the property eligible for Section 4(f) protection (i.e., City of Portland Parks and Recreation).
- ODOT would consider and further evaluate during final design the recommendations in the ODOT *Noise Technical Report* (ODOT 2019g) that noise walls be considered in two locations along the eastern edge of the I-5 that would shield Lillis–Albina Park and the Travelodge at the Coliseum from traffic noise.

3.13 Socioeconomics

Socioeconomics is the social science that studies how economic activity affects and is shaped by social processes. The socioeconomic impact analysis conducted for this EA considers the adverse and beneficial impacts of the Build Alternative on individuals and groups living and working in the local community, including changes in access to public services, effects on the local and regional economy, and effects on local property values and tax revenues.

3.13.1 Existing Conditions

The API for the socioeconomics analysis is the same as the Project Area shown on Figure 1–1. Because I-5 is an important regional transportation facility, the indirect economic and employment impacts (beneficial and adverse) were considered across the MSA, a broader geographic area than the API. Additional information on existing socio-economic conditions within the API can be found in the *Socioeconomics Technical Report* (ODOT 2019m).

3.13.1.1 Population Characteristics

According to U.S. Census Bureau statistics, there were just over 2,000 residents living in the API in 2015 (U.S. Census Bureau 2015). Most residents (72 percent) were adults age 21 to 64. Residents were also primarily white (72 percent), but a higher percentage of Black residents lived in the API compared to the MSA as a whole (13 percent compared to 3 percent).

While more than 86 percent of API residents had achieved at least a high school education, the median household income in the API in 2015 was \$38,450 compared to \$60,286 in the MSA. In 2015, the percentage of renters in the API was 86 percent compared to 39 percent in the MSA. The API also has a substantially higher percentage of workers who commute by public transportation, bicycle, and walking (52 percent) compared to the MSA as a whole (12 percent).

3.13.1.2 Public Services

Police/Fire and Rescue

The Portland Police Bureau and the Oregon State Police Patrol Division provide police services in the API. The Oregon State Police has primary jurisdiction on state highways but will respond to incidents in other areas when local agencies are unable to respond or need extra assistance. Fire and rescue services within the API are provided by the Portland Fire Bureau, primarily Station 13 located at 926 NE Weidler.

No fire stations are located within the API.

Medical Services

Legacy Emanuel Medical Center, located northeast of the API at 2801 N Gantenbein Avenue, provides emergency care and a wide variety of medical specialty services to residents in the greater Portland metropolitan area. The Legacy Clinical Research and Technology Center located on the eastern edge of the API at 1225 NE 2nd Avenue is a major medical research facility also serving patients throughout the metropolitan area.

Schools

Residents in the API are within the attendance boundaries of Boise–Eliot, Humboldt, and Buckman Elementary Schools; Harriet Tubman and Hosford Middle Schools; and Jefferson, Grant, and Cleveland High Schools. The Portland Public Schools administrative headquarters is in the Blanchard Education Service Center at 501 N Dixon Street on the western edge of the API.

Parks

Lillis–Albina City Park is in the northern portion of the API between I–5 and N Flint. It includes baseball and soccer fields and a playground. Portland Peace Memorial Park, a public open–space park, is located near the intersection of NE Oregon Street and N Interstate. The Vera Katz Eastbank Esplanade and portions of the Willamette River Greenway are in the southern portion of the API.

Social Services

Social service providers near the API include the Urban League of Portland located at 10 N Russell Street and the African American Health Coalition located at 77 NE Knott Street. Low–income multi–family housing is provided at the Madrona Studios apartments located within the API at 10 N Weidler.

Religious Institutions

Religious institutions within and close to the API include Well Church, New Direction Community Church, Holy Rosary Church, and Temple Baptist Church.

3.13.1.3 Local and Regional Economy

Portions of two Central City districts, Lower Albina and Lloyd, are located within the API and contribute to the local and regional economy. The Lower Albina district, west of I–5 and north of NE Broadway, is primarily industrial with a working harbor, freight rail facilities, and a small mixed–use historic area along N Russell. The Lloyd district, south of NE Broadway/NE Schuyler and north of I–84, is characterized by several large region–serving facilities, including the Rose Garden, Oregon Convention Center, Lloyd Center shopping mall, and several large office buildings (City of Portland et al. 2012). The Lloyd and Lower Albina districts accounted for more than 20,000 jobs within the City of Portland in 2010 (City of Portland et al. 2012). Comparatively, estimated total employment in the MSA was 1,520,613 jobs in 2010. Unemployment rates in the MSA have decreased steadily since 2010, from 10.2 percent in 2010 to 3.8 percent in 2017 (OED 2018).

3.13.1.4 Property Values and Tax Revenue

Assessed 2017 value for all taxable land within the API is approximately \$921

million, with commercial property representing the largest portion of that amount at approximately \$831 million (Corporate GIS and Portland Bureau of Technology Services 2018). Tax revenues from commercial properties within the API in 2017 were approximately \$23 million.

3.13.2 Environmental Consequences

3.13.2.1 No-Build Alternative

Proposed transportation improvements within the Broadway/Weidler corridor under the No-Build Alternative would enhance safety for people walking, bicycling, and driving within the API. These improvements would also create short-term beneficial effects within the API in the form of construction jobs and expenditures. However, future conditions on I-5 would continue to deteriorate (in terms of safety, delay, and levels of service), which would adversely affect the movement of people and goods within the API and could have long-term adverse effects on the regional transportation system and economic conditions within the larger MSA. While no new physical barriers would be created between neighborhoods by the No-Build Alternative, the historic isolation between areas east and west of I-5 that occurred when the highway was first constructed would remain.

3.13.2.2 Build Alternative

Short-term adverse impacts from the Build Alternative would include construction-related delays on I-5 and the local street network, detours and diversion of traffic, limitations on access, noise, and utility relocations. These impacts could temporarily affect neighborhoods, businesses, schools, emergency responders, and utility and public service providers located or operating in the API. Potential short-term beneficial impacts during construction could include a temporary increase in construction employment and spending on construction materials and local services.

The Build Alternative would also have a long-term beneficial effect on police, fire, and emergency responders by reducing delays and crashes on I-5 and in the Broadway/Weidler interchange area. The improvements in safety and reductions in congestion and delays on I-5 would have a beneficial effect on the regional economy by improving the movement of goods and people throughout the Project Area, thereby contributing to the overall economic well-being of the Portland region.

The Build Alternative would not divide or isolate existing business districts or adversely change the character of business districts within the API. Instead, it would improve traffic operations on I-5 and the local street system and add pedestrian and bicycle enhancements that would benefit the overall business environment in the API. The two new highway covers that would span I-5 and the Clackamas bicycle/pedestrian overcrossing would have the beneficial effect of enhancing east-west community connectivity and improving overall community cohesion within the API and would reduce the physical barrier that I-5 currently presents to the surrounding area.

The acquisition of up to 4 acres of property for ROW and the displacement of four existing businesses to accommodate construction of the Build Alternative would reduce the amount of tax revenues collected within the API because privately owned, taxable property would be converted to publicly owned, non-taxable property. However, this impact would be extremely small, affecting only 0.2 percent of the assessed value of the taxable commercial property within the API, and would not represent a substantial long-term change in overall property tax revenues generated

in the API.

Long-term indirect effects of the Build Alternative would be the same as those as those described above and would be experienced throughout the API. Improvements in safety and reductions in congestion and delays on I-5 would have an indirect beneficial effect on the regional economy by contributing to the movement of goods and people both throughout the region and the west coast, indirectly contributing to the overall economic well-being of the Portland region.

3.13.2.3 Mitigation

The following BMPs would be implemented to reduce the potential for adverse socio-economic impacts during the construction phase:

- Temporary traffic management plans would be prepared to minimize construction impacts on I-5 operations and traffic delays on local streets. These plans would address all modes of transportation, including bicycles, pedestrians, and public transit. The plans would be prepared by the construction contractor(s), approved by ODOT and the City of Portland, and implemented by the construction contractor(s).
- ODOT would require contractors to follow construction BMPs such as the 2018 Standard Specifications for Construction (ODOT 2018a) to minimize impacts to neighborhoods, businesses, schools, emergency responders, and utilities and public service providers located or operating in the API.
- ODOT would coordinate with TriMet and Portland Streetcar to follow standard procedures with regard to temporary impacts to transit services. This coordination would follow standard communication procedures for temporary transit stop closures or relocations, schedule changes, and route diversions that would be required during construction.
- Construction activities near Harriet Tubman Middle School would be scheduled for summer months to avoid potential disruptions during the school year.

Public outreach to residents and businesses in the API conducted by ODOT and the City of Portland would continue throughout final design and construction.

3.14 Transportation

The transportation system in the City of Portland includes highways and city streets, public transit (bus, rail, and street cars), and a variety of non-motorized transportation options, including walking and biking. This section of the EA focuses on transit, active transportation (bicycles and pedestrians), safety, traffic operations, and access.

3.14.1 Existing Conditions

The API for transportation generally corresponds to the Project Area, as shown on Figure 1-1, except along N Broadway, where the API extends west to N Larrabee.

3.14.1.1 Transit

Within the API, major transit trip generators and destinations include the Moda Center, Veterans Memorial Coliseum, Rose Quarter Transit Center, and businesses along the Broadway/Weidler couplet.

TriMet operates several fixed-route bus and rail lines within the API. The City of Portland provides streetcar service. Whereas most north-south and east-west transit lines pass through the Rose Quarter Transit Center, service is also provided on the Broadway/Weidler couplet (Bus lines 17 and 77). The Rose Quarter Transit Center is served by six bus lines and four MAX light rail lines and accommodates over 11,000 passengers each weekday. High frequency TriMet bus service (Lines 4 and 44) is also provided on N Vancouver and N Williams. Ten bus stops and four streetcar stations are located within the API.

3.14.1.2 Active Transportation

“Active Transportation” refers to human-powered, self-propelled travel and includes walking, bicycling, and mobility assistance devices (e.g., wheelchairs). Within the API, major active transportation destinations include the Moda Center, Veterans Memorial Coliseum, Rose Quarter Transit Center, and businesses along the Broadway/Weidler and Vancouver/Williams couplets.

The majority of the API has existing sidewalk coverage, with less than 10 percent of the Project Area having gaps in sidewalk coverage. Formalized bikeways exist on most major streets, generally consisting of a mix of conventional bike lanes and neighborhood greenways. The Vera Katz Eastbank Esplanade is a shared-use path serving walkers and bikers traveling to, from, and through the API.

Most signalized intersections include infrastructure that serves pedestrians, including crosswalks, pedestrian signal heads on all corners where crossings are permitted, pedestrian push buttons at crosswalks, and dual curb ramps with detectable warning strips at most corners.

3.14.1.3 Transportation Safety

Within the API, segments of I-5 in both the SB and NB direction have crash rates that exceed the state-wide average for comparable facilities. Between 2011 and 2015, there were 881 crashes on the highway and ramps in the API. Most of the crashes were in the SB direction, most frequently between 11:00 AM and 6:00 PM.

There were 268 crashes on the local street network study intersections between 2011 and 2015; 18 of these crashes involved cyclists and 2 involved pedestrians. Turning movement conflicts were the most common collision type at the studied intersections.

3.14.1.4 Traffic Operations

Traffic conditions within the API were analyzed for AM peak hours (7:00 AM to 9:00 AM) and PM peak hours (4:00 PM to 6:00 PM). The second hour within each peak hour period (8:00 AM to 9:00 AM and 5:00 PM to 6:00 PM) is the most congested period. Average travel times during these periods are approximately 6 minutes (AM) and 9 minutes (PM). The PM peak period travel times on I-5 in the API are slower than those in the AM peak period.

For local streets, all 12 intersections evaluated operate at acceptable levels²⁰ under existing conditions. However, the N Wheeler, N Williams, and N Ramsay intersection has queues spilling back from I-5 onto N Ramsay, N Wheeler, and N Weidler at times

²⁰ Volumes to be within a GEH Statistic value of 5.0 for all entry and exit locations, all entrance and exit ramps, and all intersection turn movements greater than 100 vehicles per hour. GEH values higher than 5.0 are acceptable. The GEH formula is used in traffic engineering, forecasting, and modeling to compare two sets of traffic volumes.

during peak periods.

Weaving segments on I-5 within the API operate near or over capacity during both AM peak hours. Queues from I-5 spill back to N Wheeler, N Weidler, and N Ramsay.

3.14.1.5 Transportation Access

Currently there are 132 access points within the API (37 intersections and 95 driveways). The majority of access points are business driveways, of which 60 percent are located on N/NE Weidler and N/NE Broadway.

3.14.2 Environmental Consequences

3.14.2.1 Transit

No-Build Alternative

Transit travel time impacts in the API would roughly correspond to those experienced by motor vehicles, as described for traffic in Section 3.14.2.4. No direct light rail impacts are anticipated. The addition of transit boarding islands on Multnomah would improve passenger conditions, as the new bus stops would provide an opportunity to include enhancements such as lighting, shelters, ADA-accessible ramps, and rider information. Under the No-Build Alternative, ridership is expected to grow compared to existing conditions. Growth in ridership could lead to longer dwell times at stops and could contribute to increased transit travel times and delays.

Build Alternative

Construction-related impacts would include temporary bus stop closures or relocations, bus route detours, and changes to streetcar operations. Temporary bus stop closures and relocations could require some passengers to walk farther to reach a bus stop. Bus route detours could result in increased bus travel times and could also result in closure or relocation of bus stops outside of construction areas. Streetcar operations would continue during construction either through temporary tracks (including on a temporary cover structure over I-5) or through use of a bus bridge that would require streetcar passengers to transfer to a bus to pass through areas of active construction within the API.

The following bus lines could experience temporary short-term impacts: Line 17 WB and Portland Streetcar "B" Loop (on N/NE Broadway), Lines 4 and 44 NB (on Williams), 85, 8, 35, and 77. There is a risk that the MAX Red, Blue and Green lines, which operate on NE Holladay through the Rose Quarter Transit Center, could have temporary service disruptions due to construction activities.

During operations, streetcar travel times for the Build Alternative would be similar to the No-Build Alternative, with a slight improvement (less than a minute) during peak morning and evening commute hours for Build Alternative travel times due to the changes in traffic volumes and lane configurations.

During operations, bus travel times would increase for NB Lines 4 and 44 by less than half a minute during peak morning and evening commute hours. SB travel times on these lines could increase by less than 2 minutes between 8:00 and 9:00 AM because the intersection of Williams and Hancock would be signal-controlled compared to free-flow under the No-Build Alternative. However, SB PM travels times on these lines between 5:00 and 6:00 PM would decrease by over a minute. Line 17 travel times for the Build Alternative would increase by up to 1 minute, except for EB

Most transit operations stay the same under the Build vs. the No Build Alternative. Streetcar travel times would decrease and there would be no changes to light rail. Slight bus delays could occur due to improved pedestrian safety at crossings.

trips in the evening that would improve slightly. No long-term direct impacts to light rail operations are anticipated under the Build Alternative. The addition of transit boarding islands on Broadway/Weidler could have a long-term beneficial indirect impact on transit within the API by increasing bus ridership on 17-Holgate/Broadway and 77-Broadway/Halsey through the provision of a more accessible, comfortable, and attractive transit stop environment. For additional information on transit impacts under the Build Alternative, see the Transit Technical Report (ODOT 2019n).

Mitigation

The Build Alternative is anticipated to increase bus travel times for some routes during the morning peak period. Implementing the relevant elements of TriMet's Enhanced Transit Corridors Plan could reduce bus and streetcar travel times. The Enhanced Transit Corridors Plan projects include a range of capital and operational treatments throughout the system to improve transit capacity, reliability, and travel time. Within the API, these treatments include business access transit lanes, far-side bus stops, street/traffic modifications, curb extensions, and transit signal priority.

To address short-term impacts during construction, TriMet has indicated that it may consider implementing bus route detours around the impacted area for the duration of the construction period to avoid multiple temporary changes for a single bus route. Discussion and negotiations would determine accommodations needed for streetcar service and comparable transit connections.

3.14.2.2 Active Transportation

No-Build Alternative

Under the No-Build Alternative, additional protected bike lanes and upgraded sidewalks in the Broadway/Weidler couplet associated with the Broadway multimodal improvements project would improve conditions for people who walk or ride bicycles. Additional north-south and east-west regional bikeways and walkways would be created, including the Sullivan's Gulch Trail, Sullivan's Crossing (bicycle/pedestrian bridge traversing I-84 in the vicinity of NE 7th), North Portland Greenway, and NE 7th/9th Avenue Neighborhood Greenway.

Despite these improvements, over half the intersections in the API would continue to exceed tolerable stress levels for pedestrians.²¹ All intersections would continue to operate at acceptable stress levels for bicyclists.²² Those intersections exceeding tolerable stress levels for pedestrians are primarily located along the N/NE Broadway corridor.

Build Alternative

Under the Build Alternative, conditions for pedestrians and bicyclists would improve in the API due to increased route options, improved ramp terminal intersections, physical separation from motorized users, and reduced complexity of intersections. For additional information on impacts to active transportation under the Build Alternative, see the Active Transportation Technical Report (ODOT 2019o).

*M*ovement for people walking, biking, and rolling would improve under the Build vs. the No Build Alternative due to more route options, new I-5 crossings, improved safety through physical separation from motorized vehicles, and improved intersections at on- and off-ramps that reduce conflicts.

²¹ Tolerable stress levels were based on "Level of Traffic Stress" data provided by ODOT and future year regional bicycle demand data provided by Metro.

²² A total of 13 intersections in the API were studied (including N Hancock and Flint) (see *Active Transportation Technical Report* [ODOT 2019o]).

Long-term Operational Impacts

Increased Non-Motorized Route Options

Long-term direct and indirect impacts from increased non-motorized route options, as described in Section 2.2.4, include the following:

- The Hancock-Dixon crossing would provide connectivity and safety benefits. The new roadway crossing and associated multi-use path would directly connect Lower Albina, Lloyd, and the N/NE communities and provide multimodal route alternatives over I-5. The removal of Flint would also reduce cut-through auto traffic in this area.
- The 36-foot-wide multi-use path on N Williams between Broadway and NE Weidler would provide enhanced physical separation of people walking, biking, and rolling from motor vehicle travel lanes.
- Improved bicycle and pedestrian facilities on the local street system would include the new jug-handle at the N Vancouver and N Broadway, upgraded and separated bicycle facilities on N/NE Broadway and N/NE Weidler, and new bicycle and pedestrian connections between the N Flint/N Tillamook intersection and the new Hancock-Dixon crossing.
- The Project would improve bicycle and pedestrian facilities on N Vancouver and Broadway, upgrade and improve existing bicycle facilities on N/NE Broadway and N/NE Weidler, and add new bicycle and pedestrian connections between the N Flint/N Tillamook intersection and the Hancock-Dixon crossing.
- The Clackamas bicycle and pedestrian bridge would improve conditions for both pedestrians and bicyclists with a lower stress, physically separated option to cross I-5.

Improved Ramp Terminal Intersections

The number of ramp terminal intersections potentially encountered by people walking and biking would be the same as under the No-Build Alternative. Under the Build Alternative, however, new east/west bicycle and pedestrian routes that avoid crossing ramp terminals would be available with the Clackamas bicycle and pedestrian bridge and the Hancock-Dixon crossing. People walking or biking NB from the Rose Quarter Transit Center on N Williams would avoid crossing the existing ramp terminal at N Ramsay. However, people walking and biking in the EB direction from the Broadway Bridge on N Weidler would pass through one additional ramp terminal intersection with the relocated I-5 SB on-ramp at the Weidler and Williams intersection.

Physical Separation of Motorized and Non-Motorized Use

Physical separation between motorized and non-motorized users would increase compared to the No-Build Alternative with the following improvements:

- Transformation of N Williams between N Ramsay and Broadway from a standard road with on street parking, to a street dedicated to transit, bicycles, and pedestrians only
- Development of a new 36-foot wide multi-use path on N Williams between Broadway and NE Weidler
- Development of the new Clackamas bicycle and pedestrian bridge over I-5
- Creation of new space provided by the highway covers for wider, separated bike facilities and sidewalks on Broadway and NE Weidler

- Development of protected bike lanes on N/NE Broadway and N/NE Weidler (as described for the No-Build Alternative)²³

These facilities would establish new connections not otherwise offered by the current street system.

Reduced Complexity of Intersections

Conditions in the API would also be improved by reduction in the complexity of intersections. Such improvements could encourage more walking and biking in the area and could allow walking and biking activity to be more evenly distributed throughout the API.

Sidewalks, crossings, and other active transportation infrastructure along new or reconstructed streets would be built (or rebuilt) according to applicable design standards. These enhancements would reduce the degree of intersection complexity, particularly for pedestrians, as compared to the No-Build Alternative. These enhancements would generally concentrate along N/NE Broadway, N/NE Weidler, N Wheeler, Williams, Vancouver, and the new Hancock/Dixon connector. While existing sidewalk gaps would be filled on portions of N Wheeler and N Williams, some crossing gaps (including on Major City Walkways) would remain in portions of the API.

Bicycle and Pedestrian Stress Levels

With the Build Alternative, three of the studied intersections would improve from “exceeding tolerable stress levels” to “meeting tolerable stress levels” for pedestrians. Pedestrian stress levels would increase at the intersection of N/NE Weidler and N Williams; however, this is the result of the relocation of the I-5 SB on-ramp from N Ramsay. Overall, the pedestrian network level of stress would improve. All studied intersections would continue to operate at tolerable stress levels for bicyclists. With the Build Alternative, stress levels for bicyclists at API intersections would be similar to the No-Build Alternative.

Generally, bicycle delays at studied intersections would be similar between the No-Build and Build Alternatives. However, in areas where new signals would be added to provide greater separation between motorized vehicles and people biking, bicycle delay would increase by less than a minute for travel through the Project Area. Although bike travel times would be slightly higher than the No-Build Alternative during the AM and PM analysis periods, greater separation between motorized vehicles and people walking and riding bicycles would be provided. Affected routes include:

- Broadway Bridge to/from Williams/Vancouver corridor and Tillamook Neighborhood Greenway (one signalized intersection at Hancock and Vancouver)
- Steel Bridge/Eastbank Esplanade to/from Broadway/Weidler corridor immediately east of I-5 interchange - NB (two signalized intersections)
- Steel Bridge/Eastbank Esplanade to/from Broadway/Weidler corridor immediately east of I-5 interchange - SB (four signalized intersections)

Improved travel on the Broadway Bridge to/from Lloyd corridor would occur because the number of signalized intersections would be reduced.

²³ The potential for reduced motor vehicle/bicycle conflicts (e.g., “right hook” collisions) at intersections and driveways as a result of protected bike lanes on N/NE Broadway and N/NE Weidler would depend on final design.

Short-Term Construction Impacts

Pedestrians and bicyclists traveling through and near the API would experience temporary impacts during construction. In the Broadway/Weidler/Williams highway cover area, demolition of the Williams, Weidler, and Broadway structures over I-5 would result in temporary closures in those areas; however, access would be maintained through temporary structures that would accommodate all modes of travel. Temporary structures would be designed to minimize multimodal conflicts.

In the Vancouver/Hancock highway cover area, demolition of the Vancouver and Flint structures over I-5 during construction would close bicycling and walking connections between N/NE Portland and the City's central core; however, temporary structures could be provided to maintain access. Because these activities would occur sequentially, Flint would serve as a SB detour route for bicycle and pedestrian trips that would otherwise use Vancouver. During the demolition of the Flint structure and construction of the Hancock-Dixon connection, SB bicyclists and pedestrians could use the new Vancouver structure and NB bicyclists could use the new Williams structure. Multimodal conflicts could increase because Flint would be a motor vehicle detour route during the Vancouver structure demolition and re-construction and would also be used as a detour route for bicyclists. Additionally, when the Flint structure is demolished, motor vehicle traffic from Flint would be diverted to Vancouver or Williams, where bicycle traffic would also be diverted.

Construction activities near the Moda Center would result in few or no construction impacts along the detour route because the Broadway/Weidler corridor improvements would already be complete. Construction of the Clackamas bicycle and pedestrian bridge could require detours or produce delays for bicyclists along Williams between N Ramsay and N/NE Weidler and near the NE 2nd/NE Clackamas intersection. Additionally, the Eastbank Esplanade could be temporarily closed during modifications to the off-ramp linking I-5 SB with I-84 EB, which could require out-of-direction travel for non-motorized users.

Mitigation

A Temporary Traffic Control Plan would be developed to minimize construction-phase impacts to people who walk and ride bicycles by addressing the following priorities:

- Design detour routes for walking and biking that minimize out-of-direction travel
- Design temporary detour facilities to provide separation from traffic and meet City of Portland standards
- Where detour routes for bikeways would also carry detouring vehicular traffic, identify locations for traffic calming measures to ensure the speed and volumes of traffic do not exceed the Neighborhood Greenway thresholds.

Intersection design is a critical component of enhancing pedestrian and bicycle safety in the Build Alternative, and the designs for the impacted intersections in the API would strive for low stress levels for bicycle and pedestrian traffic. The intersection designs would incorporate the following priorities, where applicable:

- Address potential bicycle/motor vehicle conflicts through proactive signing, striping, and signal phasing. Provide physical and temporal separation between modes at higher risk intersections (i.e., ramp locations, double turn lanes, weaving bus, and bike lanes).
- Review, and remove if necessary, adjacent on-street parking to improve stopping and intersection sight distance. Follow the City of Portland's Vision Clearance

Guidelines for uncontrolled intersections.

- Verify that intersection turning radii are consistent with desired interactions between motorists, pedestrians, and bicyclists. The turn radii and corresponding design speed should be consistent with the appropriate design vehicle.
- Verify signal timing provides sufficient crossing time.
- Provide two-stage bicycle turn boxes for left-turn movements at locations where bicycle routes intersect.
- Provide protection and warning for bicycle and pedestrian movements during contraflow operations.

The Temporary Traffic Control Plan would ensure that the temporary facilities provide fully accessible, safe, and comfortable routes for people walking and biking throughout the API over the course of construction.

3.14.2.3 Transportation Safety

No-Build Alternative

As described in Section 2.1.2, the No-Build Alternative would result in an increase in crashes on I-5. Outside of the Broadway/Weidler couplet, pedestrian and bicycle safety would generally be the same as existing conditions.

Build Alternative

As discussed in Section 2.3, it is estimated that the crash rate under the Build Alternative would be lower than under the No-Build Alternative, providing an overall safety benefit in the corridor.

Numerous improvements to the local street network are expected to increase safety for all road users by providing safer connections for pedestrians and bicyclists. No adverse indirect impacts to transportation safety are anticipated under the Build Alternative. For additional information on impacts to transportation safety under the Build Alternative, see the Transportation Safety Technical Report (ODOT 2019a).

Mitigation

Safety must be a consideration both during construction and for the long-term operation of the Project. Best practices that can maximize both short-term and long-term safety are discussed below:

- Apply best practice design treatments on the local road system to integrate transit vehicles, separated bicycle lanes, pedestrians, and motorists, specifically as this relates to the potential risks associated with right turn movements or other potential conflict points between modes.

The Oregon Bicycle and Pedestrian Plan and the City of Portland's Portland Bicycle Plan for 2030 provide example best practices for transportation facility design that should be considered for this Project.

- Oregon Bicycle and Pedestrian Plan https://www.oregon.gov/ODOT/Planning/Pages/Plans.aspx#accordion-collapse-ctl00_ctl00_ctl22_g_85545598_99ee_4a1b_acd0_f0bee524051a_ctl03
- Portland Bicycle Plan for 2030 <https://www.portlandoregon.gov/transportation/article/289122>
- Construction and traffic management plans should consider best practices and opportunities to reduce risk to construction workers and the traveling public. In

Lower crash rates on I-5 would occur under the Build vs. the No Build Alternative due to less stop-and-go traffic and emergency braking, new auxiliary lanes providing drivers more time and space to merge, and new shoulders providing more room for disabled vehicles.

Safer local streets for all travel modes would occur under the Build vs. the No Build Alternative due to separated bike lanes and safer connections for people walking, biking, and rolling.

Oregon between 2011 and 2015, there were an average of 488 work-zone-related crashes per year. The distribution of crash severity in work zones vs. non-work-zones is very similar; however, there are slightly more fatal crashes in a work zone.

ODOT provides a variety of resources that describe best practices for work zone safety, including the following:

- Traffic Control Plan Design Manual
- Oregon Temporary Traffic Control Handbook
- Work Zone Traffic Analysis Handbook
- Transportation Management Plan Guidance Manual

These ODOT work zone safety documents are available at: <https://www.oregon.gov/ODOT/Engineering/pages/index.aspx>

3.14.2.4 Traffic Operations

No-Build Alternative

As described in Section 2.1, future traffic conditions under the No-Build Alternative are forecasted for ongoing deterioration through the analysis year 2045, resulting in increased congestion.

Build Alternative

Construction of the Build Alternative would have short-term impacts on highway traffic, local street motor vehicle traffic, bicyclists, pedestrians, transit, and event access. Highway lane closures would be likely on I-5 during removal and construction of the overcrossing structures and retaining walls, including potential late night and weekend closure of all directional lanes.

Temporary local street closures or turn restrictions would be implemented as necessary. Street closures would be limited to 1-week periods and managed through extensive outreach and traffic management strategies. Temporary pedestrian accommodations would be ADA-compliant.

Event access would be maintained during construction, and ODOT would coordinate closely with the Moda Center, City of Portland, and Oregon Convention Center to avoid traffic disruptions to major events to the extent practicable.

As described in Section 2.3.1.1, the Build Alternative would improve traffic operations on I-5 in both the AM and PM analysis periods, and weaving segment operations would improve. Potential queue lengths would be reduced on I-5, and travel speeds and times would be improved for all I-5 segments as compared to the No-Build Alternative.

As also described in Section 2.3.1.1, all local street intersections in the API would operate at an acceptable level of service during the AM and PM peak hours under both the No-Build and Build Alternatives.

The Build Alternative would have long-term indirect impacts on post-event traffic operations at the Moda Center. The relocation of the I-5 SB on-ramp from near the north end of the Moda Center to N Weidler would necessitate a change in post-event motor vehicle circulation patterns. Vehicles would be directed north on N Wheeler to N Weidler (N Wheeler would be one-way SB under typical operation). This routing could be accomplished with active traffic management using cones and traffic management personnel.

Motor vehicle traffic operations on local streets (travel times, delay, and queue lengths) would show similar results under the Build and No Build Alternative. During the afternoon rush hour, most intersections would experience less motor vehicle delay with the Project. For some intersections, however, an increase in vehicle delay would occur due to higher motor vehicle traffic volumes and more space provided for people walking, biking, and rolling. However, intersections would still operate within acceptable levels of service.

For additional information on impacts to traffic operations, see the *Traffic Technical Report* (ODOT 2019p).

Mitigation

The following mitigation strategies would be considered to avoid, minimize, and/or mitigate short-term construction impacts to highway drivers and local street road users in all the modes of travel:

- Development of a comprehensive transportation management plan that documents construction staging and schedule, alternate routes for all modes of travel during road closure, and lane closure restrictions as well as transportation management and operation strategies (TMOS). Specific TMOS elements may include public information and outreach to encourage changes in travel behavior, provision of real-time information to road users through the use of Intelligent Transportation System technology, and incident/emergency management to detect and remove incidents and restore traffic quickly.
- Event access would be maintained with enhanced TMOS strategies before and after events. ODOT would coordinate with the Moda Center, City of Portland, and Oregon Convention Center to avoid traffic disruptions during major events to the extent practicable.

The Build Alternative would affect event access. Several post-event circulation options were presented to the Moda Center and City of Portland (owners of the Veterans Memorial Coliseum) as potential mitigation for post-event operations. ODOT will coordinate with the Moda Center and the City to develop appropriate post-event mitigation measures.

3.14.2.5 Transportation Access

No-Build Alternative

There would be no direct or indirect access impacts associated with the No-Build Alternative.

Build Alternative

Table 3-8 summarizes the modifications and closures that could occur to driveways and intersections from the Build Alternative. In most instances, driveway modifications would likely not require relocating driveways. Where closures would occur, additional access to the property is available.

The one intersection expected to close to motor vehicles is located at N Flint/N Broadway but would be replaced with a new intersection at N Flint/N Hancock. Because the closed intersection would be replaced with a new intersection; it is not counted as a closure in Table 3-8. There would be no long-term indirect impacts

Table 3-8. Total Accesses to be Modified and/or Closed

Status	Driveways	Intersections
No Change	77	28
Modified	5	9
Closed	13	0
TOTAL	95	37

to transportation access with the Build Alternative. For additional information on impacts to transportation access, see the Transportation Access Technical Report (ODOT 2019q).

Mitigation

ODOT would work closely with businesses in the Project Area to implement strategies to limit disruption to business access. Temporary signage would be used as needed, and access to businesses during construction would be maintained to the degree possible.

Event access would be maintained during construction and could require an increased level of active traffic management before and after events. ODOT would coordinate closely with the Moda Center, City of Portland, and Oregon Convention Center to coordinate major traffic disruptions to avoid major events to the extent practicable.

3.15 Utilities

Utilities, including electricity, natural gas, water, sanitary sewer, and telecommunications, are essential public services that make living and working in a modern city possible. Numerous public and private utility providers operate in the Project Area and could be affected by construction and operation of the Build Alternative.

3.15.1 Existing Conditions

The API for utilities is the same as the Project Area shown in Figure 1-1. Utilities in the API generally occupy existing ODOT and City of Portland roadway ROW. Utility locations vary within the ROW and may occur under the pavement or above-ground where they do not impede vehicular, pedestrian, or transit traffic. The types of utilities in the API and the corresponding service providers are shown in Table 3-9. Major utilities in the API that could be affected by construction of the Build Alternative are listed in Table 3-10.

Table 3-9. Utility Types and Service Providers in the API

Utility Type	Service Provider
Natural gas pipelines	NW Natural
Electric transmission and distribution lines	PacifiCorp (Pacific Power) Portland General Electric
Potable water distribution mains and service lines	Portland Water Bureau
Stormwater and sanitary sewer lines	Portland Bureau of Environmental Services

Notes: API = Area of Potential Impact

Table 3-10. Major Utilities in the API

Utility Owner	Facility Size
CenturyLink Local Underground Ductbank	4-inch diameter
PacifiCorp Aerial Power Transmission	69 kV to 115 kV
Portland General Electric Aerial Power Transmission	57 kV to 115 kV
PacifiCorp Multiple Parallel Distribution Lines	less than 13 kV
Portland Bureau of Environmental Services Sewer Lines	72-inch to 264-inch diameter
Portland Bureau of Environmental Services Sanitary Pump Station and Piping	Building 72-inch diameter inflow 48-inch diameter pressure mains 70-inch diameter bypass
Portland Bureau of Environmental Services Sewer Lines	24-inch to 62-inch diameter

Notes: API = Area of Potential Impact; kV = kilovolt

3.15.2 Environmental Consequences

Utilities located within existing ODOT or City of Portland ROW are allowed by permit. Service providers operating permitted utilities within ODOT's ROW would not be compensated for costs associated with modifications, adjustment, or relocation of those utilities necessary to construct the Build Alternative. Service providers operating permitted non-municipal utilities within City of Portland's ROW would also not be compensated for any required modifications, adjustment, or relocation of utilities. However, if City of Portland utilities located within City of Portland ROW require relocation, the City bureaus operating those utilities would be compensated for all relocation costs. Some utilities are located on private property, including those within the Union Pacific Railroad ROW, easements over vacated ROW, and acquired easements. For the purposes of this EA, relocation of these utilities is assumed to be compensable until further investigation can be performed during later design phases.

3.15.2.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that existing utilities on NE Broadway and Weidler in locations where multimodal improvements are proposed would be relocated during construction of that project. Additionally, unplanned actions, as occurs with private development or emergency utility maintenance, could require installation of new utilities or adjustment or relocation of existing utilities in other limited locations. No planned utility relocation projects that would occur within the Project Area under the No-Build Alternative have been identified.

3.15.2.2 Build Alternative

Under the Build Alternative, both above- and below-ground impacts are assumed to occur for every utility within the API until design is sufficiently detailed to show where avoidance or protection of existing utilities is feasible. Utility relocation prior to and during construction could result in temporary interruptions of service. Potential disruptions are expected to be minimal for most of the utilities, with utility providers scheduling outages with customers to accommodate the planned disruption in service. Temporary connections would likely be established before relocating minor utility conveyances.

The magnitude and duration of direct impacts on utilities (both short-term construction impacts and long-term operational impacts) would vary by the type

Table 3-11. Summary of Utility Impacts for the Build Alternative

Utility Owner	Impact Level	Reasoning
COMMUNICATIONS AND POWER		
CenturyLink Local	Substantial	Impacts to the underground ductbank, a major utility, are assumed to be unavoidable due to the bridge removal and replacement at N/NE Broadway.
CenturyLink National	Less than Substantial	No major utilities. Anticipated impacts are primarily to overhead infrastructure. It may be feasible to avoid or minimize impacts to underground infrastructure.
Comcast Cable	Less than Substantial	No major utilities. It may be feasible to avoid or minimize impacts to underground infrastructure.
Level 3 Communications	Less than Substantial	No major utilities. Relocations should be manageable.
PacifiCorp	Substantial	<p>Impacts to the 69 -115 kV aerial power transmissions, a major utility on N Williams and NE Hancock, is assumed to be unavoidable due to the new bridge overcrossing at NE Hancock.</p> <p>Impacts to the 69-115 kV aerial power transmissions, a major utility on NE 1st, is assumed to be unavoidable for the western side poles for highway improvements.</p> <p>Impacts to the 69-115 kV aerial power transmissions, a major utility on NE Russell and N Albina, is assumed to be unavoidable due to impacting poles with highway improvements.</p> <p>Impacts to the multiple parallel distribution lines, a major utility, is assumed to be unavoidable due to the bridge removal and replacement at N/NE Weidler.</p> <p>Impact to other roadway segments with multiple parallel distribution lines could also occur.</p>
Portland General Electric	Substantial Impact	Impact to the 57 kV aerial power transmission, a major utility on N Williams and NE Hancock, is assumed to be unavoidable due to the new bridge overcrossing at NE Hancock.
Verizon National Fiber Security	Potential for Substantial	No major utilities; however, facilities are located within the Union Pacific Railroad ROW and have a high amount of communication traffic.
Unresponsive Utilities (AT&T, Zayo, and XO Communications)	Potential for Substantial	Unknown infrastructure; no determination of magnitude or duration of potential impacts.

Utility Owner	Impact Level	Reasoning
PIPING		
NW Natural	Less than Substantial	Permanent removal of the N Flint bridge would not result in any long-term and operational direct impacts to this minor utility infrastructure. The pipeline would be abandoned.
Portland Bureau of Environmental Services	Substantial	<p>The piping external to the pump station at I-84 could be impacted by interchange ramp construction. Pump station may not allow for disruptions in service.</p> <p>The 96-inch sewer at the I-84 interchange could be impacted by the I-5 improvements and the interchange ramp and off-ramp construction.</p> <p>The 72-inch CSO and 38-inch sewer on NE Lloyd Boulevard could be impacted by I-84 interchange ramp and NE 1st off-ramp construction.</p> <p>The 56-inch sewer crossing I-5 at the planned NE Hancock overcrossing structure could be impacted by the new bridge foundation.</p> <p>The 54-inch sewer on NE Holladay could be impacted by bridge construction.</p> <p>The 36-inch CSO and 30-inch CSO on N Mississippi and along the former N Mississippi alignment could be impacted by I-5/I-405 interchange area stormwater treatment or conveyance.</p> <p>The 24-inch sewer on NE 1st at NE Weidler could be impacted by new traffic signals.</p> <p>The 22-inch sewers on NE 2nd, a minor utility, could be impacted by the NE Clackamas bicycle and pedestrian bridge.</p> <p>Additional impacts to minor utilities within the API are assumed to occur.</p>
Portland Water Bureau	Potential for Substantial	No major utilities, but the N Williams and NE Weidler bridge attachments together create a looped system for the infrastructure on both sides of I-5. Only one of the two waterlines can be out of service at a time. Standard fire flow cannot be met if both of these water main crossings are out of service at the same time. Most of the water infrastructure is reimbursable, and impacts would increase the Project cost.

Notes: API = Area of Potential Impact; CSO = Combined Sewer Overflow; kV = kilovolt; I = Interstate; ROW = right of way; UPRR = Union Pacific Railroad

of utility and are summarized in Table 3-11. The Build Alternative would incorporate the avoidance, minimization, and mitigation recommendations identified in Section 3.15.2.3 to address identified potential impacts. Assuming these recommendations are implemented, the Build Alternative would not be expected to result in major impacts to utilities. Substantial impacts could occur for several utilities, but by incorporating the avoidance, minimization, and mitigation recommendations, the impacts would be similar in context and severity to other complex highway improvement projects in urban areas.

There would be costs associated with potential utility relocations. The estimates for these costs are currently approximately \$27.5 million for compensable facilities and \$15.3 million for non-compensable facilities. Further investigation of utilities and confirmation of anticipated impacts would occur in the final design phases of the Build Alternative development process. ODOT would work with the utility owners to develop plans and incorporate design and engineering controls to either protect or

relocate utility facilities within the Project Area. The Build Alternative could have an indirect impact on utility providers by affecting their long-range plans and locations for installing new or expanding existing utilities within the API. Proactive coordination between ODOT, the City of Portland, and utility providers during final design would minimize these potential impacts. Additional information on the potential impacts to utilities in the API from the Build Alternative is presented in the *Utilities Technical Report* (ODOT 2019r).

3.15.2.3 Mitigation

Proactively addressing special constraints and design considerations in order to avoid or minimize impacts to major utilities would occur during final design. In particular, impacts to the City of Portland Bureau of Environmental Services (BES) 264-inch sewer, sanitary pump station, and pump station piping would need to be avoided. Additionally, direct impact to the BES 56-inch sewer line that crosses I-5 at N Hancock would be avoided or minimized. Although a cost has been included for impacts to these BES facilities, relocation of these utilities would not be a viable option. ODOT standard process in these instances is to prepare a "Design Acceptance Package" report in the initial stages of design for Project-critical success factors. Obtaining vertical and horizontal limits of these key underground utilities would occur in subsequent phases of the design process for the Build Alternative, and recommended actions to minimize utility conflicts would be included as part of the design acceptance package.

Proper coordination and the use of standard construction procedures and techniques would minimize disturbance to system users and avoid damage or impacts to existing facilities that are deemed, during final design, to not require relocation or upgrades. Typically, new facilities such as poles or ducts are installed, and then service is switched over to the new facilities, thereby minimizing any disruption of service to the utility users.

Utility coordination would occur in accordance with the ODOT Right of Way Manual, Chapter 10 (ODOT 2016) and is expected to occur early enough in the development of the Build Alternative to allow new or relocated utilities to be brought on-line prior any major disruptions from the Build Alternative. Compliance with ODOT guidance should minimize or avoid disruption in service to the utility providers or users. Relocation plans would be prepared and service disruptions approved by affected utility providers before construction begins. Coordination would occur with utility owners to ensure that contingency plans for management of potential utility service disruptions during construction are accommodated.

3.16 Water Resources

Water resources include bodies of water such as lakes, rivers, and streams that are useful to humans and that support healthy ecosystems. While they are part of the hydrological cycle, water resources are susceptible to contamination from human-made sources and require protection, particularly in urban areas. Treatment of runoff from new highway infrastructure is necessary to remove pollutants before they affect sensitive resources.

3.16.1 Existing Conditions

The Willamette River located in the western portion of the API is the primary water resource. According to DEQ, the Willamette River is listed as an impaired waterbody

under Section 303(d) of the Clean Water Act.²⁴ Stormwater directly discharged into the Willamette River or into a storm sewer that discharges to the Willamette River must be treated to not exceed total maximum daily loads (TMDLs) for the following constituents: bacteria, DDT, dieldrin, dissolved oxygen, mercury, temperature, and turbidity (DEQ 2006). The City and ODOT each hold a National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System Permit issued by DEQ to manage their respective storm sewer systems.

Stormwater runoff from ODOT ROW in the API is collected and conveyed in stormwater-only systems to four outfall locations on the Willamette River. The conveyance systems are located within the highway alignments and do not connect to the City's combined stormwater-sanitary system. Stormwater runoff from the City ROW drains to both stormwater-only and combined stormwater-sanitary systems. Flows from the combined stormwater-sanitary system are conveyed via a large-diameter north-south conduit to the Columbia Boulevard Wastewater Treatment Facility.

Water quality treatment is currently provided for less than an acre of the 41-acre API using a combination of biofiltration swales²⁵ and City-owned "Green Street" water quality facilities. Most stormwater runoff from the ODOT and City ROW in the API is discharged to the Willamette River without water quality treatment.

While Oregon Water Resources Department databases show more than 3,000 wells located within the two 1-square-mile sections that contain the API (Township 1 North Range 1 East, Sections 27 and 34), only 3 percent of wells are water wells (the others are monitoring or geotechnical test wells). The reported depth to groundwater at 1,009 of these wells ranges between 1 and 163 feet below ground surface, with a mean depth to groundwater of 21 feet (OWRD 2017).

Small portions of the API in the southern portion of the Project Area are located within the Federal Emergency Management Agency (FEMA) 100-year floodplain of the Willamette River. A small portion of the API may be located in the FEMA floodway. For additional details, see the Water Resources Technical Report (ODOT 2019c).

3.16.2 Environmental Consequences

3.16.2.1 No-Build Alternative

Under the No-Build Alternative, stormwater runoff from more than 40 acres of impervious area from ODOT and City ROW within the API would continue to be discharged to the Willamette River without water quality treatment. Almost all development within the API on the ODOT ROW predates current water quality requirements, thus existing water quality infrastructure is limited.

3.16.2.2 Build Alternative

During the construction phase, vegetation removal, soil compaction from heavy equipment, excavation, and use of staging areas could temporarily increase sediment

²⁴ Section 303(d) of the 1972 Clean Water Act (33 U.S.C. 1251 et seq.) requires states to identify waters where current pollution control technologies alone cannot meet the water quality standards set for that waterbody. Every 2 years, states are required to submit a list of impaired waters, plus any that may soon become impaired, to the U.S. Environmental Protection Agency for approval. The impaired waters are prioritized based on the severity of the pollution and the designated use of the waterbody (e.g., fish propagation or human recreation). States must establish the total maximum daily load(s) of the pollutant(s) in the waterbody for impaired waters on their list.

²⁵ A biofiltration swale is a sloped channel that uses vegetation (typically grass) to capture and biologically degrade pollutants carried by stormwater runoff.

loads in stormwater runoff, which, if uncontrolled, could have adverse impacts on water quality in receiving waters. Impacts to groundwater and floodplains during construction are not anticipated.

The construction of auxiliary lanes and full shoulders between I-84 and I-405, ramp modifications, and full pavement reconstruction of I-5 from the Fremont Bridge to the I-84 overcrossing would result in a net increase in impervious area within the ODOT ROW of approximately 6 acres and a total contributing impervious area of approximately 30 acres. Surface street improvements, including new overcrossing structures and roadway, bike, and pedestrian improvements, would result in a net increase in impervious area within the City ROW of approximately 2 acres and a total contributing impervious area of 11 acres.

Water quality treatment facilities to manage stormwater runoff from the ODOT ROW would be developed at three locations: N Mississippi Avenue, adjacent to N Knott Street, and the Eastbank Viaduct/Esplanade. Due to site constraints, the facilities at N Mississippi and N Knott would be designed to treat stormwater runoff from impervious areas both within and outside the Build Alternative's contributing impervious area that are currently untreated.

This treatment approach would improve water quality to the required degree from the ODOT ROW prior to discharge to the Willamette River and would treat approximately 96 percent of the contributing impervious area from ODOT ROW within the API. If available, ODOT could also acquire credits at an ODOT regional water quality facility under development within the larger basin area to meet the Build Alternative's remaining unmet stormwater management requirements.

Water quality treatment for stormwater runoff from City ROW would be accomplished with additional stormwater planters located between the curb and sidewalk along N Center Court Street and N Williams.

Groundwater impacts are not expected to result from long-term operation of the Build Alternative. Water quality facility design per the ODOT Hydraulics Manual (ODOT 2014) and the City's Stormwater Management Manual (City of Portland 2016) incorporates a minimum distance from groundwater to protect groundwater quality and ensure functionality of the facility. Additionally, water quality facilities could be designed with an impermeable membrane to protect groundwater quality.

Floodplain impacts are also not expected to result from long-term and operational activities associated with stormwater management for the Build Alternative. Stormwater facilities built within the floodplain are expected to result in a net removal of material; however, this action would not result in impacts to the floodplain. The Build Alternative would not result in any long-term indirect impacts to the Willamette River, groundwater, or floodplains in the API.

3.16.2.3 Mitigation

Potential impacts to water quality during construction would be avoided by requiring contractors to follow standard best management and erosion control practices in the ODOT Erosion Control Manual (2005), ODOT Standard Specifications (2018a), ODOT Boilerplate Special Provisions (2018b), and City of Portland stormwater requirements. Additional special provisions to protect water quality and sensitive species in and around areas of proposed in-water work are described in Section 3.3.2.3.

3.17 Cumulative Impacts

Cumulative impacts result from the incremental effect of the Build Alternative when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

The analysis of cumulative impacts involves a series of steps conducted in the following order:

- Identify the resource topics that could potentially experience direct or indirect impacts from construction and operation of the Build Alternative.
- Define the geographic area (spatial boundary) within which cumulative impacts will be assessed, as well as the time frame (temporal boundary) over which other past, present, and reasonably foreseeable future actions will be considered.
- Describe the current status or condition of the resource being analyzed, as well as its historic condition (prior to any notable change) and indicate whether the status or condition of the resource is improving, stable, or in decline.
- Identify other actions or projects that are reasonably likely to occur within the area of potential impact during the established time frame and assess whether they could beneficially or adversely affect the resource being analyzed.
- Describe the combined effect on the resource being analyzed when the direct and indirect impacts of the Build Alternative are combined with the impacts of other actions or projects assumed to occur within the same geographic area during the established time frame.

The geographic area used for the cumulative impact analysis is the same as the API described for each resource topic in this EA. The time frame for the cumulative impact analysis extends from the beginning of large-scale urban development in and around the Project Area in the late 1950s/early 1960s, beginning with I-5 construction, to 2045, the horizon year for the analysis of transportation system changes.

3.17.1 Past, Present, and Reasonably Foreseeable Future Actions

The past, present, and reasonably foreseeable future actions that were considered in assessing cumulative effects from the Build Alternative are described in the following subsections.

3.17.1.1 Past Actions

Past actions include the following:

- Neighborhood and community development
 - Historical development of Portland area and accompanying changes in land use
 - Development of local transportation system (including roads, bicycle and pedestrian facilities, and bus transit)
 - Utilities (water, sewer, electric, and telecommunications)
 - Parks, trails, bikeways

- Commercial and residential development in and around the Project Area
 - Veterans Memorial Coliseum (1960)
 - Lloyd Center (1960)
 - Legacy Emanuel Medical Center (1970)
 - Oregon Convention Center (1990)
 - Rose Garden (1995)
- Regional transportation system development
 - Marine terminal facilities on the Willamette River
 - Port of Portland (1892)
 - Commission of Public Docks (1910)
 - Port of Portland (1970; consolidation of Port of Portland and Commission of Public Docks)
 - Freight rail lines (late 1800s and early 1900s)
 - Highways
 - I-84 (1963)
 - I-5 (1966)
 - I-405 (1973)
 - Rail transit system
 - MAX light rail (1986)
 - Portland Streetcar (2001)

3.17.1.2 Present Actions

Present actions include the ongoing operation and maintenance of existing infrastructure and land uses, including the following:

- Ongoing safety improvements for bicycles and pedestrians
- Local and regional transportation system maintenance
- Utility maintenance

3.17.1.3 Reasonably Foreseeable Future Actions

The evaluation of the land use and transportation impacts of the Project is largely cumulative in nature. For land use, the analysis of the Build and No-Build Alternatives considers land use outcome described in the TSP, the City's zoning code (which implements the comprehensive plan), and the Adopted Central City 2035 Plan. Therefore, the City of Portland has already considered and provided for the cumulative impacts of the Build Alternative.

Likewise, for transportation, the forecast of the performance and operation of the highway and local transportation system is based on Metro's regional travel demand model and on analysis tools that rely on the regional model data projected to the year 2045. The travel demand model is built on population and employment growth forecasts adopted by the Metro Council and the financially constrained project list included in the RTP (Metro 2014). These growth forecasts and planned transportation projects incorporate the reasonably foreseeable future growth and major actions that would potentially impact transportation operations in the API. Consequently, these reasonably foreseeable future actions are analyzed as part of the Build Alternative for any resources that rely on traffic demand models: Air Quality, Climate Change, Noise, and Transportation.

For other resources, cumulative impacts were also assessed by considering the following reasonably foreseeable future actions that were identified collaboratively with the City of Portland:

- Redevelopment of existing urban areas in the Project Area and vicinity
- Ongoing maintenance and development of existing urban infrastructure in the Project Area and vicinity

These actions include private redevelopment, public development, and infrastructure projects, as well as combined public/private redevelopments. Given the highly developed nature of the Project Area and vicinity, the reasonably foreseeable future actions are not expected to substantially change the types or intensities of existing land uses.

3.17.2 Cumulative Impacts Analysis

3.17.2.1 Air Quality

Air quality analysis is inherently cumulative in that the analysis compares the overall effects of air pollution in an airshed to ambient air quality standards or benchmarks that apply overall to the ambient air. The Build Alternative would result in emission increases during construction and virtually no effect on emissions for operations. The Build Alternative is not expected to cause air quality impacts nor contribute to cumulative effects on air quality beyond construction effects, which would be addressed by requiring contractors to implement a variety of mitigation measures to minimize emissions from construction equipment and control fugitive dust.

3.17.2.2 Aquatic Biology

The Build Alternative would not be expected to have substantial impacts on habitat and aquatic species. Only a small portion of the Build Alternative would occur in the water where sensitive species are present; therefore, the Build Alternative's contribution to the potential in-water effects of future reasonably foreseeable future actions would not be great.

3.17.2.3 Archaeology

Throughout the twentieth century, increased urbanization has affected the types and distribution of archaeological resources that may have originally been encountered in the Project Area. Past development projects typically occurred without consideration of archaeological resources because few environmental laws and regulations were in place to protect archaeological resources. The Build Alternative could result in the identification of buried archaeological resources, resulting in an incremental impact over time as these resources are discovered and potentially removed as a result of reasonably foreseeable future actions and other future development projects. Archaeological resources encountered during soil-disturbing activities associated with reasonably foreseeable future actions and other development projects in the API would likely be mitigated primarily through data recovery at the time of their discovery. Because lands within the API have been previously disturbed, the Build Alternative is less likely to encounter unspoiled archaeological resources in the Project Area. Where resources may be encountered, an Inadvertent Discovery Plan would be in place to address such discoveries; therefore, the Build Alternative's contribution to overall cumulative impacts, and those of reasonably foreseeable future actions, would not be large.

3.17.2.4 Climate Change

Global climate change is the cumulative result of numerous emissions sources contributing to global atmospheric GHG concentrations. There is presently no scientific methodology for attributing specific climatological changes to the emissions resulting from a specific transportation project. This document considers GHG emissions as a primary contributing factor to climate change associated with transportation improvements. When comparing the projected change in GHG emissions between the No-Build and Build Alternatives to the most current GHG emissions estimate for the Portland metropolitan area, the decrease in emissions from the Build Alternative would be equivalent to approximately 0.02 percent of the total regional emissions. Therefore, the Build Alternative would be expected to contribute only a small amount to the total GHG emissions now occurring in the greater Portland metropolitan area.

3.17.2.5 Environmental Justice

The API has a long history of major public infrastructure projects that displaced Black and low-income residents and disrupted the local community by introducing a substantial east-west barrier through the neighborhoods adjacent to the facility. Starting in the late 1940s, a sequence of public infrastructure projects gradually displaced nearly all the residents of Lower Albina from I-5 west. Additional public and private projects through the 1950s, 1960s, and 1970s displaced more than 900 dwelling units in and near the API; most of the displaced households were Black, and most were low-income. In addition to public infrastructure projects, the ongoing process of gentrification has also impacted the community of Albina by displacing low-income Black residents (Bates 2013; Gibson 2007; Portland Housing Bureau n.d.-a). New development on NE Hancock near its intersection with NE 3rd Avenue reflects a growing demand for housing in the neighborhood and suggests that the process of gentrification in the Albina neighborhood is continuing.

The Build Alternative was conceived and developed with consideration of the detrimental effects of past public infrastructure projects on Black residents in the API. The displacement effects of the Build Alternative would be limited to four commercial retail or service-related businesses and would not include homes or apartments. The Build Alternative is consistent with planned land use and would support growth consistent with adopted plans and policies, and would therefore not have a long-term adverse effect on population, demographics, housing or income, beyond what is already planned for in the API (see the *Land Use Technical Report* [ODOT 2019k] for additional information on the Build Alternative's consistency with adopted plans and policies). Therefore, the contribution of the Project to displacement effects from past actions would likely be small relative to the other factors that may cause displacement of EJ populations in the API, including the ongoing effects of gentrification.

The Build Alternative would provide substantial long-term benefits to EJ populations in the API, including enhanced east-west connectivity across I-5, new and enhanced transit, pedestrian and bicycle facilities, improved safety benefits for all transportation modes, and improved traffic operations and safety on I-5 and local surface streets. The Project's contribution to cumulative impacts to EJ populations would mostly be beneficial.

3.17.2.6 Hazardous Materials

The Sites of Concern identified in the hazardous materials API have resulted from

many years of past actions. Present actions may also be introducing additional Sites of Concern within the API that are not yet able to be identified, and reasonably foreseeable future actions could do the same. The Build Alternative is not expected to contribute to adverse cumulative construction or operation impacts under the Build Alternative. If contaminated media are uncovered as a result of construction of the Build Alternative or other reasonably foreseeable future actions, there would be an incremental improvement in environmental quality when the contamination is addressed according to current applicable regulatory standards. In developed locations such as the Project Area, the cumulative effects of the Build Alternative could be beneficial, as redevelopment typically triggers increased removal or remediation of existing hazardous materials.

3.17.2.7 Historic Resources

Throughout the twentieth century, increased urbanization has affected the types and distribution of historic resources in the API. Past development projects have usually occurred without consideration of historic resources because few environmental laws and regulations were in place to protect historic resources. For reasonably foreseeable future actions, only those historic properties affected by projects using federal funds would be subject to Section 106 of the NHPA. Some local or state projects may trigger state laws (such as ORS 358.653) that require consideration of historic resources owned by political subdivisions of the state.

Because the impacts of the Build Alternative on historic resources in the API would be limited to visual changes to the settings near historic properties and a small potential for construction-related vibration impacts, which would be addressed by the PA developed in consultation with the Oregon SHPO and other consulting parties, the Build Alternative's anticipated contribution to cumulative impacts to historic properties would be negligible.

3.17.2.8 Land Use

The planning processes that resulted in the inclusion of the Build Alternative in the City of Portland TSP and Adopted Central City 2035 Plan considered the impacts of the proposed action combined with past, present, and foreseeable transportation improvements and land development. All future transportation improvements in the API must implement the TSP, and all future land development must comply with the City's zoning code, which implements the comprehensive plan, including the provisions of the Adopted Central City 2035 Plan. Therefore, the City of Portland has already considered and provided for the cumulative impacts of the Build Alternative.

3.17.2.9 Noise

Changes in the distribution of vehicle trips in the API would occur in conjunction with incremental annual traffic volume growth over time that would occur with or without the Build Alternative. Changes in localized vehicle noise would occur in the context of the broader noise environment and would be cumulative relative to other changes that may occur. The general noise environment in the API includes noise sources such as I-5 and local surface streets, light industrial and commercial activities in the area, and residential development. Because the Build Alternative would contribute a relatively small amount of additional noise to existing and predicted noise levels in the API, minimal cumulative noise impacts are anticipated.

3.17.2.10 Right of Way

Past and present actions have resulted in the current land use designations, parcel boundaries, and ROW designations in the API. Reasonably foreseeable future actions would not change the existing ROW conditions in the API. The Build Alternative would result in notable changes in ROW in the Rose Quarter area of the API but would not substantially contribute to the cumulative effects of other past, present, and reasonably foreseeable future actions on the ROW.

3.17.2.11 Section 4(f)

As described for historic resources above, increased urbanization has affected the types and distribution of Section 4(f) resources in the API. Past transportation projects in the API have occurred without consideration of Section 4(f) resources, primarily historic buildings. For example, the U.S. Department of Transportation Act (49 U.S.C. 303[c]), which includes Section 4(f) guidelines, was not adopted by the U.S. Congress until 1966, after the segment of I-5 in the API was completed and many homes were displaced. Currently, only qualifying properties (such as parks and historic properties) that are affected by federal transportation agency-funded projects would be subject to Section 4(f)'s protective provisions. When combined with past, present, and reasonably foreseeable future actions, the Build Alternative's contribution to cumulative Section 4(f) impacts in the API would be minimal.

3.17.2.12 Socioeconomics

Past actions have resulted in the development of neighborhoods, urban infrastructure, community facilities, public services, and the business and economic environment that exists in the API and surroundings. The development of I-5, along with I-84 and the roadway system in Portland, enhanced access and mobility throughout the region. However, I-5 also introduced a substantial east-west barrier through the neighborhoods adjacent to the facility.

Reasonably foreseeable future actions are likely to sustain and enhance the urban development in the API through redevelopment that would update infrastructure and commercial developments. Reasonably foreseeable future actions are also likely to contribute to patterns of growth and development that have and would continue to result in changes to the regional and local economies, including property value increases and neighborhood transitions.

Pressures in the API, surrounding areas, and throughout the region affecting housing affordability and community-scale business would likely continue to be influenced by broad regional economic trends. The Build Alternative would improve connectivity across I-5 and reduce congestion and improve safety on I-5 but would not meaningfully alter the cumulative socio-economic effects of past, present, and reasonably foreseeable future actions.

3.17.2.13 Transportation

Transit

Long construction periods (coupled with circuitous bus detour routes) could temporarily suppress transit ridership due to passenger inconvenience. While transit operations (e.g., travel times) would generally trend with motor vehicle impacts, opportunities could arise to implement Enhanced Transit Corridors Plan recommendations on API corridors in tandem with the Build Alternative. This could result in improved operations, which could, in turn, grow ridership due to transit's

increased attractiveness.

Active Transportation

Cumulative active transportation impacts of past and future actions combined with the Build Alternative include more even distribution of active transportation corridors due to establishment of new active transportation corridors outside of the API and enhance the overall attractiveness of walking and biking due to additional connections, increased coverage of lower-stress bikeways, improved sidewalk and pedestrian crossings, and reduced complexity of intersections.

Safety, Traffic Operations, Access

The evaluation of the transportation impacts of the Build Alternative is largely cumulative in nature. The forecast of the performance and operation of the transportation system is based on Metro's regional travel demand model and on analysis tools that rely on the regional model data. The travel demand model is built on population and employment growth forecasts adopted by the Metro Council and the financially constrained project list included in the RTP (Metro 2014). These growth forecasts and planned transportation projects incorporate the reasonably foreseeable future growth and major actions that would potentially impact transportation operations in the API.

3.17.2.14 Utilities

The Build Alternative has the potential to impact utilities within the API. Utility relocations prior to and during construction could result in interruptions of service. For most of the utilities, potential disruptions are expected to be minimal, with utility providers scheduling outages when they are required. Potential interruptions of service for major utility infrastructure would be more disruptive and temporary connections more difficult and costly to establish. Similar impacts to utilities within the API could be expected to result from reasonably foreseeable future actions. The incremental contribution to cumulative impacts on utilities from the Build Alternative could be substantial due to the magnitude of potential relocations occurring during construction. However, the contribution of the Build Alternative to cumulative impacts would be minimized through avoidance and mitigation measures, as described in Section 3.15.2.3.

3.17.2.15 Water Resources

The anticipated trends in the condition of water quality in the API are generally beneficial, as existing developments without water quality facilities are required to implement mitigation to comply with local and state water quality regulations. Potential reasonably foreseeable future actions would be expected to comply with water quality treatment requirements. The Build Alternative would include water quality facilities designed to meet current regulatory requirements and would treat or use off-site treatment credits to mitigate stormwater impacts from approximately 41 acres of impervious area not currently treated for water quality. As a result of updated stormwater treatment that would occur, the Project's contribution to beneficial cumulative effects is considered large.

4 Public Involvement and Agency Coordination

4.1 Background

Since its inception in 2010, planning and development of the Build Alternative has included an active public involvement component. Early planning efforts for the N/NE Quadrant (as part of the Adopted Central City 2035 Plan) and I-5 Broadway/Weidler Plans were guided by the unique collaborative partnership between ODOT and the City of Portland, and a 30-person SAC. The SAC was integral to the process and defining one recommended design concept, providing input from neighborhood, business, bicycle, pedestrian, transit, freight, rail, event facility, and property owner interests. This partnership allowed for joint planning and decision-making to develop a design concept for the I-5 Broadway/Weidler interchange that would complement the land use, urban design, and transportation system envisioned for the planning districts of Lower Albina and Lloyd.

During the 2-year community engagement process, stakeholders and staff contemplated over 70 options for improving transportation on I-5 and local streets around the Broadway/Weidler interchange. Options were considered through numerous community engagement events, study area tours, and many briefings with potentially affected stakeholders and property owners. More than 2,800 people came to the public events, including the 19 SAC meetings, 14 subcommittee meetings, 4 open houses, 2 charrettes, and 3 community walks.

The outcome of this effort was the I-5 Broadway/Weidler Facility Plan to guide preliminary design and environmental analysis for the Build Alternative. The I-5 Broadway/Weidler Facility Plan and recommended design concept were adopted by the Oregon Transportation Commission and Portland City Council in 2012 and became part of Metro's 2014 RTP.

4.2 Tribal and Agency Coordination

FHWA and ODOT are the lead agencies for the EA. FHWA serves as the lead federal agency, as federal funding is anticipated. ODOT is the joint lead agency, as the direct recipient of the Project's federal funds.

Numerous agencies were invited by letter to participate as Cooperating or Participating Agencies. Several agencies are designated as cooperating agencies per the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) and therefore are automatically considered in that role unless they formally decline.

Cooperating and Participating Agencies will:

- Provide comments on the purpose and need and range of alternatives;
- Review methodologies to address technical topics consistent with special expertise or jurisdiction of the agency;
- Review the EA for sufficiency and provide comments;
- Identify any issues of concern regarding the Project's potential environmental or

socioeconomic impacts; and

- Provide timely input on unresolved issues.

The following agencies declined invitations to be a Participating Agency in the Project: United States Fish and Wildlife Service, Portland Parks and Recreation, Multnomah County, and Oregon Department of Environmental Quality.

Cooperating and Participating Agencies and their roles are summarized below.

4.2.1 Cooperating Agencies

4.2.1.1 National Marine Fisheries Service

Per SAFETEA-LU, NMFS is designated as a cooperating agency. In addition to tasks listed in Section 4.2 above, NMFS reviewed methodologies for the following technical areas: Water Quality and Endangered Species. Through cooperation with NMFS, the Project will be reviewed under the FAHP PBO.

4.2.1.2 United States Army Corp of Engineers

Per SAFETEA-LU, the United States Army Corp of Engineers (USACE) is designated as a cooperating agency. In addition to tasks listed in Section 4.2 above, USACE reviewed methodologies for the following technical areas: Water Quality and Clean Water Act Section 10 and Section 404 compliance.

4.2.1.3 United States Coast Guard

The United States Coast Guard (USCG) accepted the invitation to be a cooperating agency. In addition to tasks listed in Section 4.2 above, USCG reviewed methodologies for the following technical areas: compliance with navigable waters and structural clearance requirements.

4.2.2 Participating Agencies

4.2.2.1 Oregon State Historic Preservation Office

In addition to tasks listed in Section 4.2 above, the Oregon SHPO reviewed methodologies for the following technical areas: Historic Resources and Archaeological Resources.

As part of this consultation, ODOT and FHWA have engaged with the SHPO to determine whether known NRHP properties (listed or eligible) are located in or near the Project Area. The SHPO provided a response on October 5, 2017, identifying the historic context of the Project Area for Portland's late-nineteenth-century immigrant population and, more recently, the community's Black residents. The pending NRHP nomination for Billy Webb Elks Lodge, a property associated with Black history in NE Portland, was identified. The SHPO recommended expanding the Area of Potential Effect (APE)¹ to address a larger geographic area. The SHPO provided concurrence for the revised APE on July 25, 2018. FHWA received the concurrence from the Oregon SHPO concerning its Determinations of Eligibility and its finding that the Project would have "no adverse effects" on January 23, 2019.

In consultation with the SHPO, FHWA and ODOT have also proposed the use of a

¹ Section 106 requires the delineation of an APE, "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties." For this Project, the API is synonymous with the Section 106 process's APE.

PA to address potential impacts to archaeological and historic resources. The PA is intended to ensure identification and evaluation of potential deeply buried historic properties within the APE, address the effects of construction-related vibration upon built historic properties, and to provide for the resolution of any adverse effects on historic properties subsequent to the Section 106 finding for the Build Alternative. The PA details a Treatment Plan to outline a process to identify, evaluate, and treat archaeological discoveries or human remains that could be made during the construction phase. The signed PA is provided in Appendix D (signature in progress) and filed with the Advisory Council on Historic Preservation.

4.2.2.2 TriMet

In addition to tasks listed in Section 4.2 above, TriMet reviewed methodologies for the following technical area: Transportation.

4.2.2.3 Metro

In addition to tasks listed in Section 4.2 above, Metro reviewed methodologies for the following technical areas: Land Use and Transportation

4.2.2.4 City of Portland

Building on early planning, ODOT is working the City of Portland's Bureau of Planning and Sustainability and the Bureau of Transportation to refine design components of the Build Alternative and to develop the EA. In this capacity, the City of Portland has participated as a partner in the Build Alternative's technical development and public engagement, and as reviewer of methodology and technical reports for the following technical areas: Air Quality, Aquatic Biology, Archaeological Resources, Climate Change, Environmental Justice, Hazardous Materials, Historic Resources, Land Use, Noise, Right of Way, Section 4(f), Socioeconomics, Transportation, Utilities, and Water Quality.

With the multiple transportation modes that converge within the Project Area (streetcar, bike, pedestrian realm, automobiles, etc.) and other multimodal investments in this area, the City of Portland continues to be an engaged partner in rethinking how these modes interact and perform in the Project Area. The City of Portland and ODOT will continue to meet regularly for Transportation Advisory Committee Meetings.

4.2.2.5 Port of Portland

In addition to tasks listed in Section 4.2 above, the Port of Portland reviewed methodologies for the following technical areas: Transportation, compatibility with Port operations and freight operations.

4.2.2.6 Portland Streetcar

In addition to tasks listed in Section 4.2 above, the Portland Streetcar reviewed methodologies for the following technical areas: Transportation.

4.2.3 Tribes

The Confederated Tribes of the Grande Ronde Community of Oregon, Confederated Tribes of Siletz Indians, Confederated Tribes of the Warm Springs Reservation of Oregon, and the Cowlitz Indian Tribe were invited to become participating agencies with FHWA and ODOT in the development of the NEPA EA for the Project through

letters sent December 20, 2016. No response was received.

These tribes were asked for input on the APE for the historic and archaeological resources evaluations for the NEPA EA and Section 106 compliance through letters sent on September 11, 2017. ODOT discussed the Project at two meetings with the Grande Ronde Community of Oregon and one meeting with the Confederated Tribes of Siletz Indians. ODOT (on behalf of FHWA) sent letters to tribes listed in the agency coordination plan to invite them to review the Project PA for Section 106. No response has been received to date.

4.3 Public Involvement

Consistent with early planning, public involvement and community input have been integral to the environmental review of the Project. Public outreach has focused on sharing information about the Build Alternative, with emphasis on EJ communities affected by past infrastructure development in the Project Area. Public outreach specific to design for new bicycle and pedestrian routes and future uses for new space on highway covers would continue as the Project moves into its design phase.

4.3.1 General Public Outreach

An Open House was held in the early stages of the environmental review phase (September 2017). The event, hosted by ODOT and the City of Portland, provided an opportunity for the public to learn about the Build Alternative, talk to Project team members, and share input. The Open House was attended by about 80 participants. A second Open House will be held following the release of the public review Draft EA. In addition to the Open Houses, numerous targeted outreach events were held. A list of these events is provided in Appendix E.

4.3.2 Environmental Justice Outreach

Early in the Project, ODOT conducted interviews with 17 members and leaders of the Black community to better understand perception of ODOT, local agencies, and the proposed action considered in the Build Alternative. Their feedback helped to inform the planning of engagement activities and to refine the Project team's public involvement strategies.

The Project team held events in the communities surrounding the Project Area, including an open house at Matt Dishman Community Center attended by about 80 participants and a Community and Neighborhood Forum at Billy Webb Elks Lodge attended by more than 90 participants. During these events, EJ issues were one focal point of discussions. Concerns frequently expressed included economic opportunity, gentrification, historical injustice with past developments in the area (including I-5), distrust of agencies from past actions or perceived broken promises with development initiatives, and government services.

Smaller, group-focused outreach to EJ communities included a community liaisons group, participation in local summer events, a Pastors Breakfast, briefings, a targeted open house, and local door-to-door business canvassing. These efforts and outcomes are summarized below.

4.3.2.1 Community Liaisons Group

To further guide and inform locally relevant outreach efforts and activities to reach

the local Black community, the Project team assembled a 14-member Community Liaisons Group. This group, which includes interests and leadership for people of color, low-income, and elderly populations, met two times, in September 2017 and again in March 2018. It has served as a sounding board to discuss outreach opportunities and Project information materials.

The Community Liaisons Group provided input on outreach materials and outreach opportunities, especially those related to inner N/NE Portland. The group expressed their desire to discuss the potential for local economic development and local jobs, as well as some of the design/phasing aspects of the Build Alternative.

4.3.2.2 Local Summer Event Participation

The Project team participated in several summer festivals, including two that focused on neighborhood heritage: Good in the Hood, which celebrates local multiculturalism in inner N/NE Portland, and Juneteenth, which commemorates the 1865 announcement of the abolition of slavery and the emancipation of African American slaves. The Project team sponsored booths at both events to hand out Project information, discuss the Project with festival attendees, and identify further outreach opportunities within the community.

Visitors to the events expressed much interest in possible uses for lands on top of the highway covers and the area's redevelopment. Some expressed concerns about gentrification that might occur with further redevelopment in the area. Many indicated concerns about safer pedestrian, bicycle, and transit areas. Some indicated concerns about congestion and whether the Build Alternative could relieve that congestion.

4.3.2.3 Briefings: Pastors Breakfast and Soul District Business Association

On March 20, 2018, the Project team worked with a local pastor to organize a Pastors Breakfast, gathering 15 spiritual leaders from the Project Area to discuss issues and opportunities associated with the development of the Build Alternative. Participants in this discussion were concerned about their communities being included in outreach and wanted to be involved in the process. Creating parking for churches was important to them, as well preventing environmental impacts to Harriet Tubman Middle School. They were also interested in how the Build Alternative could create economic opportunity for the Black community, particularly regarding DBE contracting.

In October 2018, Project team representatives provided a presentation and held a discussion with the Soul District Business Association, which promotes and supports the economic and business development of urban N/NE Portland. This group expressed interest in employment opportunities during Project construction but also concern for extended construction disruption. They also expressed interest in being involved with the types of businesses and development that could be induced by the Build Alternative and voiced concerns about its potential effects on the area's residential affordability.

4.3.2.4 "What's Happening in Our Streets? A Transportation Open House for the Black Community"

As a result of recommendations from the Community Liaisons and other outreach event inquiries, ODOT and the City of Portland partnered to design and hold an event to engage with the Black community about transportation investments being made in

N/NE Portland. More than 90 people attended the event, which spotlighted the Build Alternative and provided information about the Vancouver Avenue Restriping Project, the Lloyd to Woodlawn Greenway, Martin Luther King Jr. Boulevard Improvements, Vision Zero, Safe Routes to School, Portland Fire and Rescue, and Portland Bureau of Transportation jobs and contracting opportunities.

The idea was to create an interactive space where community members could have their questions answered, identify where they lived in relationship to infrastructure projects on maps provided listing each project, and participate in a survey collecting feedback on the Build Alternative. The Project team presented proposed ideas for safety and infrastructure improvements within the Rose Quarter. Survey responses from about half of the attendees indicated that 87.5 percent of those who responded identified as African American/Black, 5 percent as Asian/Pacific Islander, and 7.5 percent as American Indian/Native American. The feedback from this event encouraged the agencies to continue to engage community members about broader issues related to transportation investments, such as housing, procurement, and job opportunities. The attendees also expressed interest in bringing back to the neighborhood residents who have been displaced by past projects and policies.

4.3.2.5 Business Canvassing

In August and September 2018, the Project team canvassed area businesses to raise awareness about the Build Alternative, answer questions, and provide contact information for those interested. This outreach effort reached more than 60 businesses, representing a wide range of business types and services. The discussions also included a number of businesses who have been long-time occupants of the area. Frequent issues brought up by the local businesses included current congestion problems and future concerns about getting deliveries to and from their businesses. Most were highly appreciative of the personal attention through the door-to-door outreach effort.

5 Anticipated Permits and Approvals

Table 5-1 lists permits and clearances that are anticipated to be required prior to implementation of the Build Alternative.

Table 5-1. Anticipated Permits and Approvals

Type of Permit/Approval	Permit Required (Y=yes, N=no, P=potentially)	Comments
Access Permit or Temporary Easement	Y	Approximately 1.5 - 2.5 acres of temporary easement for construction work areas, driveway reconnections, and staging.
Archaeology Clearance (SHPO)	Y	Compliance with Section 106.
Endangered Species Act Permits (USFWS, NMFS)	Y	Consultation with NMFS/USFWS.
Floodplain Permits (Local)	Y	Construction activities could occur within the floodplain.
U.S. Army Corps of Engineers Permits (Section 10 and/or 404)	Y	Excavation would be required in waters of the U.S.
Oregon Department of State Lands Fill and Removal Permits	P	Could be required if the final Project design includes removal or fill in a wetland or waterbody.
Historical / Cultural Resources Approval (SHPO, FHWA)	Y	A Programmatic Agreement is required.
Land Use Permits (Local)	Y	Local land use permits would be required.
Local Permits	Y	Local building permits.
Magnuson-Stevens Act clearance (NMFS, USFWS)	Y	Consultation with NMFS; authorization under the FHAP PBO.
Materials Source Permit (DOGAMI)	P	Required if fill would be excavated off-site exceeding 1 acre and/or 5,000 cubic yards of new disturbance.
Stormwater Permit	Y	1200-C permit for construction. ODOT already has this permit.
UST Decommissioning Notification	P	There are numerous USTs within the API. If a UST needs to be decommissioned as part of the Project, a decommissioning notice would be required. This is considered unlikely.
Utility Permits	Y	Utility permits would be required for relocates.

Notes: API = Area of Potential Impact; DEQ = Oregon Department of Environmental Quality; DOGAMI = Oregon Department of Geology and Mineral Industries; FHAP = Federal-Aid Highway Program; FHWA = Federal Highway Administration; NMFS = National Marine Fisheries Service; ODOT = Oregon Department of State Lands; PBO = Programmatic Biological Opinion; SHPO = State Historic Preservation Office; USFWS = U.S. Fish and Wildlife Service; UST = underground storage tank.

6 List of Preparers

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Emily Cline FHWA	FHWA Lead	Project Management and Review
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7 Technical Reports Prepared for this EA

The following technical reports and memoranda were prepared and are summarized in this EA. Copies can be found in Appendix A.

Report	Author(s)	Date
<i>Active Transportation Technical Report</i>	John Cullerton, Parametrix Rory Renfro, Alta Planning and Design Katie Mangle, Alta Planning and Design Mike Sellinger, Alta Planning and Design Kirk Paulson, Alta Planning and Design	January 8, 2019
<i>Air Quality Technical Report</i>	Martha Moore, P.E., Maul Foster Alongi Leslie Riley, Maul Foster Alongi Natalie Liljenwall (Reviewer), ODOT	January 8, 2019
<i>Archaeological Resources Technical Report</i>	Anisa Becker, AECOM Sarah McDaniel, AECOM Brandon Grilc, AECOM Michelle Stegner, AECOM Stephanie Butler, AECOM	January 8, 2019
<i>Climate Change Technical Report</i>	Martha Moore, P.E., Maul Foster Alongi Leslie Riley, Maul Foster Alongi Natalie Liljenwall (Reviewer), ODOT Michael Holthoff (Reviewer), ODOT	January 8, 2019
<i>Environmental Justice Technical Report</i>	John Kelly, OBEC Consulting Engineers Jan Aarts, AECOM	January 8, 2019
<i>Hazardous Materials Technical Report</i>	Melinda Borgens, AECOM Susan Garland, AECOM Nicky Moody, AECOM	January 8, 2019
<i>Historic Resources Technical Report</i>	Kirk Ranzetta, AECOM Brandon Grilc, AECOM Anisa Becker, AECOM Timothy Wood, AECOM Shoshana Jones, AECOM Patience Stuart, AECOM Robert W. Hadlow, ODOT	January 8, 2019

Report	Author(s)	Date
<i>Land Use Technical Report</i>	John Kelly, OBEC Consulting Engineers	January 8, 2019
<i>Noise Technical Report</i>	Craig Milliken, HDR Inc. Jennifer Maze, HDR Inc.	January 8, 2019
<i>Right of Way Technical Report</i>	Debra Mervyn, D.A. Mervyn & Associates, LLC P. Barton DeLacy, MAI, CRE, FRICS, D.A. Mervyn & Associates, LLC; Delacy Consulting, LLC Erica Antill, AECOM Shannon Fish, ODOT	January 8, 2019
<i>Section 4(f) Technical Report</i>	Kirk Ranzetta, AECOM Robert W. Hadlow, ODOT	January 8, 2019
<i>Socioeconomics Technical Report</i>	James Gregory, HDR Inc. Jeremy Beard, HDR Inc. Brian Bauman, HDR Inc.	January 8, 2019
<i>Traffic Analysis Technical Report</i>	John Cullerton, Parametrix Ryan LeProwse, Parametrix Rory Renfro, Alta Planning and Design Katie Mangle, Alta Planning and Design Mike Sellinger, Alta Planning and Design Kirk Paulson, Alta Planning and Design Elizabeth Wemple, PE, HDR Inc. Andrew Johnson, HDR Inc. Camille Alexander, HDR Inc. Jeremy Jackson, HDR Inc. Chengxin Dai, HDR Inc. Natalie Sager (Lindsoe), HDR Inc. Meekyung Lee, HDR Inc.	January 8, 2019
<i>Transit Technical Report</i>	John Cullerton, Parametrix Ryan LeProwse, Parametrix Rory Renfro, Alta Planning and Design Katie Mangle, Alta Planning and Design	
<i>Transportation Access Technical Report</i>	John Cullerton, Parametrix Elizabeth Wemple, PE, HDR Inc. Andrew Johnson, HDR Inc. Camille Alexander, HDR Inc.	

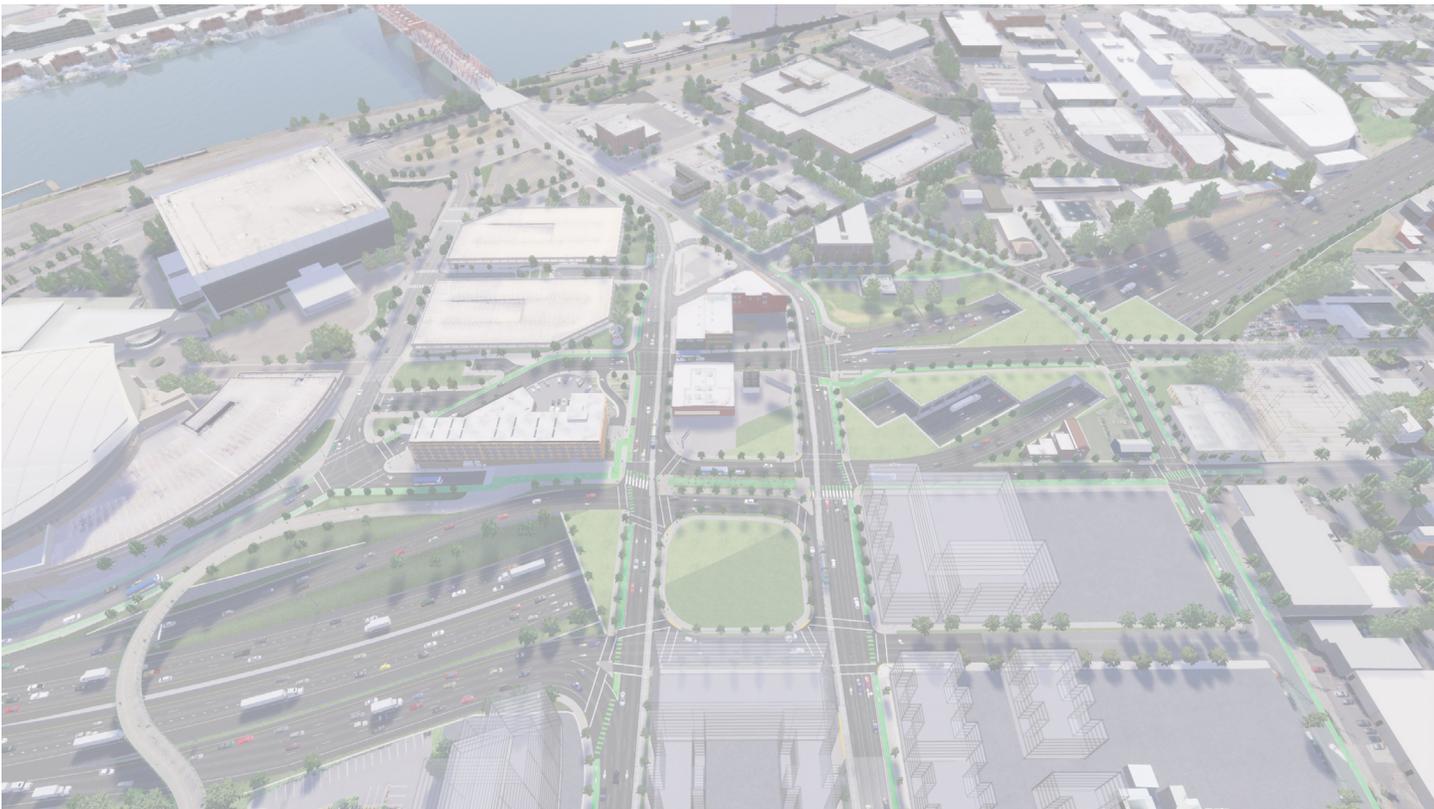
Report	Author(s)	Date
<i>Transportation Safety Technical Report</i>	John Cullerton, Parametrix Rory Renfro, Alta Planning and Design Elizabeth Wemple, PE, HDR Inc. Chengxin Dai, HDR Inc. Natalie Sager (Lindsoe), HDR Inc.	January 8, 2019
<i>Utilities Technical Report</i>	Tina Adams, PE, Casso Cory Burlingame, PE, Casso Seth Bergeson, AECOM	January 8, 2019
<i>Water Resources Technical Report</i>	Ryan Sheean, PE, HDR, Inc. Christine Higgins, PE, HDR, Inc.	January 8, 2019

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This Environmental Assessment and associated documents were prepared in compliance with Section 508 of the Rehabilitation Act of 1973. Additionally, an appendix containing detailed figure descriptions is provided for reference. Requests for descriptions or clarifications regarding items such as technical drawings or maps should be directed to the ODOT Senior Environmental Project Manager at (503) 731-4804.