FINAL

Transportation Access Technical Report

I-5 Rose Quarter Improvement Project

Oregon Department of Transportation

January 8, 2019

Contents

Tables

Figures[1]

[1] Appendix C 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.

Appendices

Acronyms and Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
API	Area of Potential Impact
EB	eastbound
FHWA	Federal Highway Administration
I-405	Interstate 405
I-5	Interstate 5
I-84	Interstate 84
mvmt	million vehicle miles travelled
NB	northbound
NEPA	National Environmental Policy Act
ODOT	Oregon Department of Transportation
OHP	Oregon Highway Plan
ORS	Oregon Revised Statute
OTP	Oregon Transportation Plan
RTP	*Regional Transportation Plan*
SAC	Stakeholder Advisory Committee
SB	southbound
SPIS	Safety Priority Index System
TMA	Transportation Management Association
TSP	transportation system plan
WB	westbound

Executive Summary

The I-5 Rose Quarter Improvement Project (Project) is located in Portland, Oregon, along the 1.7-mile segment of Interstate 5 (I-5) between Interstate 405 (I-405) to the north (milepost 303.2) and Interstate 84 (I-84) to the south (milepost 301.5). The Project also includes the interchange of I-5 and N Broadway and NE Weidler Street (the 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.

The purpose of the Project is to improve the safety and operations on I-5 between I-405 and I-84, the Broadway/Weidler interchange, and adjacent surface streets in the vicinity of the Broadway/Weidler interchange. The existing short weaving distances and lack of shoulders for crash/incident recovery in this segment of I-5 are physical factors that may contribute to the high number of crashes and safety problems. In achieving the purpose, the Project would also support improved local connectivity and multimodal access in the vicinity of the Broadway/Weidler interchange.

This report identifies existing and anticipated future transportation access conditions, including long-term effects of the no action (No-Build) Alternative and the long-term, short-term (construction), and cumulative effects of the proposed action (Build) Alternative.

Currently there are 130 access points within the Area of Potential Impact (37 intersections and 95 driveways). The majority incorporate business driveways, of which 60 percent are located on N/NE Weidler and N/NE Broadway. No changes would be made to 77 driveways and 28 intersections, which account for 80 percent of the access points in the Project Area. There are currently 13 driveways that could be closed at the time of property redevelopment or at the time of Project implementation. One intersection would be closed by the proposed Project but would be replaced by a new intersection. Five driveways and nine intersections would remain open but be modified by the proposed Project.

1 Introduction

1.1 Project Location

The I-5 Rose Quarter Improvement Project (Project) is located in Portland, Oregon, along the 1.7-mile segment of Interstate 5 (I-5) between Interstate 405 (I-405) to the north (milepost 303.2) and Interstate 84 (I-84) to the south (milepost 301.5). The Project also 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 illustrates the Project Area in which the proposed improvements are 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 would also 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.

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 Oregon. Crash data from 2011 to 2015 indicate that I-5 between I-84 and the merge point from the N Broadway ramp on to I-5 had a crash rate (for all types of crashes[2]) that was approximately 3.5 times higher than the statewide average for comparable urban interstate facilities (ODOT 2015a).

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

Figure 1. Project Area

  - Seventy-five percent of crashes occurred on southbound (SB) I-5, and 79 percent of all the crashes were rear-end collisions. Crashes during this 5-year period included one fatality, which was a pedestrian fatality. A total of seven crashes resulted in serious injury.
  - The Safety Priority Index System (SPIS) is the systematic scoring method used by the Oregon Department of Transportation (ODOT) for identifying potential safety problems on state highways based on the frequency, rate, and severity of crashes (ODOT 2015b). The 2015 SPIS shows two SB sites in the top 5 percent and two northbound (NB) sites in the top 10 percent of the SPIS list.
  - The 2015 crash rate on the I-5 segment between I-84 and the Broadway ramp on to I-5 is 2.70 crashes per million vehicle miles. The statewide average for comparable urban highway facilities is 0.77 crashes per million vehicle miles travelled (mvmt).
  - The existing short weaving distances and lack of shoulders for accident/incident recovery in this segment of I-5 are physical factors that may contribute to the high number of crashes and safety problems.

- **I-5 Operations:** The Project Area is at the crossroads of three regionally significant 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). The following factors affect I-5 operations:
  - Close spacing of multiple interchange ramps results in short weaving segments where traffic merging on and off I-5 has limited space to complete movements, thus becoming congested. There are five on-ramps (two NB and three SB) and six off-ramps (three NB and three SB) in this short stretch of highway. Weaving segments on I-5 NB between the I-84 westbound (WB) on-ramp and the NE Weidler off-ramp, and on I-5 SB between the N Wheeler Avenue on-ramp and I-84 eastbound (EB) off-ramp, currently perform at a failing level-of-service during the morning and afternoon peak periods.
  - The high crash rate within the Project Area can periodically contribute to congestion on this segment of the highway. As noted with respect to safety, the absence of shoulders on I-5 contributes to congestion because vehicles involved in crashes cannot get out of the travel lanes.
  - Future (2045) traffic estimates indicate that the I-5 SB section between the N Wheeler on-ramp and EB I-84 off-ramp is projected to have the most critical congestion in the Project Area, with capacity and geometric constraints that result in severe queuing.

- **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 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.

- The Broadway/Weidler couplet provides east-west connectivity for multiple modes throughout the Project Area, including automobiles, freight, people walking and biking, and Portland Streetcar and TriMet buses. The highest volumes of vehicle traffic on the local street network in the Project Area occur on NE Broadway and NE Weidler in the vicinity of I-5. The N Vancouver Avenue/N Williams couplet, which forms a critical north-south link and is a Major City Bikeway within the Project Area with over 5,000 bicycle users during the peak season, crosses Broadway/Weidler in the immediate vicinity of the I-5 interchange.
- The entire length of N/NE Broadway is included in the Portland High Crash Network—streets designated by the City of Portland for the high number of deadly crashes involving pedestrians, bicyclists, and vehicles.[3]
- The SB on-ramp from N Wheeler and SB off-ramp to N Broadway experienced a relatively high number of crashes per mile (50-70 crashes per mile) compared to other ramps in the Project Area during years 2011-2015. Most collisions on these ramps were rear-end collisions.
- Of all I-5 highway segments in the corridor, those that included weaving maneuvers to/from the Broadway/Weidler ramps tend to experience the highest crash rates:
  - SB I-5 between the on-ramp from N Wheeler and the off-ramp to I-84 (SB-S5) has the highest crash rate (15.71 crashes/mvmt).
  - NB I-5 between the I-84 on-ramp and off-ramp to NE Weidler (NB-S5) has the second highest crash rate (5.66 crashes/mvmt).
  - SB I-5 between the on-ramp from I-405 and the off-ramp to NE Broadway (SB-S3) has the third highest crash rate (4.94 crashes/mvmt).

- **Travel Reliability on the Transportation Network:** Travel reliability on the transportation network decreases as congestion increases and safety issues expand. The most unreliable travel times tend to occur at the end of congested areas and on the shoulders 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.

[3] Information on the City of Portland's High Crash Network is available at https://www.portlandoregon.gov/transportation/54892.

1.4 Project Goals and Objectives

In addition to the purpose and need, which focus on the state's transportation system, the Project includes related goals and objectives 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. The following goals and objectives may be carried forward beyond the National Environmental Policy Act (NEPA) process to help guide final design and construction of the Project:

- 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.

2 Project Alternatives

This technical report describes the potential effects of no action (No-Build Alternative) and the proposed action (Build Alternative).

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 proposed action. The No-Build Alternative consists of existing conditions and any planned actions with committed funding in the Project Area.

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 east-west highway for the State of Oregon. Because the Project Area includes the crossroads of three regionally significant 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 1 presents the I-5 on- and off-ramps in the Project Area. Table 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 1. I-5 Ramps in the Project Area

I-5 Travel Direction	On-Ramps From	Off-Ramps To
Northbound	• I-84 • N Broadway/N Williams Avenue	• NE Weidler Street/NE Victoria Avenue • I-405 • N Greeley Avenue
Southbound	• N Greeley Avenue • I-405 • N Wheeler Avenue/N Ramsay Way	• N Broadway/N Vancouver Avenue • I-84 • Morrison Bridge/Highway 99E

Notes: I = Interstate

Table 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
Northbound	N Broadway/N Williams Avenue to I-405	1,075 feet
Southbound	I-405 to N Broadway	2,060 feet
Southbound	N Wheeler Avenue/N Ramsay Way to I-84	1,300 feet

Notes: I = Interstate

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 *Regional Transportation Plan* (RTP) financially constrained project list (Metro 2014).[4] One of these actions 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. Proposed improvements also include

[4] 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

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.

2.2 Build Alternative

The Project alternatives development process was completed during the ODOT and City of Portland 2010-2012 N/NE Quadrant and I-5 Broadway/Weidler Interchange planning process. A series of concept alternatives were considered following the definition of Project purpose and need and consideration of a range of transportation-related problems and issues that the Project is intended to address.

In conjunction with the Stakeholder Advisory Committee (SAC) and the public during this multi-year process, ODOT and the City of Portland studied more than 70 design concepts, including the Build Alternative, via public design workshops and extensive agency and stakeholder input. Existing conditions, issues, opportunities, and constraints were reviewed for the highway and the local transportation network. A total of 19 full SAC meetings and 13 subcommittee meetings were held; each was open to the public and provided opportunity for public comment. Another 10 public events were held, with over 100 attendees at the Project open houses providing input on the design process. Of the 70 design concepts, 13 concepts advanced for further study based on SAC, agency, and public input, with six concepts passing into final consideration.

One recommended design concept, the Build Alternative, was selected for development as a result of the final screening and evaluation process. The final I-5 Broadway/Weidler Facility Plan (ODOT 2012a) and recommended design concept, herein referred to as the Build Alternative, were supported by the SAC and unanimously adopted in 2012 by the Oregon Transportation Commission and the Portland City Council.[5] The features of the Build Alternative are described below.

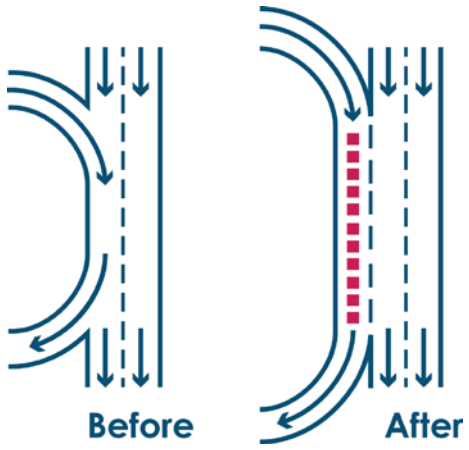
The Build Alternative includes I-5 mainline improvements and multimodal improvements to the surface street network in the vicinity of the Broadway/Weidler interchange. The proposed I-5 mainline improvements include the construction of auxiliary lanes (also referred to as ramp-to-ramp lanes) and full 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.

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.

[5] Resolution No. 36972, adopted by City Council October 25, 2012. Available at: https://www.portlandoregon.gov/citycode/article/422365

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 connecting N/NE 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).



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.

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 illustrates the location of the proposed auxiliary lanes. Figure 3 illustrates the auxiliary lane configuration, showing the proposed improvements in relation to the existing conditions. Figure 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 WB on-ramp to the N Greeley 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.

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.

Figure 2. Auxiliary Lane/Shoulder Improvements

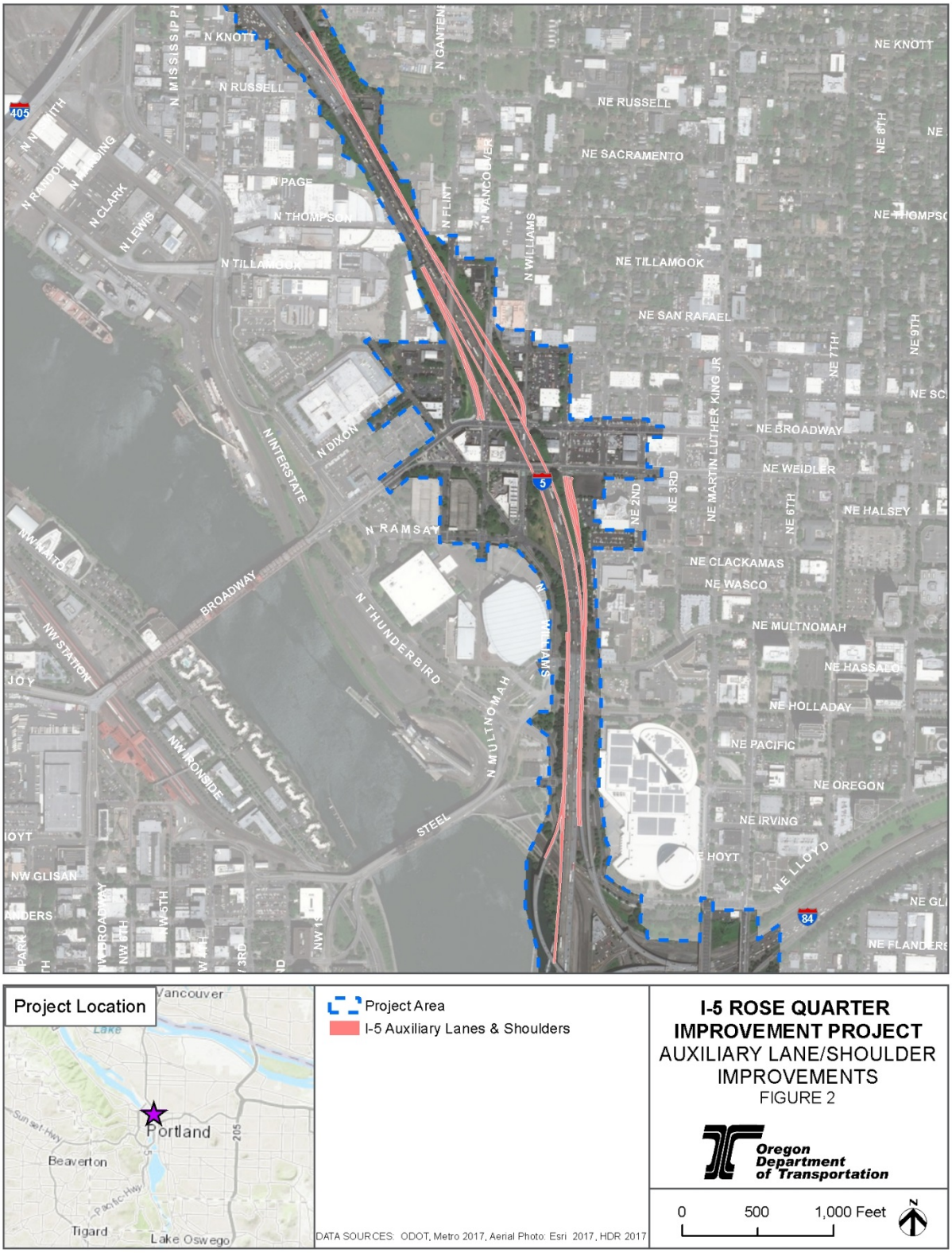


Figure 3. I-5 Auxiliary (Ramp-to-Ramp) Lanes – Existing Conditions and Proposed Improvements

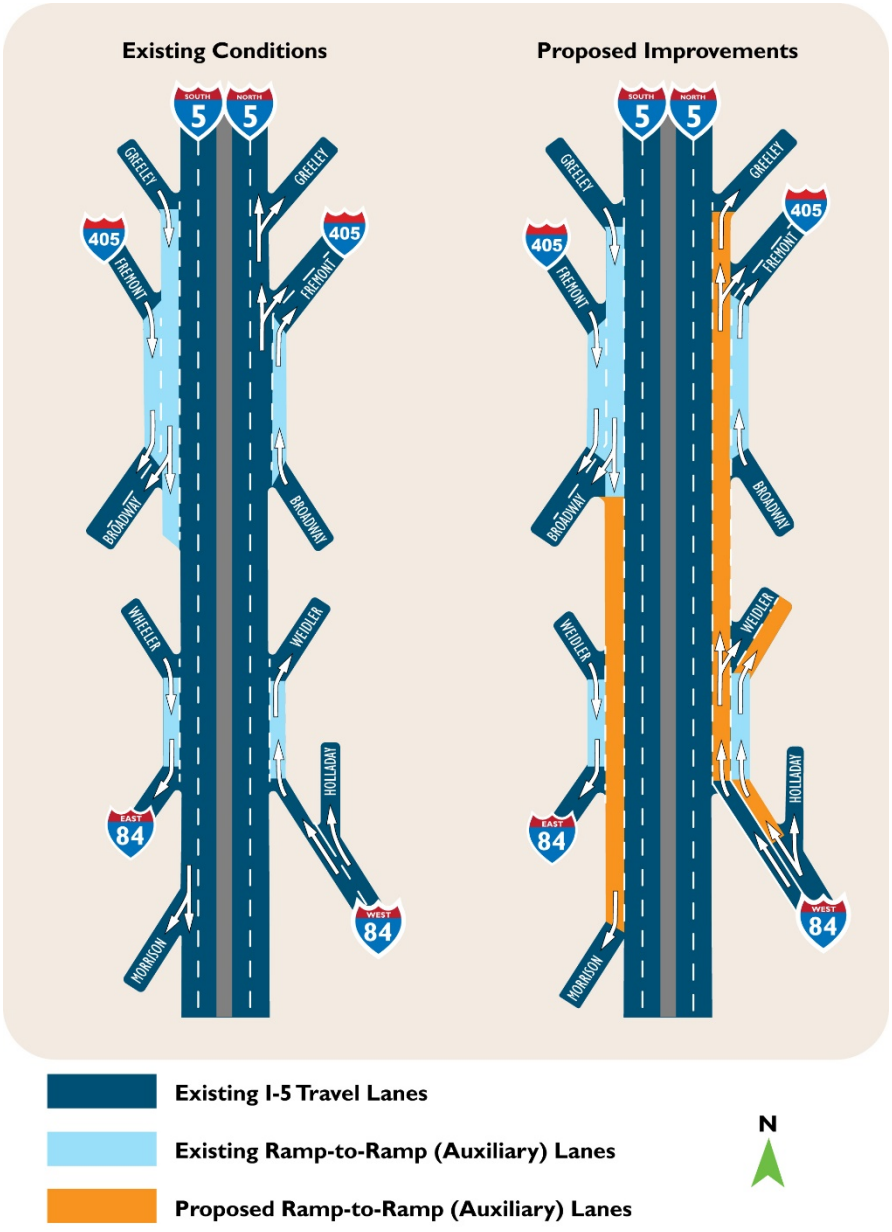
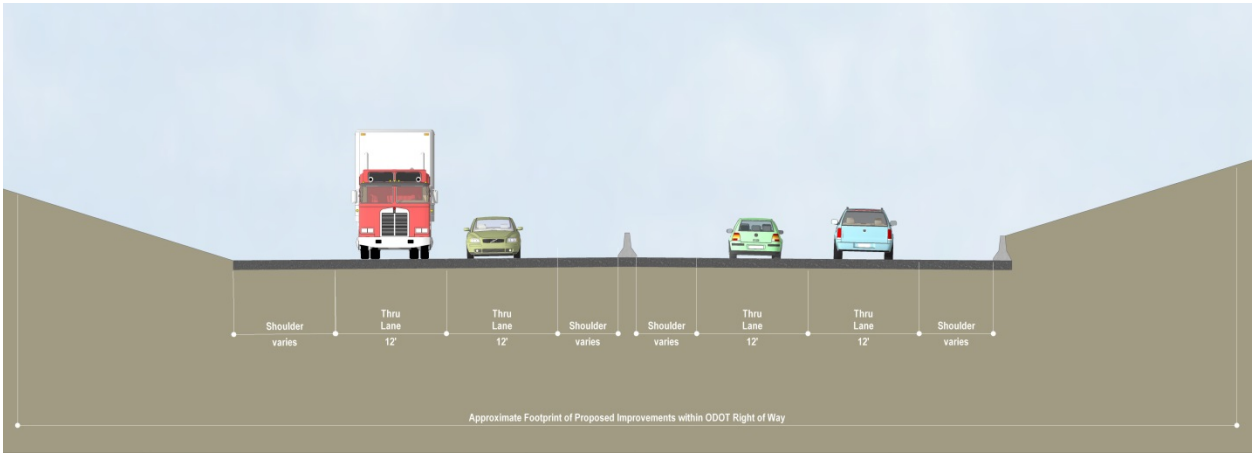
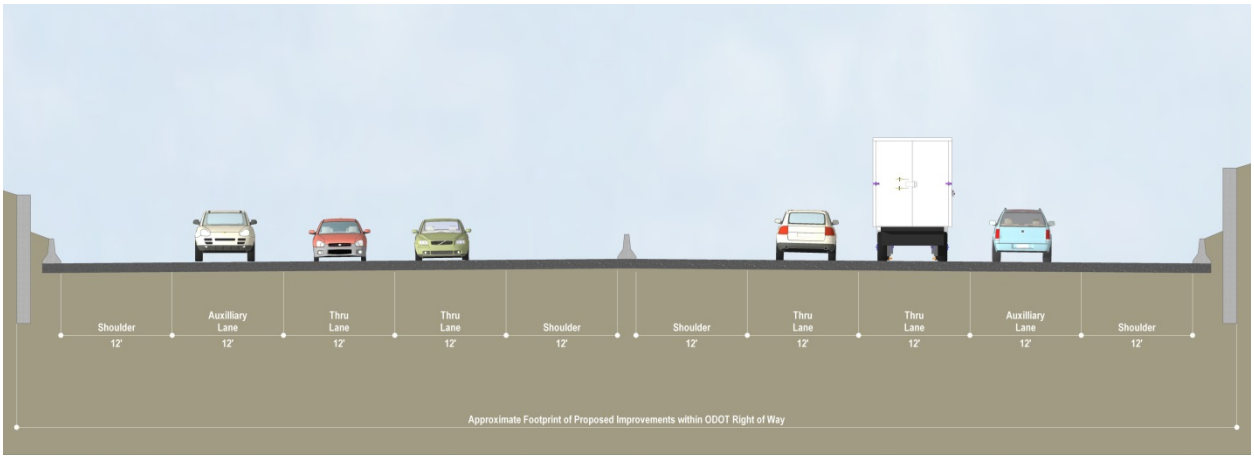


Figure 4. I-5 Cross Section (N/NE Weidler Overcrossing) – Existing Conditions and Proposed Improvements



Existing Lane Configuration



Proposed Lane Configuration

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 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 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.

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.

Figure 5. Broadway/Weidler/Williams and Vancouver/Hancock Highway Covers

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 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. Like 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 would be added to the Vancouver/Hancock highway cover (see element "A" in Figure 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 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 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 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 6 and 7). 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. These improvements are illustrated in Figures 6 and 7.

Figure 6. Broadway/Weidler Interchange Area Improvements

Figure 7. Conceptual Illustration of Proposed N Williams Multi-Use Path and Revised Traffic Flow

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 would also 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

2.2.4.1 New Hancock-Dixon Crossing

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 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 6, element "F").

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

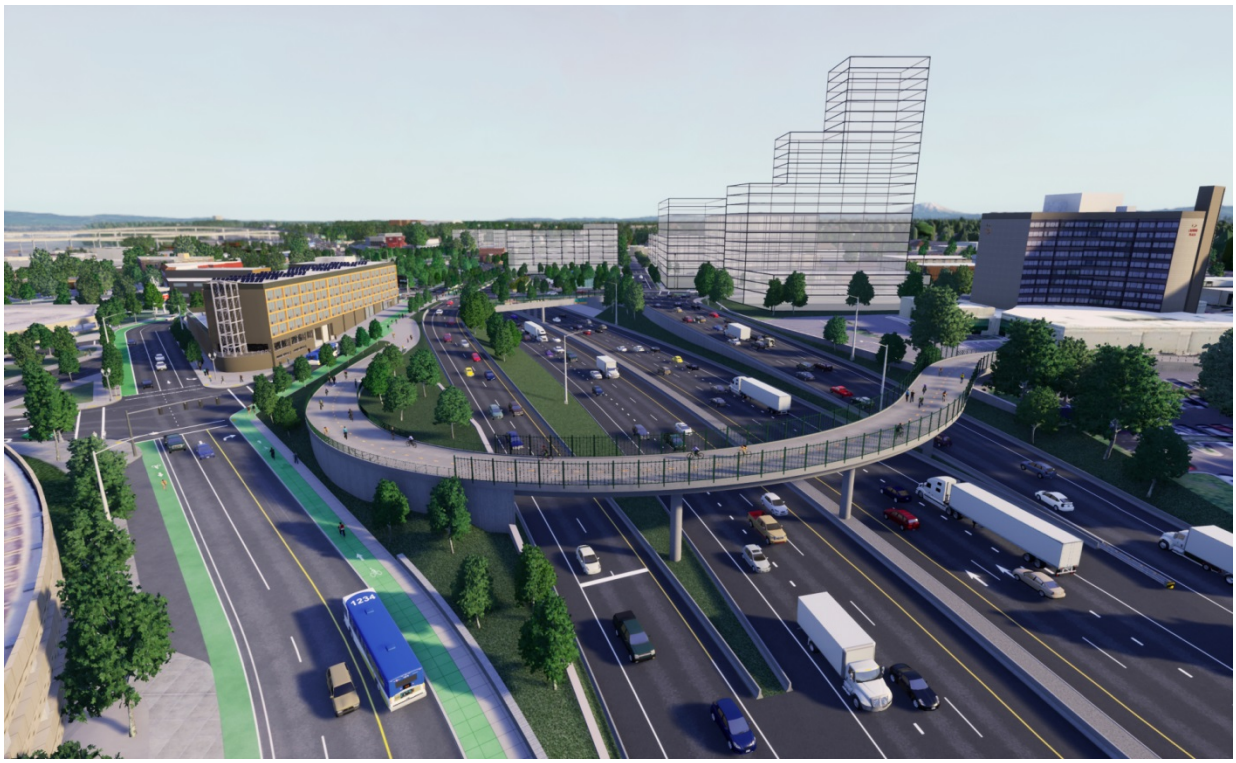
The existing N Flint structure over I-5 would be removed, and N Flint south of N Russell Street would terminate at and connect directly to N Tillamook (see Figure 6, element "G"). The portion of Flint between the existing I-5 overcrossing and Broadway would be closed as a through street for motor vehicles. Driveway access would be maintained on this portion of N Flint to maintain local access.

A new multi-use path would be added between the new Hancock-Dixon crossing and Broadway at a grade of 5 percent or less to provide an additional travel route option for people walking and biking. The new multi-use path would follow existing N Flint alignment between N Hancock and N Broadway (see Figure 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 6, element "H," and Figure 8). The Clackamas bicycle and pedestrian bridge would offer a new connection over I-5 and would provide an alternative route for people walking or riding a bike through the Broadway/Weidler interchange.

Figure 8. Clackamas Bicycle and Pedestrian Crossing



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.[6]

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.

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 6.

[6] Additional details on which streets are included are available at http://i5rosequarter.org/local-street-bicycle-and-pedestrian-facilities/

3 Regulatory Framework

Federal, state, regional, and local plans and policies have been established that guide the development of transportation projects. Some of these plans and policies relate to the design and operation of the Project. The *Land Use Technical Report* (ODOT 2019) includes detailed descriptions of the most applicable regulatory documents (i.e., Oregon Statewide Planning Program, Transportation Planning Rule, Metro's RTP, and City of Portland Comprehensive Plan). Additional planning and policy documents that are directly related to implementing a transportation project in this location are described below.

3.1 Federal Plans and Policies

3.1.1 ADA Guide

The ADA Guidelines contains scoping and technical requirements for accessibility to buildings and facilities by individuals with disabilities under the ADA of 1990. These scoping and technical requirements are to be applied during the design, construction, and alteration of buildings and facilities to ensure accessibility and usability to individuals with disabilities. The 2010 ADA Standards for Accessible Design, dated September 15, are the most recent guidelines (U.S. Department of Justice 2010).

3.1.2 Federal Highway Administration (FHWA) Bicycle and Pedestrian Guides

The purpose of FHWA guidance is to describe federal legislative and policy direction related to safety and accommodation for bicycling and walking. The Intermodal Surface Transportation Efficiency Act of 1991 enacted significant changes to federal transportation policy and programs that expanded consideration of and eligibility for funding bicycle and pedestrian improvements. The Transportation Equity Act for the 21st Century (TEA-21) in 1998 and the Safe Accountable, Flexible, Efficient Transportation Equity Act: a Legacy for Users (SAFETEA-LU) in 2005 continued these provisions. The Moving Ahead for Progress in the 21st Century Act (MAP-21) of 2012 enacted some program and funding changes but continued broad consideration and eligibility for bicycling and walking. Bicycle and pedestrian design standards are included in the American Association of State Highway and Transportation Officials (AASHTO) guidance document *A Policy on Geometric Design of Highways and Streets – 2011* (AASHTO 2011) and in the ODOT 2012 *Highway Design Manual* (ODOT 2012b).

3.2 State Laws, Plans, and Policies

3.2.1 Oregon Transportation Plan

The 2006 Oregon Transportation Plan (OTP) is the state's long-range multimodal transportation plan (ODOT 2007). The OTP is the overarching policy document

among a series of plans that together form the state transportation system plan (TSP; City of Portland 2018). The OTP considers all modes of Oregon's transportation system as a single system and addresses the future needs of Oregon's airports, bicycle and pedestrian facilities, highways and roadways, pipelines, ports and waterway facilities, public transportation, and railroads. It assesses state, regional, and local public and private transportation facilities. The OTP establishes goals, policies, strategies, and initiatives that address the core challenges and opportunities facing Oregon. The OTP provides the framework for prioritizing transportation improvements based on varied future revenue conditions, but it does not identify specific projects for development.

3.2.2 Oregon Highway Plan

The 1999 Oregon Highway Plan (OHP; ODOT 1999) defines policies and investment strategies for Oregon's state highway system for the next 20 years. It further refines the goals and policies of the OTP and is part of Oregon's Statewide Transportation Plan. The OHP has three main elements:

- The Vision presents a vision for the future of the state highway system, describes economic and demographic trends in Oregon and future transportation technologies, summarizes the policy and legal context of the OHP, and contains information on the current highway system.
- The Policy Element contains goals, policies, and actions in five policy areas: system definition, system management, access management, travel alternatives, and environmental and scenic resources.
- The System Element contains an analysis of state highway needs, revenue forecasts, descriptions of investment policies and strategies, an implementation strategy, and performance measures.

3.2.3 ODOT Highway Design Manual

The ODOT 2012 *Highway Design Manual* (ODOT 2012b) provides uniform highway design standards and procedures for ODOT. It is intended to provide guidance for the design of new construction; major reconstruction (4R); resurfacing, restoration, and rehabilitation (3R); or resurfacing (lR) projects. The manual is used for all projects that are located on the state highways and by all ODOT personnel for planning studies and project development. The flexibility contained in the manual supports the use of Practical Design concepts and Context Sensitive Design practices.

The manual conforms to the AASHTO document *A Policy on Geometric Design of Highways and Streets - 2011* (AASHTO 2011). National Highway System or federal-aid projects on roadways that are under the jurisdiction of cities or counties will typically use the AASHTO design standards or ODOT 3R design standards. State and local planners will also use the manual in determining design requirements as they relate to the state highways in TSPs, Corridor Plans, and Refinement Plans.

3.2.4 Division 51: Access Management Rules

Division 51 establishes procedures, standards, and approval criteria used by ODOT to govern highway approach permitting and access management consistent with Oregon Revised Statutes (ORS), Oregon Administrative Rules, statewide planning goals, acknowledged comprehensive plans, and the OHP. The intent of Division 51 is to provide a highway access management system based on objective standards that balance the economic development objectives of properties abutting state highways with the transportation safety and access management objectives in a manner consistent with local TSPs and the land uses permitted in local comprehensive plan(s) acknowledged under ORS Chapter 197. The standard highway interchange spacing for a multi-lane crossroads are as follows[7]:

- Distance between the start and end of tapers to adjacent interchanges is 5,280 feet
- Distance to first approach on the right; right in/right out only is 750 feet
- Distance to first intersection where left turns are allowed is 1,320 feet
- Distance between the last right in/right out approach and the start of the taper for the on-ramp is 990 feet

3.3 Regional and Local Plans

3.3.1 TriMet Plans

TriMet has adopted service enhancement plans for various portions of the metropolitan area. The North/Central Service Enhancement Plan encompasses the Area of Potential Impact (API) for this Project (TriMet 2016). Service enhancements included in the plan for this area include extended service hours for Line 4 Division/Fessenden and a new bus route connecting the Parkrose/Sumner Transit Center to downtown via NE Prescott Street, NE Alberta Street, and NE Martin Luther King Jr. Boulevard to the Rose Quarter Transit Center and the Steel Bridge.

TriMet is currently considering long-term plans for the Steel Bridge, including consideration of a new transit-only crossing, as well as the long-term layout and function of the Rose Quarter Transit Center. No final documents or policy decisions have been made regarding these opportunities.

3.3.2 City of Portland Transportation System Plan and Modal Plans

The City of Portland TSP, which is necessary to meet state and regional planning requirements, was updated in 2018 (City of Portland 2018). The TSP is an element of the City's Comprehensive Plan and it contains several modal plans including bicycle, pedestrian, and freight, as well as neighborhood area plans and street plans. Transportation projects included in the TSP that are in or adjacent to the Project

[7] http://or22safety.org/files/library/oar734-051.pdf, Oregon Administrative Rules Chapter 734, Division 51, Table 8

Area include streetcar turnarounds at NE Grand Avenue and NE Weidler and at NE Grand and NE Oregon Street, new traffic signals along NE Grand and NE Martin Luther King Jr. Boulevard, a new bicycle and pedestrian bridge across I-84 in the vicinity of NE 7th, redesign of the Rose Quarter Transit Center, and a multi-use pathway along the east bank of the Willamette River north of the Steel Bridge.

3.3.3 Go Lloyd

Go Lloyd was founded in 1994 as the Lloyd District Transportation Management Association (TMA). TMAs are public/private partnerships formed so that employers, developers, building owners, and government entities can work collectively to establish policies, programs, and services to address local transportation issues and foster economic development. Go Lloyd is managed by a board of directors and works closely with local government agencies, non-profits, and business to promote transportation and economic development improvements for Lloyd.

Go Lloyd tracks transportation activities and plans in the district and prepares an annual report that includes results of the Employee Commute Choice Survey. Survey results are used to report on transportation mode split to the district and help to measure the effectiveness of various programs. Go Lloyd does not adopt specific plans and policies but has worked closely with the City of Portland on the N/NE Quadrant Plan as part of the Central City Plan and Comprehensive Plan updates.

3.4 Other Relevant Guidance

3.4.1 American Association of State Highway and Transportation Officials (AASHTO)

AASHTO is a standards-setting body that publishes specifications, test protocols, and guidelines, which are used in highway design and construction throughout the United States. AASHTO sets transportation standards and policy for the United States but is not an agency of the federal government; rather, it is an organization of the states themselves. Policies of AASHTO are not federal laws or policies, but rather are ways to coordinate state laws, policies, and design standards in the field of transportation. The association represents not only highways but includes air, rail, water, and public transportation.

The voting membership of AASHTO consists of the Department of Transportation of each state in the United States, as well as those of Puerto Rico and the District of Columbia. The United States Department of Transportation; some U.S. cities, counties, and toll-road operators; most Canadian provinces; the Hong Kong Highways Department; the Ministry of Public Works and Settlement; and the Nigerian Association of Public Highway and Transportation Officials have non-voting associate memberships.

3.4.2 National Association of City Transportation Officials Urban Street Design Guide

The National Association of City Transportation Officials is an association of 62 American cities and 10 transit agencies. The Urban Street Design Guide provides guidance on the design and operation of urban streets (NACTO 2018). The guide is not prescriptive but provides recommendations and description of best practices for implementing urban streets that function safely for all modes of travel.

4 Methodology and Data Sources

This section presents the methodology used to analyze transportation access conditions. Potential cumulative impacts were assessed based on the Metro RTP-based regional travel demand model, in which traffic numbers consider identified reasonably foreseeable future actions.

4.1 Project Area and Area of Potential Impact

The API for the transportation access study generally corresponds to the Project Area, as shown on Figure 1, except along NE Broadway, where the API extends west to N Larrabee (see Figure 9).

4.2 Resource Identification and Evaluation

Access management is defined by the FHWA as "the proactive management of vehicular access points to land parcels adjacent to all manner of roadways."[8] Access points may include driveways, intersections, and ramps.

ODOT and the City of Portland provided information about property access within the API. The Project team mapped and categorized the information as appropriate. Potential impacts and alternative access routes were identified as appropriate.

Listed below are the sources and definitions used in the access management analysis:

- Online aerial imagery was used to verify locations of intersections and driveways.
- Property lines were identified using the tax lot layers provided in Metro's MetroMap database.
- Individual driveways, intersections, and interchanges and the distance between each were measured using Google Earth.

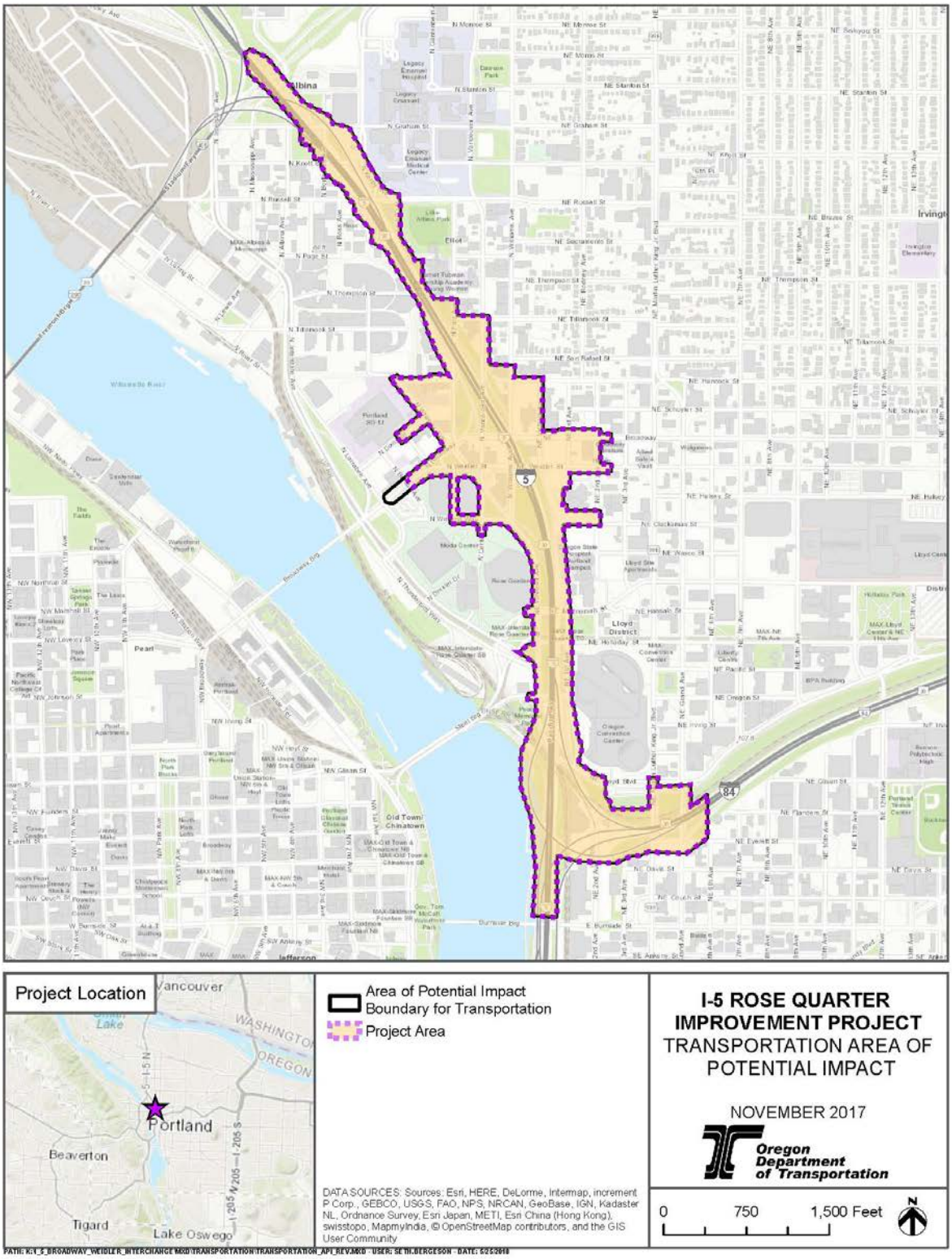
4.3 Assessment of Impacts

The summary tables provided in Appendix A were developed by giving each access point a unique number identifying the following information:

- **Type:** Intersection or driveway.
- **Distance:** Distance (in feet) to adjacent intersection, driveway or interchange.

[8] https://ops.fhwa.dot.gov/access_mgmt/what_is_accsmgmt.htm

Figure 9. Transportation Area of Potential Impact



- **Status:** Closed, modified, or no change. Status information was confirmed by ODOT.
    - Closed – Approach is likely to be closed due to direct physical or operational impacts as a part of or at the same time as the Project is implemented.
    - Modified – Approach is likely to be modified but remain open. Modifications could include changes to the exact location, turn movement restrictions, and/or width.
    - No change – Approach is likely to be replaced in-kind or not affected.
- **Impacted by Proposed Concept:** Yes/No. The proposed improvements will/will not impact the access points and an explanation if changed or closed.

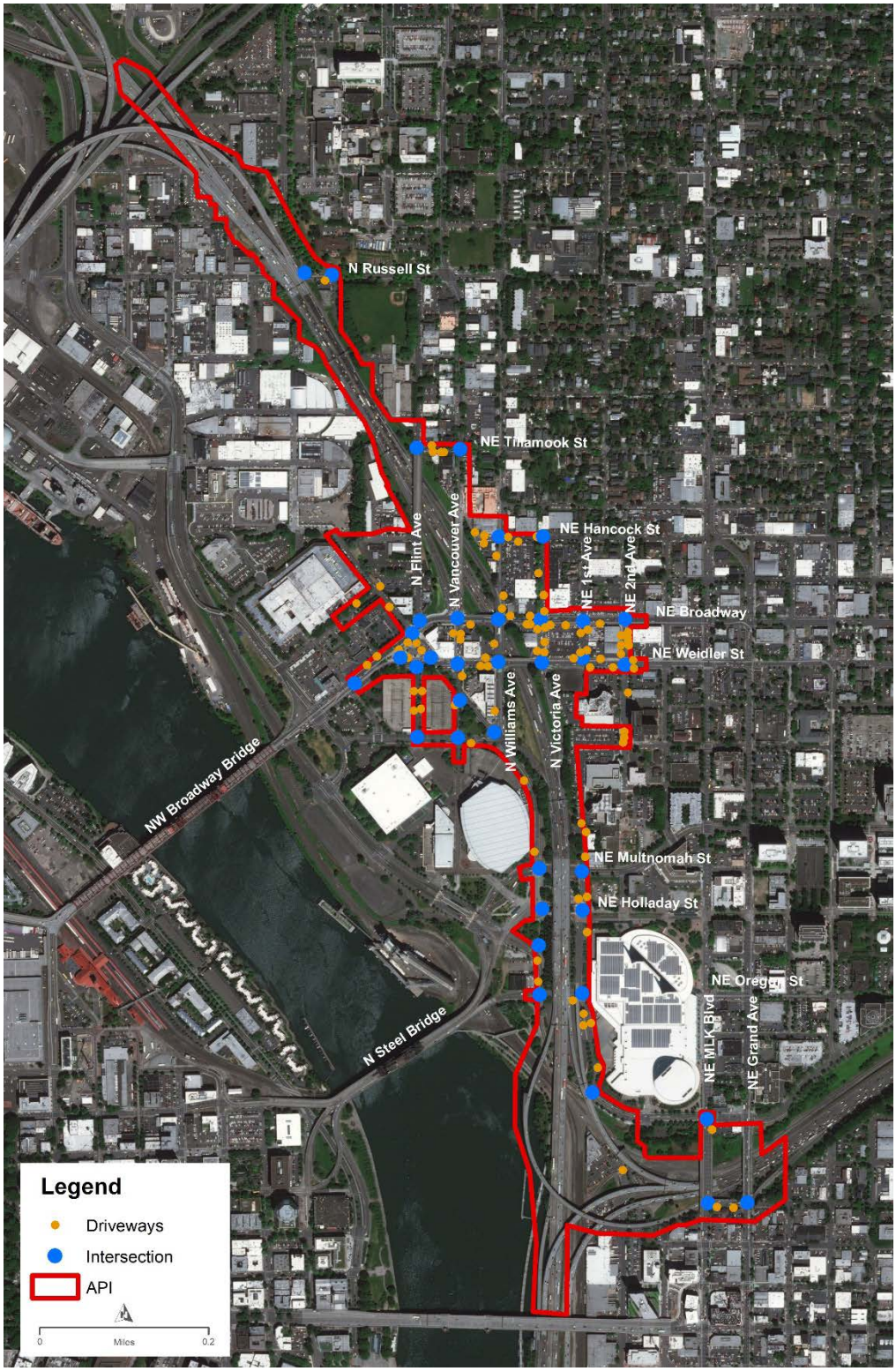
4.4 Cumulative Impacts

The cumulative impacts analysis considered the Project's impacts combined with other past, present, and reasonably foreseeable future actions that would result in environmental impacts in the Project Area. A list of reasonably foreseeable future actions was developed with the City of Portland and Metro staff (Appendix B). This list includes any permitted public and private construction projects within the Project Area and any projects that are in the permit application process. The cumulative impact assessment qualitatively assessed the magnitude of impacts expected from reasonably foreseeable future actions in combination with anticipated Project impacts. This assessment also identified the contribution of the Project to overall cumulative impacts.

5 Affected Environment

There are currently 132 access points (37 intersections and 95 driveways) within the API. The majority of access points are business driveways, and most of these (60 percent) are located on N/NE Weidler and N/NE Broadway. Figure 10 depicts existing driveways and intersections within the API.

Figure 10. Existing Access Locations within the Project API



6 Environmental Consequences

The Project team evaluated potential impacts to access locations in the API resulting from implementation of the No-Build and Build Alternatives.

6.1 No-Build Alternative

As described in Section 2.1, 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.

6.1.1 Direct Impacts

Under the No-Build Alternative, the proposed I-5 mainline and Broadway/Weidler interchange area improvements would not be constructed, and the current road system would remain in-place. There would be no direct access impacts associated with the No-Build Alternative.

6.1.2 Indirect Impacts

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

6.2 Build Alternative

Under the Build Alternative, the Project's proposed roadway, bicycle, and pedestrian improvements would be constructed, as described in Section 2.2.

6.2.1 Short-Term Construction Impacts

Construction of the Project would have short-term impacts to highway traffic, local street motor vehicle traffic, bicyclists, pedestrians, transit, and business and event access. A detailed transportation management plan would be prepared prior to construction that would describe the construction sequence and strategies for maintaining through travel and local access for all modes of transportation. Overall Project construction and transportation disruption could occur in phases for up to 4 years.

6.2.2 Long-Term and Operational Direct Impacts

Implementation of the Build Alternative would result in the following potential impacts to access locations in the Project Area:

- There are currently 18 driveways that may be closed or modified (5 modified and 13 closed) under the Build Alternative (Table 3). In most instances, driveway modifications would likely not require relocating driveways. Where closures would occur, additional access to the property is available. The driveways are shown on Figure 11 and are described in more detail in Appendix A. A total of 77

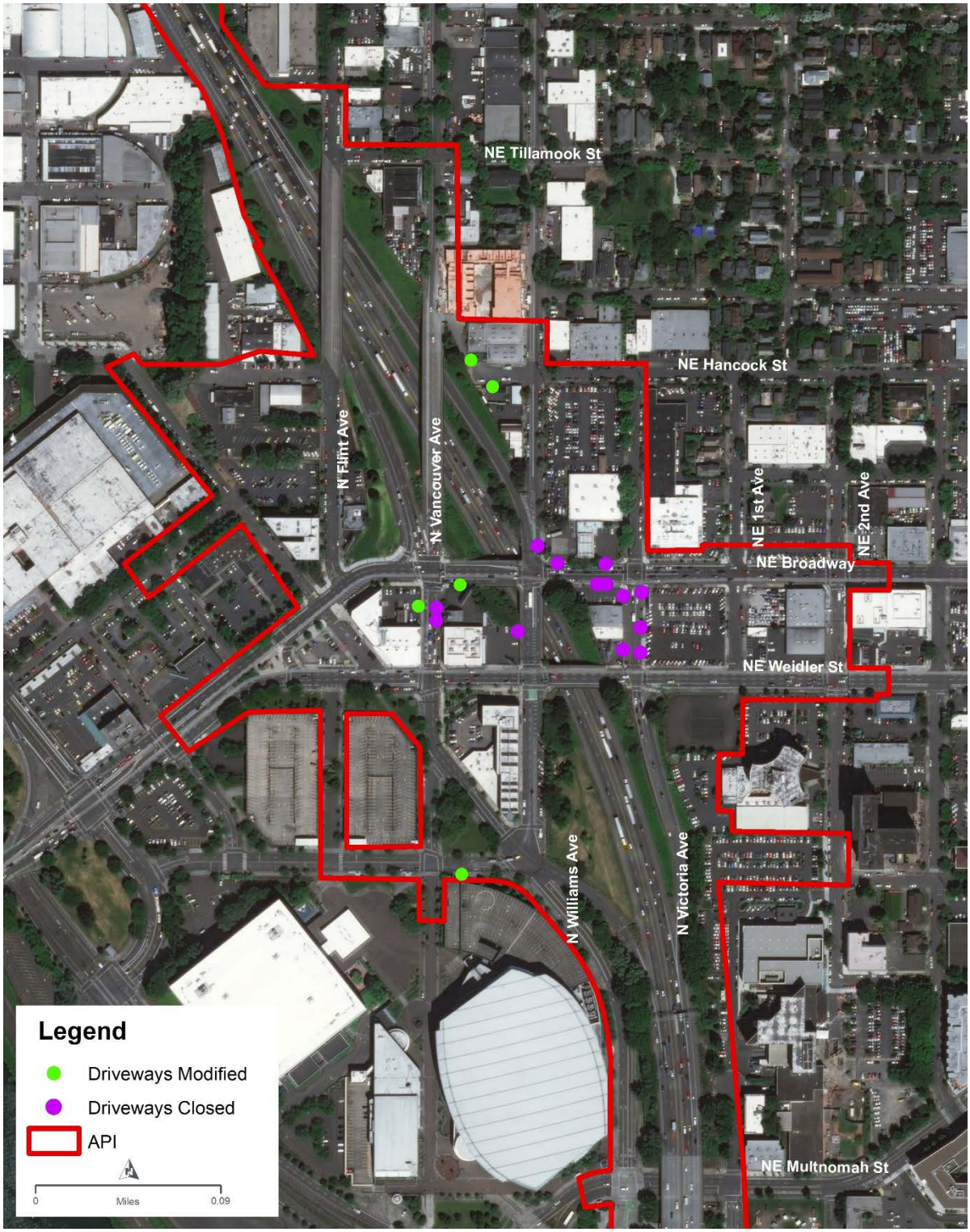
driveways identified within the API are not anticipated to be impacted under the Build Alternative.

- There are currently nine intersections that would be modified under the Build Alternative to maintain or restore their functionality for all roadway users (Table 3). These are described in more detail in Appendix A and are listed below:
  - NE Weidler/NE Victoria Avenue
  - N/NE Weidler/N Williams
  - N Weidler/N Vancouver
  - N/NE Broadway/N Williams
  - NE Broadway/NE Victoria
  - N Broadway/N Center Court Street
  - N Ramsay/N Wheeler/N Williams (formerly NE Wheeler)
  - N Ramsay/N Center Court
  - N Flint/N Tillamook
- One intersection (N Flint Avenue/N Broadway) is expected to close to motor vehicles but would be replaced with a new intersection at N Flint/N Hancock. Because the closed intersection will be replaced with a new intersection, it is not counted as a closure in Table 3.
- Twenty-eight intersections would not change under the Build Alternative.

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

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

Figure 11. Driveways Modified or Closed



6.2.3 Long-Term and Operational Indirect Impacts

There would be no long-term and operational indirect impacts with the Build Alternative.

6.3 Cumulative Effects

Cumulative impacts are environmental effects that result from the incremental effect of the proposed action 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 (Title 40 Code of Federal Regulations 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 proposed action.
- Define the geographic area (spatial boundary) within which cumulative impacts will be assessed, as well as the timeframe (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 historical 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 timeframe and assess whether they could positively or adversely affect the resource being analyzed.
- Describe the combined effect on the resource being analyzed when the direct and indirect impacts of the project are combined with the impacts of other actions or projects assumed to occur within the same geographic area during the established time frame.

6.3.1 Spatial and Temporal Boundaries

The geographic area used for the cumulative impact analysis is the same as the API described in Section 4.1 and shown on Figure 9. The time frame for the cumulative impact analysis extends from the beginning of large-scale urban development in and around the Project Area to 2045, the horizon year for the analysis of transportation system changes.

6.3.2 Past, Present, and Reasonably Foreseeable Future Actions

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

6.3.2.1 Past Actions

Past actions include the following:

- Neighborhood and community development
  - Historical development of the Portland area and accompanying changes in land use
  - Development of the 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)

6.3.2.2 Present Actions

Present actions include 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

6.3.2.3 Reasonably Foreseeable Future Actions

Reasonably foreseeable future actions were identified collaboratively with the City of Portland and consist of the following:

- 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. Specific projects and the plans identifying them are described in detail in a memorandum provided in Appendix B. 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.

Future transportation projects included in Metro's 2014 RTP Project List were incorporated into the travel demand modeling for this Project.

6.3.3 Results of Cumulative Impact Analysis

The evaluation of the transportation impacts of the Project 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.

6.4 Conclusions

The Build Alternative would result in impacts to driveways and intersections in the API. These impacts would be minor and are not expected to result in adverse conditions related to property access or access management within the API. Currently, there are 132 access points within the API (37 intersections and 95 driveways). The majority incorporate business driveways, of which 60 percent are located on N/NE Weidler and N/NE Broadway. No changes would be made to 77 driveways and 28 intersections, which account for 80 percent of the access points in the Project Area. There are currently 13 driveways that could be closed at the time of property redevelopment or at the time of the Project implementation. One intersection would be closed by the proposed Project but would be replaced by a new intersection. Five driveways and nine intersections would remain open but be modified by the proposed Project.

7 Avoidance, Minimization, and Mitigation Measures

The Project would work closely with businesses in the Project Area to implement strategies to limit disruption to business access. The Project would use temporary signage as needed and attempt to maintain access to businesses during construction.

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

8 Contacts and Coordination

To complete this report, the preparers coordinated with various ODOT staff and other members of the consultant team.

9 Preparers

Name	Discipline	Education	Years of Experience
John Cullerton, Parametrix	Transportation Lead	B.S., Geography, University of Oregon (1977)	38
Elizabeth Wemple, PE, HDR Inc.	Safety Planning and Engineering	Master of City Planning, University of California at Berkeley (1992) M.S., Transportation Engineering, University of California at Berkeley (1991) B.S., University of California at Berkeley (1987)	30
Andrew Johnson, HDR Inc.	Transportation Planning	Master of Regional Planning, Community and Region Planning, University of Minnesota, Twin Cities, 2002 B.S., Geography, University of Minnesota, Twin Cities, 2000	17
Camille Alexander, HDR Inc.	Transportation Planning	B.S., Urban Planning, University of Utah (2007)	9

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