

FINAL



# Active Transportation Technical Report

I-5 Rose Quarter Improvement Project

Oregon Department of Transportation

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**I-5 ROSE QUARTER**  
IMPROVEMENT PROJECT





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<sup>1</sup> Appendix A 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

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
API	Area of Potential Impact
CPC Plan	<i>I-5 Rose Quarter Interchange Improvement Project Construction Phasing Concept Plan</i>
EB	eastbound
FHWA	Federal Highway Administration
GIS	geographic information system
I-405	Interstate 405
I-5	Interstate 5
I-84	Interstate 84
LTS	Level of Traffic Stress
mvmt	million vehicle miles travelled
NB	northbound
NEPA	National Environmental Policy Act
OBPP	Oregon Bicycle and Pedestrian Plan
ODOT	Oregon Department of Transportation
OHP	Oregon Highway Plan
ORS	Oregon Revised Statute
OTP	Oregon Transportation Plan
RTP	<i>Regional Transportation Plan</i>
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 also would support improved local connectivity and multimodal access in the vicinity of the Broadway/Weidler interchange.

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

The Project team used data and plans provided by Metro, the City of Portland, and Oregon Department of Transportation to qualitatively assess existing and future-year active transportation conditions in the Project Area.

With its proximity to Portland's central core, the Area of Potential Impact (API) is a hub of walking and bicycling activity, and most of the API is designated as a Pedestrian District. Within the API, major walking and bicycling destinations include the Moda Center, Veterans Memorial Coliseum, Rose Quarter Transit Center, and businesses along the Broadway/Weidler couplet. Immediately beyond the API, major activity nodes include the Oregon Convention Center and Lloyd. The N Williams Avenue/N Vancouver Avenue corridor, Martin Luther King Jr. Boulevard/NE Grand Avenue corridor, and Broadway Bridge are major destinations.

Sidewalks comprise the majority of pedestrian facilities within the API. The majority of the Project Area has existing sidewalk coverage, with less than 10 percent of the Project Area having gaps in sidewalk coverage (approximately 3,300 feet of gaps). Formalized bikeways exist on most major streets, generally consisting of conventional bike lanes, buffered bike lanes, or neighborhood greenways. Serving people walking and bicycling, the Eastbank Esplanade is a shared-use path following the Willamette River's east side.

Most signalized intersections include crosswalks on all sides, supplemented by pedestrian signal heads on all corners where crossings are permitted. Pedestrian push buttons exist at crossings where actuated or semi-actuated signal phases exist.

Dual curb ramps with detectable warning strips exist at most corners. Unsignalized intersections generally do not include marked crosswalks, and the presence and quality of curb ramps varies by location. Some intersections include additional infrastructure (e.g., colored bike lanes, bike boxes, two-stage left turn boxes, bicycle-only signals) to address operating characteristics. Pedestrian and bicycle Level of Traffic Stress (LTS) analysis was conducted for the 14 “Build Area” intersections to assess existing conditions. Seven study intersections exhibit characteristics that exceed the tolerable stress level (LTS 2) for people walking, while all intersections currently operate at Bicycle LTS 1, with conditions generally favorable to a broader bicycling population.

The No Build Alternative is anticipated to include the following:

- Direct Impacts
  - Construction of protected bike lanes on N/NE Broadway and N/NE Weidler would substantially increase the degree of separation between bicycles and motor vehicles. Outside of the Broadway/Weidler couplet, intersection conditions (including complexity and deficiencies) would be similar to existing conditions.
  - Implementation of reasonably foreseeable future actions within and near the API would provide additional north-south and east-west regional bikeways and walkways. These reasonably foreseeable future actions include the Sullivan’s Gulch Trail, Sullivan’s Crossing, North Portland Greenway, and NE 7th Avenue/NE 9th Avenue Neighborhood Greenway.
  - Existing sidewalk gaps of approximately 3,300 feet would remain.
  - Seven study intersections would continue to exhibit characteristics exceeding the tolerable stress level (LTS 2) for people walking. All study intersections would operate at Bicycle LTS 1, with conditions generally favorable to a broader bicycling population.
  - The addition of transit boarding islands on NE Multnomah would improve passenger conditions, as the new bus stops would provide an opportunity to include enhancements such as lighting, shelters, Americans with Disability Act (ADA)-accessible ramps, and rider information.
  - The following impacts are anticipated along the five primary travel routes traversing the API:
    - Most of the bicycle and pedestrian routes would follow a relatively direct path between their origin and destination.
    - People bicycling would encounter generally favorable conditions, as defined by the Bicycle LTS scores at the study intersections through which the routes would pass. Pedestrians would encounter a variety of intersection conditions depending on location.

- The number of ramp terminal intersections encountered by people walking and bicycling would generally depend on the route and the user's direction of travel and would range between zero and two crossings.
  - Separation between pedestrians and motor vehicle traffic would continue in the form of sidewalks and shared-use paths, depending on location. Protected bike lanes would increase separation from motor vehicles along the Broadway/Weidler couplet.
  - People walking and bicycling would encounter relatively flat or moderate grades with few excessively steep slopes.
  - The degree of bicycle delay would generally depend on the route under focus and the rider's direction of travel. Longer delays are anticipated along routes passing through a higher number of signalized intersections.
- Indirect Impacts
    - Improved walking and bicycling conditions on N/NE Broadway and N/NE Weidler could encourage more walking and bicycling, especially for shorter trips.
    - The reasonably foreseeable future actions would more evenly distribute regional walking and bicycling activity through and near the API. Specifically, the revised travel patterns would moderate the demand currently placed on the Broadway/Weidler corridor and on the Williams/Vancouver corridor.
    - Outside of the Broadway/Weidler corridor, intersection complexity would generally resemble existing conditions. As the level of walking and bicycling grows in the area, these conditions would affect a larger number of people.
    - The continued presence of sidewalk gaps would diminish pedestrian convenience, comfort, and safety.
    - Transit stop enhancements could increase ridership through the provision of a more accessible, comfortable, and attractive transit stop environment.
    - The density of signals in the area would require frequent stopping and could increase the average travel time for people biking through the area.

The Build Alternative is anticipated to include the following:

- Short-Term Impacts
  - Demolition of roadway structures over I-5 (e.g., Williams, Vancouver, Broadway, Weidler) would result in potentially lengthy temporary closures of key walking and bicycling routes, thereby requiring non-motorized users to divert to alternative routes or use temporary detour structures. Because several of these alternative routes could potentially also serve as motor vehicle detour routes, the potential for multimodal conflicts could increase during the construction period. These impacts could be significant, depending on the duration and staging of the closures, and the routing and design of the

detour facilities. A detailed construction plan would be developed, which would identify bike and pedestrian detour routes and ways that access would be maintained in compliance with ADA and other regulatory requirements.

- Direct Impacts

- Similar to the No-Build Alternative, implementation of other reasonably foreseeable future actions within and near the API would establish additional north-south and east-west regional bikeways and walkways. These routes include the Sullivan's Gulch Trail, Sullivan's Crossing, North Portland Greenway, and NE 7th/9th Avenue Neighborhood Greenway.
- Existing sidewalk gaps (approximately 800 feet) along portions of N Wheeler/N Williams (formerly NE Wheeler) would be filled. Other existing gaps would remain (approximately 2,600 feet).
- Three study intersections that exceed the tolerable stress level (LTS 2) for people walking in the No-Build Alternative would be improved under the Build Alternative to Pedestrian LTS 1. One study intersection in the Build Alternative (N/NE Weidler and N Williams) would see an increase in stress for people walking from Pedestrian LTS 1 to LTS 3 due to the relocation of a ramp terminal.
- Similar to the No-Build Alternative, all study intersections would operate at Bicycle LTS 1, with conditions generally favorable to a broader bicycling population.
- While sidewalks, crossings, and other active transportation infrastructure along new or reconstructed streets would generally reduce the degree of intersection complexity, pedestrians and bicyclists would continue to encounter complex intersection geometry in some locations.
- Physical separation between motorized and non-motorized users would increase along additional corridors, including N Wheeler, N Williams (including the segment formerly named NE Wheeler), and the Clackamas bicycle and pedestrian bridge.
- The addition of transit boarding islands on N/NE Broadway, N/NE Weidler, 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.
- The Clackamas bicycle and pedestrian bridge would establish a new and direct active transportation link between Lloyd and the Moda Center, while providing a low-stress option for crossing I-5.
- Removal of the N Flint Avenue overcrossing structure would remove an existing north-south bicycle connection. However, the Hancock/Dixon connection, along with the associated multi-use path, would replace this link. This new connection would follow substantially steeper grades compared with

the existing Flint structure. The predominant bicycle movements using the existing Flint structure are SB to WB toward the Broadway Bridge and the primary use of the new N Hancock/N Dixon Street structure would be WB to SB in the downhill direction to connect to Broadway WB. In addition, under the Build Alternative, new bike facilities on Vancouver would be added to provide the option to turn right onto Broadway from Vancouver as well as replace the function of the existing Flint connection.

- Most of the pedestrian and bicycle routes used with the No-Build Alternative would be available to use with the Build Alternative (with the exception of Flint, which would be replaced by an ADA-compliant bicycle/pedestrian ramp). In addition, the Build Alternative would provide new route options such as the Clackamas pedestrian and bicycle bridge and the Hancock/Dixon connection (and the associated multi-use path), which would involve additional uphill and downhill grades when compared to existing routes.
- The following impacts are anticipated along the five primary travel routes traversing the API:
  - Similar to the No-Build Alternative, most of the primary travel routes would follow a relatively direct path between their origin and destination.
  - Similar to the No-Build Alternative, people bicycling would encounter generally favorable conditions, as defined by the Bicycle LTS scores at the study intersections through which the routes would pass. Overall conditions for people walking would also be similar to the No-Build Alternative, with the exception of slightly improved intersection quality in some locations.
  - Similar to the No-Build Alternative, the number of ramp terminal intersections encountered by people walking and bicycling would generally depend on the route and the user's direction of travel and would range between zero and two crossings. Several routes would include fewer ramp terminal crossings compared with the No-Build Alternative.
  - Compared with the No-Build Alternative, the degree of separation between motorized and non-motorized users would generally improve on all five of the primary travel routes.
  - Compared with the No-Build Alternative, the new, additional travel routes in the Build Alternative would require additional climbing and descending. However, the primary travel routes in No-Build Alternative would remain available to people and walking in the Build Alternative (Flint would be replaced by an ADA-compliant bicycle/pedestrian ramp).
  - The degree of bicycle delay would generally depend on the route under focus and the rider's direction of travel. Reduced delay is anticipated for bicyclists using the Clackamas bicycle and pedestrian bridge. Bicycle



delay is expected to increase slightly for bicyclists traveling to the Steel Bridge from the Broadway/Weidler corridor.

- Indirect Impacts
  - Improved walking and bicycling conditions on N/NE Broadway and N/NE Weidler could encourage more walking and bicycling, especially for shorter trips.
  - The reasonably foreseeable future actions within and near the API would provide a more robust network for walking and biking trips through and within the area.
  - By reducing intersection complexity, upgraded intersections along new or reconstructed streets could improve pedestrian convenience, comfort, and safety. Collectively, these enhancements could make walking more practical and attractive. People with disabilities would also encounter fewer barriers in these areas.
  - Despite system improvements throughout the API, potentially challenging crossing conditions in the vicinity of highway ramp terminal intersections could suppress walking and bicycling potential, particularly for less-confident riders and people with disabilities. The relocation of the I-5 SB ramp moves from the intersection of two Major City Walkways to another intersection of two Major City Walkways.
  - Sidewalk gap closures of approximately 800 feet on N Wheeler/N Williams (formerly NE Wheeler) would improve walking connections in the Moda Center's vicinity. The continued presence of gaps elsewhere (totaling approximately 2,600 feet), similar to the No-Build Alternative, would diminish pedestrian convenience, comfort, and safety.
  - Increased physical separation between motorized and non-motorized users along other major corridors could also generate higher ridership, particularly among less-confident bicyclists.
  - Removal of existing active transportation connections, establishment of new connections, and other changes to the local street system are anticipated to alter walking and bicycling travel patterns within the Project Area, compared with the No-Build Alternative.
  - Transit stop enhancements could increase ridership through the provision of a more accessible, comfortable, and attractive transit stop environment.
  - Relatively steep grades would render some streets and paths challenging for pedestrians and bicyclists and may be particularly less attractive for people traveling in the uphill direction. Travel routes with moderate grades would be available as alternatives to the streets and paths with steep grades.



- Cumulative Impacts
  - Long construction periods (coupled with circuitous detour routes) could significantly impact safety and use of walking and bicycling facilities within the API.
  - Establishment of new active transportation corridors outside of the API would make progress toward completing the active transportation networks. However, existing bikeways and walkways, particularly the Major City Bikeways and City Walkways within the Pedestrian District and within the API, would continue to fulfill prominent roles in the local and regional network.
  - Addition of new connections and increased coverage of lower-stress bikeways within the API would substantially enhance the attractiveness of bicycling. Growing ridership would support local and regional bicycle mode share goals.
  - Improved sidewalk connections and pedestrian crossings, coupled with a reduction in intersection complexity, would increase the attractiveness of walking. Increased walking activity would support local and regional pedestrian mode share goals. However, some of these gains could be tempered by the challenging crossing conditions that would remain at several major intersections, along with increased grades on most major walking routes.

Because people walking and bicycling are sensitive to conditions on a more granular scale, the active transportation network's functionality and attractiveness would largely depend on design details. These design details would be defined in early 2019 and would be informed by the Environmental Analysis and public comment.



# 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

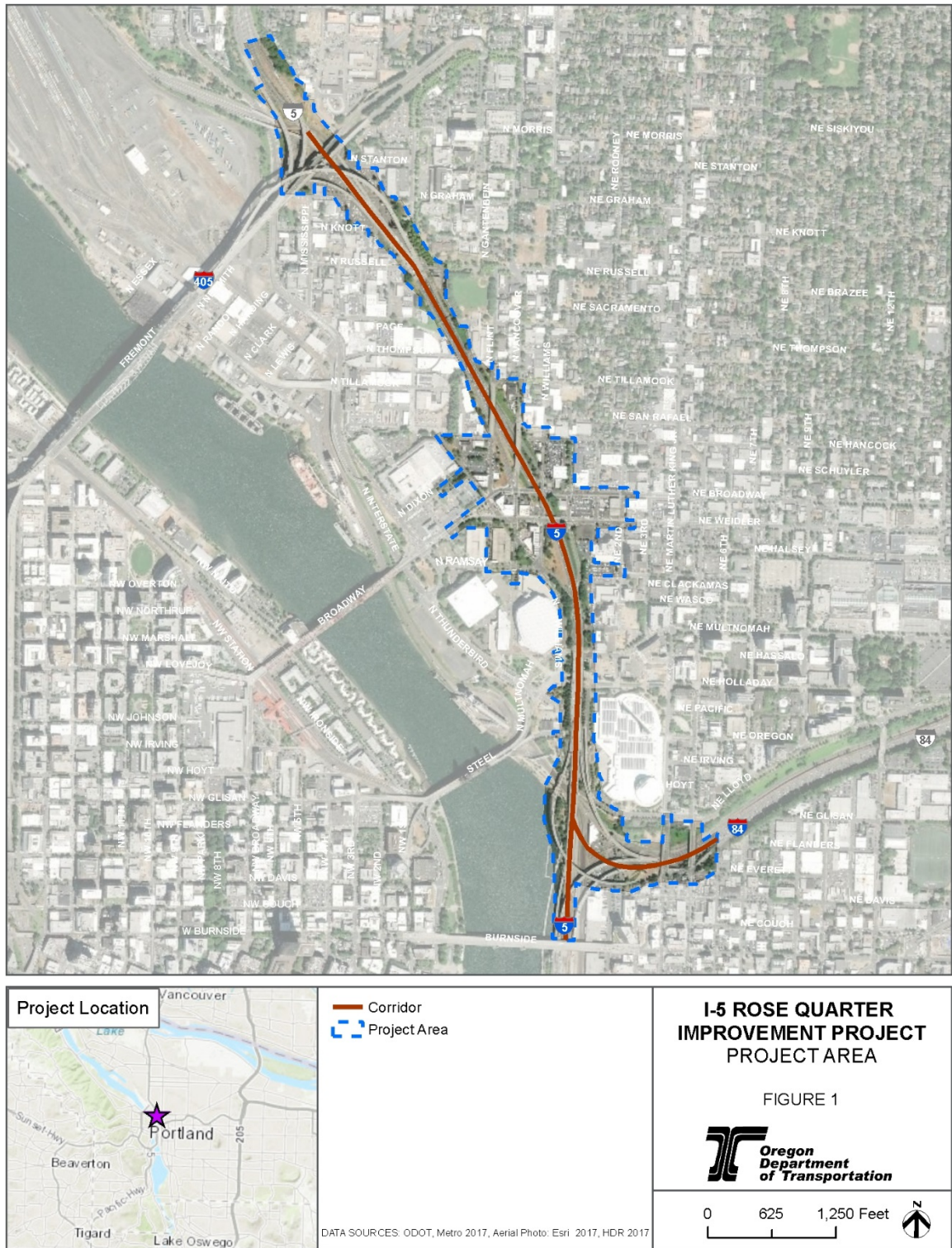
The Project would address the following primary needs:

- **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<sup>2</sup>) that was approximately 3.5 times higher than the statewide average for comparable urban interstate facilities (ODOT 2015a).

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<sup>2</sup> 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.<sup>3</sup>
- 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.

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<sup>3</sup> 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	<ul style="list-style-type: none"> <li>I-84</li> <li>N Broadway/N Williams Avenue</li> </ul>	<ul style="list-style-type: none"> <li>NE Weidler Street/NE Victoria Avenue</li> <li>I-405</li> <li>N Greeley Avenue</li> </ul>
Southbound	<ul style="list-style-type: none"> <li>N Greeley Avenue</li> <li>I-405</li> <li>N Wheeler Avenue/N Ramsay Way</li> </ul>	<ul style="list-style-type: none"> <li>N Broadway/N Vancouver Avenue</li> <li>I-84</li> <li>Morrison Bridge/Highway 99E</li> </ul>

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).<sup>4</sup> 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

<sup>4</sup> 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](https://www.oregonmetro.gov/sites/default/files/Appendix%201.1%20Final%202014%20RTP%20%20Project%20List%208.5x11%20for%20webpage_1.xls)

and reduce pedestrian crossing distances. 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.

## 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.<sup>5</sup> 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.

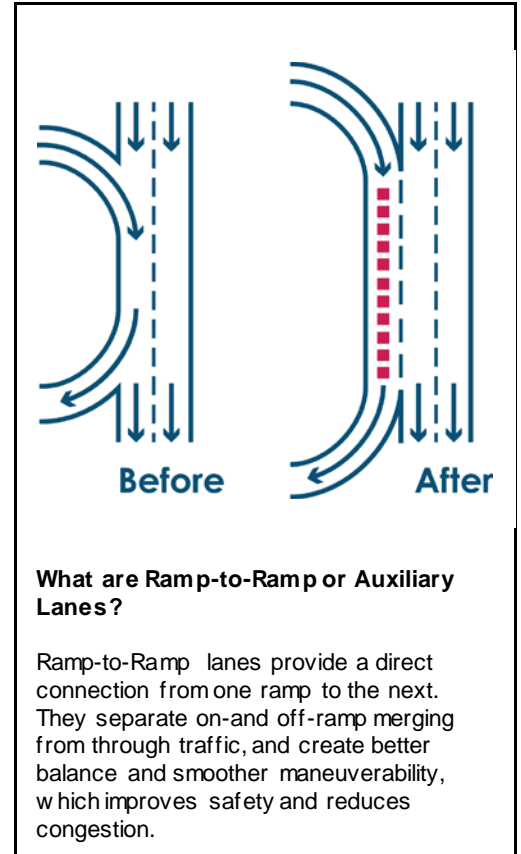
Construction of the I-5 mainline improvements would require the rebuilding of the N/NE Weidler, N/NE Broadway, N Williams, and N Vancouver structures over I-5.

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<sup>5</sup> 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).



## 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

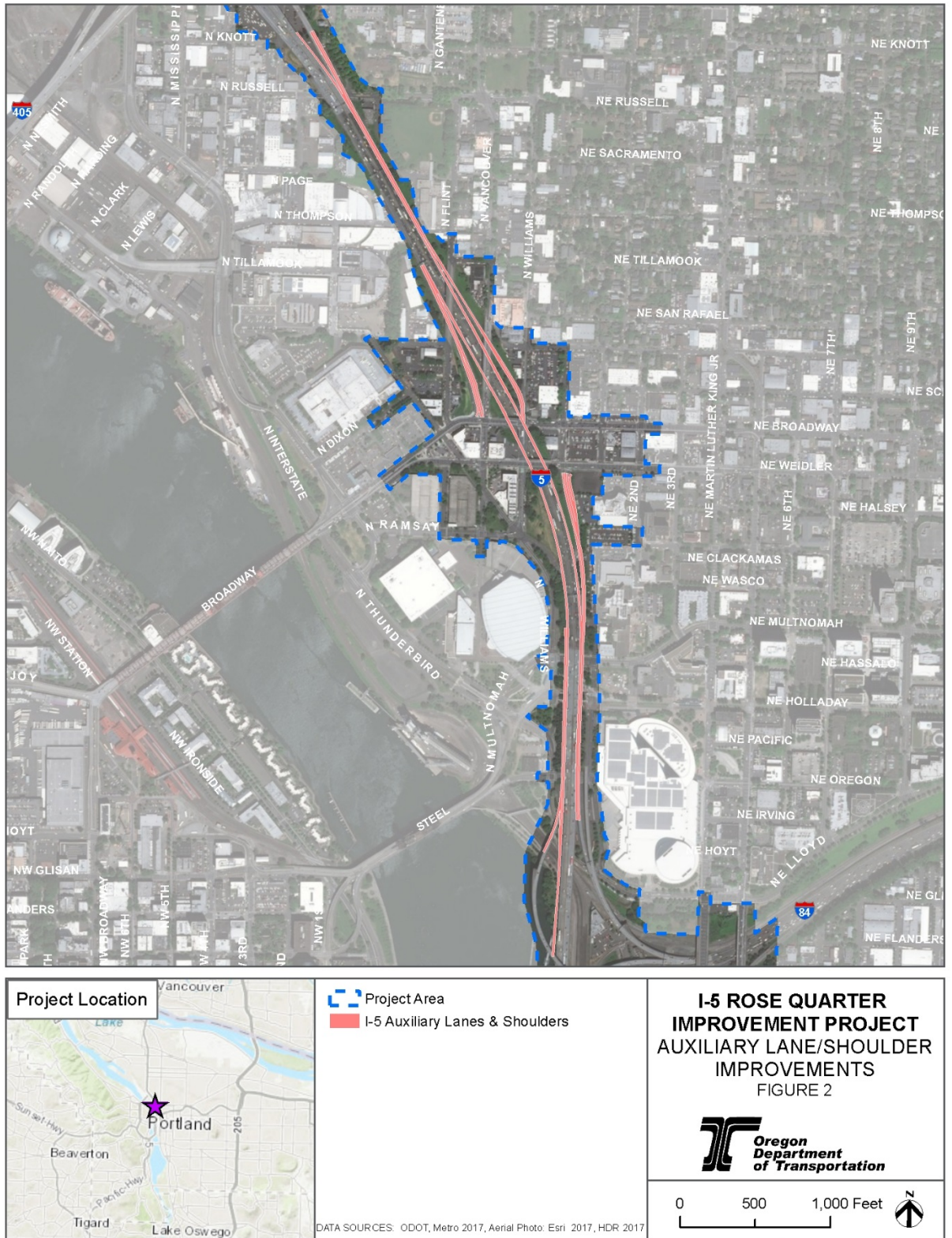
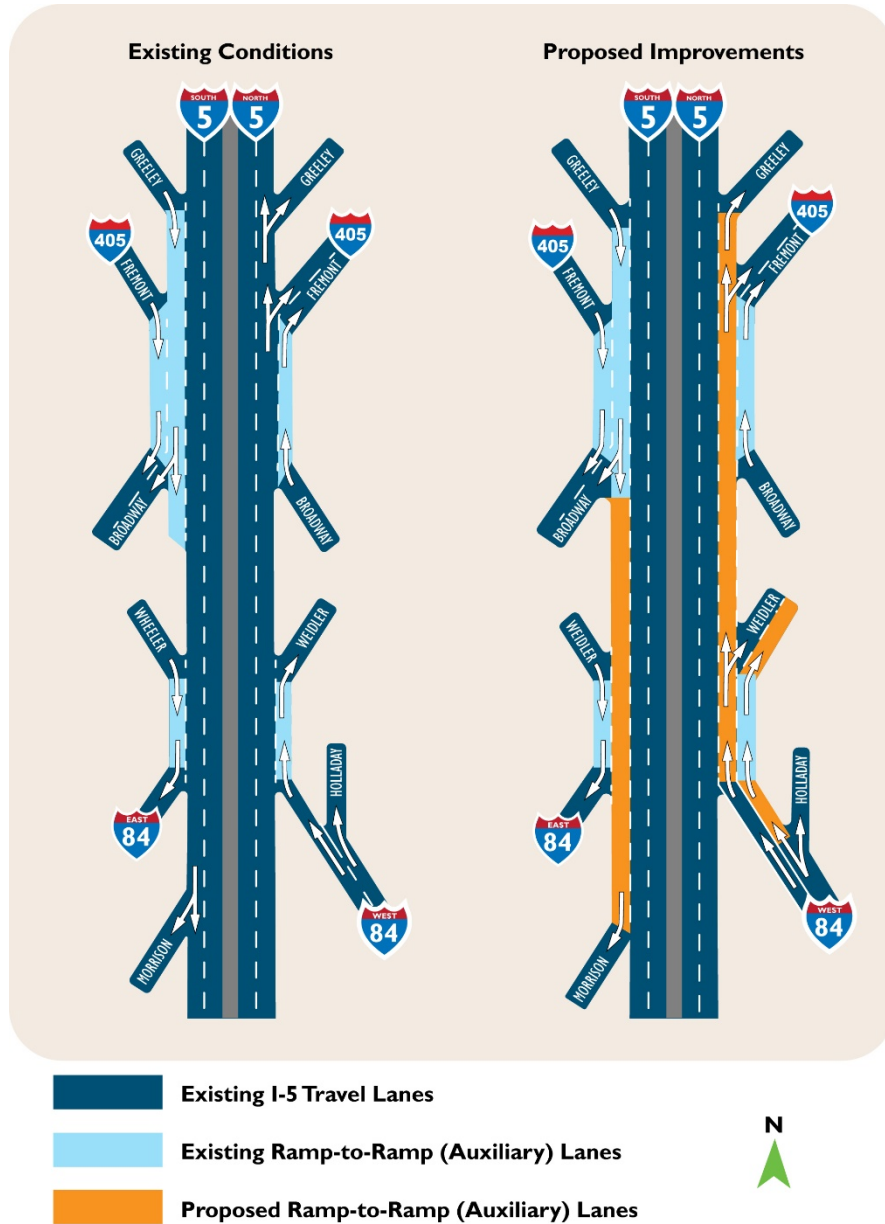
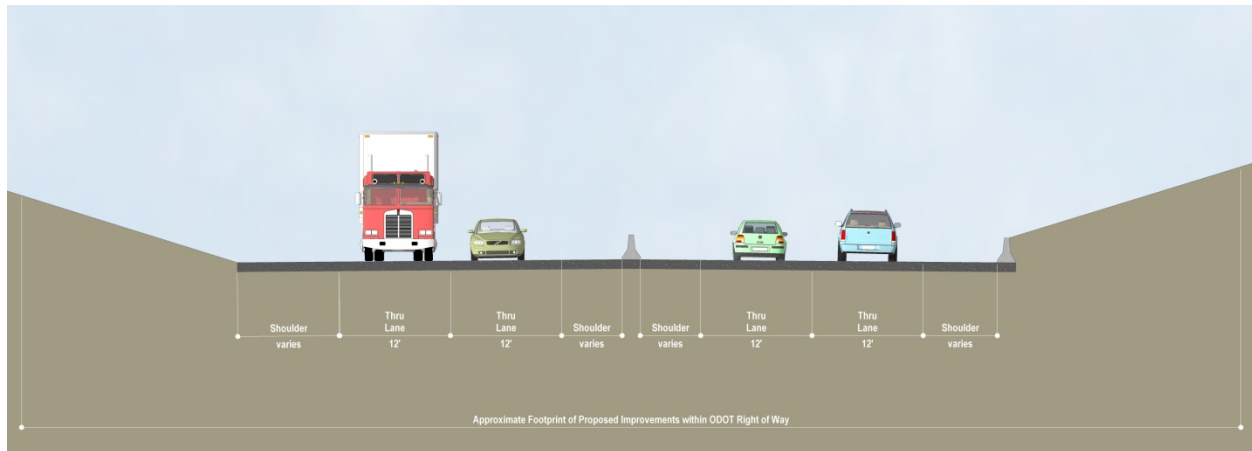




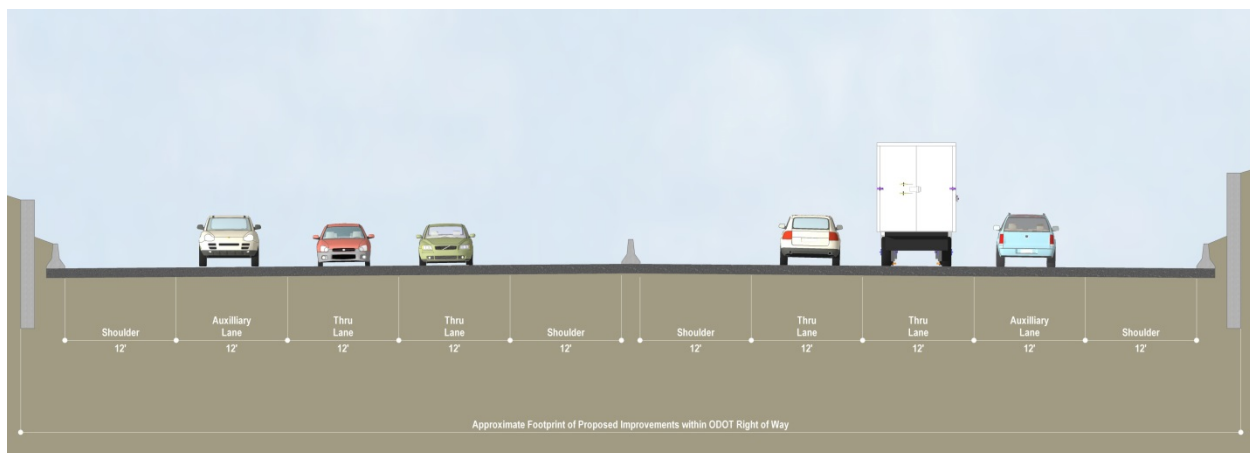
Figure 3. I-5 Auxiliary (Ramp-to-Ramp) Lanes – Existing Conditions and Proposed Improvements



**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

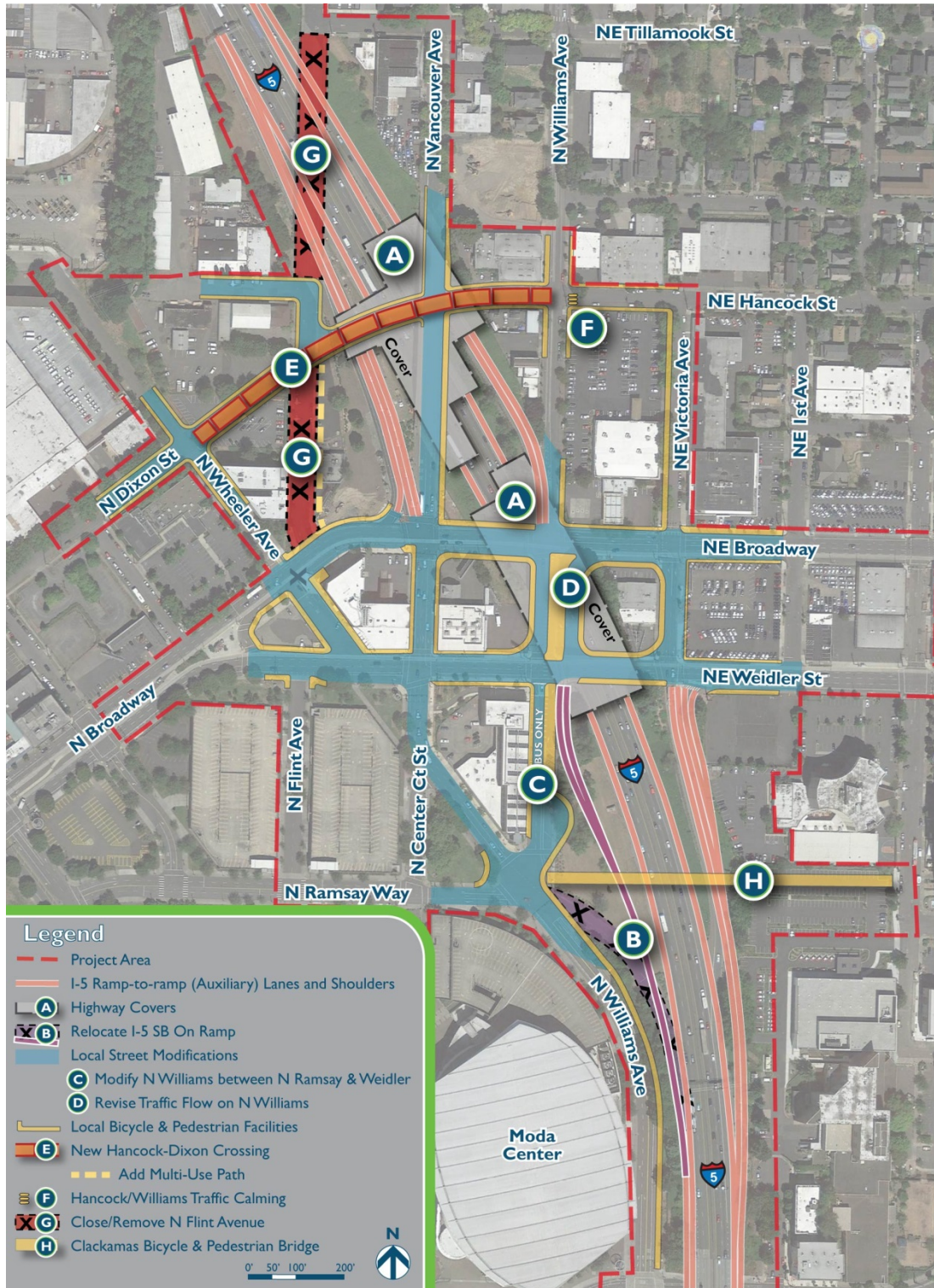
The Build Alternative would modify the travel circulation on N Williams between N Ramsay and N Weidler. This one-block segment of N Williams would be closed to through-travel for private motor vehicles and would only be permitted for pedestrians, bicycles, and public transit (buses) (Figures 6 and 7). 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

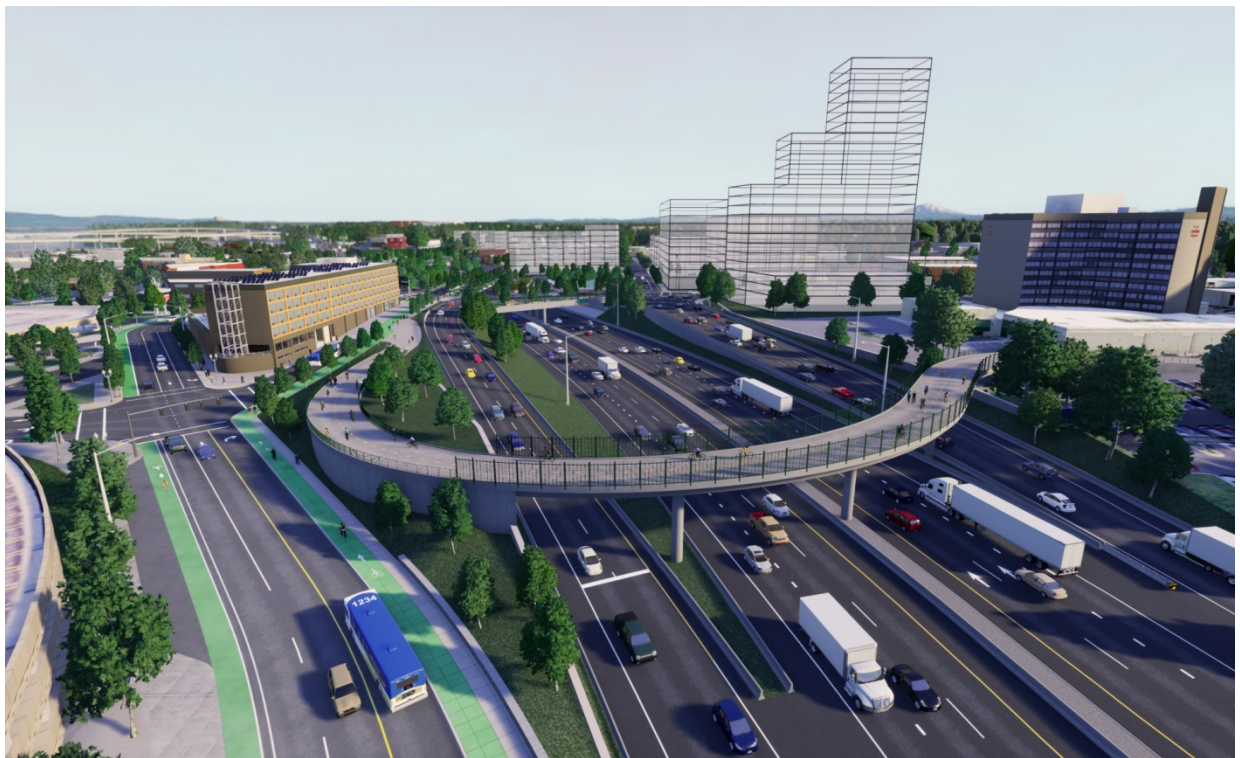
The existing N Flint structure over I-5 would be removed, and N Flint south of N Russell Street would terminate at and connect directly to N Tillamook (see Figure 6, element “G”). The portion of Flint between the existing I-5 overcrossing and Broadway would be closed as a through street for motor vehicles. 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.<sup>6</sup>

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.

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<sup>6</sup> 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 2019a) includes detailed descriptions of the most applicable regulatory documents (i.e., Oregon Statewide Planning Program, Transportation Planning Rule, the Metro 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). 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 Bicycle and Pedestrian Plan

The Oregon Bicycle and Pedestrian Plan (OBPP) is one of eight modal elements of the OTP (ODOT 2016a). Updated in 2016, it provides a decision-making framework for walking and biking efforts in Oregon. The OBPP is intended to guide investment for bicycle and pedestrian projects through a series of policies and strategies on the following topics:

- Safety
- Accessibility and connectivity
- Mobility and efficiency
- Community and economic vitality
- Equity
- Health
- Sustainability
- Strategic investment
- Coordination, cooperation, and collaboration

Specific policies that are most relevant to this Project include the following:

- **Policy 1.1:** Provide safe and well-designed streets and highways for pedestrian and bicycle users.
- **Policy 2.3:** Add pedestrian, bicycle infrastructure, and street crossings to connect system gaps, understanding the unique needs of urban, suburban, and rural communities.
- **Policy 2.4:** Improve access to multimodal connections for bicyclists and pedestrians through planning, design, prioritization, and coordination.
- **Policy 3.1:** Bring about a pedestrian and bicycle network that achieves ease of movement, especially considering the people using these modes are vulnerable users of the system.

The OBPP does not identify specific projects, but local and regional plans must be consistent with its policies and strategies.

### 3.2.3 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 TSP. 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.

### 3.2.4 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 (IR) 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.

### 3.2.5 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.

## 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

#### 3.3.2.1 Comprehensive Plan

The Comprehensive Plan is a long-range land use and public facility investment plan intended to guide future growth and the physical development of Portland. Elements of the TSP — the policies, the projects included in the List of Significant Projects, street classification maps, and street plan maps — are adopted as part of the Comprehensive Plan. The API is within the Central City planning area.

The City's goals for transportation support the vision for a city in which people of all ages and abilities can safely walk within any neighborhood and to key destinations (such as employment and schools). The City's top transportation priority (Goal 9a, Policy 9.49.a) is Vision Zero (eliminating traffic deaths and serious injuries) and designing for equitable and safe access for all modes of travel.

Other pertinent transportation policies adopted into the Comprehensive Plan include the following:

- **Policy 9.2:** Maintain and implement street policy classifications for pedestrian, bicycle, transit, freight, emergency vehicle, and automotive movement, while considering access for all modes, connectivity, adjacent planned land uses, and state and regional requirements.
- **Policy 9.2.b:** Designate district classifications that give priority to pedestrian access in areas where high levels of pedestrian activity exist or are planned, including the Central City, Gateway regional center, town centers, neighborhood centers, and transit station areas.



- **Policy 9.6:** Transportation strategy for people movement, establishes a prioritization of modes to be used when determining tradeoffs needed during the design and operation of streets:
  1. Walking
  2. Biking
  3. Transit
  4. Taxi / commercial transit / shared vehicles
  5. Zero emission vehicles
  6. Other single-occupant vehicles
- **Policy 9.21:** Establishes the City's intended user of bikeway facilities as being people of all ages and abilities, stating, "[c]reate a bicycle transportation system that is safe, comfortable, and accessible to people of all ages and abilities."

### 3.3.2.2 Transportation System Plan

The City of Portland TSP, which is necessary to meet state and regional planning requirements, was updated in 2018, following adoption of the new Comprehensive Plan. 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.

The TSP contains the City's list of planned transportation capital projects. Transportation projects that are in or adjacent to the Project 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.

### 3.3.2.3 Modal Plans

#### *Pedestrian Plan*

The City is currently preparing an update to its Pedestrian Master Plan, also known as PedPDX. The 2018 TSP explicitly defers to PedPDX to address pedestrian network needs, priorities, classifications, and policies. PedPDX will define the City's pedestrian network, including areas designated as pedestrian districts. While the plan is pending completion, the City is acting on some new policies, including new guidelines for the spacing of marked pedestrian crossings of roadways. The guidelines are intended to identify crossing gaps in the pedestrian network.

#### *Portland's Protected Bicycle Lane Planning and Design Guide*

In October 2018, the City created the Portland Pedestrian Bicycle Lane Planning and Design Guide to establish expectations for the design of facilities of all ages and abilities. Implementing Policy 9.21 to consider people of all ages and abilities as the intended user of bicycle facilities, the guidelines specify separated bicycle lanes, either raised or barrier/parking-protected. Figure 3 in the Design Guide recommends

specific widths for directional bikeways, based on peak hour directional cyclist volumes. Where volumes exceed 750 people per hour, the minimum dimension is 8 feet, preferably 10 feet.

### 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 as a whole 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 (NACTO) 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 assess existing and future active transportation conditions within the API. 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 active transportation study generally corresponds to the Project Area, as shown on Figure 1, except along N Broadway, where the API extends west to N Larrabee Avenue (see Figure 9).

### 4.2 Resource Identification and Data Sources

The Project team used data and plans provided by Metro, the City of Portland, and ODOT to qualitatively assess existing and future-year active transportation conditions in the Project Area. “Active Transportation” refers to human-powered, self-propelled travel and includes walking, bicycling, and mobility assistance devices (e.g., wheelchairs).

Existing data sources included 2016 pedestrian and bicycle volumes and bicycle/pedestrian Level of Traffic Stress (LTS) data provided by ODOT, geographic information system (GIS) data provided by Metro, and aerial imagery. Future-year data included regional bicycle demand data (provided by Metro from its regional Bicycle Demand Model), bicycle/pedestrian LTS data provided by ODOT, and planned and programmed capital projects.

### 4.3 Assessment of Impacts

#### 4.3.1 Existing Conditions Assessment

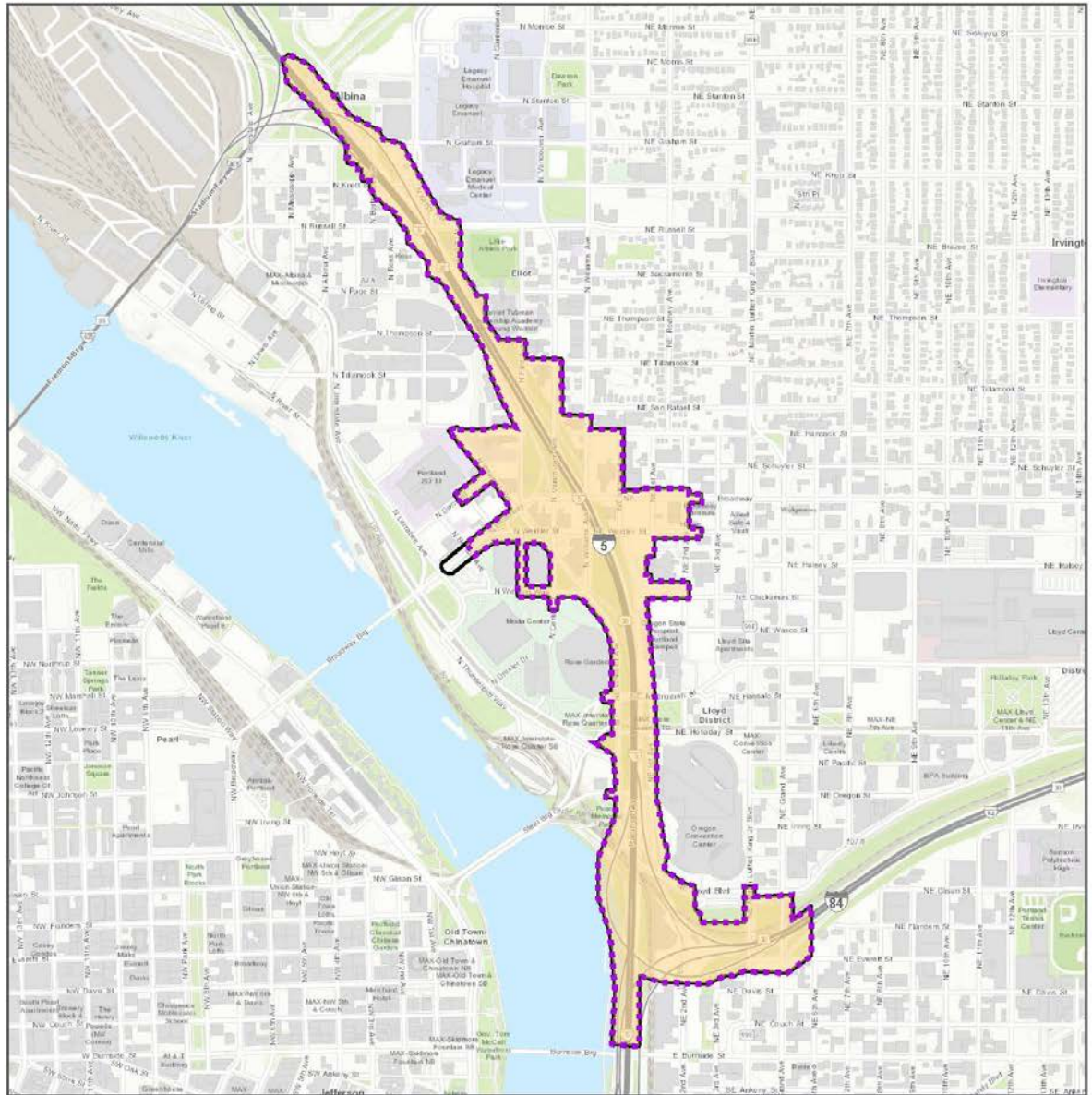
The active transportation element of the transportation analysis included two primary approaches to describe and assess existing conditions: a high-level inventory of bicycle and pedestrian facilities and a bicycle/pedestrian LTS analysis.

##### 4.3.1.1 High-Level Inventory

The Project team conducted a high-level inventory of existing bicycle and pedestrian facilities in the API, based on readily available GIS data. The inventory noted the presence/absence of formalized facilities (e.g., sidewalks, bike lanes, neighborhood greenways) on API street segments, supplemented by a more detailed description of crossing treatments at the 14 “Build Area” intersections.

These focused intersections displayed in Figure 10 are within the API and would be most impacted by the Project. They are the same study intersections included in the *Traffic Technical Report* (ODOT 2019b), with the addition of Hancock and Flint.

Figure 9. Transportation Area of Potential Impact



**Project Location**

Area of Potential Impact Boundary for Transportation  
 Project Area

DATA SOURCES: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

**I-5 ROSE QUARTER IMPROVEMENT PROJECT TRANSPORTATION AREA OF POTENTIAL IMPACT**

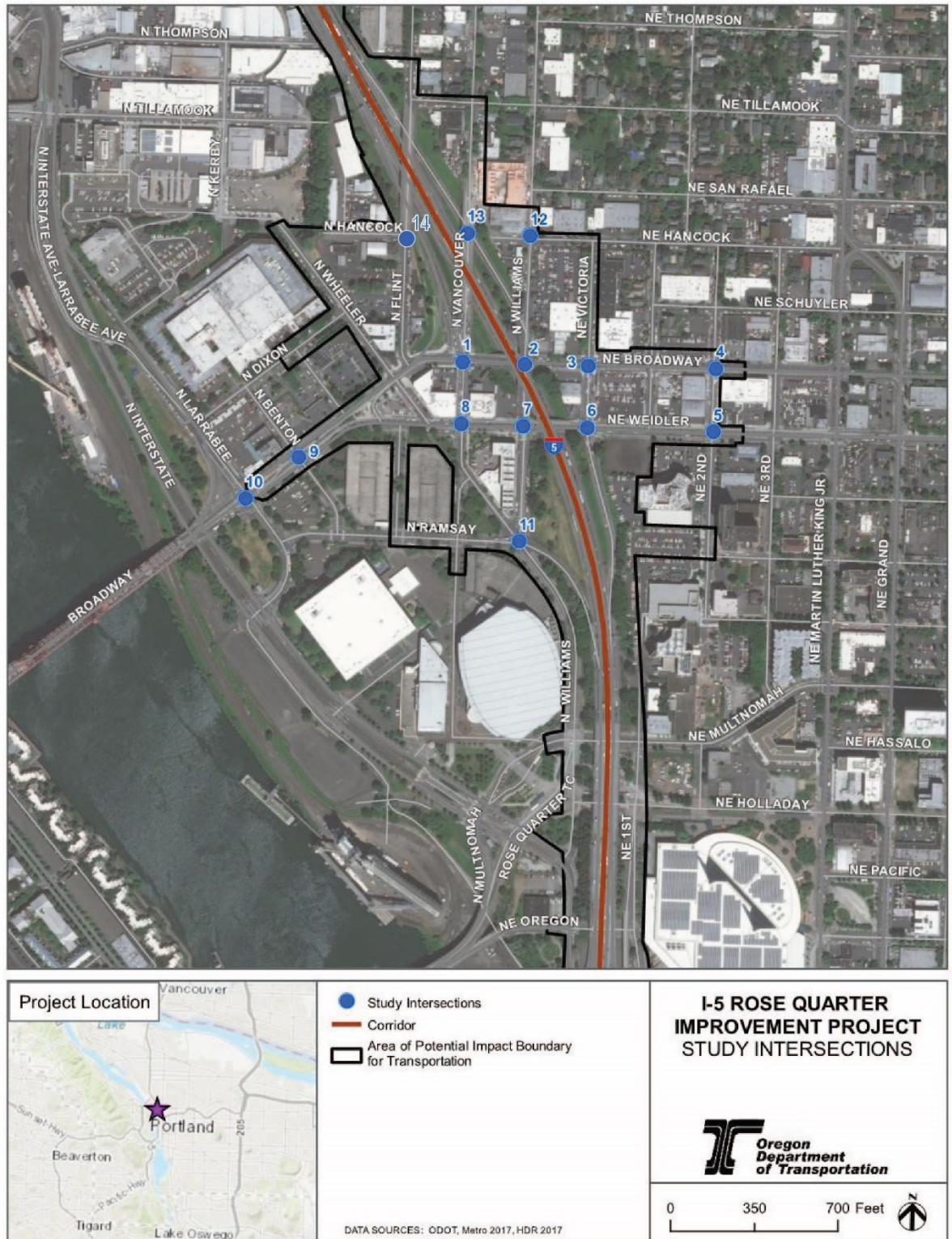
NOVEMBER 2017

0 750 1,500 Feet

PATH: \\C:\BROADWAY\UTR\TR\_INTERCHANGEBUILD\TRANSPORTATION\TRANSPORTATION\_API\_REVISED-USR\SR\BIRBERGSON-DAT\20170611



Figure 10. Build Area Intersections



The Project team summarized this inventory in narrative and tabular format, supported by maps depicting the existing walkway and bikeway networks (at the API scale) and maps illustrating crossing treatments at the 14 “Build Area” intersections. The resulting product identified gaps in the current active transportation network.

#### 4.3.1.2 Bicycle and Pedestrian Level of Traffic Stress Analysis

Separate bicycle and pedestrian LTS analyses were conducted at the 14 “Build Area” intersections. Utilizing readily available GIS data, ODOT conducted analysis at the intersection level following ODOT’s *Analysis Procedure Manual* methodology (ODOT 2016b). Roadway segments and intersection approaches were not analyzed. According to ODOT’s *Analysis Procedure Manual*, LTS generally “quantifies the perceived safety issue of being in close proximity to vehicles whether on a spacing distance or speed basis” (ODOT 2016b). This tool provides a data-driven approach to support the user’s perception as it relates to comfort and safety.

LTS scores for both walking and bicycling range from “1” to “4,” with LTS 1 representing the best possible score (representing relatively lower-stress conditions). Factors that influence an intersection’s bicycle LTS score typically include the following:

- Motor vehicle speeds
- Intersection control (e.g., signalized or unsignalized)
- Number of motor vehicle traffic lanes being crossed
- Presence (or absence) of a center median

Factors that influence an intersection’s pedestrian LTS score typically include the following:

- Motor vehicle traffic volumes and speeds (including turning speeds)
- Roadway functional classification
- Intersection control (e.g., signalized or unsignalized)
- Number of motor vehicle traffic lanes being crossed
- Presence (or absence) of a center median
- Conventional right-angle intersections versus skewed or highly complex intersections
- Permissive left or right turns
- Presence of curb ramps and degree to which they are ADA accessible
- Closed crosswalks
- Slip lanes/channelized right turns
- Presence of illumination



Using multiple criteria and focusing on several primary bicycle/pedestrian travel routes in the API, the assessment identified additional positive and adverse impacts that would otherwise not have emerged from the intersection-level LTS analysis. The subsections below describe the methodology and assumptions applied to this assessment.

- **Design User:** People traveling on foot and bicycle fall under many typologies based on age, ability, confidence level, and other factors and thus have varying needs and preferences regarding active transportation infrastructure. For this analysis, the Project team used the perspective of the following “design users,” which are similar to the user types assumed in previous I-5/Rose Quarter Interchange analyses:
  - **Pedestrian:** ODOT’s target design user falls within the Pedestrian LTS 2 category, defined as follows: “Represents little traffic stress but requires more attention to the traffic situation than of which young children may be capable. This would be suitable for children over 10, teens and adults. All users should be able to use the facility but, some factors may limit people using wheeled mobility devices. Sidewalk condition should be good with limited areas of fair condition. Roadways may have higher speeds and/or higher volumes. Most users are willing to use this facility” (ODOT 2016b)
  - **Bicycle:** ODOT’s target design user falls within the Bicycle LTS 2 category, defined as follows: “Represents little traffic stress but requires more attention than young children can handle, so is suitable for teen and adult cyclists with adequate bike handling skills. Traffic speeds are slightly higher, but speed differentials are still low, and roadways can be up to three lanes wide in total for both directions. Intersections are not difficult to cross for most teenagers and adults. Typical locations include collector-level streets with bike lanes or a central business district” (ODOT 2016b).

As described in Section 3.3.2, the City of Portland’s target design users are different than ODOT’s. Though the ODOT target user was the basis of this comparative analysis, design of a Build Alternative would need to also address the City’s policy to design streets for all ages and abilities, particularly on Major City Bikeways, City Walkways, in Pedestrian Districts, and on Safe Routes to Schools.

#### 4.3.2 Future Year (2045) No-Build and Build Assessments

The Project team qualitatively described anticipated active transportation benefits and impacts of the 2045 No-Build and Build scenarios at two geographic scales:

- **Intersection-Based Multimodal Risk/Safety Assessment:** As described in the *Transportation Safety Technical Report* (ODOT 2019c), the Project team conducted a multimodal risk assessment for each study intersection, coupled with a LTS analysis. These analyses identified potential issues at a more granular scale (e.g., potentially challenging crossing conditions).

- **Route-Based Conditions Assessment:** The Project team also evaluated bicycling and walking conditions at a broader, Project-level scale. While incorporating elements from intersection-level analyses, the corridor assessment included additional criteria such as route directness, grade, and degree of separation between motorized and non-motorized users.

These analyses drew from the existing conditions assessment, while also considering funded and planned ODOT and City of Portland projects (gleaned from ODOT's Statewide Transportation Improvement Program, Metro's RTP, Portland TSP and Capital Improvement Plan, and other information provided by these agencies). The analyses compared the active transportation performance of the Build Alternative with the performance of the No-Build Alternative. The findings of the analyses ultimately informed the identification of potential direct and indirect impacts, which are described in Section 6 of this report.

The Project team based the No-Build and Build scenarios assessment on conditions encountered by pedestrians and bicyclists along five primary travel routes traversing the API, as listed below. These five routes correspond to the primary origin-destination patterns in the API. The Project Team assessed each route, in each direction, for both modes. Listed below, the origins/destinations associated with these routes generally aligned with those used in previous I-5/Rose Quarter Interchange analyses:

- Broadway Bridge to/from the Williams/Vancouver corridor and N/NE Tillamook Neighborhood Greenway
- Broadway Bridge to/from Lloyd
- Broadway Bridge to/from the Broadway/Weidler corridor immediately east of the I-5 interchange
- Steel Bridge/Eastbank Esplanade to/from the Williams/Vancouver corridor and N/NE Tillamook Neighborhood Greenway
- Steel Bridge/Eastbank Esplanade to/from the Broadway/Weidler corridor immediately east of I-5

Using the criteria below, the Project team qualitatively assessed the Build scenario's performance relative to the No-Build scenario. Specifically, the team applied each criterion to the five primary travel routes described above and assessed each route (in each direction) for both bicyclists and pedestrians. The criteria included the following:

- **Route directness:** Relative degree to which the route would follow a reasonably direct path and minimize circuitous travel
- **Intersection quality:** Relative degree of bicyclist/pedestrian comfort based on LTS scores for any of the study intersections through which the route would pass
- **Ramp terminal avoidance:** Relative degree to which the route would avoid I-5 ramp terminal intersections

- **Degree of separation from motor vehicle traffic:** Relative degree of physical separation between motorized and non-motorized users along street segments
- **Grades:** Relative degree of hill inclines/declines (particularly steep slopes) encountered along the route under focus
- **Bicycle delay:** Relative degree of delay experienced by bicyclists at any of the signalized study intersections through which the route under focus would pass.<sup>7</sup>

## 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. Because transportation impacts typically occur on a broader, system-wide scale, the Project team considered actions within and immediately beyond the Project Area. The cumulative impact assessment qualitatively assessed the magnitude of impacts associated with projects listed in the financially constrained element of Metro's RTP (Metro 2014) and other shorter-term projects identified by the City of Portland, in combination with anticipated Project impacts. This assessment also identified the contribution of the Project to overall cumulative impacts.

Within the API, projects listed in the financially constrained element of Metro's RTP include the Sullivan's Gulch Trail, streetscape enhancements along the Martin Luther King Jr. Boulevard/Grand couplet, protected bike lanes and enhanced pedestrian crossings on the Broadway/Weidler couplet, and an undefined list of multimodal safety improvements in Portland's Central City (Metro 2014). These four projects were assumed to be in place under the No-Build Alternative. It was also assumed that these projects would be designed according to applicable agency standards.

Several other RTP financially constrained projects are planned near the API, which would affect bicycle and pedestrian circulation patterns in the future. These projects include the North Portland Greenway, NE 7th/9th Avenue Neighborhood Greenway, and Sullivan's Crossing (bicycle/pedestrian bridge traversing I-84 in the vicinity of NE 7th).

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<sup>7</sup> As described in the *Transportation Safety Technical Report* (ODOT 2019c), the Project team used VISSIM traffic flow simulation software to project peak hour bicycle delay at signalized study intersection approaches that have bicycle facilities (e.g., conventional or protected bike lanes) separated from motor vehicle travel lanes.

## 5 Affected Environment

With its proximity to Portland's central core, the API is a hub of walking and bicycling activity. The vast majority of the API is designated by the City of Portland as a Pedestrian District. Within the API, major walking and bicycling destinations include the Moda Center, Veterans Memorial Coliseum, Rose Quarter Transit Center, and businesses along the Broadway/Weidler couplet. Immediately beyond the API, major activity nodes include the Oregon Convention Center and Lloyd. The Williams/Vancouver corridor, Martin Luther King Jr./Grand corridor, and Broadway Bridge are major destinations. The subsections below describe the existing active transportation network as well as current pedestrian and bicycle planning designations for streets within the API. A summary of the pedestrian and bicycle LTS analysis follows, followed by a description of current safety issues for non-motorized users.

### 5.1 Existing Pedestrian Network

The Project team conducted a high-level inventory of existing pedestrian infrastructure within the API based on readily available data. The inventory noted the presence/absence of formalized walking facilities (e.g., sidewalks, shared-use paths) along street segments, supplemented by a more detailed inventory of crossing treatments at the study intersections. It also includes a marked crossing spacing analysis, which identifies roadway segments that do not meet the City of Portland's crossing spacing guidelines.

#### 5.1.1 Pedestrian Network Classifications

Portland's forthcoming Pedestrian Master Plan, also known as PedPDX, defines the City's pedestrian network. Each segment along the network is classified depending on its current and expected pedestrian demand:

- **Major City Walkways:** These walkways consist of the Civic and Neighborhood Corridors and Main Streets, as defined by Portland's 2035 Comprehensive Plan; all streets along the planned and existing Frequent Transit Network; and off-street trails in high demand corridors.
- **City Walkways:** These walkways consist of all arterial streets, collector streets, streets with transit service that are not designated as Major City Walkways, and off-street trails in moderate demand corridors.

- **Neighborhood Walkways:** These walkways consist of streets on a designated Safe Routes to School travel route or on an existing or funded neighborhood greenway. Neighborhood walkways also include designated paths with the street right of way and neighborhood trails.
- **Local Streets:** Local streets are included on the network if they are located in a Pedestrian District or within a quarter-mile of a fixed rail stop.

Figures 11 and 12 display the pedestrian network classifications on streets within and surrounding the API.

### 5.1.2 Sidewalks and Shared-Use Paths

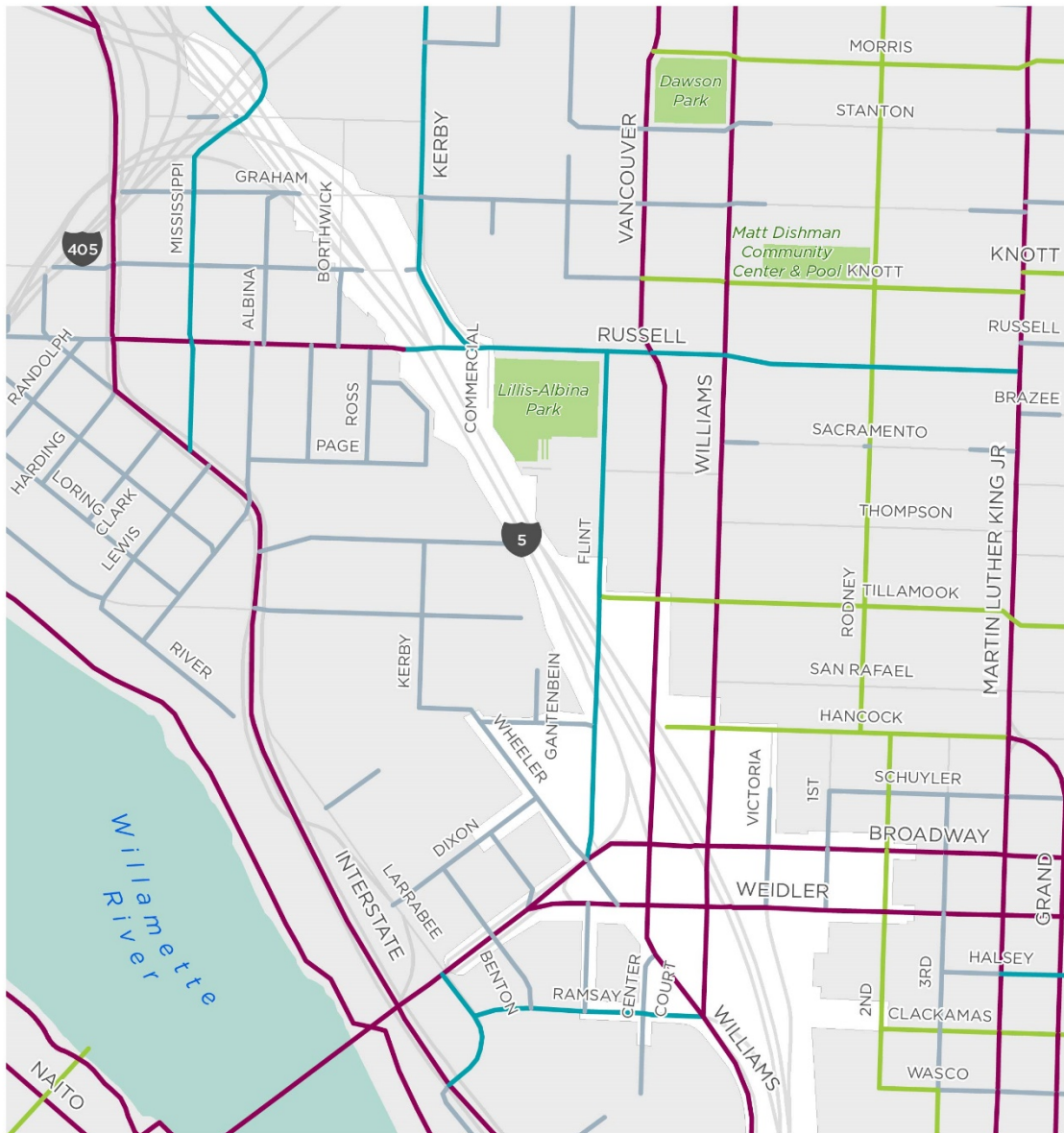
Figures 13 and 14 depict existing pedestrian facilities along street segments within the API. Sidewalks exist on one or both sides of all streets. While sidewalk coverage is mostly complete, approximately 3,330 feet of gaps exist, as shown in Table 3. Scattered throughout the API, these gaps reside on streets ranging from lower-volume local corridors (e.g., N Commercial Avenue), to higher-volume major streets (e.g., Lloyd). Four of the gaps exist on Major City Walkways, as shown in Table 3.

Supplementing the on-street pedestrian network, the Eastbank Esplanade is a shared-use path following the Willamette River's east side. From the intersection of N Williams (formerly Interstate)<sup>8</sup> and NE Oregon, a shared-use path leads to the Esplanade, while the Esplanade itself connects with several local and regional active transportation corridors and five Willamette River bridges.

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<sup>8</sup> Segments of NE Wheeler and N Interstate between N Ramsay Way and NE Oregon are being renamed as N Williams.

Figure 11. Pedestrian Network Classifications–North



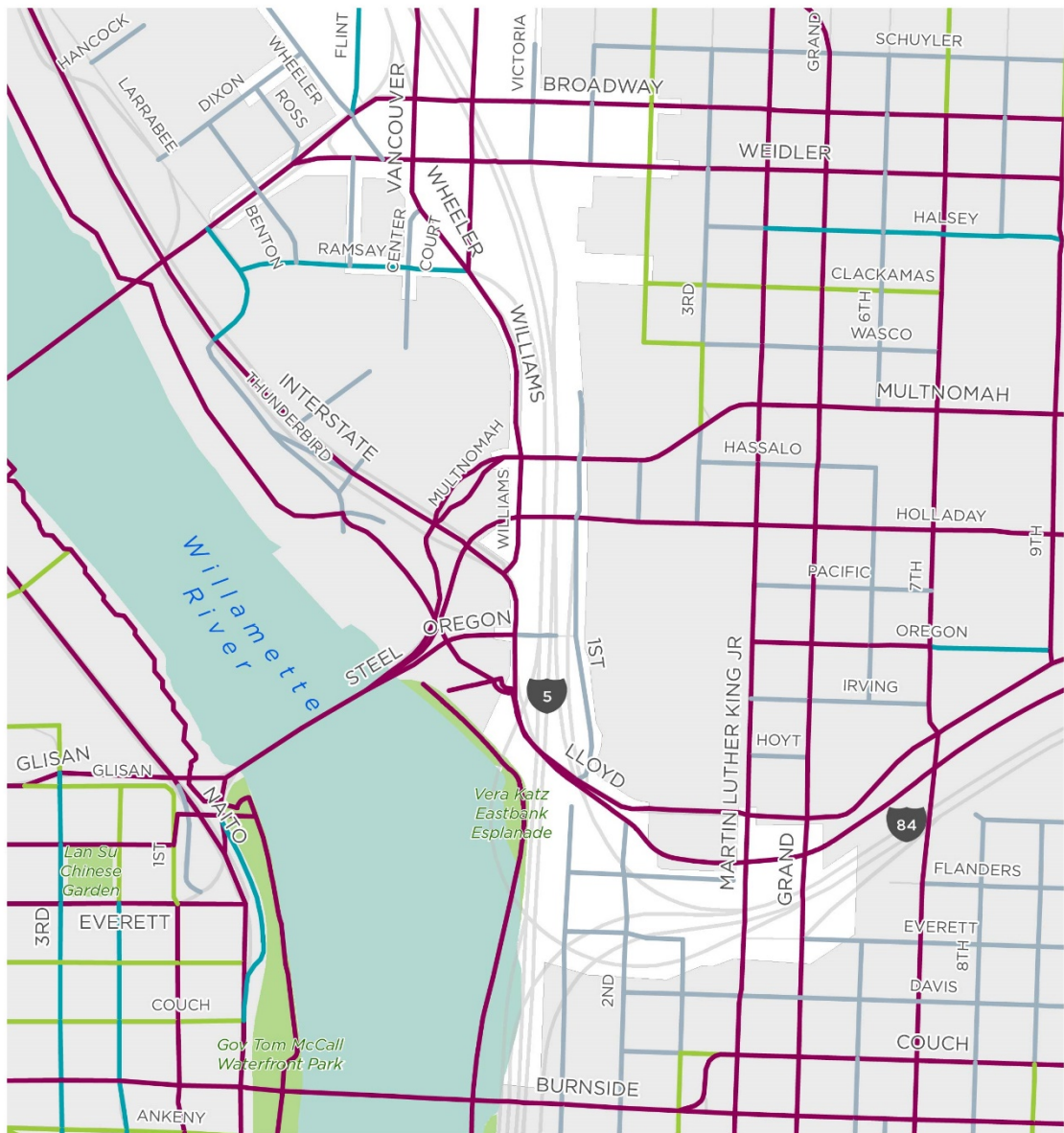
## PEDESTRIAN NETWORK CLASSIFICATIONS- NORTH

### I-5/ROSE QUARTER IMPROVEMENT PROJECT





Figure 12. Pedestrian Network Classifications–South



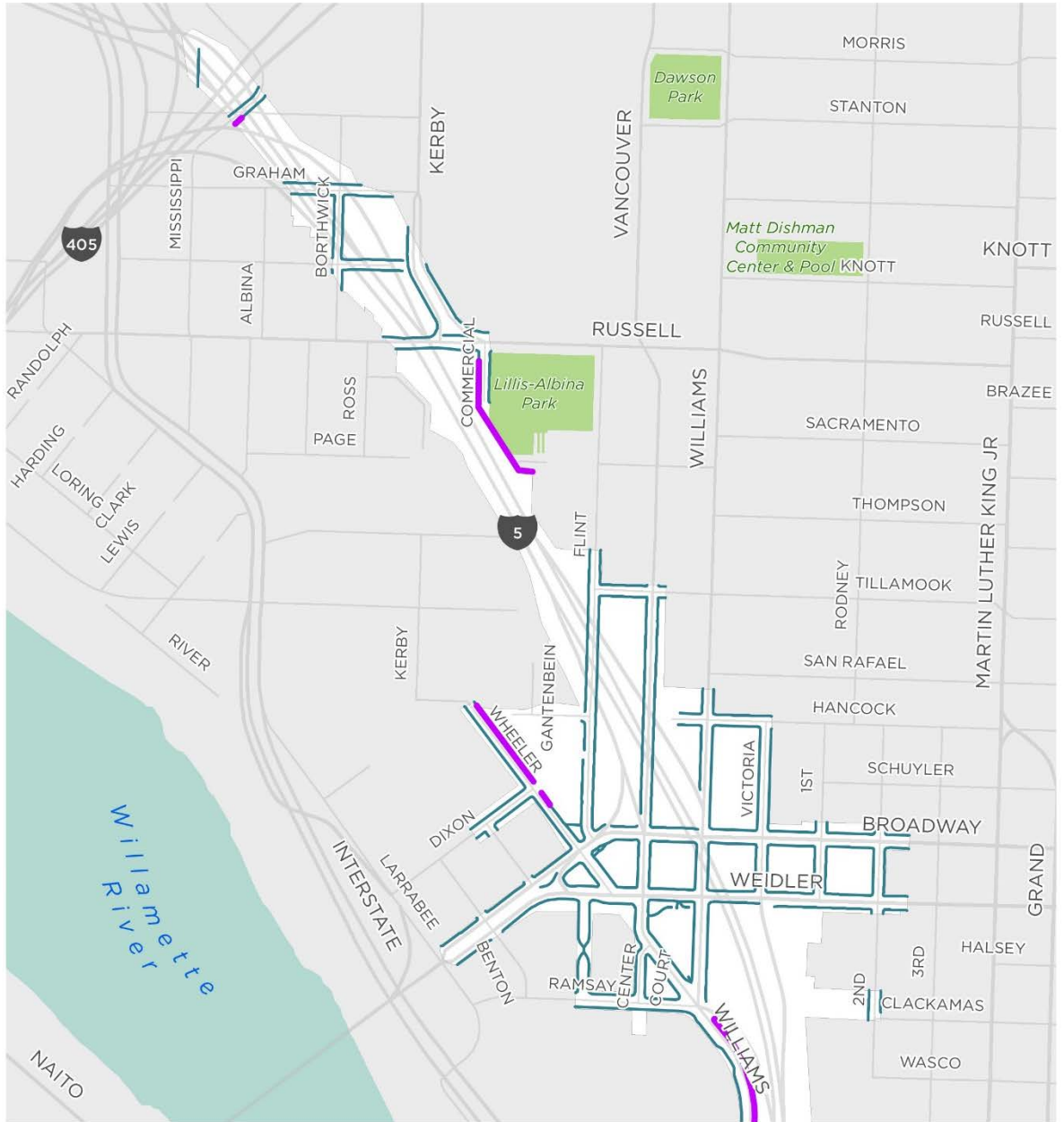
## PEDESTRIAN NETWORK CLASSIFICATIONS- SOUTH

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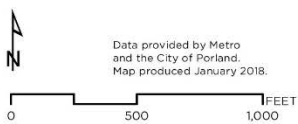


Figure 13. Existing Pedestrian Facilities–North



## EXISTING PEDESTRIAN FACILITIES - NORTH

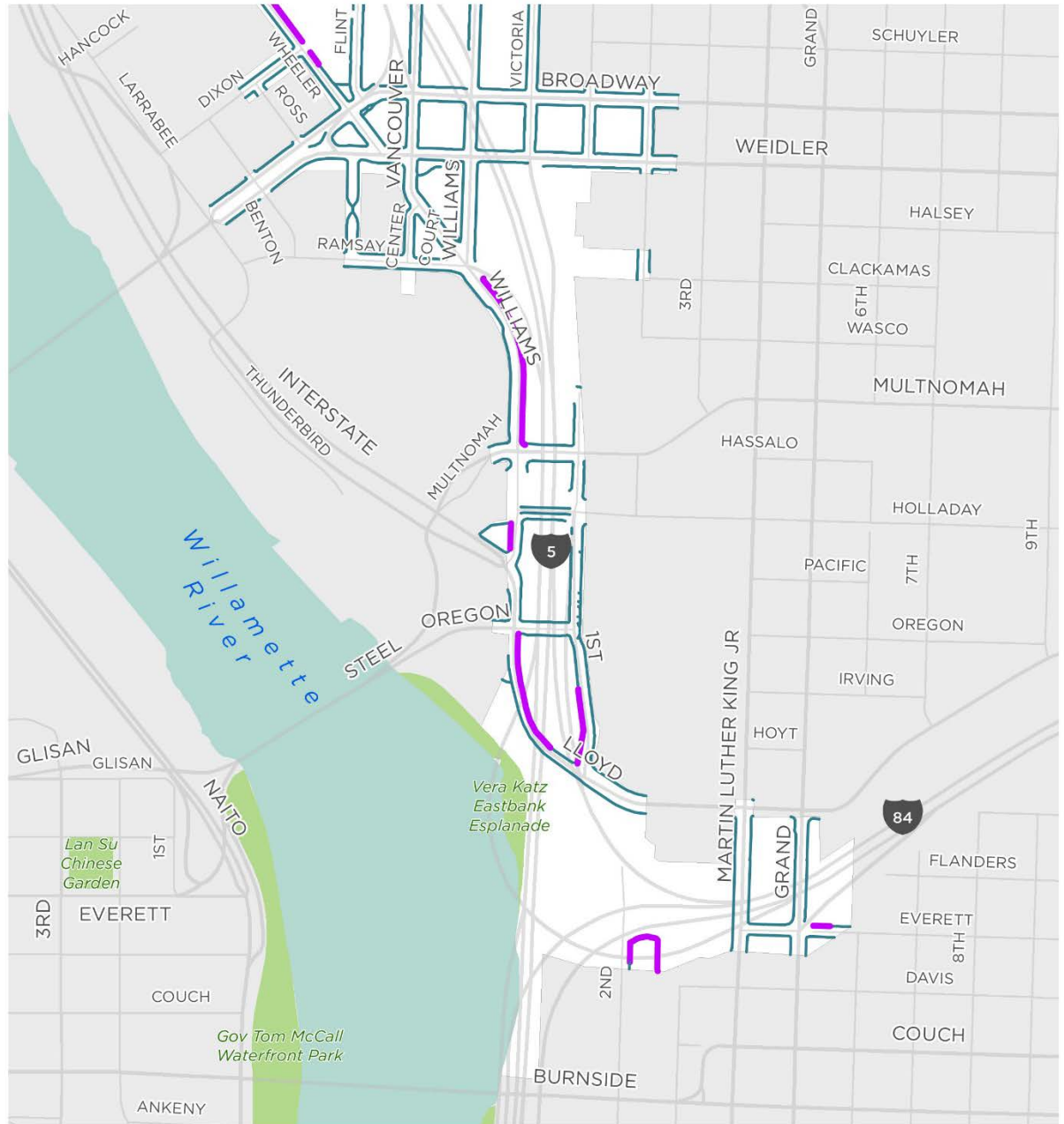
### I-5/ROSE QUARTER IMPROVEMENT PROJECT



Data provided by Metro  
and the City of Portland.  
Map produced January 2018.

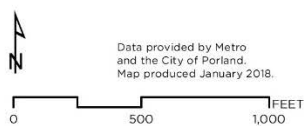
- SIDEWALK
- Not Present
- Present
- Area of Potential Impact
- Water
- Parks

**Figure 14. Existing Pedestrian Facilities–South**



## EXISTING PEDESTRIAN FACILITIES - SOUTH

### I-5/ROSE QUARTER IMPROVEMENT PROJECT



- |                 |                          |
|-----------------|--------------------------|
| <b>SIDEWALK</b> | Area of Potential Impact |
| Not Present     | Water                    |
| Present         | Parks                    |

**Table 3. Pedestrian Network Gaps within the Area of Potential Impact**

Street	Segment	Pedestrian Classification	Side of Street	Approx. Length (ft.)
N Mississippi	I-5 SB viaduct to immediately west of I-5 SB viaduct	City Walkway	North	50
N Commercial	Lillis Albina Park Parking Lot to N Russell	No Designation	West	600
N Wheeler	Immediately south of N Dixon to N Wheeler Place	Local Street	East	500
N Williams (formerly NE Wheeler)	NE Multnomah to N Ramsay	Major City Walkway	East	800
N Williams (formerly NE Wheeler)	N Interstate to NE Holladay	Major City Walkway	West	100
NE Lloyd Boulevard	NE Oregon to west of NE 1st	Major City Walkway	East	550
NE 1st	NE Lloyd to south of NE Oregon	Local Street	West	350
NE 2nd/NE Everett/NE 3rd	Vicinity of I-84 EB flyover ramp	Neighborhood Walkway / Local Street	East/South/West	350
NE Everett	NE Grand to west of NE 6th	Local Street	North	100


Notes: EB = eastbound; ft. = feet; I = Interstate; SB = southbound

### 5.1.3 Intersections

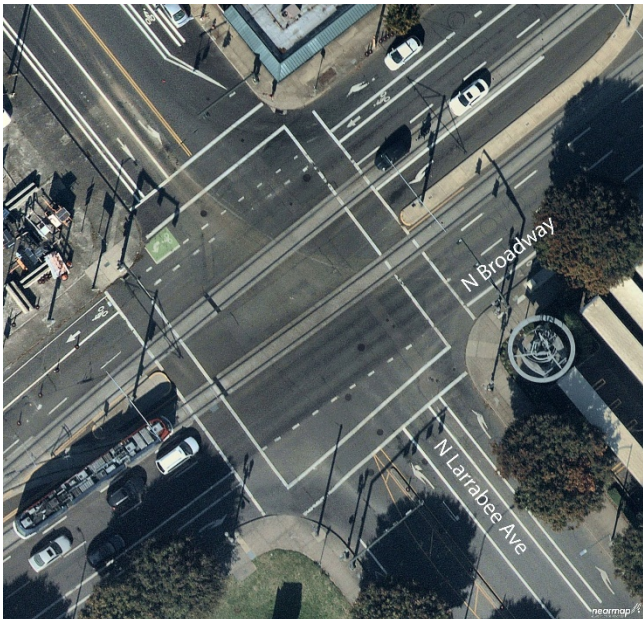
Tables 4 through 16 illustrate and summarize existing pedestrian and bicycle crossing provisions at the study intersections. Most signalized intersections include crosswalks on all sides, supplemented by pedestrian signal heads on all corners where crossings are permitted. Pedestrian push buttons exist at crossings where actuated or semi-actuated signal phases exist. Dual curb ramps with detectable warning strips exist at most corners. Unsignalized intersections generally do not include marked crosswalks, and the presence and quality of curb ramps varies by location.



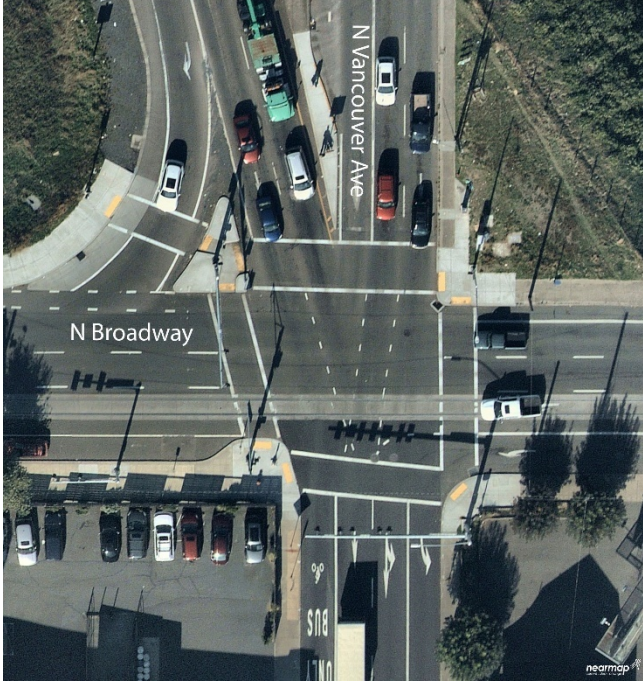
**Table 4. Existing, Deficient, and Missing Crossing Treatments – N Broadway and N Benton**

N Broadway and N Benton	
	<p>Existing bicycle/pedestrian crossing provisions:</p> <ul style="list-style-type: none"> <li>• Marked crosswalks (all legs)</li> <li>• Detectable warning strips on all curb ramps</li> <li>• Pedestrian signal heads (all corners); push buttons for all actuated crossing movements</li> </ul> <p>Deficient or missing crossing provisions:</p> <ul style="list-style-type: none"> <li>• Diagonal curb ramps on all corners (though ramp slopes meet ADA, perpendicular curb ramps are preferred)</li> </ul>

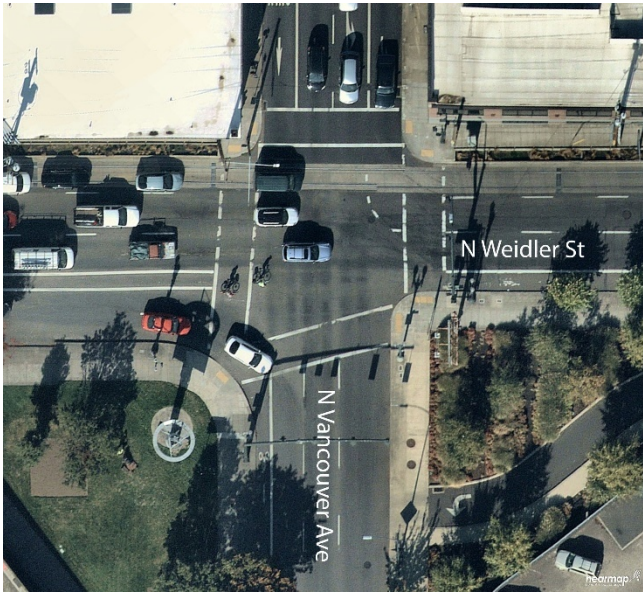
**Table 5. Existing, Deficient, and Missing Crossing Treatments – N Broadway and N Larrabee**

N Broadway and N Larrabee	
	<p>Existing bicycle/pedestrian crossing provisions:</p> <ul style="list-style-type: none"> <li>• Marked crosswalks (all legs)</li> <li>• Pedestrian signal heads (all corners); push buttons for all actuated crossing movements</li> <li>• Eastbound and westbound bike lane markings through intersection</li> <li>• Two-stage turn box (northwest corner)</li> </ul> <p>Deficient or missing crossing provisions:</p> <ul style="list-style-type: none"> <li>• Diagonal curb ramps on all corners (dual curb ramps preferred)</li> <li>• Detectable warning strips absent from all curb ramps</li> </ul>

**Table 6. Existing, Deficient, and Missing Crossing Treatments – N Broadway and N Vancouver**

N Broadway and N Vancouver	
	<p>Existing bicycle/pedestrian crossing provisions:</p> <ul style="list-style-type: none"> <li>• Marked crosswalks (all legs)</li> <li>• Dual curb ramps on northwest, northeast, and southwest corners; curb ramps on both sides of slip lane</li> <li>• Detectable warning strips on all curb ramps</li> <li>• Pedestrian signal heads (all corners); push buttons for all actuated crossing movements</li> <li>• WB bike lane markings through slip lane area</li> </ul> <p>Deficient or missing crossing provisions:</p> <ul style="list-style-type: none"> <li>• None</li> </ul>

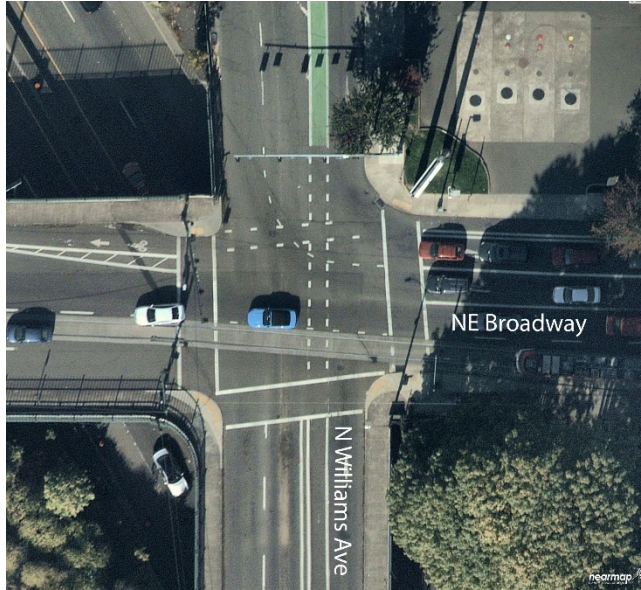
**Table 7. Existing, Deficient, and Missing Crossing Treatments – N Weidler and N Vancouver**

N Weidler and N Vancouver	
	<p>Existing bicycle/pedestrian crossing provisions:</p> <ul style="list-style-type: none"> <li>• Marked crosswalks (all legs)</li> <li>• Dual curb ramps on northwest, northeast, and southeast corners</li> <li>• Detectable warning strips on all curb ramps</li> <li>• Pedestrian signal heads (all corners); push buttons for all actuated crossing movements</li> </ul> <p>Deficient or missing crossing provisions:</p> <ul style="list-style-type: none"> <li>• Diagonal curb ramp on southwest corner (dual curb ramps preferred)</li> </ul>



**Table 8. Existing, Deficient, and Missing Crossing Treatments –  
N/NE Broadway and N Williams**

**N/NE Broadway and N Williams**




Existing bicycle/pedestrian crossing provisions:

- Marked crosswalks on all legs where pedestrian crossings are permitted
- Dual curb ramps on southeast corner; single curb ramps on northwest and NE corners (oriented directly toward the single crosswalk where crossings are permitted)
- Detectable warning strips on all curb ramps
- Pedestrian signal heads on all corners where crossings are permitted
- Bike signal (westbound) with push button activation
- Northbound and westbound bike lane markings through intersection


Deficient or missing crossing provisions:

- Prohibited pedestrian crossing (north leg)
- Depressed corner on southwest corner (dual curb ramps preferred)

**Table 9. Existing, Deficient, and Missing Crossing Treatments – N/NE Weidler and N Williams**


N/NE Weidler and N Williams	
	<p>Existing bicycle/pedestrian crossing provisions:</p> <ul style="list-style-type: none"> <li>• Marked crosswalks (all legs)</li> <li>• Dual curb ramps on southwest corner</li> <li>• Detectable warning strips on all curb ramps</li> <li>• Pedestrian signal heads (all corners); push buttons for all actuated crossing movements</li> <li>• “Jug handle” ramp to facilitate eastbound-to-northbound bicycle turning movements</li> <li>• Bike box (northbound approach)</li> <li>• North-bound colored bike lane markings through intersection</li> </ul> <p>Deficient or missing crossing provisions:</p> <ul style="list-style-type: none"> <li>• Depressed corner on northwest and northeast corners, diagonal curb ramp on southeast corner (dual curb ramps preferred)</li> </ul>

**Table 10. Existing, Deficient, and Missing Crossing Treatments – N Williams and N/NE Hancock**


N Williams and N/NE Hancock	
	<p>Existing bicycle/pedestrian crossing provisions:</p> <ul style="list-style-type: none"> <li>• Dual curb ramps on southwest corner</li> </ul> <p>Deficient or missing crossing provisions:</p> <ul style="list-style-type: none"> <li>• Diagonal curb ramps on northwest and southwest corners (dual curb ramps preferred)</li> <li>• Curb ramps to facilitate crossings of Williams are absent from intersection’s east side</li> <li>• Detectable warning strips absent from all curb ramps</li> </ul>




**Table 11. Existing, Deficient, and Missing Crossing Treatments – N Flint and N Hancock**

N Flint and N Hancock	
	<p>Existing bicycle/pedestrian crossing provisions:</p> <ul style="list-style-type: none"> <li>• No formalized facilities; see comments below</li> </ul> <p>Deficient or missing crossing provisions:</p> <ul style="list-style-type: none"> <li>• Curb ramp absent from northwest corner</li> <li>• Diagonal curb ramp on southwest corner (dual curb ramps preferred)</li> <li>• Detectable warning strips absent from all curb ramps</li> </ul>


**Table 12. Existing, Deficient, and Missing Crossing Treatments – NE Broadway and NE 2nd**

NE Broadway and NE 2nd	
	<p>Existing bicycle/pedestrian crossing provisions:</p> <ul style="list-style-type: none"> <li>• Marked crosswalks (all legs)</li> <li>• Dual curb ramp on southeast corner</li> <li>• Detectable warning strips on all curb ramps</li> <li>• Pedestrian signal heads (all corners); push buttons for all actuated crossing movements</li> <li>• Bicycle loop detection (north- and southbound approaches)</li> </ul> <p>Deficient or missing crossing provisions:</p> <ul style="list-style-type: none"> <li>• Diagonal curb ramp on northwest, northeast and southwest corners (dual curb ramps preferred)</li> </ul>

**Table 13. Existing, Deficient, and Missing Crossing Treatments – NE Weidler and NE 2nd**

NE Weidler and NE 2nd	
	<p>Existing bicycle/pedestrian crossing provisions:</p> <ul style="list-style-type: none"> <li>• Marked crosswalks (all legs)</li> <li>• Dual curb ramps on northwest and northeast corners</li> <li>• Detectable warning strips on northwest and northeast corner curb ramps</li> <li>• Pedestrian signal heads (all corners); push buttons for all actuated crossing movements</li> <li>• Bicycle loop detection (north- and southbound approaches)</li> </ul> <p>Deficient or missing crossing provisions:</p> <ul style="list-style-type: none"> <li>• Diagonal curb ramps on southwest and southeast corners (dual curb ramps preferred)</li> <li>• Detectable warning strips absent from curb ramps on southwest and southeast corners</li> </ul>

**Table 14. Existing, Deficient, and Missing Crossing Treatments – NE Broadway and NE Victoria**

NE Broadway and NE Victoria	
	<p>Existing bicycle/pedestrian crossing provisions:</p> <ul style="list-style-type: none"> <li>• Marked crosswalks (all legs)</li> <li>• Detectable warning strips on all curb ramps</li> <li>• Pedestrian signal heads (all corners); push buttons for all actuated crossing movements</li> <li>• Bike signal (westbound)</li> </ul> <p>Deficient or missing crossing provisions:</p> <ul style="list-style-type: none"> <li>• Diagonal curb ramps on all corners (dual curb ramps preferred)</li> </ul>



**Table 15. Existing, Deficient, and Missing Crossing Treatments –  
NE Weidler and NE Victoria**

NE Weidler and NE Victoria	
	<p>Existing bicycle/pedestrian crossing provisions:</p> <ul style="list-style-type: none"><li>• Marked crosswalks (all legs), plus slip lane</li><li>• Dual curb ramps on northeast and southeast corners</li><li>• Detectable warning strips on all curb ramps (on four main corners)</li><li>• Pedestrian signal heads (all corners)</li><li>• Eastbound colored bike lane markings through slip lane area</li></ul> <p>Deficient or missing crossing provisions:</p> <ul style="list-style-type: none"><li>• Depressed corner on southwest corner, diagonal curb ramp on northwest corner (dual curb ramps preferred)</li><li>• Detectable warning strip absent from curb ramp on east side of slip lane</li></ul>



**Table 16. Existing, Deficient, and Missing Crossing Treatments –  
N Wheeler and N Ramsay/N Williams**

**N Wheeler and N Ramsay/N Williams**



Existing bicycle/pedestrian crossing provisions:

- Marked crosswalks (all legs), plus slip lane (where crossings are permitted)
- Dual curb ramps on northwest and southwest corners; single curb ramp on intersection's northeast corner (oriented directly toward the single crosswalk where crossings are permitted)
- Detectable warning strips on northern curb ramp
- Pedestrian signal heads on all corners where crossings are permitted; push buttons for all actuated crossing movements
- Bike signal (southeast bound)

Deficient or missing crossing provisions near I-5 on-ramp on east leg:

- Prohibited pedestrian crossing (south and east legs)
- Diagonal curb ramp on northern corner (dual curb ramps preferred)
- Detectable warning strips absent from curb ramps on intersection's northwest, northeast and southwest corners

Note: NE Wheeler from N Ramsay/N Williams to NE Oregon currently undergoing name change to N Williams.

While all study intersections include some degree of pedestrian crossing provisions, gaps and/or deficient conditions typically include the following:

- Prohibited crossing movements (e.g., N Broadway at Williams, N Wheeler at Ramsay)
- Double turn lanes (e.g., N Vancouver at N Weidler, NE Broadway at N Williams)
- Slip lanes (e.g., I-5 NB off-ramp at NE Weidler)
- Diagonal curb ramps and/or depressed corners
- Lack of detectable warning strips on curb ramps

The Project team also conducted a Local Street Multimodal Risk/Safety Assessment that describes other physical and operational conditions at the study intersections and their impact on pedestrian/bicyclist safety and comfort. Results of that study are included in the *Transportation Safety Technical Report* (ODOT 2019c).

### 5.1.4 Crossing Spacing Analysis

The City has recently adopted the following spacing guidelines for marked crossings to help identify crossing gaps:

- Marked crossings every 530 feet on arterials and collectors within Pedestrian Districts
- Marked crossings every 800 feet on City Walkways and Major City Walkways outside of Pedestrian Districts

Figures 15 and 16 depict the results of the crossing spacing analysis for streets within and surrounding the API. Marked crossing gaps exist throughout the API, including along the following Major City Walkways: N Vancouver, N Williams, and N Lloyd. The existing marked crossings along NE Broadway and NE Wielder meet the City's guidelines.

## 5.2 Existing Bicycle Network

The Project team conducted a high-level inventory of existing bicycle infrastructure within the API, based on readily available data. The inventory noted the presence/absence of formalized bicycle facilities (e.g., bike lanes, neighborhood greenways and shared-use paths), supplemented by a more detailed inventory of crossing treatments at the study intersections.

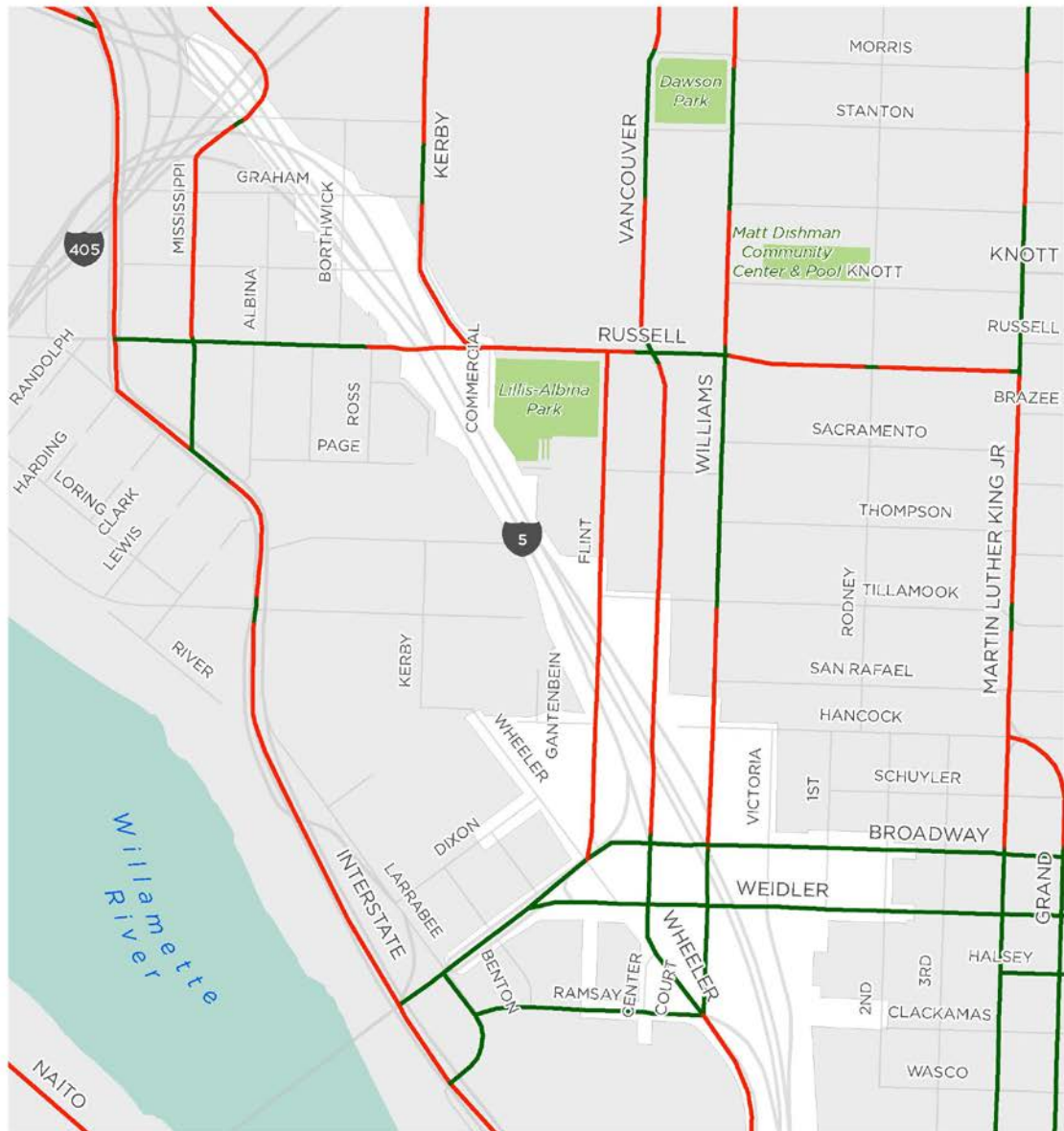
### 5.2.1 On-Street Bikeways and Shared-Use Paths

Figures 17 and 18 depict existing bicycle facilities on street segments within the API. Formalized bikeways exist on most major streets, generally consisting of conventional bike lanes or buffered bike lanes along a street's right side. In some instances (e.g., N Williams [formerly NE Wheeler] east of the Moda Center), shared lane markings exist where an otherwise separated bicycle facility is preferred. Neighborhood greenways, lower-volume local streets adapted to prioritize bicycle travel, exist on two API streets (N/NE Tillamook Street and NE 2nd). Where formalized on-street bikeways do not exist, people on bicycles share general-purpose lanes with motor vehicle traffic (e.g., Ramsay and other local streets).

While conventional bicycle facilities exist on most streets within the API, less conventional treatments, intended to address unique operating conditions and/or physical constraints, also exist. Examples include left-side buffered bike lanes (e.g., Williams), bi-directional colored bike lanes (e.g., Rose Quarter Transit Center), and combined bus/bike lanes (e.g., Vancouver).

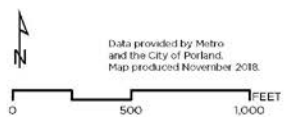
Described earlier, the Eastbank Esplanade is a shared-use path following the Willamette River's east side. From the N Williams (formerly N Interstate)/NE Oregon intersection, a shared-use path leads to the Esplanade.

Figure 15. Marked Crossing Spacing Analysis–North



## MARKED CROSSING SPACING ANALYSIS- NORTH

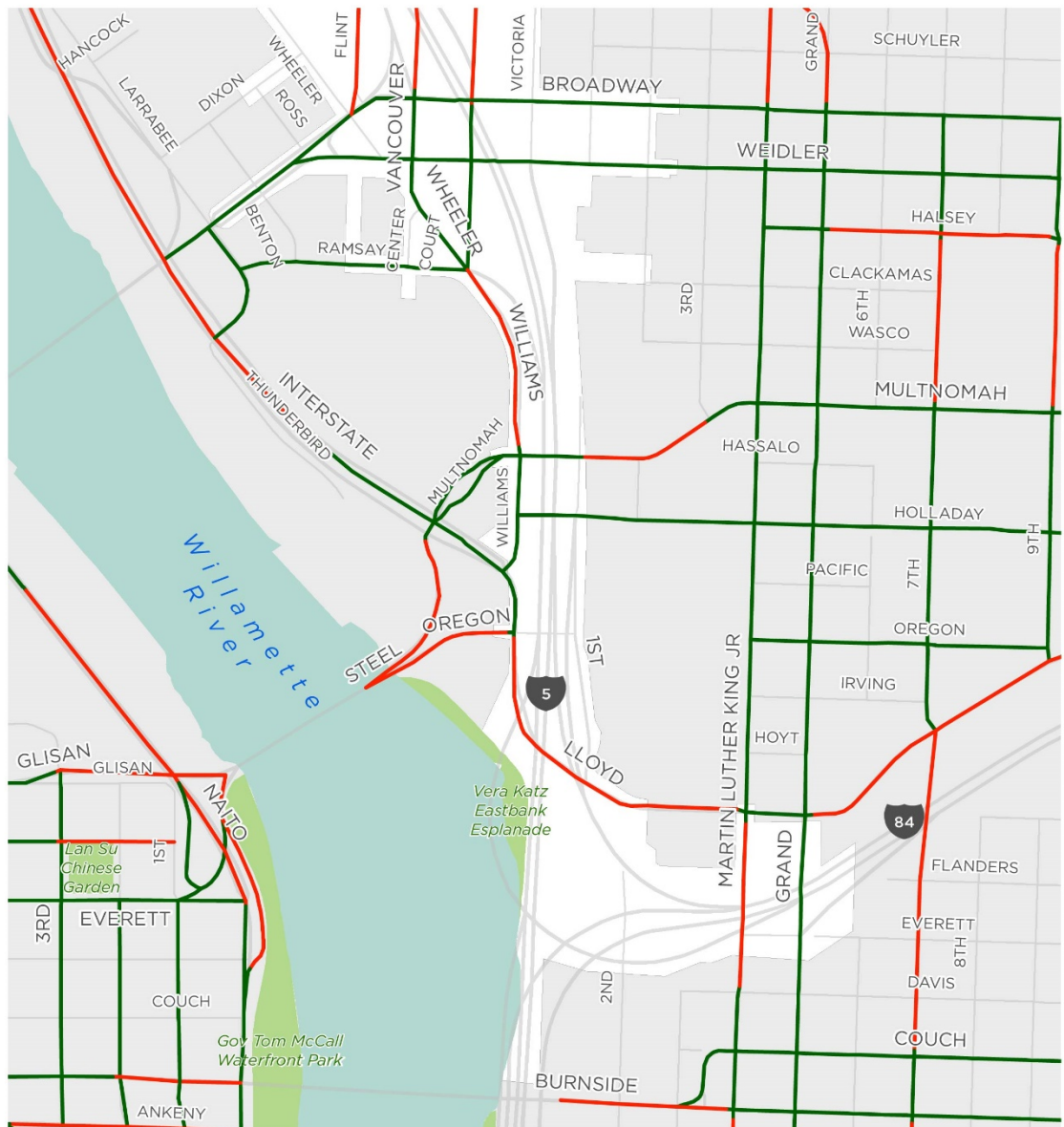
### I-5/ROSE QUARTER IMPROVEMENT PROJECT



#### LEGEND

- Meets City's Crossing Standards
- Does Not Meet City's Crossing Standards
- Area of Potential Impact
- Water
- Parks

Figure 16. Marked Crossing Spacing Analysis–South



## MARKED CROSSING SPACING ANALYSIS- SOUTH

### I-5/ROSE QUARTER IMPROVEMENT PROJECT

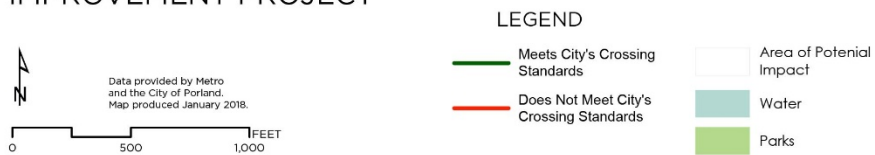
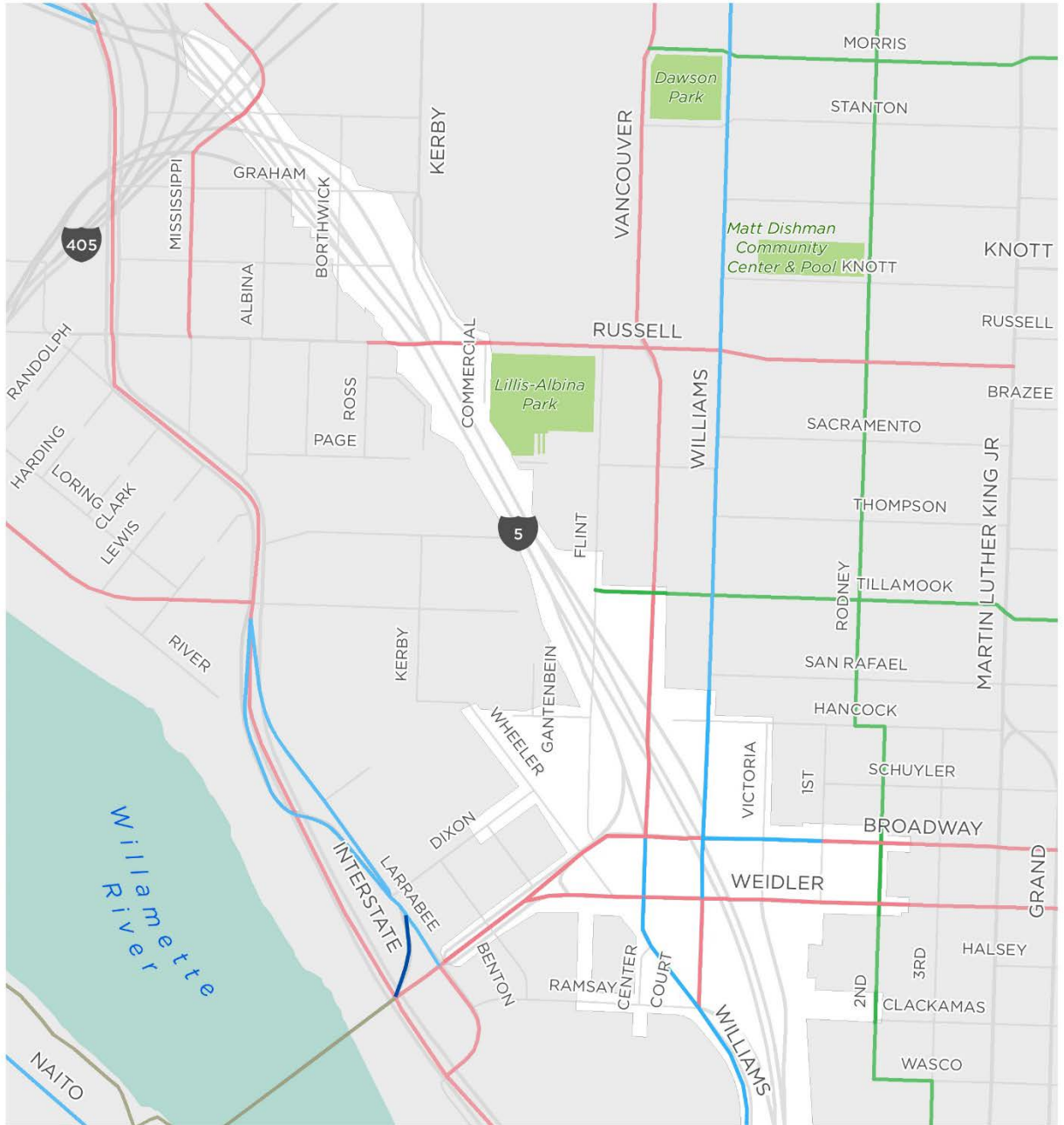


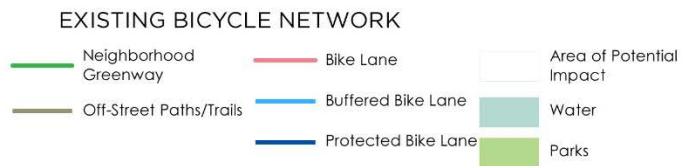
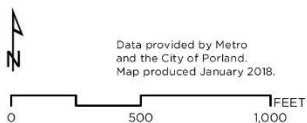


Figure 17. Existing Bicycle Facilities–North



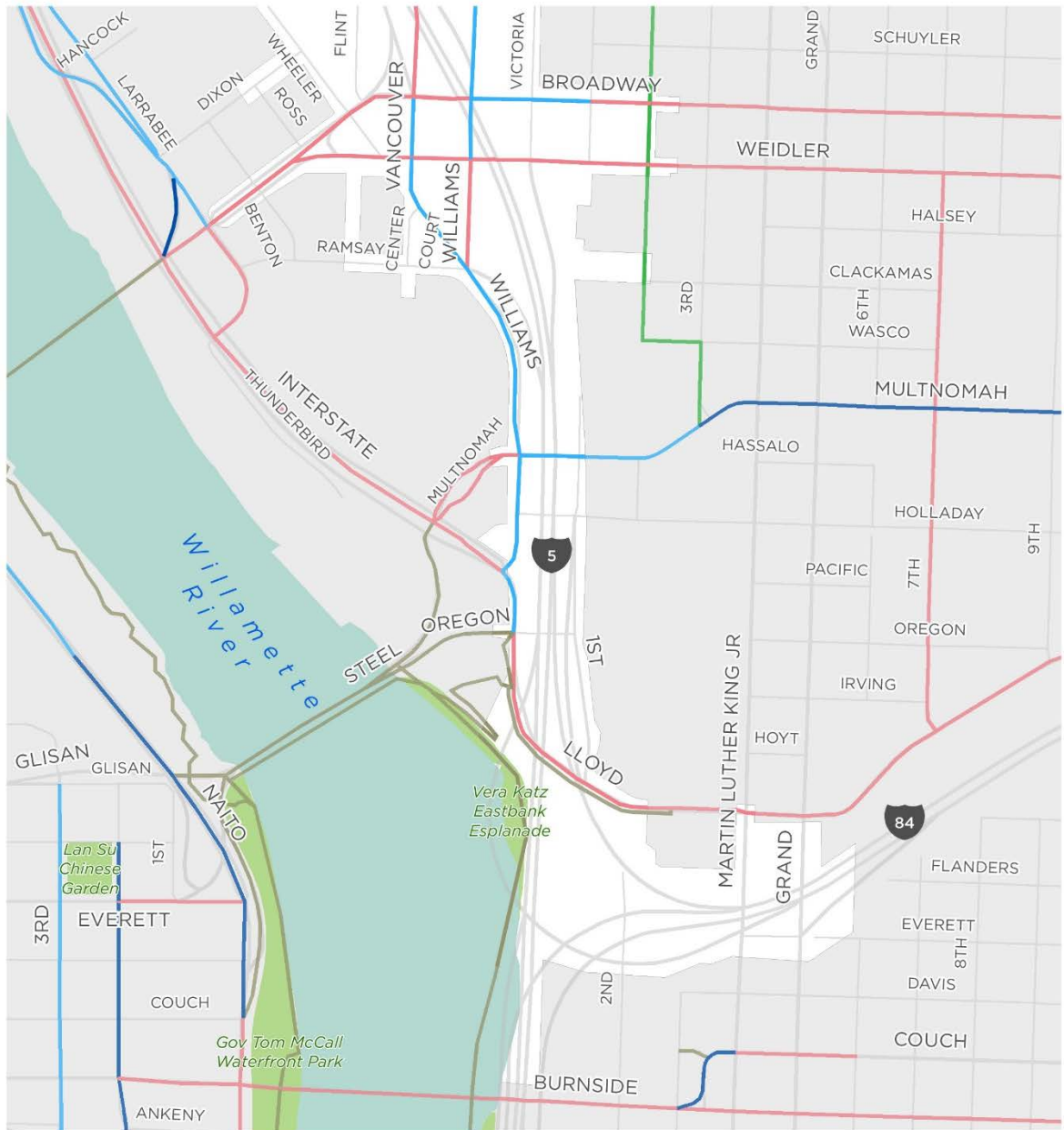
## EXISTING BICYCLE FACILITIES - NORTH

### I-5/ROSE QUARTER IMPROVEMENT PROJECT



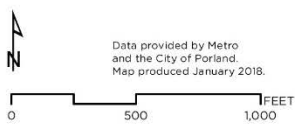


**Figure 18. Existing Bicycle Facilities—South**



**EXISTING BICYCLE FACILITIES - SOUTH**

**I-5/ROSE QUARTER  
 IMPROVEMENT PROJECT**



Data provided by Metro  
 and the City of Portland.  
 Map produced January 2018.

**EXISTING BICYCLE NETWORK**

- Neighborhood Greenway
- Bike Lane
- Buffered Bike Lane
- Protected Bike Lane
- Off-Street Paths/Trails
- Area of Potential Impact
- Water
- Parks

## 5.2.2 Intersections

Tables 4 through 16 illustrate and summarize existing bicycle and pedestrian crossing provisions at the study intersections. While most intersections include conventional traffic control (e.g., signals, stop signs) and pavement markings, several intersections include additional infrastructure to address operating characteristics:

- Bike lane markings extending through the intersection, to both guide bicyclists through the intersection, and to raise awareness of motor vehicle/bicycle conflict points
- Colored bike lanes
- Bike boxes
- Two-stage left turn boxes
- Bicycle-only signals (e.g. Broadway and Victoria, Broadway and Williams, and Vancouver and Ramsay).
- Bicycle loop detection and/or push buttons

Challenging intersection conditions include the following:

- Double turn lanes (e.g., Broadway at Williams)
- Slip lanes (e.g., I-5 NB off-ramp at NE Weidler)

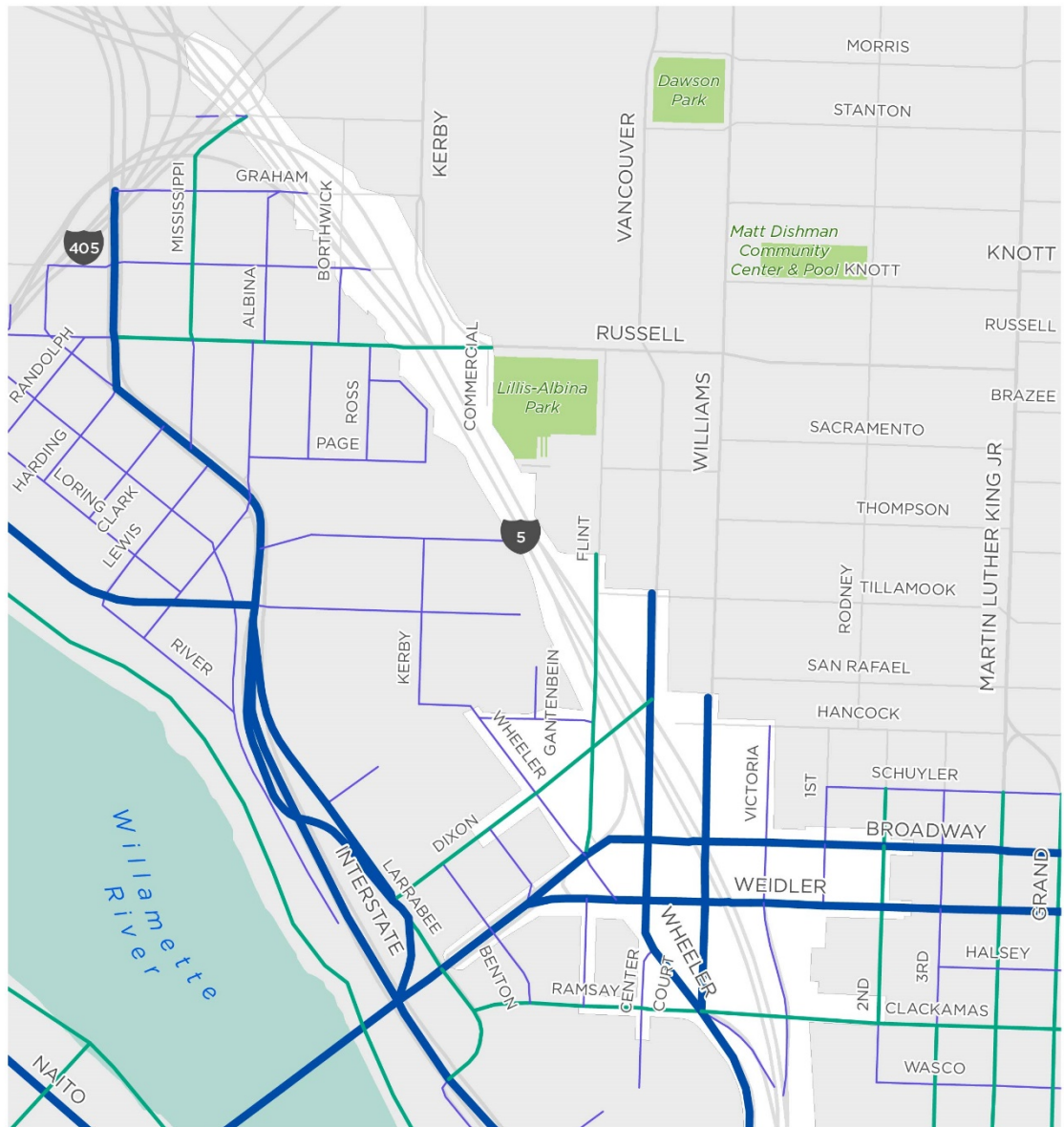
## 5.3 Bikeshare Stations

Portland's BIKETOWN bikeshare system includes one station within the API, located at the intersection of N Williams (formerly NE Wheeler) and Multnomah. The station has an 18-bike capacity.

## 5.4 Bicycle Planning Designations

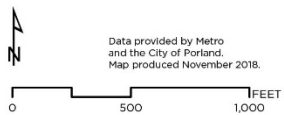
Portland's Central City 2035 Plan and 2018 TSP assign a bicycle classification to all streets within the API. The existing TSP classifications are shown in Figures 19 and 20. Major City Bikeways "form the backbone of the city's bikeway network and are intended to serve high volumes of bicycle traffic and provide direct, seamless, efficient travel across and between transportation districts" (City of Portland 2018). Major City Bikeways "should be designed to accommodate large volumes of bicyclists, to maximize their comfort and to minimize delays by emphasizing the movement of bicycles" (City of Portland 2018).

Figure 19. TSP Bike Street Classifications–North



**TSP BIKE STREET CLASSIFICATIONS- NORTH**

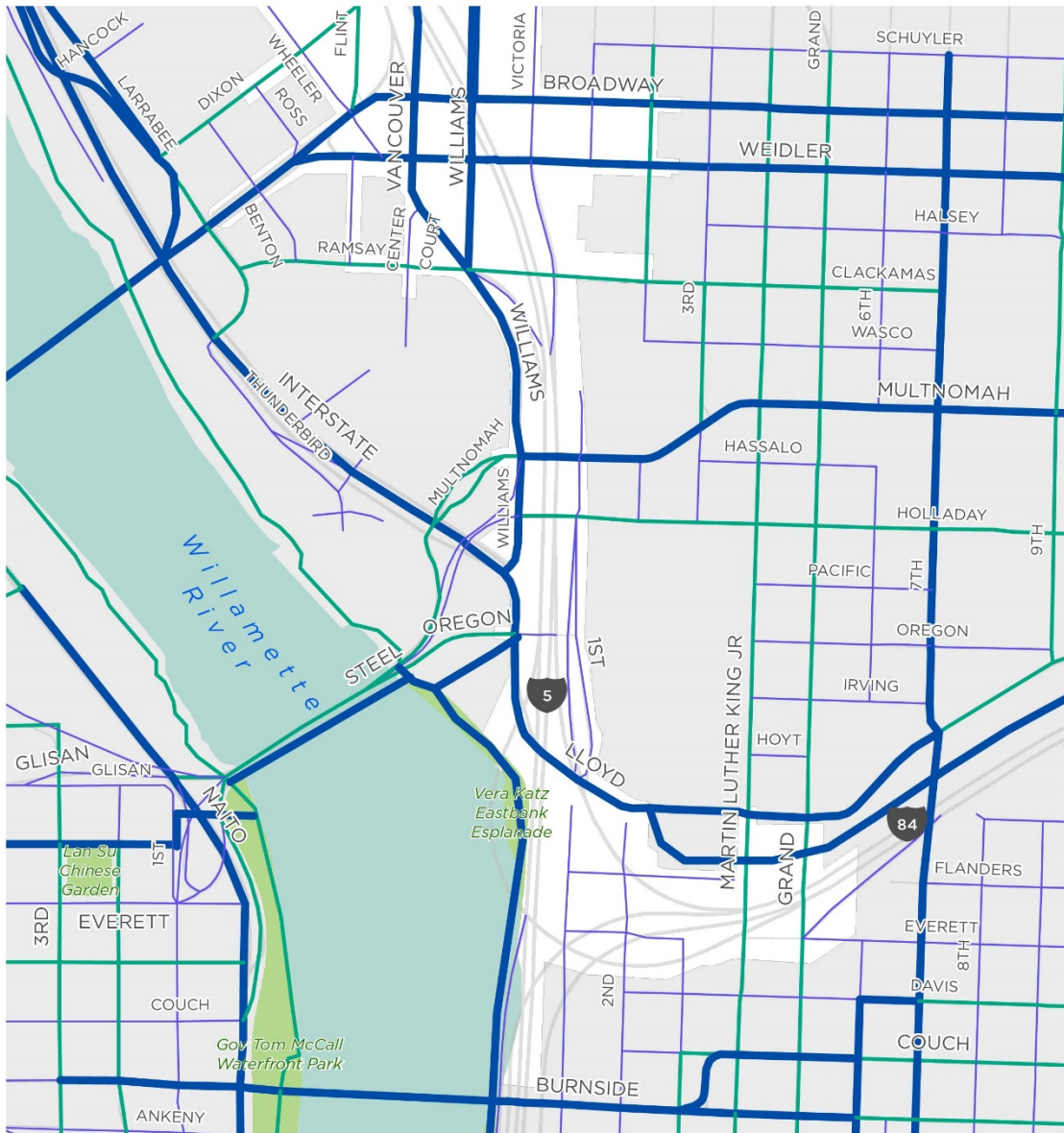
**I-5/ROSE QUARTER  
IMPROVEMENT PROJECT**



**LEGEND**

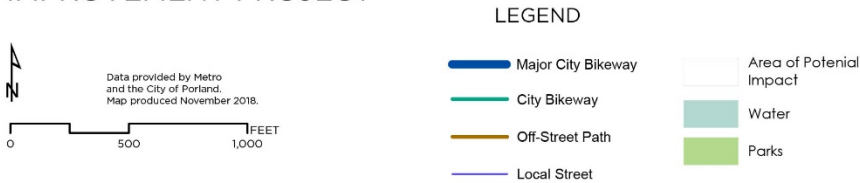
- Major City Bikeway
- City Bikeway
- Off-Street Path
- Local Street
- Area of Potential Impact
- Water
- Parks

Figure 20. TSP Bike Street Classifications–South



**TSP BIKE STREET CLASSIFICATIONS- SOUTH**

**I-5/ROSE QUARTER IMPROVEMENT PROJECT**





City Bikeways “are intended to establish direct and convenient bicycle access to significant destinations, to provide convenient access to Major City Bikeways and to provide coverage within three city blocks of any given point” (City of Portland 2018). In addition to the existing City Bikeways, the Clackamas bicycle and pedestrian bridge and future Hancock/Dixon connector are designated City Bikeways. Local Service Bikeways “are intended to serve local circulation needs for bicyclists and provide access to adjacent properties” (City of Portland 2018).

The TSP and Central City 2035 Plan also designate much of Lloyd as a “Bicycle District.” The TSP defines such districts as areas with “a dense concentration of commercial, cultural, institutional and/or recreational destinations where the City intends to make bicycle travel more attractive than driving. High density and mixed-use neighborhoods should be targeted as bicycle districts. Auto-oriented development should be discouraged in Bicycle Districts” (City of Portland 2018). The Bicycle District designation encompasses the API’s entirety except for the portion south of I-84 and north of N/NE Broadway.

## 5.5 Pedestrian and Bicycle Level of Traffic Stress Analysis

Pedestrian LTS analysis was conducted for the 13 “Build Area” intersections to assess existing conditions (one of the 14 “Build Area” intersections does not exist and is only evaluated in the Build Scenario). As shown in Table 17, seven of these study intersections exhibit characteristics that exceed the tolerable stress level (LTS 2) for people walking. Most of these intersections exist along the N/NE Broadway corridor. Conditions contributing to perceived higher stress generally include longer crossing distances, double turn lanes, and prohibited crossings (in some locations).

Bicycle LTS analysis was conducted for the 13 “Build Area” intersections to assess existing conditions (one of the 14 “Build Area” intersections does not exist and is only evaluated in the Build Scenario). All API intersections currently operate at LTS 1, with conditions generally favorable to a broader bicycling population. The presence of signalized traffic control results in scores of LTS 1 for each intersection. It should be noted that characteristics vary at each intersection, and other factors (e.g., intersection complexity) could further influence a user’s perception of safety and comfort. These considerations are addressed further in the Local Street Multimodal Risk/Safety Assessment included in the *Transportation Safety Technical Report* (ODOT 2019c).



**Table 17. Existing Intersection-Level Pedestrian and Bicycle LTS Results**

Intersection	Pedestrian LTS Score	Bicycle LTS Score
N Broadway & N Benton	3	1
N Broadway & N Larrabee	3	1
N Broadway & N Vancouver	3	1
N Weidler & N Vancouver	1	1
NNE Broadway & N Williams	3	1
NNE Weidler & N Williams	1	1
N Williams & NNE Hancock	3	1
N Hancock & N Flint	3	1
NE Broadway & NE 2nd	1	1
NE Weidler & NE 2nd	1	1
NE Broadway & NE Victoria	1	1
NE Weidler & NE Victoria	2	1
N Wheeler/N Ramsay/N Williams (formerly NE Wheeler)	3	1

Source: ODOT, Winter 2018.

Notes: LTS = Level of Traffic Stress

## 6 Environmental Consequences

This section discusses the anticipated beneficial and adverse impacts of the Project with regard to active transportation for 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

The purpose of this section is to describe and disclose potential impacts that would result from the No-Build Alternative. Section 7 considers potential measures to mitigate for significant 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. Direct active transportation impacts under the No-Build Alternative, including planned improvements, would include the following:

- Protected bike lanes on N/NE Broadway and N/NE Weidler would substantially increase the degree of separation between bicycles and motor vehicles. The potential for motor vehicle/bicycle conflicts (e.g., “right-hook” collisions) at intersections and driveways would depend on the project’s design.
- Outside of the Broadway/Weidler couplet, intersection conditions (including complexity and deficiencies) would be similar to existing conditions. Depending on location, features contributing to increased complexity would include slip lanes, double turn lanes, broad turning radii, prohibited crossings, and deficient curb ramps.
- The addition of transit boarding islands (waiting areas located on a median) 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.
- Implementation of other reasonably foreseeable future actions within and near the API would provide additional north-south and east-west regional bikeways and walkways. These routes include 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.
- Existing sidewalk gaps, as listed in Table 3, would remain (approximately 3,300 feet in gaps).
- Existing crossing gaps, as displayed in Figures 15 and 16, would remain.

The following subsections describe the results of LTS analysis and route-based conditions assessment for the No-Build Alternative.

### 6.1.1.1 LTS Analysis Results

As shown in Table 18, seven study intersections under the No-Build Alternative would exhibit characteristics exceeding the tolerable stress level (LTS 2) for people walking (see methodology for an explanation of this threshold). Most of these intersections exist along the N/NE Broadway corridor, which is a Major City Walkway. Pedestrians would encounter conditions contributing to perceived higher stress (e.g., longer crossing distances, double turn lanes) in some locations, which is no different than the existing conditions.

**Table 18. Intersection-Level Pedestrian LTS Results, No-Build Alternative**

Intersection	Pedestrian LTS Score	Pedestrian Network Classifications
N Broadway & N Benton	3	Major City Walkway & Local Street
N Broadway & N Larrabee	3	Major City Walkway & Local Street
N Broadway & N Vancouver	3	Major City Walkway & Major City Walkway
N Weidler & N Vancouver	1	Major City Walkway & Major City Walkway
N/NE Broadway & N Williams	3	Major City Walkway & Major City Walkway
N/NE Weidler & N Williams	1	Major City Walkway & Major City Walkway
N Williams & N/NE Hancock	3	Major City Walkway & Local Street
N Hancock & N Flint	3	Local Street & City Walkway
NE Broadway & NE 2nd	1	Major City Walkway & NW
NE Weidler & NE 2nd	1	Major City Walkway & NW
NE Broadway & NE Victoria	1	Major City Walkway & Local Street
NE Weidler & NE Victoria	2	Major City Walkway & Local Street
N Wheeler/N Ramsay & N Williams (formerly NE Wheeler)	3	Major City Walkway, City Walkway, and Major City Walkway

Source: ODOT, Spring 2018.

Notes: LTS = Level of Traffic Stress

According to the Bicycle LTS analysis, all API intersections would operate at LTS 1 under the No-Build Alternative, with conditions generally favorable to a broader bicycling population (Table 19). The presence of signalized traffic control results in scores of LTS 1 for each intersection. It should be noted that characteristics would vary at each intersection, and other factors (e.g., intersection complexity) could further influence a user’s perception of safety and comfort. These considerations are described further in the Local Street Multimodal Risk/Safety Assessment included in the *Transportation Safety Technical Report* (ODOT 2019c).

**Table 19. Intersection-Level Bicycle LTS Results, No-Build Alternative**

Intersection	Bicycle LTS Score	TSP Bike Street Classifications
N Broadway & N Benton	1	Major City Bikeway & Local Street
N Broadway & N Larrabee	1	Major City Bikeway & City Bikeway
N Broadway & N Vancouver	1	Major City Bikeway & Major City Bikeway
N Weidler & N Vancouver	1	Major City Bikeway & Major City Bikeway
NNE Broadway & N Williams	1	Major City Bikeway & Major City Bikeway
NNE Weidler & N Williams	1	Major City Bikeway & Major City Bikeway
N Williams & NNE Hancock	1	Major City Bikeway & N/A
N Hancock & N Flint	1	Local Street & City Bikeway
NE Broadway & NE 2nd	1	Major City Bikeway & City Bikeway
NE Weidler & NE 2nd	1	Major City Bikeway & City Bikeway
NE Broadway & NE Victoria	1	Major City Bikeway & Local Street
NE Weidler & NE Victoria	1	Major City Bikeway & Local Street
N Wheeler/N Ramsay & N Williams (formerly NE Wheeler)	1	Major City Bikeway, City Bikeway, & Major City Bikeway

Source: ODOT, Spring 2018.

Notes: LTS = Level of Traffic Stress

#### 6.1.1.2 Route-Based Conditions Assessment

The Project team assessed conditions along five primary travel routes that traverse the API, as described in Section 4.3.2 and illustrated in Figures 21 and 22. While numerous route options would exist between each origin and destination, the Project team identified the route that would likely be most suitable and attractive to the target design user (e.g., Pedestrian LTS 2, Bicycle LTS 2). Other major routing options are shown in dotted lines.



Table 20 presents a detailed summary of the No-Build Alternative's performance for each primary travel route. In general, with the exception of improvements associated with the reasonably foreseeable future actions, conditions in the No-Build Alternative would generally resemble existing conditions. Key findings are summarized below:

- **Route directness:** Passing through and near the API, most routes would follow a relatively direct path between their origin and destination. However, limited street system connectivity would force pedestrians and bicyclists to follow somewhat circuitous routing on two routes: Broadway Bridge to/from Lloyd, and Steel Bridge to/from the Broadway/Weidler corridor (east of I-5).
- **Intersection quality:** People bicycling along the primary travel routes would encounter generally favorable conditions, as defined by the Bicycle LTS scores at the study intersections through which the routes would pass. Pedestrians would encounter a variety of intersection conditions depending on location. While intersection Pedestrian LTS scores would indicate favorable conditions in most areas, people walking along the Broadway/Weidler corridor would encounter stress levels beyond those deemed acceptable for the target design user.
- **Ramp terminal avoidance:** The number of ramp terminal intersections encountered by people walking and bicycling would generally depend on the route and the user's direction of travel and would range between zero and two crossings. Most primary travel routes would pass through one ramp terminal intersection.
- **Degree of separation from motor vehicle traffic:** Separation between pedestrians and motor vehicle traffic would continue in the form of sidewalks and shared-use paths, depending on location. Protected bike lanes on Broadway and Weidler would increase separation along the corridor. Elsewhere, separation between bicyclists and motor vehicles would vary by location, ranging from no separation (e.g., NE 2nd Avenue Neighborhood Greenway) to delineated separation (e.g., conventional bike lanes or buffered bike lanes).
- **Grades:** People walking and bicycling along the primary travel routes would encounter relatively flat or moderate grades with few excessively steep slopes. Users would not encounter excessive climbing/descending beyond the total elevation difference between each route's origin and destination.

### 6.1.2 Indirect Impacts

Indirect active transportation impacts under the No-Build Alternative would include the following:

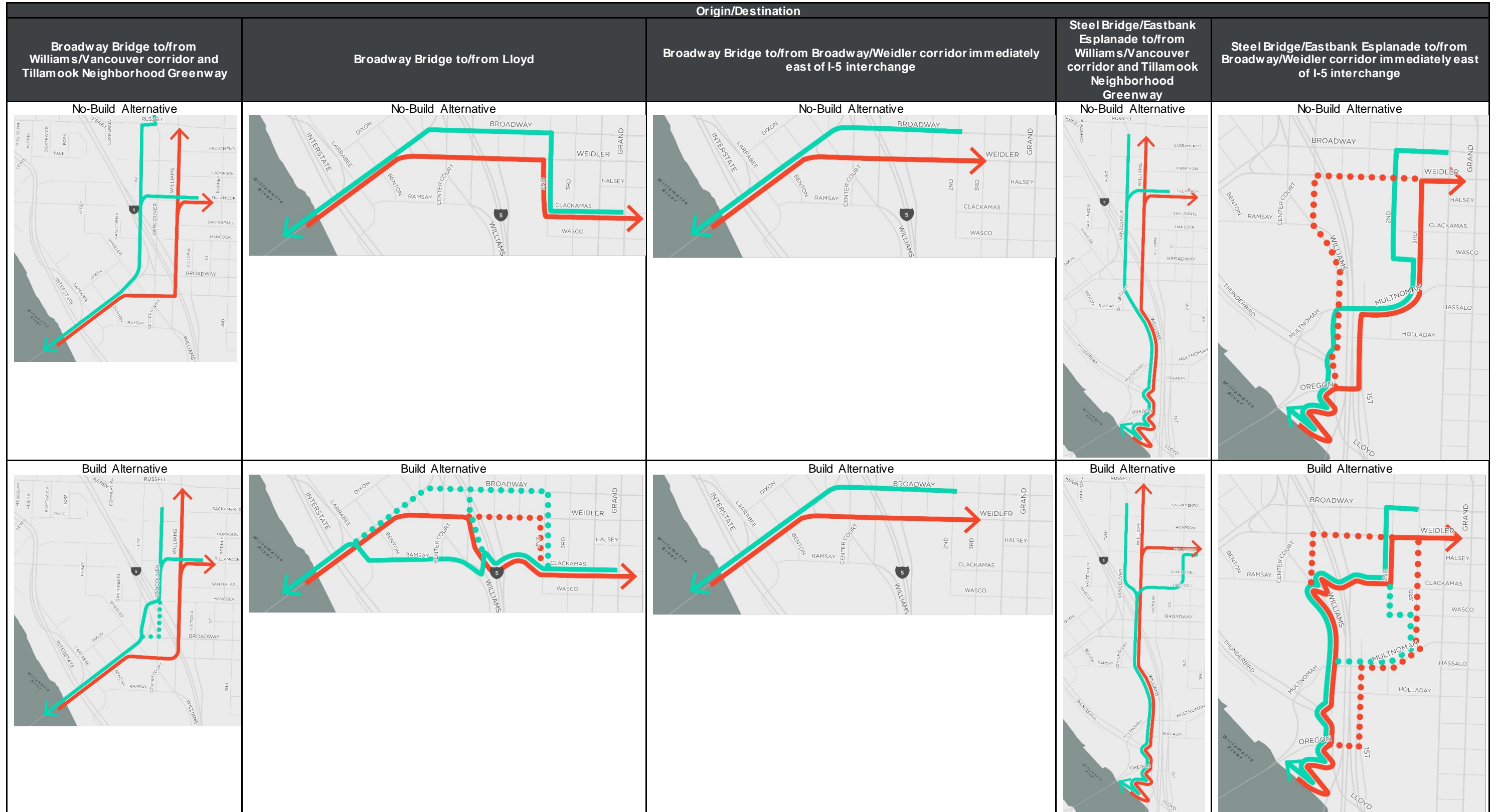
- Protected bike lanes on N/NE Broadway and N/NE Weidler would increase comfort, and potentially safety, for people bicycling. Together, these enhancements could encourage more bicycling, especially for shorter trips.



Figure 21. Primary Pedestrian Travel Routes



Figure 22. Primary Bicycle Travel Routes





**Table 20. Route-Based Conditions Assessment, No-Build Alternative**

Primary Travel Route	Mode	Direction of Travel	Criteria				
			Route Directness	Intersection Quality	Ramp Terminal Avoidance	Separation from Motor Vehicle Traffic	Grades
Broadway Bridge to/from Williams/Vancouver corridor and Tillamook Neighborhood Greenway	Bicycling	Eastbound	Relatively direct route with minimal out-of-direction travel. Length of route = 5,500 feet.	All six study intersections (through which the route passes) yield BLTS scores representing favorable conditions for the target design user	Route passes through one ramp terminal intersection	Physical separation on Broadway and Weidler (protected bike lanes); delineated separation on Williams (buffered bike lane)	Moderate uphill grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between the Broadway Bridge and Williams/Vancouver/Tillamook
		Westbound	Direct route with no out-of-direction travel. Length of route = 5,500 feet.	Both study intersections (through which the route passes) yield BLTS scores representing favorable conditions for the target design user	Route passes through no ramp terminal intersections	Delineated separation on Vancouver (conventional bike lane); no separation on Flint; physical separation on Broadway (protected bike lane)	Moderate downhill grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between Williams/Vancouver/Tillamook and the Broadway Bridge
	Walking	Eastbound	Direct route with no out-of-direction travel. Length of route = 5,540 feet.	Both study intersections (through which the route passes) yield PLTS scores representing less favorable conditions for the target design user	Route passes through no ramp terminal intersections	Physical separation (sidewalks) along street corridors	Moderate uphill grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between the Broadway Bridge and Williams/Vancouver/Tillamook
		Westbound	Direct route with no out-of-direction travel. Length of route = 5,540 feet.	Both study intersections (through which the route passes) yield PLTS scores representing less favorable conditions for the target design user	Route passes through no ramp terminal intersections	Physical separation (sidewalks) along street corridors	Moderate downhill grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between Williams/Vancouver/Tillamook and the Broadway Bridge
Broadway Bridge to/from Lloyd	Bicycling	Eastbound	Relatively indirect route, with some out-of-direction travel necessary (to traverse I-5). Length of route = 3,570 feet.	All six study intersections (through which the route passes) yield BLTS scores representing favorable conditions for the target design user	Route passes through one ramp terminal intersection	Physical separation on Broadway and Weidler (protected bike lanes); no separation on 2nd (neighborhood greenway); no separation on Clackamas	Moderate uphill and downhill grades with no excessively steep slopes; users would encounter minimal additional climbing/descending beyond the total elevation difference between the Broadway Bridge and Lloyd
		Westbound	Relatively indirect route, with some out-of-direction travel necessary (to traverse I-5). Length of route = 3,960 feet.	All seven study intersections (through which the route passes) yield BLTS scores representing favorable conditions for the target design user	Route passes through two ramp terminal intersections	No separation on Clackamas; no separation on 2nd (neighborhood greenway); physical separation on Broadway (protected bike lane)	Moderate uphill and downhill grades with no excessively steep slopes; users would encounter minimal additional climbing/descending beyond the total elevation difference between Lloyd and the Broadway Bridge
	Walking	Eastbound	Relatively indirect route, with some out-of-direction travel necessary (to traverse I-5). Length of route = 3,850 feet.	Two of six study intersections (through which the route passes) yield PLTS scores representing less favorable conditions for the target design user	Route passes through one ramp terminal intersection	Physical separation (sidewalks) along street corridors; sidewalks along Broadway and Weidler may be upgraded in tandem with implementation of planned protected bikeway and crossing enhancements	Moderate uphill and downhill grades with no excessively steep slopes; users would encounter minimal additional climbing/descending beyond the total elevation difference between the Broadway Bridge and Lloyd
		Westbound	Relatively indirect route, with some out-of-direction travel necessary (to traverse I-5). Length of route = 3,850 feet.	Two of six study intersections (through which the route passes) yield PLTS scores representing less favorable conditions for the target design user	Route passes through one ramp terminal intersection	Physical separation (sidewalks) along street corridors; sidewalks along Broadway and Weidler may be upgraded in tandem with implementation of planned protected bikeway and crossing enhancements	Moderate uphill and downhill grades with no excessively steep slopes; users would encounter minimal additional climbing/descending beyond the total elevation difference between Lloyd and the Broadway Bridge
Broadway Bridge to/from Broadway/Weidler corridor immediately east of I-5 interchange	Bicycling	Eastbound	Direct route with no out-of-direction travel. Length of route = 2,800 feet.	All six study intersections (through which the route passes) yield BLTS scores representing favorable conditions for the target design user	Route passes through one ramp terminal intersection	Physical separation on Broadway and Weidler (protected bike lanes)	Moderate uphill and/or relatively flat grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between the Broadway Bridge and the Broadway/Weidler corridor east of I-5
		Westbound	Direct route with no out-of-direction travel. Length of route = 2,920 feet.	All six study intersections (through which the route passes) yield BLTS scores	Route passes through two ramp terminal	Physical separation on Broadway and Weidler (protected bike lanes)	Moderate downhill and/or relatively flat grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation



Primary Travel Route	Mode	Direction of Travel	Criteria					
			Route Directness	Intersection Quality	Ramp Terminal Avoidance	Separation from Motor Vehicle Traffic	Grades	
	Walking			representing favorable conditions for the target design user	intersections		difference between the Broadway/Weidler corridor (east of I-5) and the Broadway Bridge	
		Eastbound	Direct route with no out-of-direction travel. Length of route = 3,060 feet.	Two of six study intersections (through which the route passes) yield PLTS scores representing less favorable conditions for the target design user	Route passes through one ramp terminal intersection	Physical separation (sidewalks) along street corridors; sidewalks along Broadway and Weidler may be upgraded in tandem with implementation of planned protected bikeway and crossing enhancements	Moderate uphill and/or relatively flat grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between the Broadway Bridge and the Broadway/Weidler corridor east of I-5	
	Westbound	Direct route with no out-of-direction travel. Length of route = 3,060 feet.	Two of six study intersections (through which the route passes) yield PLTS scores representing less favorable conditions for the target design user	Route passes through one ramp terminal intersection	Physical separation (sidewalks) along street corridors; sidewalks along Broadway and Weidler may be upgraded in tandem with implementation of planned protected bikeway and crossing enhancements	Moderate downhill and/or relatively flat grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between the Broadway/Weidler corridor (east of I-5) and the Broadway Bridge		
Steel Bridge/Eastbank Esplanade to/from Williams/Vancouver corridor and Tillamook Neighborhood Greenway	Bicycling	Northbound	Direct route with no out-of-direction travel. Length of route = 7,360 feet.	All four study intersections (through which the route passes) yield BLTS scores representing favorable conditions for the target design user	Route passes through two ramp terminal intersections	Physical separation between Esplanade and Williams (formerly Interstate)/Oregon intersection (shared-use path); delineated separation on Interstate and Williams (conventional bike lane on Interstate, bi-directional bike lane through Rose Quarter Transit Center, conventional bike lane and buffered bike lane on Williams)	Moderate uphill and/or relatively flat grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between the Eastbank Esplanade and Williams/Vancouver/Tillamook	
		Southbound	Direct route with no out-of-direction travel. Length of route = 7,740 feet.	All three study intersections (through which the route passes) yield BLTS scores representing favorable conditions for the target design user	Route passes through two ramp terminal intersections	Delineated separation on Vancouver and Wheeler (conventional bike lane on Vancouver north of Broadway, combined bike/bus lane on Vancouver between Broadway and Weidler, buffered bike lane on Vancouver/Wheeler south of Broadway); no separation on Williams (formerly Wheeler [shared lane markings north of Multnomah]; delineated separation on Williams (formerly Wheeler and Interstate [bi-directional bike lane through Rose Quarter Transit Center, conventional bike lane on Williams]); physical separation between Williams (formerly Interstate)/Oregon intersection and Esplanade (shared-use path)	Moderate downhill and/or relatively flat grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between Williams/Vancouver/Tillamook and the Eastbank Esplanade	
	Walking	Northbound	Direct route with no out-of-direction travel. Length of route = 7,000 feet.	Three of four study intersections (through which the route passes) yield PLTS scores representing less favorable conditions for the target design user	Route passes through two ramp terminal intersections	Physical separation between Esplanade and Williams (formerly Interstate)/Oregon intersection (shared use path); physical separation (sidewalks) along street corridors; note: sidewalk gaps would remain on Williams (formerly Wheeler) between Interstate and Holladay and between Multnomah and Ramsay	Moderate uphill and/or relatively flat grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between the Eastbank Esplanade and Williams/Vancouver/Tillamook	
		Southbound	Direct route with no out-of-direction travel. Length of route = 7,000 feet.	Three of four study intersections (through which the route passes) yield PLTS scores representing less favorable conditions for the target design user	Route passes through two ramp terminal intersections	Physical separation (sidewalks) along street corridors; physical separation between Esplanade and Williams (formerly Interstate)/Oregon intersection (shared-use path); note: sidewalk gaps would remain on Williams (formerly Wheeler) between Interstate and Holladay and between Multnomah and Ramsay	Moderate downhill and/or relatively flat grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between Williams/Vancouver/Tillamook and the Eastbank Esplanade	
	Steel Bridge/Eastbank Esplanade to/from Broadway/Weidler corridor immediately east of I-5 interchange	Bicycling	Northbound	Relatively direct route with minimal out-of-direction travel. Length of route = 4,580 feet.	N/A (route does not pass through any study intersections)	Route passes through no ramp terminal intersections	Physical separation between Esplanade and Williams (formerly Interstate)/Oregon intersection (shared-use path); no separation on Oregon (shared lane markings); physical separation on 1st (protected bike lane); delineated separation on Multnomah (buffered bike lane); no separation on 3rd (neighborhood greenway); physical separation on Weidler (protected bike lane)	Moderate uphill and/or relatively flat grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between the Eastbank Esplanade and the Broadway/Weidler corridor east of I-5
			Southbound	Relatively indirect route, with some out-of-direction travel necessary (in order to utilize signalized crossings to traverse Broadway and Weidler). Length of route = 5,370 feet.	Both study intersections (through which the route passes) yield BLTS scores representing favorable conditions for the target design user	Route passes through no ramp terminal intersections	Physical separation on Broadway (protected bike lane); no separation on 2nd, Wasco, and 3rd (neighborhood greenway), delineated separation on Multnomah and Williams (formerly Wheeler and Interstate segments) (buffered bike lanes on Multnomah, bi-directional bike lane through Rose Quarter Transit Center, conventional bike lane on Williams [formerly Interstate]; physical separation between Williams (formerly Interstate)/Oregon intersection and Esplanade (shared-use path)	Moderate downhill, uphill and/or relatively flat grades with no excessively steep slopes; users would encounter minimal additional climbing/descending beyond the total elevation difference between the Broadway/Weidler corridor (east of I-5) and the Eastbank Esplanade
Walking		Northbound	Relatively direct route with minimal out-of-direction travel.	N/A (route does not pass through any study intersections)	Route passes through no ramp terminal intersections	Physical separation between Esplanade and Williams (formerly Interstate)/Oregon intersection (shared-use path); physical	Moderate uphill and/or relatively flat grades with no excessively steep slopes; users would not encounter	

Primary Travel Route	Mode	Direction of Travel	Criteria				
			Route Directness	Intersection Quality	Ramp Terminal Avoidance	Separation from Motor Vehicle Traffic	Grades
			Length of route = 4,530 feet.	intersections)	terminal intersections	separation (sidewalks) along street corridors	excessive climbing/descending beyond the total elevation difference between the Eastbank Esplanade and the Broadway/Weidler corridor east of I-5
		Southbound	Relatively direct route with minimal out-of-direction travel. Length of route = 4,530 feet.	N/A (route does not pass through any study intersections)	Route passes through no ramp terminal intersections	Physical separation (sidewalks) along street corridors; physical separation between Esplanade and Williams (formerly Interstate)/Oregon intersection (shared-use path)	Moderate downhill and/or relatively flat grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between the Broadway/Weidler corridor (east of I-5) and the Eastbank Esplanade

Notes: BLTS = Bicycle Level of Traffic Stress; N/A = Not applicable; PLTS = Pedestrian Level of Traffic Stress

Assessment based on conditions experienced by people walking and bicycling via the "Primary Travel Routes," as illustrated in Figures 21 and 22.





- Outside of the Broadway/Weidler corridor, intersection complexity would generally remain unchanged from existing conditions. Features positively or adversely impacting active transportation would remain. These elements include treatments intended to improve user safety and comfort (e.g., bike boxes, bike signals) and features detracting from the user experience (e.g., slip lanes, broad turning radii, deficient curb ramps). As the level of walking and bicycling grows in the area, these conditions would affect a larger number of people.
- Transit stop enhancements (e.g., transit boarding islands Multnomah) could increase ridership on Line 8-Jackson Park through the provision of a more accessible, comfortable and attractive transit stop environment.
- The reasonably foreseeable future actions within and near the API would create a more robust network for walking and bicycling activity through and near the API.
- The continued presence of sidewalk gaps would diminish pedestrian convenience, comfort, and safety by forcing foot traffic to either cross to the other side of the street to reach a sidewalk or walk within the roadway. These conditions would be especially challenging for persons with disabilities.

## 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. The purpose of this section is to describe and disclose potential impacts that would result from the Build Alternative. Section 7 considers potential measures to mitigate for significant impacts.

### 6.2.1 Short-Term (Construction Impacts)

The *I-5 Rose Quarter Interchange Improvement Project Construction Phasing Concept Plan* (CPC Plan) describes an approximately 4- to 5-year completion schedule (HDR 2017). A detailed Construction Phasing Plan would be developed in conjunction with the Project design work and prior to initiating construction. It generally describes a strategy for phased and coordinated construction of project elements. While the whole project would be completed in 5 years, individual elements of the on-street network would take less time and would not all occur simultaneously. Table 2 of the Concept Plan estimates approximate durations for Major Project Components, including:

- Broadway/Weidler/Williams Cover: 24 months, beginning in early 2023
- Vancouver/Hancock Cover: 24 months, beginning in late 2024
- Clackamas Bicycle and Pedestrian Overcrossing: 24 months, beginning in 2026

Future construction phasing would comply with regulations to maintain access through the construction area. While the CPC Plan does not describe anticipated active transportation issues in detail, the document includes the assumption that a

bicycle/pedestrian Temporary Traffic Control Plan would be developed as the Project progresses into further design stages.

The CPC Plan does not address the following:

- Design details for temporary pedestrian/bicycle facilities (e.g., facility typologies, widths, and signage)
- Details for maintaining pedestrian and bicycle movement throughout the entirety of the Project's construction timeline

The subsections below describe anticipated short-term (construction) impacts for active transportation users. The assessment assumes that construction phasing and activities would follow "Scenario C," as described in the CPC Plan.

#### 6.2.1.1 Broadway/Weidler/Williams Cover Area

Anticipated short-term active transportation impacts in the Broadway/Weidler/Williams cover area are described below. Per the CPC Plan, the Project team assumed that construction activities described below would occur sequentially.

- Demolition of the Williams structure over I-5 would result in a temporary closure of the Broadway/Williams intersection and approaching streets. The exact duration of this closure is not yet known but would likely be less than the 24 months estimated for completion of the Broadway/Weidler/Williams cover. As N/NE Broadway and Williams both function as major walking and bicycling routes, non-motorized users would be required to divert to alternative routes. Depending on user origins/destinations and travel mode (walking versus bicycling), north-south users would potentially need to divert to Victoria, Vancouver, or Flint. East-west users would need to divert to N/NE Weidler, Multnomah, or N/NE Tillamook. Because several of these streets could potentially serve as motor vehicle detour routes (either as part of the Temporary Traffic Control Plan, or unintended diversion), the potential for multimodal conflicts could increase. Bicycle detour options would be limited, given that several streets only accommodate one-way travel, and limited street connectivity could complicate the ability for bicyclists to safely and conveniently access alternative routes.
- Demolition of the Weidler structure over I-5 would not substantially impact pedestrian and bicycle circulation on the N/NE Weidler corridor, as a temporary detour bridge would first be constructed immediately adjacent to the existing structure. However, the proximity of demolition activity to the N/NE Weidler/N Williams intersection would likely result in a closure of Williams in this area. The exact duration of this closure is not yet known. Depending on user origins/destinations and travel mode (walking versus bicycling), north-south users would potentially need to divert to Victoria, Vancouver, or Flint. Bicycle detour options would be limited given that several streets only accommodate one-way travel, and limited street connectivity could complicate the ability for bicyclists to safely and conveniently access alternative routes.

- Demolition of the Broadway structure over I-5 would result in a temporary closure of the Broadway/Williams intersection and approaching streets. The exact duration of this closure is not yet known but would likely be less than the 24 months estimated for completion of the Broadway/Weidler/Williams cover. Pedestrian, bicycle, and motor vehicle traffic on N/NE Broadway would be re-routed onto the newly completed cover's southern portion (in the vicinity of N/NE Weidler). Alternatively, east-west users could potentially divert to Multnomah or N/NE Tillamook. The temporary closure of Williams north of Broadway would also require non-motorized users to divert to Victoria, Vancouver, or Flint. Because several of these streets could also serve as motor vehicle detour routes (either as part of the Temporary Traffic Control Plan, or unintended diversion), there would be potential for increased multimodal conflicts. Bicycle detour options would be limited given that several streets only accommodate one-way travel, and limited street connectivity could complicate the ability of bicyclists to safely and conveniently access alternative routes.

#### 6.2.1.2 Vancouver/Hancock Highway Cover Area

Anticipated short-term impacts in the Vancouver/Hancock highway cover area are described below. Per the CPC Plan, the Project team assumed that construction activities described below would occur sequentially.

- Demolition of the Vancouver structure over I-5 would temporarily eliminate a major bicycling and walking connection between N/NE Portland and the city's central core. Depending on user origins/destinations and travel mode (walking versus bicycling), north-south active transportation users would need to divert to Flint or Williams. Detour options for SB bicyclists would be limited given that Williams only accommodates one-way (NB) travel. It should also be noted that Flint would serve as a formalized motor vehicle detour route. Increased vehicle traffic volumes, combined with the lack of separated bicycle facilities on Flint, could increase multimodal conflict potential on this corridor.
- Demolition of the Flint structure over I-5 would likely be included in the final phase of construction. The elimination of the Flint structure would temporarily remove a connection for bicyclists and pedestrians traveling from the north via N Flint Avenue and from the east via N/NE Tillamook Street destined to central Portland via the Broadway Bridge. During construction, these WB trips would travel SB on N Vancouver Avenue and use the planned bike box at N Vancouver and N Broadway to safely turn right onto Broadway WB across the SB off-ramp from I-5. The bike box is a project element of the I-5 Rose Quarter Improvement Project which would be constructed prior to the demolition of the N Flint overcrossing. N Flint is used primarily as a SB to WB route, and NB trips from central Portland to N/NE Portland typically use N Williams Avenue. Following Project completion, SB bicycle and pedestrian trips that formerly used N Flint could either continue to use the N Vancouver at N Broadway bike box to safely cross the highway off-ramp or choose to access N Broadway WB via the new Hancock/Dixon overcrossing and connect to N Broadway via N Ross Avenue or

N Benton Avenue. N Flint is a relatively wide street with light motor vehicle traffic. PM peak hour (5:00 to 6:00 PM) traffic counts in 2016 on N Flint showed 170 SB and 130 NB vehicles at N Hancock with bicycle counts of 27 SB and 14 NB. Most of these vehicle and bicycle trips are likely to temporarily move to N Vancouver during demolition of the N Flint overcrossing and the completion of the Hancock/Dixon connection.

#### 6.2.1.3 Moda Center and Clackamas Bicycle and Pedestrian Bridge

Anticipated short-term impacts within the Moda Center and Clackamas bicycle and pedestrian bridge areas are described below.

- The magnitude of active transportation impacts in the Moda Center area would depend on the scale and duration of construction activities (and any associated closures) on Williams, Vancouver, Wheeler, and Ramsay. As the Williams and N Wheeler/Vancouver Avenue corridors serve as major active north-south transportation routes, street closures would require pedestrians and bicyclists to divert to NE 2nd or Interstate (pedestrians would also have the option using N Center Court). Closures of Ramsay would require non-motorized users to divert to the Broadway/Weidler corridor. Because the Broadway/Weidler corridor improvements would be complete prior to construction activities in the Moda Center area, pedestrians and bicyclists would encounter few or no construction activities along the detour route.
- Short-term impacts associated with the Clackamas bicycle and pedestrian bridge would likely concentrate in the vicinity of the bridge's endpoints, namely Williams between Ramsay and N/NE Weidler and the area in the vicinity of the NE 2nd/NE Clackamas intersection. As Williams and NE 2nd are major bikeways, riders could encounter delays and/or detours depending on the nature of construction activities. Detour options for bicyclists would be limited given that several streets only accommodate one-way travel, and limited street connectivity could complicate the ability of bicyclists to safely and conveniently access alternative routes. Pedestrian impacts would be less substantial given the presence of multiple alternative routing options with complete sidewalk networks and crossing provisions.

#### 6.2.1.4 Other Areas

Modifications to the off-ramp linking I-5 SB with I-84 EB would likely result in temporary closures of the Eastbank Esplanade, due to the Esplanade's location directly beneath the ramp structure. Given the Esplanade's limited access points and lack of nearby parallel routes, temporary closures would require people walking and bicycling to divert substantially out of direction, either to the Willamette River's west side, or to local streets within Lloyd and Central Eastside Industrial District. The lack of formalized and lower-stress alternatives within proximity of the Esplanade may present comfort and safety issues for non-motorized users.

## 6.2.2 Long-Term and Operational Direct Impacts

Direct active transportation impacts under the Build Alternative would include the following:

- Similar to the No-Build Alternative, implementation of other reasonably foreseeable future actions within and near the API would provide additional north-south and east-west regional bikeways and walkways. These routes include 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.
- Similar to the No-Build Alternative, protected bike lanes on N/NE Broadway and N/NE Weidler would substantially increase the degree of separation between bicycles and motor vehicles. The potential for motor vehicle/bicycle conflicts (e.g., "right-hook" collisions) at intersections and driveways would depend on the Project's design.
- Pedestrian crossing enhancements on N/NE Broadway and N/NE Weidler would improve conditions for people with disabilities, particularly through curb ramp upgrades.
- Similar to the No-Build Alternative, crossing gaps (including on Major City Walkways) would remain.
- Physical separation between motorized and non-motorized users would increase compared to the No-Build Alternative along additional corridors, including N Wheeler/N Williams (formerly NE Wheeler) (shared-use path) and N Williams (bi-directional protected bike lane). The Clackamas bicycle and pedestrian bridge would establish a new connection not otherwise offered by the street system.
- Sidewalks, crossings, and other active transportation infrastructure along new or reconstructed streets would be built (or rebuilt) according to the design standards of the applicable agency. 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.
- Despite the multimodal enhancements throughout the API, pedestrians and bicyclists would continue to encounter complex intersection geometry at and near ramp termini. Challenging crossing conditions would include double turn lanes, broad turning radii, prohibited crossings, left-side bike lanes transitioning to right-side bike lanes, and major bicycle movements requiring two-stage crossings of a single intersection.
- Existing sidewalk gaps along portions of N Wheeler and N Williams (formerly NE Wheeler segment) would be filled (approximately 800 feet). Other existing gaps, as listed in Section 5.1.1, would remain (approximately 2,600 feet)



- Removal of the Flint overcrossing structure would remove an existing north-south bicycle connection. However, the Hancock/Dixon connection, along with the associated multi-use path, would replace this link. The new roadway connection via Hancock/Dixon would follow substantially steeper grades compared with the existing Flint structure, however, the new multi-use path would be designed to be ADA compliant. The new facilities and the option to turn right onto Broadway from N Vancouver would be another replacement route option for people biking.
- The Hancock/Dixon connector would establish a new multimodal link traversing I-5. While this new connection would enhance bicycle/pedestrian connectivity, the street's relatively steep grade could limit its utility, particularly for less-confident bicyclists and for people with disabilities.
- The Clackamas bicycle and pedestrian bridge would establish a new and direct active transportation link between Lloyd and Moda Center, while providing an additional low-stress option for crossing I-5.
- The addition of transit boarding islands on NNE Broadway and NNE Weidler 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.
- Compared with the No-Build Alternative, additional bicycle and pedestrian routes would be available for many trips. Some of these new and additional routes would involve additional uphill and downhill grades when compared to existing routes. This is particularly true for the Hancock/Dixon connection.

#### 6.2.2.1 LTS Analysis Results

As shown in Table 21, five study intersections under the Build Alternative would exhibit characteristics exceeding the tolerable stress level (LTS 2) for people walking (see methodology for an explanation of this threshold). Similar to the No-Build Alternative, most intersections with higher-stress conditions would be concentrated along the NNE Broadway corridor, with major contributing factors including longer crossing distances and double turn lanes, depending on location. Under the Build Alternative, Pedestrian LTS scores would improve at three intersections (N Williams at NNE Hancock, N Hancock at N Flint, N Wheeler/N Williams [formerly NE Wheeler] at N Ramsey). The addition of signalized intersection control would improve crossing conditions at the intersections along NNE Hancock.

The removal of the I-5 SB entrance ramp would improve conditions at N Wheeler/N Williams (formerly NE Wheeler) at N Ramsay. Simultaneously, the Pedestrian LTS score at the intersection of NNE Weidler and N Williams is anticipated to degrade, primarily due to the addition of the I-5 SB entrance ramp at this location, coupled with skewed crossings on several intersection legs. The two intersections impacted by the I-5 SB entrance ramp change are located at the intersection of two Major City Walkways. Overall fewer intersections under the Build Alternative would exceed Pedestrian LTS 2 compared with the No-Build Alternative.

**Table 21. Intersection-Level Pedestrian LTS Results, Build Alternative**

Intersection	No Build Pedestrian LTS Score	Build Pedestrian LTS Score	Pedestrian Network Classifications
N Broadway & N Benton	3	3	Major City Walkway & Local Street
N Broadway & N Larrabee	3	3	Major City Walkway & Local Street
N Broadway & N Vancouver	3	3	Major City Walkway & Major City Walkway
N Weidler & N Vancouver	1	1	Major City Walkway & Major City Walkway
NNE Broadway & N Williams	3	3	Major City Walkway & Major City Walkway
NNE Weidler & N Williams	1	3	Major City Walkway & Major City Walkway
N Williams & NNE Hancock	3	1	Major City Walkway & Local Street
N Vancouver & N Hancock	NA	1	Major City Walkway & Neighborhood Walkway
N Hancock & N Flint	3	1	Local Street & City Walkway
NE Broadway & NE 2nd	1	1	Major City Walkway & NW
NE Weidler & NE 2nd	1	1	Major City Walkway & NW
NE Broadway & NE Victoria	1	1	Major City Walkway & Local Street
NE Weidler & NE Victoria	2	1	Major City Walkway & Local Street
N Wheeler/N Williams (formerly NE Wheeler) & N Ramsay Way	3	1	Major City Walkway, City Walkway, and Major City Walkway

Source: ODOT, Spring 2018.

Notes: LTS = Level of Traffic Stress

Similar to the No-Build Alternative, all API intersections would operate at Bicycle LTS 1 under the Build Alternative, with conditions generally favorable to a broader bicycling population (Table 22). The presence of signalized traffic control represents a major contributing factor. It should be noted that characteristics would vary at each intersection, and other factors (e.g., intersection complexity) could further influence a user's perception of safety and comfort. See the Local Street Multimodal Risk/Safety Assessment in the *Transportation Safety Technical Report* (ODOT 2019c) for further details.

**Table 22. Intersection-Level Bicycle LTS Results, Build Alternative**

Intersection	No Build Bicycle LTS Score	Build Bicycle LTS Score	TSP Bike Street Classifications
N Broadway & N Benton	1	1	Major City Bikeway & Local Street
N Broadway & N Larrabee	1	1	Major City Bikeway & City Bikeway
N Broadway & N Vancouver	1	1	Major City Bikeway & Major City Bikeway
N Weidler & N Vancouver	1	1	Major City Bikeway & Major City Bikeway
NNE Broadway & N Williams	1	1	Major City Bikeway & Major City Bikeway
NNE Weidler & N Williams	1	1	Major City Bikeway & Major City Bikeway
N Williams & NNE Hancock	1	1	Major City Bikeway & N/A
N Vancouver & N Hancock	NA	1	Major City Walkway & Neighborhood Walkway
N Hancock & N Flint	1	1	Local Street & City Bikeway
NE Broadway & NE 2nd	1	1	Major City Bikeway & City Bikeway
NE Weidler & NE 2nd	1	1	Major City Bikeway & City Bikeway
NE Broadway & NE Victoria	1	1	Major City Bikeway & Local Street
NE Weidler & NE Victoria	1	1	Major City Bikeway & Local Street
N Wheeler/N Williams (formerly NE Wheeler) & N Ramsay Way	1	1	Major City Bikeway, City Bikeway, & Major City Bikeway

Source: ODOT, Spring 2018.

Notes: LTS = Level of Traffic Stress; TSP = transportation system plan

### 6.2.2.2 Route-Based Conditions Assessment

Similar to the No-Build Alternative, the route-based conditions assessment qualitatively evaluated bicycling and walking conditions at a broader, corridor-level scale. The Project team assessed conditions along five primary travel routes traversing the API, linking the same origin/destination pairs described in the No-Build Alternative. As shown in Figures 21 and 22, pedestrian and bicycle routing would change in several locations due to revisions in the local street system. Using the same criteria described for the No-Build Alternative, the Project team assessed each route, in each direction, for both walking and bicycling. While numerous route options would exist between each origin and destination, the Project team identified the route

that would likely be most suitable and attractive to the target design user (e.g., Pedestrian LTS 2, Bicycle LTS 2) in the Build Alternative. Other major routing options are shown in dotted lines.

Table 23 presents a detailed summary of the Build Alternative's performance for each primary travel route, including color-coded cells denoting its performance relative to the primary route in the No-Build Alternative. Green cells denote improvement compared to the No-Build Alternative, while red cells show degradation compared to the No-Build Alternative. Darker colors represent more substantial differences, while lighter colors represent more minimal differences. Grey cells highlight cases where the Build and No-Build Alternatives have similar impacts. Key findings are summarized below:

- **Route directness:** Similar to the No-Build Alternative, most of the primary travel routes would follow a relatively direct path between their origin and destination. While network changes would streamline routes in some areas, route directness would be reduced in other areas. The Clackamas bicycle and pedestrian bridge would improve route directness between the Broadway Bridge and Lloyd for pedestrians and bicyclists alike but decrease the route directness for pedestrians using the bridge to access the Broadway/Weidler corridor.
- **Intersection quality:** Similar to the No-Build Alternative, people bicycling along the primary travel routes would encounter generally favorable conditions, as defined by the Bicycle LTS scores at the study intersections through which the routes would pass. Overall conditions for people walking along the primary travel routes would also be similar to the No-Build Alternative, with the exception of slightly improved intersection quality along routes between the Broadway Bridge and Lloyd, between the Broadway Bridge and Broadway/Weidler corridor east of I-5, and between the Steel Bridge and N Williams/N Vancouver corridor. These improvements would be attributable to both physical enhancements and a shift in travel patterns resulting from new pedestrian connections.
- **Ramp terminal avoidance:** The number of ramp terminal intersections encountered by people walking and bicycling would generally depend on the route and the user's direction of travel and would range between zero and two crossings. While conditions would be generally similar to the No-Build Alternative, conditions would improve for people walking and bicycling between the Broadway Bridge, Lloyd, and the Broadway/Weidler corridor east of I-5 (as the Clackamas bicycle and pedestrian bridge would provide opportunities to avoid ramp terminal intersections altogether). People walking and biking on N Williams would no longer have to cross a ramp terminal. EB bicyclists en route from the Broadway Bridge to Williams would pass through two ramp terminal intersections at Vancouver and at Williams (as opposed to one ramp terminal at Vancouver in the No-Build Alternative). The two intersections impacted by the I-5 SB entrance ramp change (current and future) are both located at the intersections of two Major City Walkways and Major City Bikeways.





**Table 23. Route-Based Conditions Assessment, Build Alternative**

Primary Travel Route	Mode	Direction of Travel	Criteria*						
			Route Directness	Intersection Quality	Ramp Terminal Avoidance	Separation from Motor Vehicle Traffic	Grades	Bicycle Delay	
Broadway Bridge to/from Williams/Vancouver corridor and Tillamook Neighborhood Greenway	Bicycling	Eastbound	Length of route = 5,500 feet. No change from the primary No-Build Route. (=)	All six study intersections (through which the route passes) yield BLTS scores representing favorable conditions for the target design user (=)	Route passes through two ramp terminal intersections (Williams/Broadway and Williams/Weidler) (-)	Physical separation on Broadway and Weidler (protected bike lanes); physical separation on Williams (36-foot multi-use path between Weidler and Broadway, bi-directional protected bike lane between Broadway and Hancock); delineated separation on Williams (buffered bike lane north of Hancock) (++)	Moderate uphill grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between the Broadway Bridge and Williams/Vancouver/Tillamook; however, users would encounter a grade increase from about 1% to 4% for approximately 100 feet on Weidler (due to the cover's increased height) An approximately 150-foot segment of Weidler would have a less steep slope, reduced from 1-2% to about 0% to -1% (downgrade). (-)	No change (=)	
		Westbound	Length of route = 5,300 feet. Difference of -200 feet from the primary No-Build Route. (+)	All four study intersections (through which the route passes) yield BLTS scores representing favorable conditions for the target design user (=)	Route passes through no ramp terminal intersections (=)	Delineated separation on Vancouver (buffered bike lane); physical separation on Hancock/Dixon multi-use path; physical separation on Broadway (protected bike lane) (+)	Moderate downhill grades and a relatively steep downhill slope of approximately 5% on Hancock/Dixon multi-use path; users would not encounter excessive climbing/descending beyond the total elevation difference between Williams/Vancouver/Tillamook and the Broadway Bridge (--)	The route passes through the following additional signalized intersection, compared to the No-Build route: • Hancock and Vancouver (-)	
	Walking	Eastbound	Length of route = 5,500 feet. Difference of -40 feet from the primary No-Build Route. (=)	Three of five study intersections (through which the route passes) yield PLTS scores representing less favorable conditions for the target design user (=)	Route passes through two ramp terminal intersections (Williams/Broadway and Vancouver/Broadway) (-)	Physical separation (sidewalks) along street corridors (=)	Users would not encounter excessive climbing/descending beyond the total elevation difference between the Broadway Bridge and Williams/Vancouver/Tillamook (=)	N/A (criterion does not apply) (=)	
		Westbound	Length of route = 5,500 feet. Difference of -40 feet from the primary No-Build Route. (=)	Two of five study intersections (through which the route passes) yield PLTS scores representing less favorable conditions for the target design user (=)	Route passes through no ramp terminal intersections (=)	Physical separation (sidewalks) along street corridors and Hancock/Dixon multi-use path (=)	Moderate downhill grades, and a relatively steep downhill slope of approximately 5% on Hancock/Dixon multi-use path; users would not encounter excessive climbing/descending beyond the total elevation difference between Williams/Vancouver/Tillamook and the Broadway Bridge (--)	N/A (criterion does not apply) (=)	
	Broadway Bridge to/from Lloyd	Bicycling	Eastbound	Length of route = 3,550 feet. Difference of -20 feet from the primary No-Build Route. (=)	All four study intersections (through which the route passes) yield BLTS scores representing favorable conditions for the target design user (=)	Route passes through one ramp terminal intersection (=)	Physical separation on Broadway and Weidler (protected bike lanes); physical separation (Clackamas bicycle and pedestrian bridge) between Williams and 2nd; no separation on Clackamas (++)	Moderate uphill and downhill grades with no excessively steep slopes; in order to access the Clackamas bicycle and pedestrian bridge, users would encounter some additional climbing/descending of 5% or less (beyond the total elevation difference between the Broadway Bridge and Lloyd) (-)	The route would no longer have to pass through the following two signalized intersections: • Weidler and Victoria • Weidler and 2nd (++)
			Westbound	Length of route = 3,400 feet. Difference of -560 feet from the primary No-Build Route. (++)	Both study intersections (through which the route passes) yield BLTS scores representing favorable conditions for the target design user (=)	Route passes through no ramp terminal intersections (++)	No separation on Clackamas; physical separation (Clackamas bicycle and pedestrian bridge) between 2nd and Wheeler; no separation on Ramsay; delineated separation on Larrabee (conventional bike lane); physical separation on Broadway (protected bike lane) (=)	Moderate uphill and downhill grades with no excessively steep slopes; in order to access the Clackamas bicycle and pedestrian bridge, users would encounter some additional climbing/descending of 5% or less (beyond the total elevation difference between Lloyd and Broadway Bridge) (-)	The route would pass through three signalized intersections compared to four in the No-Build route (++)
Walking		Eastbound	Length of route = 3,650 feet. Difference of -200 feet from the primary No-Build Route. (+)	One of two study intersections (through which the route passes) yield PLTS scores representing less favorable conditions for the target design user (+)	Route passes through no ramp terminal intersections (++)	Physical separation (sidewalks) along street corridors; physical separation (Clackamas bicycle and pedestrian bridge) between Wheeler and 2nd (+++)	Moderate uphill and downhill grades with no excessively steep slopes; in order to access the Clackamas bicycle and pedestrian bridge, users would encounter some additional climbing/descending of 5% or less (beyond the total elevation difference between the Broadway Bridge and Lloyd) (-)	N/A (criterion does not apply) (=)	



Primary Travel Route	Mode	Direction of Travel	Criteria*					Bicycle Delay
			Route Directness	Intersection Quality	Ramp Terminal Avoidance	Separation from Motor Vehicle Traffic	Grades	
		Westbound	Length of route = 3,650 feet. Difference of -200 feet from the primary No-Build Route. (+)	One of two study intersections (through which the route passes) yield PLTS scores representing less favorable conditions for the target design user (+)	Route passes through no ramp terminal intersections (++)	Physical separation (sidewalks) along street corridors; physical separation (Clackamas bicycle and pedestrian bridge) between 2nd and Wheeler (+++)	Moderate uphill and downhill grades with no excessively steep slopes; to access the Clackamas bicycle and pedestrian bridge, users would encounter some additional climbing/descending of 5% or less (beyond the total elevation difference between Lloyd and Broadway Bridge) (-)	N/A (criterion does not apply) (=)
Broadway Bridge to/from Broadway/Weidler corridor immediately east of I-5 interchange	Bicycling	Eastbound	Length of route = 2,800 feet. No change from the primary No-Build Route. (=)	All six study intersections (through which the route passes) yield BLTS scores representing favorable conditions for the target design user (=)	Route passes through one ramp terminal intersection (=)	Physical separation on Broadway and Weidler (protected bike lanes) (=)	Moderate uphill and/or relatively flat grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between the Broadway Bridge and the Broadway/Weidler corridor east of I-5; however, users would encounter a grade increase from about 1% to 4% for approximately 100 feet on Weidler (due to the cover's increased height). An approximately 150-foot segment of Weidler would have a less steep slope, reduced from 1-2% to about 0% to -1% (downgrade). (-)	No change (=)
		Westbound	Length of route = 2,920 feet. No change from the primary No-Build Route. (=)	All six study intersections (through which the route passes) yield BLTS scores representing favorable conditions for the target design user (=)	Route passes through two ramp terminal intersections (=)	Physical separation on Broadway and Weidler (protected bike lanes) (=)	Moderate downhill and/or relatively grades, with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between the Broadway/Weidler corridor (east of I-5) and the Broadway Bridge (=)	No change (=)
	Walking	Eastbound	Length of route = 3,920 feet. Difference of an additional 860 feet from the primary No-Build Route. (--)	One of three study intersections (through which the route passes) yield PLTS scores representing less favorable conditions for the target design user (+)	Route passes through no ramp terminal intersections (++)	Physical separation (sidewalks) along street corridors; sidewalks along Broadway and Weidler may be upgraded in tandem with implementation of planned protected bikeway and crossing enhancements; physical separation (Clackamas bicycle and pedestrian bridge) between Wheeler and 2nd (+++)	Moderate uphill and downhill grades with no excessively steep slopes; in order to access the Clackamas bicycle and pedestrian bridge, users would encounter some additional climbing/descending of 5% or less (beyond the total elevation difference between the Broadway Bridge and the Broadway/Weidler corridor east of I-5) (-)	N/A (criterion does not apply) (=)
		Westbound	Length of route = 3,920 feet. Difference of an additional 860 feet from the primary No-Build Route. (--)	One of three study intersections (through which the route passes) yield PLTS scores representing less favorable conditions for the target design user (+)	Route passes through no ramp terminal intersections (++)	Physical separation (sidewalks) along street corridors; sidewalks along Broadway and Weidler may be upgraded in tandem with implementation of planned protected bikeway and crossing enhancements; physical separation (Clackamas bicycle and pedestrian bridge) between 2nd and Wheeler (+++)	Moderate uphill and downhill grades with no excessively steep slopes; in order to access the Clackamas bicycle and pedestrian bridge, users would encounter some additional climbing/descending of 5% or less (beyond the total elevation difference between the Broadway/Weidler corridor (east of I-5) and the Broadway Bridge) (-)	N/A (criterion does not apply) (=)
Steel Bridge/Eastbank Esplanade to/from Williams/Vancouver corridor and Tillamook Neighborhood Greenway	Bicycling	Northbound	Length of route = 7,360 feet. No change from the primary No-Build Route. (=)	All four study intersections (through which the route passes) yield BLTS scores representing favorable conditions for the target design user (=)	Route passes through two ramp terminal intersections (=)	Physical separation between Esplanade and Williams (formerly Interstate)/Oregon intersection (shared-use path); delineated separation on Williams (formerly Interstate and Wheeler) (conventional bike lane on Williams [formerly Interstate], bi-directional bike lane through Rose Quarter Transit Center); physical separation on Williams (shared-use path between Multnomah and Broadway); physical separation on Williams (bi-directional protected bike lane between Broadway and Hancock); delineated separation on Williams (shared-use path north of Hancock) (+++)	Moderate uphill and/or relatively flat grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between the Eastbank Esplanade and Williams/Vancouver/Tillamook (=)	No change (=)

Primary Travel Route	Mode	Direction of Travel	Criteria*					
			Route Directness	Intersection Quality	Ramp Terminal Avoidance	Separation from Motor Vehicle Traffic	Grades	Bicycle Delay
Steel Bridge/Eastbank Esplanade to/from Broadway/Weidler corridor immediately east of I-5 interchange	Walking	Southbound	Length of route = 7,740 feet.  No change from the primary No-Build Route. (=)	All five study intersections (through which the route passes) yield BLTS scores representing favorable conditions for the target design user (=)	Route passes through two ramp terminal intersections (=)	Delineated separation on Vancouver (buffered bike lane); physical separation on Williams (bi-directional protected bike lane between Hancock and Weidler, shared-use path between Weidler and Multnomah); delineated separation on Williams (formerly Wheeler and Interstate) (bi-directional bike lane through Rose Quarter Transit Center, conventional bike lane on Williams [formerly Interstate]); physical separation between Williams (formerly Interstate)/Oregon intersection and Esplanade (shared-use path) (+++)	Moderate downhill and/or relatively flat grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between Williams/Vancouver/Tillamook and the Eastbank Esplanade (=)	No Change (=)
		Northbound	Length of route = 7,000 feet.  No change from the primary No-Build Route. (=)	Two of four study intersections (through which the route passes) yield PLTS scores representing less favorable conditions for the target design user (+)	Route passes through two ramp terminal intersections (=)	Physical separation between Esplanade and Williams (formerly Interstate)/Oregon intersection (shared-use path); physical separation (sidewalks) along Williams through Rose Quarter Transit Center; physical separation on Williams (shared-use path between Multnomah and Broadway); physical separation on Williams (sidewalks) north of Broadway (++)	Moderate uphill and/or relatively flat grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between the Eastbank Esplanade and Williams/Vancouver/Tillamook (=)	N/A (criterion does not apply) (=)
		Southbound	Length of route = 7,000 feet.  No change from the primary No-Build Route. (=)	Two of four study intersections (through which the route passes) yield PLTS scores representing less favorable conditions for the target design user (+)	Route passes through two ramp terminal intersections (=)	Physical separation (sidewalks) on Williams north of Broadway; physical separation on Williams (shared-use path between Broadway and Multnomah); physical separation (sidewalks) on Williams (formerly Wheeler and Interstate) through Rose Quarter Transit Center; physical separation between Williams (formerly Interstate)/Oregon intersection and Esplanade (shared-use path) (++)	Moderate downhill and/or relatively flat grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between Williams/Vancouver/Tillamook and the Eastbank Esplanade (=)	N/A (criterion does not apply) (=)
	Bicycling	Northbound	Length of route = 5,260 feet.  Difference of an additional 680 feet from the primary No-Build Route. (--)	Both study intersections (through which the route passes) yield BLTS scores representing favorable conditions for the target design user (=)	Route passes through no ramp terminal intersections (=)	Physical separation between Esplanade and Williams (formerly Interstate)/Oregon intersection (shared-use path); delineated separation on Interstate and Williams (formerly Wheeler) (conventional bike lane on Interstate, bi-directional bike lane through Rose Quarter Transit Center); physical separation on Williams (shared use path between Multnomah and Ramsay); physical separation (Clackamas bicycle and pedestrian bridge) between Williams and 2nd; no separation on 2nd (neighborhood greenway); physical separation on Broadway and Weidler (protected bike lanes) (+++)	Moderate uphill, downhill and/or relatively flat grades with no excessively steep slopes; in order to access the Clackamas bicycle and pedestrian bridge, users would encounter some additional climbing/descending of 5% or less (beyond the total elevation difference between the Steel Bridge and the Broadway/Weidler corridor east of I-5) (-)	The route passes through two additional signalized intersections, compared to the primary No-Build route (-)
		Southbound	Length of route = 5,500 feet.  Difference of an additional 130 feet from the primary No-Build Route. (-)	All three study intersections (through which the route passes) yield BLTS scores representing favorable conditions for the target design user (=)	Route passes through no ramp terminal intersections (=)	Physical separation on Broadway (protected bike lane); no separation on 2nd (neighborhood greenway); physical separation (Clackamas bicycle and pedestrian bridge) between 2nd and Williams (formerly Wheeler); physical separation on Williams (formerly Wheeler) (shared-use path between Ramsay and Multnomah); delineated separation on Wheeler and Interstate (bi-directional bike lane through Rose Quarter Transit Center, conventional bike lane on Interstate); physical separation between Interstate/Oregon intersection and Esplanade (shared use path) (+++)	Moderate downhill, uphill and/or relatively flat grades with no excessively steep slopes; in order to access the Clackamas bicycle and pedestrian bridge, users would encounter some additional climbing/descending of 5% or less (beyond the total elevation difference between the Broadway/Weidler corridor (east of I-5) and the Steel Bridge) (-)	The route passes through four signalized intersections compared to three in the primary No-Build route (-)



Primary Travel Route	Mode	Direction of Travel	Criteria*					Bicycle Delay
			Route Directness	Intersection Quality	Ramp Terminal Avoidance	Separation from Motor Vehicle Traffic	Grades	
	Walking	Northbound	Length of route = 4,530 feet. No change from the primary No-Build Route. (=)	N/A (route does not pass through any study intersections) (=)	Route passes through no ramp terminal intersections (=)	Physical separation between Esplanade and Interstate/Oregon intersection (shared-use path); physical separation (sidewalks) along street corridors (=)	Moderate uphill and/or relatively flat grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between the Eastbank Esplanade and the Broadway/Weidler corridor east of I-5 (=)	N/A (criterion does not apply) (=)
		Southbound	Length of route = 4,530 feet. No change from the primary No-Build Route. (=)	N/A (route does not pass through any study intersections) (=)	Route passes through no ramp terminal intersections (=)	Physical separation (sidewalks) along street corridors; physical separation between Esplanade and Interstate/Oregon intersection (shared use path) (=)	Moderate downhill and/or relatively flat grades with no excessively steep slopes; users would not encounter excessive climbing/descending beyond the total elevation difference between the Broadway/Weidler corridor (east of I-5) and the Eastbank Esplanade (=)	N/A (criterion does not apply) (=)

Notes: BLTS = Bicycle Level of Traffic Stress; N/A = Not applicable; PLTS = Pedestrian Level of Traffic Stress

\* Conditions are indicated by color scheme and use of the symbols +, =, and -. See descriptions of color and symbol meanings below.

Assessment based on conditions experienced by people walking and bicycling via the "Primary Travel Routes," as illustrated in Figures 21 and 22.

Bicycle delay is a qualitative assessment comparing the number of signalized intersections between the primary build route and the primary non-build route.

Darker green cells: Substantial improvement compared with No-Build Alternative (+++)	Lighter green cells: Moderate improvement compared with No-Build Alternative (++)	Very light green cells: Slight improvement compared with No-Build Alternative (+)	Gray cells: Relatively similar compared with No-Build Alternative, and or criterion is not applicable (=)	Very light red cells: Slight degradation compared with No-Build Alternative (-)	Lighter red cells: Moderate degradation compared with No-Build Alternative (--)	Darker red cells: Substantial degradation compared with No-Build Alternative (---)
--------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------	-----------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------	---------------------------------------------------------------------------------	------------------------------------------------------------------------------------



- **Degree of separation from motor vehicle traffic:** The degree of separation between motorized and non-motorized users would generally improve on all primary travel routes under the Build Alternative. In addition to planned protected bike lanes on the Broadway/Weidler couplet, the Build Alternative would include other physically separated facilities:
  - Bi-directional protected bikeway on Williams (north of N/NE Broadway)
  - Shared use path along N Wheeler and N Williams (south of N/NE Broadway, including the segment formerly named NE Wheeler)
  - Clackamas bicycle and pedestrian bridge
  - Hancock/Dixon multi-use path
- **Grades:** Compared with the No-Build Alternative, the grades on most bicycling and walking routes would remain the same. There would be no change along Broadway, Vancouver, and Williams. The segment of Weidler approximately 100 feet east of Williams would increase from an existing grade of about 1 percent to 4 percent. The segment of Weidler approximately 150 feet east of the segment above would decrease from an existing grade of 1 to 2 percent to a grade of 0 to -1 percent (downgrade). One route would create new and significant grades for people walking and bicycling, on the Hancock/Dixon connector, where the grade would be approximately 10 percent from Vancouver to Wheeler. A separate multi-use path from Hancock-Dixon would provide a parallel, though less direct, route that would be constructed with ADA-compliant grades.
- **Bicycle Delay:** Bicycle delay was assessed by comparing the difference in the number of signalized intersections between the primary Build route and the primary No-Build route. The number of signalized intersections would decrease for cyclists riding from Lloyd to the Broadway Bridge. The primary Build Alternative route uses the Clackamas bicycle and pedestrian bridge, reducing the number of signalized intersections along the route. Bicycle delay is expected to increase slightly for bicyclists traveling to the Steel Bridge from the Broadway/Weidler corridor.

### 6.2.3 Long-Term and Operational Indirect Impacts

The following long-term and operational indirect impacts were identified for the Build scenario:

- Similar to the No-Build Alternative, the reasonably foreseeable future actions within and near the API would provide a more robust network for walking and biking trips through and within the area.
- Removal of existing active transportation connections, establishment of new connections, and other changes to the local street system are anticipated to alter some of the primary bicycle/pedestrian travel routes, as shown on Figures 21 and 22. Major travel pattern changes, as they relate to the design user, as defined in Section 4.3.1.2, would include the following:



- The Clackamas bicycle and pedestrian bridge is anticipated to draw some non-motorized users away from the Broadway/Weidler corridor, especially pedestrians and bicyclists traveling between the Broadway Bridge and Lloyd.
- Between the Steel Bridge and Williams/Vancouver corridor, most SB bicyclists are anticipated to shift from Vancouver to Williams (in the vicinity of Hancock), where a bi-directional protected bike lane would proceed south before transitioning to a shared use path along N Wheeler/N Williams (formerly NE Wheeler).
- People bicycling between the Steel Bridge and the Broadway/Weider corridor (east of I-5) are generally anticipated to use the Clackamas bicycle and pedestrian bridge in lieu of the NE 2nd Neighborhood Greenway.
- As with the No-Build Alternative, protected bike lanes on N/NE Broadway and N/NE Weidler would increase comfort, and potentially safety, for people bicycling. Together, these enhancements could encourage more bicycling, especially for shorter trips.
- Increased physical separation between motorized and non-motorized users along other major corridors could also generate higher ridership, particularly among less-confident bicyclists.
- Sidewalk gap closures on N Wheeler/N Williams (formerly NE Wheeler) would substantially improve walking connections in the Moda Center's vicinity. The continued presence of gaps elsewhere, similar to the No-Build Alternative, would diminish pedestrian convenience, comfort, and safety by forcing foot traffic to either cross to the other side of a street to reach a sidewalk or walk within the roadway. These conditions would be especially challenging for persons with disabilities.
- By reducing intersection complexity, upgraded intersections along new or reconstructed streets could improve pedestrian convenience, comfort, and safety. Collectively, these enhancements could make walking more practical and attractive. People with disabilities would also encounter fewer barriers in these areas.
- Despite system improvements throughout the API, potentially challenging crossing conditions in the vicinity of highway ramp terminal intersections could suppress walking and bicycling potential, particularly for less-confident riders and people with disabilities.
- Relatively steep grades would render some streets and paths challenging for pedestrians and bicyclists and may be particularly less attractive for people traveling in the uphill direction. Examples include the Hancock/Dixon connector and other streets in the vicinity. These conditions could adversely impact ridership in these areas. However, a multi-use path is planned from Hancock-Dixon to Broadway to address steep grades for people walking and biking.

- Transit stop enhancements (e.g., transit boarding islands on N/NE Broadway, N/NE Weidler) could increase ridership on Lines 17-Holgate/Broadway, and 77-Broadway/Halsey through the provision of a more accessible, comfortable and attractive transit stop environment.

## 6.3 Cumulative Effects

Cumulative impacts are environmental effects that 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 (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 Build Alternative.
- 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)

#### *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

### 6.3.2.2 Reasonably Foreseeable Future Actions

Reasonably foreseeable future actions included projects listed on the financially constrained project list in the Technical Appendix to Metro’s RTP (Metro 2014) and other shorter-term projects identified by the City of Portland.

As shown in Table 24, projects listed in the financially constrained element of Metro’s RTP include the Sullivan’s Gulch Trail, streetscape enhancements along the Martin Luther King Jr./Grand couplet, protected bike lanes and enhanced pedestrian crossings on the Broadway/Weidler couplet, and an undefined list of multimodal safety improvements in Portland’s Central City (Metro 2014). These four projects were assumed to be in place under the No-Build Alternative. It was also assumed that these projects would be designed according to applicable agency standards.

**Table 24. Reasonably Foreseeable Future Actions (Active Transportation) within the API**

Project ID#	Project Name	Project Start Point	Project End Point	Project Description
10257	Grand/MLK Jr, SE/NE: CEID/Lloyd District Streetscape Improvements	Not specified	Not specified	Complete boulevard design improvements including street trees, tree grates, ornamental lighting, and curb extensions.
11323	Sullivan’s Gulch Trail	Eastbank Esplanade	NE 21st Avenue	Sullivan’s Gulch Trail is envisioned as a 5-mile commuter and recreational trail that will provide a vital east-west link in the Portland Metropolitan area’s bike network.
11646	NE Broadway Multimodal Improvements	Broadway Bridge	NE 42nd Avenue	Protected bikeway, enhanced crossings on N/NE Broadway.
11560	Central City Multimodal Safety Improvements	Not specified	Not specified	Strategy that identifies multimodal safety improvements and prioritizes investments in the Portland Central City.

Source: Metro 2014

Notes: API = Area of Potential Impact

Several other RTP financially constrained projects are planned near the API that would affect bicycle and pedestrian circulation patterns in the future. These projects include the North Portland Greenway, NE 7th/9th Avenue Neighborhood Greenway, and Sullivan’s Crossing (bicycle/pedestrian bridge traversing I-84 in the vicinity of NE 7th).

In addition to updating its TSP, the City of Portland is undertaking additional long-range active transportation planning efforts that geographically encompass the API, including Central City in Motion and PedPDX. Central City in Motion will plan for and address safety and access issues for people biking or walking in Portland's Central City. The primary outcomes will include a set of pedestrian crossings and a low stress bicycle network. The priority projects will improve safety, eliminate barriers, and improve access to transit. PedPDX, an update to the City's Pedestrian Master Plan, will identify sidewalk and crossing improvement needs and identify investments to make walking safer and more comfortable across the city. Additionally, the City is implementing small projects with local and state funds, such as adding buffered bike lanes on Vancouver. Continued residential and commercial development in the API will be required to construct frontage improvements, resulting in sidewalks that meet current City standards.

Completed in 2010, Portland's Bicycle Plan for 2030 established City of Portland policy, bikeway design, the density of the City's bikeway network, and an array of supporting efforts and programs (City of Portland 2010). Projects from this plan are included in the Comprehensive Plan.

Portland's Green Loop is envisioned as a roughly 6-mile-long active transportation corridor linking several districts within Portland's central core. The corridor would primarily include enhancements to existing streets, while potentially leveraging new connections such as the Clackamas bicycle and pedestrian bridge (included as part of this Project). While the City has identified a conceptual alignment, it has not yet been finalized.

While the longer-range planning efforts described above provide context for potential active transportation improvements within the API, the Project team assumed that only projects listed in the RTP's financially constrained project list would be in place under the No-Build Alternative.

### 6.3.3 Results of Cumulative Impact Analysis

The cumulative active transportation impacts of past and future actions, combined with the Project, would include the following:

- Though the exact phasing and duration of construction-related closures and detours are not yet known, they are anticipated to significantly affect City Bikeways and City Walkways. Long construction periods and circuitous detour routes could impact the continuity and quality of the existing walking and biking networks. Where detour routes for autos and people biking overlap, there is potential for modal conflict and degradation of bicycle facilities. As a result, construction could temporarily suppress walking and bicycling rates within the API, and inordinately affect people who are dependent on walking and biking for their transportation.
- Establishment of new active transportation corridors outside of the API would lessen the burden on corridors within the API by spreading out demand more evenly. However, existing bikeways and walkways within the API, particularly



those designated as Major City Bikeways and City Walkways, would continue to fulfill prominent roles in the local and regional network due to future population and employment growth in Lloyd and Eliot Neighborhood and given the API's proximity to Portland's Central Core.

- The addition of new connections and upgrades to existing bicycle routes to include separation from traffic would fill existing gaps in the bicycle network and make the bicycle network in the API attractive to a wider portion of the population.
- The conditions for walking in the area would benefit from improved sidewalk connections and pedestrian crossings, coupled with a reduction in intersection complexity. Increased walking activity would support local and regional pedestrian mode share goals. However, some of these gains could be tempered by the challenging crossing conditions that would remain at several major intersections, along with increased grades on most major walking routes.
- Because people walking and bicycling are sensitive to conditions on a more granular scale, the active transportation network's functionality and attractiveness would largely depend on design details, which are less defined at this level of analysis. Route directness, level of stress and risk, grades, delay, and other factors would collectively inform the user's perception.

## 6.4 Conclusions

The Project team used data and plans provided by Metro, the City of Portland, and ODOT to qualitatively assess existing and future-year active transportation conditions in the Project Area.

Anticipated active transportation impacts under the No-Build Alternative include the following:

- Direct Impacts
  - Implementation of the reasonably foreseeable future actions within and near the API would provide additional north-south and east-west regional bikeways and walkways.
  - Protected bike lanes N/NE Broadway and N/NE Weidler would substantially increase the degree of separation between bicycles and motor vehicles. Outside of the Broadway/Weidler couplet, intersection conditions (including complexity and deficiencies) would be similar to existing conditions.
  - Existing sidewalk gaps would remain (approximately 3,300 feet of gaps).
  - Existing marked crossing gaps would remain.
  - Seven study intersections would exhibit characteristics exceeding the tolerable stress level (LTS 2) for people walking. All study intersections would operate at Bicycle LTS 1, with conditions generally favorable to a broader bicycling population.

- 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.
- The following impacts are anticipated along the five primary travel routes traversing the API:
  - Most of the routes would follow a relatively direct path between their origin and destination.
  - People bicycling would encounter generally favorable conditions, as defined by the Bicycle LTS scores at the study intersections through which the routes would pass. Pedestrians would encounter a variety of intersection conditions depending on location.
  - The number of ramp terminal intersections encountered by people walking and bicycling would generally depend on the route and the user's direction of travel and would range between zero and two crossings.
  - Separation between pedestrians and motor vehicle traffic would continue in the form of sidewalks and shared-use paths, depending on location.
  - Separation between bicyclists and motor vehicle traffic would increase along Broadway and Weidler.
  - People walking and bicycling would encounter relatively flat or moderate grades with few excessively steep slopes.
  - The degree of bicycle delay would generally depend on the route under focus and the rider's direction of travel. Longer delays are anticipated along routes passing through a greater number of signalized intersections.
- Indirect Impacts
  - The reasonably foreseeable future actions within and near the API would provide a more robust network for walking and biking trips through and within the area.
  - Improved bicycling conditions on N/NE Broadway and N/NE Weidler could encourage more bicycling, especially for shorter trips.
  - Outside of the Broadway/Weidler corridor, intersection complexity would generally resemble existing conditions. As the level of walking and bicycling grows in the area, these conditions would affect a larger number of people.
  - The continued presence of sidewalk gaps and crossing gaps would diminish pedestrian convenience, comfort, and safety.
  - Transit stop enhancements could increase ridership through the provision of a more accessible, comfortable, and attractive transit stop environment.

Anticipated active transportation impacts under the Build Alternative include the following:

- **Short-Term Impacts**
  - Demolition of roadway structures over I-5 (e.g., Williams, Vancouver, Broadway, Weidler) would result in temporary but potentially lengthy closures of key walking and bicycling routes, thereby requiring people walking and biking to use alternative routes. The exact duration and timing of such closures has not been determined. Because several of these alternative routes, such as Tillamook, could potentially serve as motor vehicle detour routes, the potential for multimodal conflicts could increase and the quality of the bikeways could decrease. Because the Clackamas bicycle and pedestrian bridge would be constructed in a later phase of the Project, this connection would not yet be available during most of the Project's construction phases. Together, the combination of closures and detours has potential to impact travel time, safety, and level of stress on existing bikeways.
- **Direct Impacts**
  - Similar to the No-Build Alternative, implementation of other reasonably foreseeable future actions within and near the API would establish additional north-south and east-west regional bikeways and walkways.
  - Protected bike lanes and pedestrian crossing enhancements on N/NE Broadway and N/NE Weidler would substantially increase the degree of separation between bicycles and motor vehicles while improving conditions for people with disabilities.
  - Existing sidewalk gaps along portions of N Wheeler/N Williams (formerly NE Wheeler) would be filled. Other existing gaps would remain.
  - Five study intersections (compared with seven intersections in the No-Build Alternative) would exhibit characteristics exceeding the tolerable stress level (LTS 2) for people walking. Similar to the No-Build Alternative, all study intersections would operate at Bicycle LTS 1, with conditions generally favorable to a broader bicycling population.
  - While sidewalks, crossings, and other active transportation infrastructure along new or reconstructed streets would generally reduce the degree of intersection complexity, pedestrians and bicyclists would continue to encounter complex intersection geometry in some locations.
  - Physical separation between motorized and non-motorized users would increase along additional corridors, including N Wheeler, N Williams, and the Clackamas bicycle and pedestrian bridge.
  - The addition of transit boarding islands on N/NE Broadway, and N/NE Weidler would improve passenger conditions.

- The Clackamas bicycle and pedestrian bridge would establish a new and direct active transportation link between Lloyd and the Moda Center, while providing a lower-stress option for crossing I-5.
- Removal of the Flint overcrossing structure would sever a major north-south bicycle connection. However, the Hancock/Dixon connector would generally replace this link. This new connection would follow substantially steeper grades compared with the existing Flint structure.
- Compared with the No-Build Alternative, pedestrians and bicyclists would encounter additional uphill and downhill grades, particularly on new or re-built structures including the Broadway/Weidler/Williams cover, Hancock/Dixon connector, and Clackamas bicycle and pedestrian bridge.
- The following impacts are anticipated along the five primary travel routes traversing the API:
  - Similar to the No-Build Alternative, most of the primary travel routes would follow a relatively direct path between their origin and destination.
  - Similar to the No-Build Alternative, people bicycling would encounter generally favorable conditions, as defined by the Bicycle LTS scores at the study intersections through which the routes would pass. Overall conditions for people walking would also be similar to the No-Build Alternative. The relocation of the I-5 SB ramp would improve the intersection LTS score at the current location and decrease its LTS score at the new location (Weidler and Williams).
  - Similar to the No-Build Alternative, the number of ramp terminal intersections encountered by people walking and bicycling would generally depend on the route and the user's direction of travel and would range between zero and two crossings. Several routes would include fewer ramp terminal crossings compared with the No-Build Alternative.
  - Compared with the No-Build Alternative, the degree of separation between motorized and non-motorized users would generally improve on all five of the primary travel routes.
  - Compared with the No-Build Alternative, people walking and bicycling would encounter additional climbing and descending as well as relatively steep slopes in some areas.
  - The degree of bicycle delay would generally depend on the route under focus and the rider's direction of travel. Reduced delay is anticipated for bicyclists using the Clackamas bicycle and pedestrian bridge. Bicycle delay is expected to increase slightly for bicyclists traveling to the Steel Bridge from the Broadway/Weidler corridor.

- Indirect Impacts
  - Similar to the No-Build Alternative, the reasonably foreseeable future actions within and near the API would provide a more robust network for walking and biking trips through and within the area.
  - Improved walking conditions on N/NE Broadway and N/NE Weidler could encourage more walking and bicycling, especially for shorter trips.
  - By reducing intersection complexity, upgraded intersections along new or reconstructed streets could improve pedestrian convenience, comfort, and safety. Collectively, these enhancements could make walking more practical and attractive. People with disabilities would also encounter fewer barriers in these areas.
  - Despite system improvements throughout the API, potentially challenging crossing conditions in the vicinity of highway ramp terminal intersections could suppress walking and bicycling potential, particularly for less-confident riders and people with disabilities.
  - Sidewalk gap closures on N Wheeler/N Williams (formerly NE Wheeler) would substantially improve walking connections in the Moda Center's vicinity. The continued presence of gaps elsewhere, similar to the No-Build Alternative, would diminish pedestrian convenience, comfort, and safety.
  - Increased physical separation between motorized and non-motorized users along other major corridors could also generate higher ridership, particularly among less-confident bicyclists.
  - Removal of existing active transportation connections, establishment of new connections, and other changes to the local street system are anticipated to alter walking and bicycling travel patterns within the Project Area, compared with the No-Build Alternative.
  - Transit stop enhancements could increase ridership through the provision of a more accessible, comfortable, and attractive transit stop environment.
  - Relatively steep grades would render some streets and paths challenging for pedestrians and bicyclists and may be particularly less attractive for people traveling in the uphill direction.
  - Compared with the No-Build Alternative, reduced bicycle delay along several of the primary travel routes could increase overall ridership, while increased delay could suppress ridership on others. The Project's addition of new active transportation links (e.g., Clackamas bicycle and pedestrian bridge) could encourage bicyclists to divert to alternative routes if a perceived time savings could be derived.



- Cumulative Impacts
  - Long construction periods (coupled with circuitous detour routes) could impact the walking and biking network and could temporarily suppress walking and bicycling rates within the API.
  - Addition of new connections and increased coverage of low-stress bikeways within the API would substantially enhance the attractiveness of bicycling. Growing ridership would support local and regional bicycle mode share goals.
  - Improved sidewalk connections and pedestrian crossings, coupled with a reduction in intersection complexity, would increase the attractiveness of walking. Increased walking activity would support local and regional pedestrian mode share goals. However, some of these gains could be tempered by the challenging crossing conditions that would remain at several major intersections, along with increased grades on most major walking routes.
  - Because people walking and bicycling are sensitive to conditions on a more granular scale, the active transportation network's functionality and attractiveness would largely depend on design details, which are less defined at this level of analysis.

In general, the Build Alternative would provide additional bicycle and pedestrian routes and additional separation from motor vehicles, compared to the No-Build Alternative. Accessing these new routes may require out-of-direction travel and additional climbing or descending. The more direct and flatter route options would remain in place with the exception of the Flint overcrossing. The Build Alternative would reduce the number of intersections exceeding the tolerable level of stress for pedestrians by two within the API. Due to the reconfiguration of ramps, some of the primary routes through the API would pass through fewer ramp terminal intersections, and some would pass through additional ramp terminal intersections.

## 7 Avoidance, Minimization, and Mitigation Measures

While the exact duration and staging of the construction of the Build Alternative is not yet fully defined, the extent and nature of the construction impacts could significantly impact conditions for walking and biking in the short term. Addressing the short-term impacts related to the closure of walking and biking routes, and detour routes for all vehicles, would require a detailed detour plan. The plan should incorporate the following:

- Design detour routes for walking and biking that minimize out-of-direction travel.
- Design temporary detour facilities that provide separation from traffic and meet City of Portland standards.
- Where detour routes for bikeways would also carry detouring vehicular traffic, as may be the case on Tillamook, 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. The designs for the impacted intersections in the API should strive for bicycle and pedestrian LTS scores of 1. The intersection designs should incorporate the following, 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.

Additionally, the specific design of the ramp terminal intersections would be critical. These intersections typically have intrinsic visibility problems and vehicles that

anticipate accelerating to highway speeds, which can result in high speed differentials between motor vehicles and people walking or biking.

The 4- to 5-year construction period anticipated for the Build Alternative could significantly impact bicycle and pedestrian conditions. The CPC Plan does not provide design details for temporary pedestrian/bicycle facilities or details for maintaining pedestrian and bicycle movement throughout the entirety of the Project's construction timeline. The bicycle and pedestrian Temporary Traffic Control Plan (not yet developed) would need to 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. The Temporary Traffic Control plan should follow the City of Portland's Traffic Design Manual Volume 2: Temporary Traffic Control and strive to meet the highest level of accommodation for bicyclists and pedestrians.

## 8 Contacts and Coordination

To complete this report, the preparers coordinated with the City of Portland and Metro, to obtain traffic volume assignments and bicycle trip assignments from the regional travel demand model; TriMet, to obtain route- and stop-level transit ridership data and policies and plans for future improvements; and Portland Streetcar Inc., to obtain policies and plans for future improvements. Other contacts included various ODOT staff and other members of the consultant team.



## 9 Preparers

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