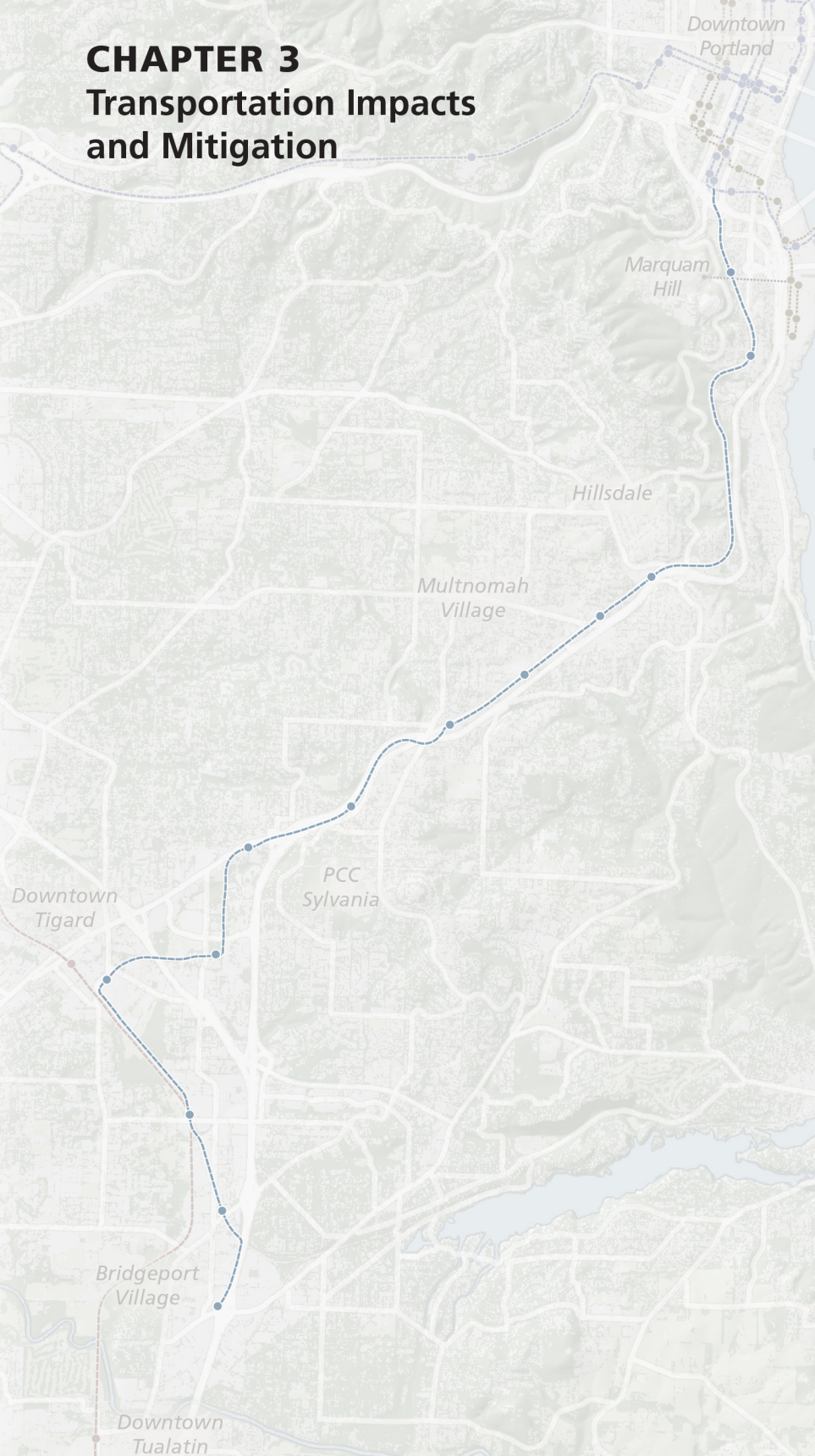


# CHAPTER 3

## Transportation Impacts and Mitigation



### 3. TRANSPORTATION IMPACTS AND MITIGATION

This chapter summarizes the roles and functions of the various modes of transportation in the Southwest Corridor, describes potential direct beneficial and adverse long-term impacts and short-term (construction) impacts of the Southwest Corridor Light Rail Project (Project) on transportation, and identifies mitigation.

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The National Environmental Policy Act requires that the Environmental Impact Statement (EIS) disclose the direct, indirect and cumulative impacts of a proposed action on the environment. Direct, indirect and cumulative impacts are defined as follows:

- **Direct (long-term or short-term) impacts** are caused by the action and occur at the same time and place. For example, there would be long-term impacts of stormwater runoff from increased roadway impervious surface or short-term air quality impacts from the operation of construction equipment.
- **Indirect impacts** are caused by the action and occur later in time or farther removed in distance but still are reasonably foreseeable, such as changes in land use patterns around station locations.
- **Cumulative impacts** result from the incremental impact of the proposed action when its impact is added to those of other past, present and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts are considered because the public and government agencies need to evaluate a proposed action and its alternatives from a broad perspective, including how the proposed action might interact with impacts that persist from past actions, with present-day activities, and with other projects that are planned but have not been built yet (reasonably foreseeable future actions). See Appendix B4-18, Indirect and Cumulative Effects Background Information, for the list of planned projects considered in this Final EIS.

The analysis of the transportation system considers:

- regional and corridor travel
- public transportation
- active transportation (pedestrians and bicyclists)
- motor vehicle operations
- on-street parking
- freight
- safety

Attachment A, the *Transit Impacts and Travel Demand Forecasting Results Report*, and Attachment B, the *Transportation Impacts Results Report*, provide more detail on existing conditions and transportation impacts. Impacts to emergency services are addressed in Section 4.16, Public Services.

This chapter updates information from the Draft EIS for the affected environment and focuses on the impacts of the Preferred Alternative and related transportation improvements compared to the No-Build Alternative. The Preferred Alternative for the light rail investment represents the full 11-mile light rail alignment that would terminate at the Bridgeport Station, paired with a connection to Marquam Hill, a shuttle to the Portland Community College (PCC) Sylvania campus and a new operations and maintenance (O&M) facility. The related transportation improvements consist of the Ross Island Bridgehead Reconfiguration and station access improvements. These are options for additional access and mobility improvements that could be phased to be built before, with or after the light rail investment, depending on funding availability, including other federal grants or local funding initiatives. This Final EIS also evaluates two terminus options, which are portions of the Preferred Alternative that could be constructed if there is insufficient funding for the full-length alignment. The Upper Boones Ferry Terminus Option would be a 10-mile light rail alignment that would terminate at the Upper Boones Ferry Station, including 12 new light rail stations and 4 new or modified park and rides. The Hall Terminus Option would be an 8-mile light rail alignment that would terminate at the Hall Station, including 10 new light rail stations and 4 new or modified park and rides. The No-Build Alternative includes planned projects in the *Regional Transportation Plan* (RTP), which is the currently adopted transportation system plan for the greater Portland metropolitan region. The alternatives and options considered in this Final EIS are described in more detail in Chapter 2, Alternatives Considered.

As discussed in Chapter 2, the Preferred Alternative is based on alternatives studied in the Draft EIS, but includes changes that improve efficiency, avoid or minimize impacts, and respond to comments received during the Draft EIS comment period (see Appendix I, Preferred Alternative Selection and Project Refinements, for more information). The updated design for the Preferred Alternative incorporates many of the transportation mitigation measures suggested in the Draft EIS. The major refinements affecting transportation, according to the Project's geographic segments, include:

- **Segment A, Inner Portland.** The most notable refinement in Segment A was shifting the location of the light rail structure over Interstate 405 (I-405) to tie in at SW Fifth Avenue, and extending the structure south over SW Caruthers and SW Sheridan Streets to land in the center of SW Barbur Boulevard, which avoided three at-grade crossings and related traffic impacts. The design also revised some major intersections to increase turn lane storage, added bus platforms within the shared transitway at the Gibbs Station, separated bicyclists from traffic with raised bicycle lanes south of SW Naito Parkway, added marked pedestrian crossings and included changes to improve street connectivity.
- **Segment B, Outer Portland.** Changes in Segment B included reducing the park and ride capacity at the Barbur Transit Center (TC) Station and the 53rd Station to reduce traffic impacts and costs. The changes also improved pedestrian crossings, such as by separating bicyclists from traffic with raised bicycle lanes north of the Barbur Transit Center; they adjusted park and ride access to reduce traffic impacts and improve multimodal access and safety; and they extended or added turn lanes to reduce traffic impacts at certain intersections, including Interstate 5 (I-5) ramps.
- **Segment C, Tigard and Tualatin.** This segment includes the most substantial changes from the original Draft EIS alignment alternatives. The Baylor Station and associated park and ride were moved to SW 68th Parkway near Pacific Highway (designated as Oregon Route 99W), and the Tigard Transit Center Station and associated park and ride were moved to the east side of SW Hall Boulevard (they are now named the Hall Station and Hall Park and Ride). Other changes in Segment C included



reconfiguring the Hunziker Operations and Maintenance (O&M) Facility, removing park and rides from the Bonita and Upper Boones Ferry Stations, adjusting the Upper Boones Ferry Station design to improve safety, and relocating the bus hub at the Bridgeport Station to the south side of SW Lower Boones Ferry Road.

### **3.1. Affected Environment**

The transportation study area covers locations where the Project would affect transit, walking, bicycling or traffic operations, and is therefore both regional in scale as well as local. The local transportation study area was determined using traffic and travel demand models that identified locations where changes in transit ridership and traffic operations would occur at levels with the potential to result in impacts; with buffers of typically one-half mile from the Project, the local study area also encompasses walking and bicycling activities and facilities around proposed light rail stations. In addition to locations adjacent to the light rail alignment, the transportation study area includes streets in the southern portion of downtown Portland, the streets and ramps at the west end of the Ross Island Bridge, and the interchange areas along I-5 between I-405 and SW Lower Boones Ferry Road. I-5 and I-405 are under the purview of both the Federal Highway Administration (FHWA) and Oregon Department of Transportation (ODOT). Chapter 2 has detailed figures of the Project and the major adjacent transportation facilities.

#### **3.1.1. Regional and Corridor Travel**

I-5 is the primary north/south route in the Interstate Highway System on the West Coast, serving travel between and within California, Oregon and Washington. In the Portland metropolitan area, I-5 is the major route serving vehicle trips between central Portland and the suburban communities of Tigard, Tualatin, Lake Oswego and Wilsonville, and is generally oriented north and south. In 2018, daily bidirectional traffic volumes on I-5 in the corridor ranged from 109,000 to 167,000 vehicles. Before the construction of I-5 in the 1960s, the major north/south highway route was Pacific Highway, which includes parts of SW Barbur Boulevard. SW Barbur Boulevard serves as an alternate route when there are collisions or other traffic incidents on I-5. I-405 is a major north/south loop route around downtown Portland, connecting from I-5 on the east and west sides of the Willamette River, and connecting to U.S. Highway 26 (U.S. 26). U.S. 26 is a major east/west route intersecting the corridor, connecting west to Washington County and east to southeast Portland and Gresham via the Ross Island Bridge.

Congestion regularly occurs on all of the regional facilities, particularly during the morning and evening weekday peak travel periods. I-5 experiences northbound and southbound congestion. SW Barbur Boulevard, as a north/south route generally paralleling I-5 and connecting to Pacific Highway in Tigard, experiences high levels of travel and congestion. The west end of the Ross Island Bridge, where U.S. 26 intersects the corridor and connects to I-5 and multiple regional and local facilities, also contributes to areawide congestion in South Portland.

#### **3.1.2. Public Transportation**

##### **Transit Providers**

The Tri-County Metropolitan Transportation District of Oregon (TriMet) is the largest transit provider in the Portland region, with a fleet of approximately 700 buses that serve 85 bus lines and seasonal shuttles with over 6,500 bus stops and nearly 1,000 bus shelters. There are 216 miles of frequent-service bus lines

on 17 routes that provide 15-minute or better all-day service 7 days a week. The 60-mile-long Metropolitan Area Express (MAX) light rail system has 5 lines serving 97 stations, and operates 15-minute or better all-day service 7 days a week. Westside Express Service (WES) Commuter Rail operates during peak hours between Beaverton and Wilsonville. In addition to fixed-route bus, MAX and WES service, TriMet operates more than 250 LIFT vehicles, which provide door-to-door service for people with special needs. TriMet operates three bus O&M facilities and two rail O&M facilities. Overall, 90 percent of people within the TriMet district live within 0.5 mile of TriMet service.

Other smaller transit providers in the corridor include the South Metro Area Regional Transit (SMART), which serves the Wilsonville area, and Ride Connection, a private, nonprofit paratransit provider, which operates two deviated fixed routes in Tualatin. Lewis and Clark College operates a shuttle in the corridor as well, connecting students and staff from the college to downtown Portland.

### **Transit Service Network**

Transit in the corridor is primarily fixed-route, fixed-schedule buses operating in mixed traffic, and WES Commuter Rail operating during peak hours only. The major frequent-service bus route (operating every 15 minutes or better all day) is the Line 12, which runs on SW Barbur Boulevard and Pacific Highway between downtown Tigard and downtown Portland. The Line 44 provides daily local service connecting North Portland to the Portland Community College (PCC) Sylvania campus via downtown Portland and SW Barbur Boulevard. The Line 93 bus provides daily local service connecting Sherwood and the Tigard Transit Center via Pacific Highway. The Line 94 bus operates on weekdays on Pacific Highway and SW Barbur Boulevard, with local service between Sherwood and Tigard and express service between Tigard and downtown Portland. The Line 96 bus is an express route that runs all day but with a peak-period focus between Tualatin and downtown Portland. The Line 97 Tualatin-Sherwood Road bus operates peak-period weekday service connecting Sherwood to the Tualatin WES station. SMART operates Route 2X between Wilsonville and the Tualatin Park and Ride. Several other TriMet and SMART bus routes provide local service through the corridor on smaller arterial and collector streets.

The Portland Aerial Tram, operated by Oregon Health & Science University (OHSU), connects the South Waterfront and OHSU. Streetcar service, managed by Portland Streetcar Inc., includes the Portland Streetcar A and B Loops and N-S Line, which connect South Waterfront with central Portland. The MAX Orange Line connects South Waterfront with downtown Portland, southeast Portland and Milwaukie. The MAX Green Line from Clackamas to Portland State University in downtown Portland also serves the north end of the corridor.

Appendix A, Detailed Maps and Descriptions of the Alternatives, shows the assumed 2035 transit networks for the travel demand modeling for this Final EIS.

### **Current Transit Ridership**

In Fiscal Year 2019, the TriMet system averaged 182,800 daily bus boardings, 120,900 light rail boardings and 1,500 WES Commuter Rail boardings. Additionally, LIFT service averaged 3,500 weekday boardings; streetcar service averaged more than 15,000 weekday boardings; and the Portland Aerial Tram averaged more than 8,500 weekday boardings. Up until spring of 2020, when the COVID-19 pandemic altered typical social, economic and transportation activities nationwide, including in the Portland metropolitan area, ridership levels have been relatively steady. TriMet's ridership declined sharply in spring of 2020 and is

now in a period of recovery, similar to other major transit systems in the United States. As of 2021, TriMet is operating at approximately 90 percent of pre-pandemic service with approximately 40 percent of pre-pandemic ridership (after an initial decline to 30 percent of pre-pandemic ridership). The agency predicted pre-pandemic levels of transit service and ridership may not fully rebound until 2024 to 2025. However, service levels and ridership on the largest ridership routes were already beginning to recover by the start of 2021, particularly in areas with transit-dependent populations or where more manufacturing, industrial or service industry employment opportunities were located. Depending on the pace of vaccination and other factors influencing ridership demand, TriMet may be able return service to pre-pandemic levels as soon as 2022.

### **3.1.3. Active Transportation**

Active transportation refers to people traveling by walking or riding a bicycle. As noted in Chapter 2. Purpose and Need, the corridor today has limited connections for walking or bicycling to access transit and corridor land uses, and there are major gaps in pedestrian and bicycle facilities, which creates unsafe conditions. This section summarizes the condition and presence of sidewalks, bicycle facilities and marked pedestrian crossings in the study area. In general, the study area for pedestrian facilities extends 0.5 mile from the light rail alignment, and the study area for bicycle facilities extends 3 miles from the light rail alignment. Topography and highways, including I-5 and Highway 217, restrict cyclist and pedestrian routes and crossings.

The neighborhoods in Segment A were developed earlier than those in the other two segments and tend to feature sidewalks on local streets, but the major arterials such as SW Barbur Boulevard and SW Naito Parkway have discontinuous sidewalk systems. Many of the neighborhoods in the vicinity of Segment B and the Tigard Triangle portions of Segment C were developed in the 1950s and 1960s and were not designed with sidewalks. In all three segments, many existing sidewalks throughout the corridor do not meet current design guidelines, including Americans with Disabilities Act (ADA) standards. Similarly, bicycle lanes are infrequently present in the corridor and often do not meet current design standards.

### **3.1.4. Motor Vehicle Operations**

Motor vehicle operations are measured in terms of motor vehicle delay at intersections, queuing at intersections and at locations where the Project would coincide with the freeway system, and larger-scale effects on motor vehicle circulation in the study area.

The analysis of motor vehicle delay at intersections uses each roadway's volume-to-capacity (V/C)<sup>1</sup> ratio to measure the potential for delay. The closer a roadway gets to capacity (theoretically, a V/C ratio of 1.0), the greater the potential for delay. Local jurisdictions and transportation agencies typically have established targets that seek to achieve a V/C ratio of less than 1.0. In heavily congested areas such as downtown Portland and designated town centers, however, V/C ratios of up to 1.1 are acceptable during the peak hour provided they meet the V/C target outside of the peak hour.

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<sup>1</sup> The most common measure of motor vehicle performance in Oregon is the volume-to-capacity (V/C) ratio. All jurisdictions in the Preferred Alternative study area use the V/C ratio.

Queue length refers to the length of the line of vehicles when there is a delay at an intersection. The typical impacts of concern involve queuing that blocks adjacent intersections, or when queuing backups extend to the deceleration zone of highway off-ramps or into freeway lanes.

In the following locations, where delays and queuing impacts were identified at multiple intersections, Vissim or SimTraffic microsimulation models were used to assess operations in more detail:

- all of Segment A
- Segment B intersections of SW Barbur Boulevard/SW Terwilliger Boulevard and SW Barbur Boulevard/SW Bertha Boulevard
- Segment C intersections of Pacific Highway/SW 68th Parkway, SW Hall Boulevard/SW Hunziker Street vicinity, and the SW Upper Boones Ferry Road/SW 72nd Avenue/I-5 interchange, as well as in the Tigard Triangle area
- the vicinity of the Preferred Alternative terminus at Bridgeport Village in Segment C

## Intersection Operations

Field observations of intersection operations occurred on weekdays in the spring of 2017 and were supplemented by additional field observation and data collection in the fall of 2018. Most of the intersections within 0.5 mile of the Project meet jurisdiction or agency targets in the AM and PM peak hours as of 2018. Those that do not meet jurisdiction or agency V/C targets are listed in Table 3.1-1.

**Table 3.1-1. Intersections Currently Not Meeting V/C Targets During AM or PM Peak Hour**

Intersection	Intersection Type	Peak Hour Not Meeting V/C Target
<b>Segment A: Inner Portland</b>		
Ross Island Bridge on-ramps from SW Naito Pkwy. and SW Kelly St.	stop-controlled	AM and PM
SW Corbett Ave./SW Bancroft St.	stop-controlled	PM
SW Corbett Ave./SW Hamilton St.	stop-controlled	AM and PM
SW Kelly St./SW Water Ave.	stop-controlled	AM
<b>Segment B: Outer Portland</b>		
SW Barbur Blvd./SW Terwilliger Blvd.	signalized	AM
SW Barbur Blvd./SW Bertha Blvd./I-5 ramps	signalized	AM
SW Terwilliger Blvd./I-5 northbound off-ramp	signalized	PM
SW Barbur Blvd./SW Taylors Ferry Rd./SW Baird St.	stop-controlled	AM
SW Taylors Ferry Rd./I-5 southbound off-ramp	stop-controlled	PM
SW Taylors Ferry Rd./SW Capitol Hwy.	stop-controlled	AM and PM
<b>Segment C: Tigard and Tualatin</b>		
SW 65th Ave./SW Haines St./I-5 northbound off-ramp	stop-controlled	PM

Note: I-5 = Interstate 5; V/C = volume-to-capacity.

## Queuing

Table 3.1-2 lists locations with noticeable existing AM and PM peak-hour queuing problems, indicating when vehicle backups affect the operations of other intersections or facilities, including freeway ramps or

lanes. Existing conditions information for Segment A was updated for the Final EIS, while information for Segments B and C is drawn from the Draft EIS. See Attachment B for more details.

**Table 3.1-2. Intersections with Existing Queuing Problems During AM or PM Peak Hour**

Intersection	Peak Hour	Queuing Issue
<b>Segment A: Inner Portland</b>		
Northbound I-405 on-ramp on SW Sixth Ave.	AM and PM	Weaving conflicts and high traffic volumes
Northbound SW Naito Pkwy. on-ramp to eastbound Ross Island Bridge	AM	High traffic volumes and sight distance issues lead to queuing
Intersection of SW Hamilton St. and SW Barbur Blvd.	AM and PM	High traffic volumes
Intersection of SW Hamilton St. and SW Corbett Ave.	AM and PM	High traffic volumes, partly due to traffic bypassing I-5 congestion
Intersection of SW Capitol Hwy. and SW Terwilliger Blvd.	AM	Queuing on SW Capitol Hwy. at this intersection
Downtown grid encompassed by SW Harrison St., SW Jackson St., SW Broadway and SW Fourth Ave.	PM	Queuing throughout the day at multiple intersections
I-405 southbound off-ramp to SW Broadway	PM	High traffic volumes
Ross Island Bridgehead eastbound	PM	High eastbound traffic volumes
<b>Segment B: Outer Portland</b>		
SW Barbur Blvd. at SW Terwilliger Blvd.	AM	High through volumes on SW Barbur Blvd.
SW Taylors Ferry Rd. and SW Capitol Hwy.	AM and PM	Heavy traffic volumes from I-5 off-ramp
SW Taylors Ferry Rd. and I-5 southbound off-ramp	PM	Off-ramp queue extends back near freeway mainline
Northbound I-5 off-ramp at SW Terwilliger Blvd.	PM	Heavy traffic exiting I-5
<b>Segment C: Tigard and Tualatin</b>		
SW Hall Blvd. at WES Commuter Rail crossing	PM	Southbound traffic volumes on SW Hall Blvd.
SW Haines St. and SW 65th Ave.	PM	Queuing related to northbound and eastbound movements
SW Upper Boones Ferry Rd./SW Carman Dr. at northbound I-5 ramps	AM and PM	Heavy traffic on eastbound traffic on SW Upper Boones Ferry Rd./SW Carman Dr. onto northbound I-5 in AM; heavy westbound traffic on SW Upper Boones Ferry Rd./SW Carman Dr. in PM
SW Lower Boones Ferry Rd. at SW 72nd Ave.	PM	Queuing throughout the vicinity of this intersection

Note: I-5 = Interstate 5; I-405 = Interstate 405; WES = Westside Express Service.

## Local Circulation

In much of the Southwest Corridor, major arterial streets such as SW Barbur Boulevard serve regional trips as well as collect and distribute traffic to local streets and the driveways of adjacent developments. The major intersections are signalized, but minor streets and most driveway intersections typically are not. There are varied treatments for turn movements on and off of the major arterials. Currently, only a limited number of locations allow left turns from side streets or center lanes, which involve turns across traffic mid-block, but in most locations, there are right-in and right-out restrictions for safety and operational reasons.

### 3.1.5. Parking

In most of the Southwest Corridor, parking is accommodated on side streets and on off-street lots or garages. There is limited on-street parking along SW Barbur Boulevard, Pacific Highway and other major arterials. Table 3.1-3 shows the existing on-street parking locations and supply along the immediate alignment of the Preferred Alternative and in the vicinity of the Ross Island Bridgehead Reconfiguration.



**Table 3.1-3. Existing On-Street Parking Supply**

Parking Location	On-Street Parking Supply (spaces)	Parking Restrictions
<b>Segment A – Vicinity of Preferred Alternative</b>		
SW Barbur Blvd. south of SW Sheridan St.	28	2-hour limit
SW Pennoyer St.	6	2-hour visitor parking
<b>Segment A – Vicinity of Ross Island Bridgehead Reconfiguration</b>		
SW Naito Pkwy.	26	2-hour limit
SW Corbett Ave.	20	4-hour limit
SW Kelly Ave.	5	2-hour limit
SW Water Ave.	20	None
<b>Segment B</b>		
SW Barbur Blvd. between SW 13th Ave. and SW 60th Ave.	Approximately 113	5 spaces near Original House of Pancakes are 2-hour limit
<b>Segment C</b>		
SW 70th Ave. at SW Dartmouth St.	30	None

### 3.1.6. Freight Facilities

#### Roadway Freight

The study area includes facilities that are part of the National Highway System (NHS), as well as state, regional and local freight routes. In Segment A, SW Barbur Boulevard south of SW Naito Parkway, SW Naito Parkway and the Ross Island Bridge ramps are all part of the NHS, and they carry state and local freight designations as well. The NHS designation is consistent with transit access in that these routes are a national priority for being maintained in a state of good repair. Oregon Revised Statutes (ORS) 366.215 designates the Ross Island Bridge and its ramps to accommodate oversize freight. In Segment B, SW Barbur Boulevard is part of the NHS and is a City of Portland freight route. In Segment C, the Project would not operate on designated freight routes.

#### Railroad Freight

There are no existing freight railroads within Segments A and B. Within Segment C, there are Class 3 tracks owned by Union Pacific Railroad, which are used by Portland and Western Railroad, a short-line operator that provides freight rail service to customers in Tigard and Tualatin with connections to Clatsop, Columbia and Washington Counties. They also connect to the Union Pacific Railroad tracks at Willsburg Junction; and to points south within the Willamette Valley. A portion of the Preferred Alternative alignment in Segment C would be located adjacent to the Union Pacific Railroad track.

### 3.1.7. Safety

Between 2013 and 2017, there were 30 serious injury collisions and 5 fatal collisions on roadways within approximately 0.25 mile of the Preferred Alternative alignment. An additional 13 serious injury collisions and 3 fatal collisions occurred between 2018 and 2019.

Analysis of ODOT vehicular crash data from 2013 to 2017, with an update through years 2018 and 2019, showed notable collision problem areas at the following locations: the vicinity of the Ross Island Bridgehead Reconfiguration, the SW Barbur Boulevard curve approaching Burlingame, SW Barbur Boulevard between

SW Multnomah Boulevard and SW Capitol Highway (I-5 Exit 295), and SW Barbur Boulevard at I-5 Exit 294. Collision analysis showed, in general, few serious pedestrian and cyclist collisions (three total), although this may be a result of the low levels of pedestrian and bicycle activity on a corridor with few facilities for bicycling and walking. Most collisions were the result of a vehicle hitting fixed objects, or were caused by turning vehicles or rear-end collisions.

ODOT has identified several intersections on SW Barbur Boulevard as high-crash locations, including the intersection of SW Barbur Boulevard and the following streets: SW Capitol Hill Road, SW Huber Street, SW 64th Avenue and SW 65th Avenue. SW Barbur Boulevard is also identified as a collision hotspot on the City of Portland's High Crash Network and in the city's Vision Zero Action Plan.

## **3.2. Long-Term Impacts**

This section discusses the long-term impacts of the No-Build Alternative and the Project on travel patterns, public transportation, active transportation (bicycle and pedestrian), motor vehicle operations, parking, freight (roadway and rail), and safety. Short-term impacts are addressed in Section 3.3. Indirect and cumulative impacts are addressed in Section 3.4.

The technical analysis described here uses traffic and other travel data generated for a 2035 forecast year using Metro's regional travel demand model (see Appendix A for a summary of the transit and roadway networks assumed in the model, including other planned projects in the corridor). In addition, at the request of FHWA and ODOT, the analysis uses year 2045 traffic forecasts to evaluate impacts where the Project could impact interstate ramp terminal operations. This analysis is discussed further in Attachment B.

### **3.2.1. Regional and Corridor Travel Impacts**

This system-wide analysis reviews impacts to motor vehicle travel patterns on the regional roadway system, including changes to circulation patterns as well as the potential for traffic to divert to other streets, and compares the impacts of the Project with those of the No-Build Alternative. Metro's travel demand model is the primary source for this analysis. Metro's travel demand model reflects population and employment growth through 2035, including planned projects listed in the RTP (see Appendix A for a list of notable projects included in the traffic and transit demand modeling). The resulting travel conditions in 2035 are shown in Table 3.2-1 with and without the Project (that is, with the Preferred Alternative and with the No-Build Alternative). Future traffic levels would be higher than today in all segments. The model did not assume a future regional tolling system. Other regional proposals are considering tolling, but no details have yet been determined.

Traffic conditions on local streets, including intersection operations, are discussed in Section 3.2.4.

**Table 3.2-1. Average Regional Weekday Daily Travel – Year 2035**

Mode	Vehicle Miles Traveled		Vehicle Hours Traveled	
	No-Build Alternative	Preferred Alternative	No-Build Alternative	Preferred Alternative
Auto	51,475,121	51,388,268	1,556,865	1,552,574
Truck	3,389,874	3,389,165	81,226	81,143
Bus	98,213	98,777	6,547	6,587
Light rail	15,919	17,746	847	926
Streetcar	2,798	2,798	277	276
Commuter rail (WES)	472	472	7	7

Source: Metro Regional Travel Demand Model, 2020.

Note: WES = Westside Express Service. Data correspond to the entirety of Clackamas, Multnomah, Washington and Clark (WA) Counties.

## No-Build Alternative

In general, the No-Build Alternative would continue to have more automobile and truck travel and more vehicle hours traveled at the regional level, compared to the Preferred Alternative. Major regional facilities such as I-5, I-405 and SW Barbur Boulevard would be heavily traveled and congested, particularly during peak periods.

## Preferred Alternative

With the Preferred Alternative, total miles traveled by automobiles or trucks would decline slightly regionally by over 87,000 daily vehicle miles traveled per day compared to regional travel under the No-Build Alternative. There would be a slight increase in vehicle miles traveled by bus or light rail. Regional travel model forecasts, which predict likely changes in demand in given corridors, as well as routes vehicles may use, show there could be shifts in travel patterns and travel volumes at certain locations in the corridor. This forecasted shift in local trips reflects typical driver behavior when a given route is perceived to be faster or more reliable than another. Potential effects on queuing and intersection operations from these increases are also considered in Section 3.2.5, Motor Vehicle Operations Impacts.

With the Preferred Alternative, revisions to the roadway network would alter local circulation patterns and access for connecting streets. The effects on queuing and intersection delay in the area are included in the analysis in Section 3.2.5, Motor Vehicle Queuing Impacts.

## Segment A: Inner Portland

To assess potential effects due to circulation changes with the Preferred Alternative, including local neighborhood access and traffic diversion, this Final EIS includes a circulation study for Segment A that was completed in coordination with the City of Portland (see Attachment B – Appendix B20, Segment A Circulation Study, which includes maps of turn movements and travel patterns). The circulation study focused on the area bounded by I-405 to the north, SW Terwilliger Boulevard to the west, I-5 to the east and SW Hamilton Street to the south. This study detailed existing travel patterns in the area and applied future project conditions to predict future travel patterns and the potential changes to neighborhood access, as well as the potential for diversions to local streets.

The Preferred Alternative and the No-Build Alternative would have congestion and delays on major arterials such as SW Barbur Boulevard and SW Naito Parkway. The Preferred Alternative also would have a number of locations along SW Barbur Boulevard where left turns to or from local streets would be allowed. These

conditions would allow for local access to the adjacent neighborhoods, but would also allow some vehicles to divert to local neighborhood streets to avoid congestion and reach major destinations such as downtown Portland, the OHSU complex on Marquam Hill or east Portland via the Ross Island Bridge.

The Preferred Alternative would affect local circulation by restricting or removing left-turn and some right-turn movements between SW Barbur Boulevard and SW Pennoyer Street, SW Bancroft Street, SW Lane Street, SW Condor Street and SW Hooker Street, and by providing a new intersection of SW Barbur Boulevard and SW Naito Parkway. The circulation study identified the potential for increases in traffic on other local streets in the South Portland area, which could also increase delays on local access routes.

The Preferred Alternative includes an inclined elevator connecting from the Gibbs Station on SW Barbur Boulevard up to SW Terwilliger Boulevard, where a new signalized intersection would replace an existing crosswalk at SW Campus Drive. No changes to vehicular circulation are anticipated.

The Preferred Alternative would have some sections that constrain vehicle capacity in Segment A. There are three streets in Segment A where roadway system changes related to the Preferred Alternative are forecasted to shift traffic to other streets compared to the No-Build Alternative:

- **SW Macadam Avenue.** The Preferred Alternative would shift traffic by adding about 3 percent more vehicles in the AM peak hour and 5 percent more in the PM peak hour to northbound SW Macadam Avenue approaching SW Kelly Avenue. The forecasts predict drivers would divert to SW Macadam Avenue as a result of reduced capacity on northbound SW Barbur Boulevard.
- **SW Terwilliger Boulevard.** The Preferred Alternative would shift traffic by adding about 4 percent more vehicles in the AM peak hour and 17 percent more in the PM peak hour to northbound SW Terwilliger Boulevard approaching the intersection with SW Sheridan Street. Model forecasts predict some drivers would shift to SW Terwilliger Boulevard because of access restrictions on northbound SW Barbur Boulevard between SW Pennoyer Street and SW Hooker Street, which would change how some vehicles may circulate in the area.
- **SW Corbett Avenue.** The Preferred Alternative would shift traffic by adding about 240 more vehicles in the AM peak hour and 420 more vehicles in the PM peak hour on southbound SW Corbett Avenue between SW Bancroft Street and SW Hamilton Street. Considering the relatively low traffic volumes on this block of SW Corbett Avenue in the No-Build Alternative, this shift would be a localized increase in traffic during both the AM and PM peak hours, but intersections would still operate acceptably. This predicted shift is the result of the relocation of the southbound left turn at SW Barbur Boulevard and SW Hamilton Street to the intersection of SW Barbur Boulevard and SW Bancroft Street in the Preferred Alternative. Based on the traffic analysis in the Draft EIS, the Preferred Alternative has been designed to include a new signalized intersection at SW Corbett Avenue and SW Hamilton Street to avoid impacts to intersection operations associated with this shift in traffic patterns.

In addition to the traffic shifts listed above, the Preferred Alternative would create the potential for traffic to divert to neighborhood streets in South Portland if drivers seek to avoid congestion. Mitigation is proposed for this impact. See Section 3.6 and Table 3.6-1 for more details.

### ***Segment B: Outer Portland***

In Segment B, the analysis included a review of circulation impacts on the residential areas north and south of SW Barbur Boulevard, between SW Fifth Avenue and SW Brier Place (the Fulton Park area). North of SW Barbur Boulevard, the Preferred Alternative would remove a frontage road along SW Barbur Boulevard from SW Third Avenue and SW Second Avenue, but a new connection would be placed between SW Fourth Avenue and SW Fifth Avenue. About 10 additional vehicles from the neighborhood may use SW Nevada Street or SW Nevada Court as short cuts during peak hours as a result of this change; these streets have unimproved sections, but these added volumes would be low. South of SW Barbur Boulevard, the Preferred Alternative would replace access to SW Miles Street and SW Second Avenue with a new full signal at SW Third Avenue and SW Barbur Boulevard. Traffic in these neighborhoods would remain primarily local, and the study found that there would not be major changes in volumes.

North of the Barbur Transit Center in Segment B, median-running light rail would also restrict left turns to or from SW Barbur Boulevard and minor streets and driveways, although in some sections such turns are already restricted and would continue to be restricted under the No-Build Alternative. This may increase out-of-direction travel for some vehicles, but the Preferred Alternative design would allow U-turns at major signalized intersections to reduce this impact.

### ***Segment C: Tigard and Tualatin***

In Segment C, in both the AM and PM peak periods, overall traffic volumes on major arterials affected by the Preferred Alternative would be similar to traffic volumes with the No-Build Alternative, and circulation patterns would also be similar. There would be slightly more traffic on SW Lower Boones Ferry Road because of trips to the park and ride at the Bridgeport Station. Otherwise, the Preferred Alternative alignment through most of Segment C would involve light rail on new or modified right of way, with light rail crossing individual streets rather than being within them for long sections. This configuration would result in minor changes in circulation, and in some locations, left turns to or from driveways and side streets would be restricted to prevent vehicles from crossing light rail tracks mid-block.

### **Terminus Options**

Overall, traffic volumes and circulation patterns with the terminus options would be similar to those with the Preferred Alternative in Segments A and B. In Segment C, overall traffic volumes and circulation with the terminus options would be similar to those with the No-Build Alternative, except there would be more traffic on SW Hall Boulevard and SW Hunziker Street in the vicinity of the Hall Park and Ride.

### **Related Transportation Improvements**

#### ***Ross Island Bridgehead Reconfiguration***

The Ross Island Bridgehead Reconfiguration would reconfigure and improve function of the U.S. 26/ Pacific Highway interchange immediately west of I-5 and immediately east of the light rail alignment along SW Barbur Boulevard. The Ross Island Bridgehead Reconfiguration was developed and analyzed with the assumption that the Preferred Alternative would also be constructed. It would further modify traffic circulation and volumes in South Portland. In addition to the Preferred Alternative's changes on SW Barbur Boulevard and intersecting streets, the Ross Island Bridgehead Reconfiguration would alter traffic conditions for the following facilities:



- **SW Naito Parkway.** Traffic would decrease by about 35 percent in the AM and PM peak hours on southbound SW Naito Parkway between SW Lincoln Street and SW Porter Street, because the Ross Island Bridgehead Reconfiguration would shift traffic to southbound SW First Avenue. The Preferred Alternative paired with the Ross Island Bridgehead Reconfiguration would reduce southbound SW Naito Parkway traffic south of SW Gibbs Street by about 25 percent during the AM peak hour, because some of the traffic destined for OHSU via either SW Condor Lane or SW Hamilton Terrace would shift to other routes. At this same location, northbound SW Naito Parkway PM peak-hour traffic would increase by about 40 percent, because regional trips would be forced off of routes through residential neighborhoods on SW Kelly Avenue and SW Corbett Avenue and back onto the arterial route (SW Barbur Boulevard and SW Naito Parkway) due to the closure of the SW Kelly Avenue ramp onto the Ross Island Bridge.
- **SW Kelly Avenue.** Northbound traffic on SW Kelly Avenue at SW Water Street would decrease by about 25 percent during the AM and PM peak hours due to the closure of the northbound on-ramp from SW Kelly Avenue onto SW Naito Parkway. Southbound traffic on SW Kelly Avenue would increase by about 400 percent in the AM peak hour and more than 800 percent in the PM peak hour, as intended by the project design, to re-route eastbound Ross Island Bridge traffic onto SW Naito Parkway and out of residential neighborhoods, namely SW First Avenue and SW Corbett Avenue.
- **SW First Avenue.** Southbound traffic would increase on SW First Avenue between SW Lincoln Street and SW Arthur Street by about 20 percent during the AM peak hour and 35 percent during the PM peak hour due to the closure of the southbound SW Naito Parkway access to the eastbound Ross Island Bridge.
- **SW Macadam Avenue.** Traffic would increase by about 15 percent during the AM and PM peak hours on northbound SW Macadam Avenue approaching SW Kelly Avenue, as intended by the project design, which would re-route vehicles traveling between I-5 northbound and then using local streets to connect to U.S. 26 eastbound/the Ross Island Bridge.
- **SW Corbett Avenue.** Northbound traffic on SW Corbett Avenue north of SW Bancroft Street would decrease by about 20 percent during the AM peak hour and 60 percent during the PM peak hour due to the closure of the SW Kelly Avenue ramp onto the eastbound Ross Island Bridge.

Overall, the Ross Island Bridgehead Reconfiguration would alter local circulation by restricting or removing some turn movements and creating new connections in the vicinity of the bridgehead. These changes would be in addition to the South Portland area circulation changes and traffic diversion that could occur with the Preferred Alternative. The mitigation proposed for the Preferred Alternative to address traffic diversion in South Portland would still be required if the Ross Island Bridgehead Reconfiguration were also constructed. The Ross Island Bridgehead Reconfiguration would also remove regional traffic from local streets such as SW Gibbs Street (east of SW Naito Parkway), SW Kelly Street and SW First Avenue, supporting City of Portland plans to encourage more walking, bicycling and transit use in the South Portland area.

### ***Station Access Improvements***

The station access improvements would help encourage riders to access light rail by foot or by bicycle, but would not affect motor vehicle traffic conditions.

### **3.2.2. Public Transportation Impacts**

The impacts analysis for public transportation focuses on transit operations and performance, looking at the full length of the corridor. This analysis considers the operations and performance of the light rail investment as part of the Preferred Alternative. Chapter 2 describes how the Preferred Alternative is configured, and Appendix A provides a description and maps of the supporting bus networks. Only the public transportation impacts of the No-Build Alternative, Preferred Alternative and terminus options are discussed here, because the related transportation improvements would have no direct public transportation impacts. No public transportation mitigation measures are proposed.

#### **Service Levels**

The No-Build Alternative would not have light rail service in the majority of the corridor, except for the northernmost end of the corridor near downtown Portland. The Final EIS analysis of the Preferred Alternative assumes light rail would operate at a baseline service of 15-minute frequencies all day, seven days a week. More frequent service would be provided between downtown Portland and Tigard during weekdays to meet higher future travel demand during AM and PM peak travel periods, with the growth in future travel demand being driven by the growth in population and employment in the corridor through 2035. The travel demand modeling used in this analysis is based on the forecasted 2035 ridership demand, which is anticipated to require 7.5-minute peak service frequencies to prevent overcrowding. See Attachment A for more detail on travel demand and ridership forecasts.

Multiple bus lines serving the corridor would be improved by 2035 under both the No-Build Alternative and the Preferred Alternative, including by providing more frequent service, upgrading from peak-only to all-day service and extending routes to serve additional areas (see Appendix A for information about specific bus lines). The overall amount of transit service in the corridor would be higher for the Preferred Alternative than the No-Build Alternative (see Attachment A for detailed information).

#### **Travel Time**

Compared to the No-Build Alternative, in 2035 the Preferred Alternative would reduce the PM peak-hour travel time for transit vehicles from Portland State University to Bridgeport Village from 38 minutes (via TriMet Line 96 Tualatin Express bus) to 30 minutes (via light rail).

#### **Reliability**

Light rail lines in the TriMet system use reserved or exclusive right of way and exhibit greater percentages of on-time arrivals than do buses operating in mixed traffic. With the Preferred Alternative, there would be 11 miles of exclusive or reserved transit right of way. The benefits of this increased reliability for transit patrons can be measured in terms of use, with an estimated 227,996 weekday passenger miles of travel occurring by 2035, of which 49 percent would occur in that exclusive right of way. The Preferred Alternative features a shared transitway for buses and light rail on SW Barbur Boulevard from south of SW Hamilton Street to downtown Portland. This shared transitway would allow bus Lines 44 and 56 to avoid congestion and improve travel times and reliability.

## Projected Light Rail Ridership by Line

The light rail ridership presented in Table 3.2-2 below includes 2035 forecast average weekday boardings for the light rail lines in the TriMet system for both the No-Build Alternative and the Preferred Alternative. RTP projects and planned transit system changes are included as baseline assumptions for this analysis (see Appendix A for more details). While the COVID-19 pandemic has resulted in economic, societal and transportation demand changes currently, the long-term demand for transit through 2035 is still anticipated to increase as the region grows, particularly given the limited capacity for growth in auto trips.

**Table 3.2-2. Average Weekday Light Rail Ridership and Peak Load – Year 2035**

Measure	No-Build Alternative	Preferred Alternative	UBF Terminus Option	Hall Terminus Option
<b>Light Rail Ridership</b>				
Southwest Corridor Light Rail Project	N/A	37,500	31,800	29,300
Portland-Milwaukie MAX (Orange Line)	23,000	23,000	23,100	23,200
East-West MAX (Blue Line) Eastside	60,700	59,300	59,800	59,900
East-West MAX (Blue Line) Westside	59,400	59,900	59,500	59,500
Airport MAX (Red Line) Eastside	28,100	27,300	27,500	27,500
Airport MAX (Red Line) Westside	23,500	23,400	23,300	23,300
I-205 MAX (Green Line)	53,800	59,800	58,900	59,200
Interstate MAX (Yellow Line)	41,000	41,400	41,300	41,300
<b>PM, Peak-Hour, Peak-Direction, Peak-Load Point</b>				
Southwest Corridor Light Rail Project	N/A	1,980	1,630	1,560
Portland-Milwaukie MAX (Orange Line)	1,910	1,900	1,900	1,900
East-West MAX (Blue Line) Eastside	2,740	2,710	2,710	2,700
East-West MAX (Blue Line) Westside	2,760	2,770	2,740	2,740
Airport MAX (Red Line) Eastside	550	560	550	550
Airport MAX (Red Line) Westside	790	790	780	780
I-205 MAX (Green Line)	2,440	2,590	2,570	2,570
Interstate MAX (Yellow Line)	1,720	1,750	1,750	1,750

Source: *Transit Impacts and Travel Demand Forecasting Results Report* (Attachment A).

Note: I-205 = Interstate 205; MAX = Metropolitan Area Express; N/A = not applicable; UBF = Upper Boones Ferry.

In addition to average weekday total boardings, Table 3.2-2 provides peak load point information for each light rail line. The peak load point is the location along the line with the highest projected ridership in the peak direction in the peak hour, and it determines the frequency of service needed to accommodate demand. Peak load points on all light rail lines in the TriMet system are close to downtown Portland. The peak load point of the Preferred Alternative would occur just south of the Gibbs Station.

Most existing MAX light rail lines would experience changes in ridership with the introduction of the Project. Ridership on the I-205 MAX (Green Line) is projected to increase by approximately 11 percent, which would be the highest change in the system. This increased ridership on the Green Line would occur in part because riders using the Green Line to travel to and from the Southwest Corridor would not need to transfer. Ridership is projected to decrease slightly on several other lines (see Table 3.2-2).

## Corridor and Total System-Wide Ridership

With the Preferred Alternative, total transit ridership in the corridor, including riders on light rail, buses and commuter rail, would be 9 percent higher than with the No-Build Alternative (see Table 3.2-3). Total system-wide transit ridership with the Preferred Alternative would increase over the No-Build Alternative by 22,200 average weekday trips, for a total estimate of 586,700 average weekday transit trips.

**Table 3.2-3. Average Weekday Total System-Wide and Southwest Corridor Transit Trips – Year 2035**

Measure	Existing (2015)	No-Build Alternative	Preferred Alternative	UBF Terminus Option	Hall Terminus Option
Total corridor transit trips (originating rides)	136,700	229,200	249,500	247,400	245,800
Change from existing	N/A	92,500	112,800	110,700	109,100
Percentage change from existing	N/A	68%	83%	81%	80%
Change from No-Build	N/A	N/A	20,300	18,200	16,600
Percentage change from No-Build	N/A	N/A	9%	8%	7%
Total system-wide transit trips	317,500	564,500	586,700	584,300	582,600

Source: *Transit Impacts and Travel Demand Forecasting Results Report* (Attachment A).

Note: N/A = Not Applicable; UBF = Upper Boones Ferry.

## Transit Trip Productions

Figure 3.2-1 shows the change in transit trip productions (i.e., where trips originate) for the Preferred Alternative compared to the No-Build Alternative. The map shows where the number of transit trips produced would increase with the Project, and where the number of transit trips produced would decrease.

The ridership forecasts were prepared using Metro’s regional travel demand model, which divides the region into more than 2,000 geographic units known as transportation analysis zones (TAZs). The project corridor includes 180 TAZs. Of these, 112 would see an increase of more than 20 average weekday transit trips compared to the No-Build Alternative, for a total of 12,530 additional transit trips with the Preferred Alternative. No TAZs in the corridor would see decreases of more than five transit trips. In addition to corridor zones, 106 zones outside of the corridor would gain more than 20 transit trips each, for a total of 4,470 new transit trips. In general, the increase in transit trips would be a result of improvements in travel times and accessibility with the proposed light rail line. Increases in transit trips for certain TAZs may also be the result of modifications that are assumed would occur to local bus service with the Preferred Alternative (bus routing changes are described in both Appendix A and Attachment A). TriMet would make final bus service decisions before implementation of light rail in the corridor.

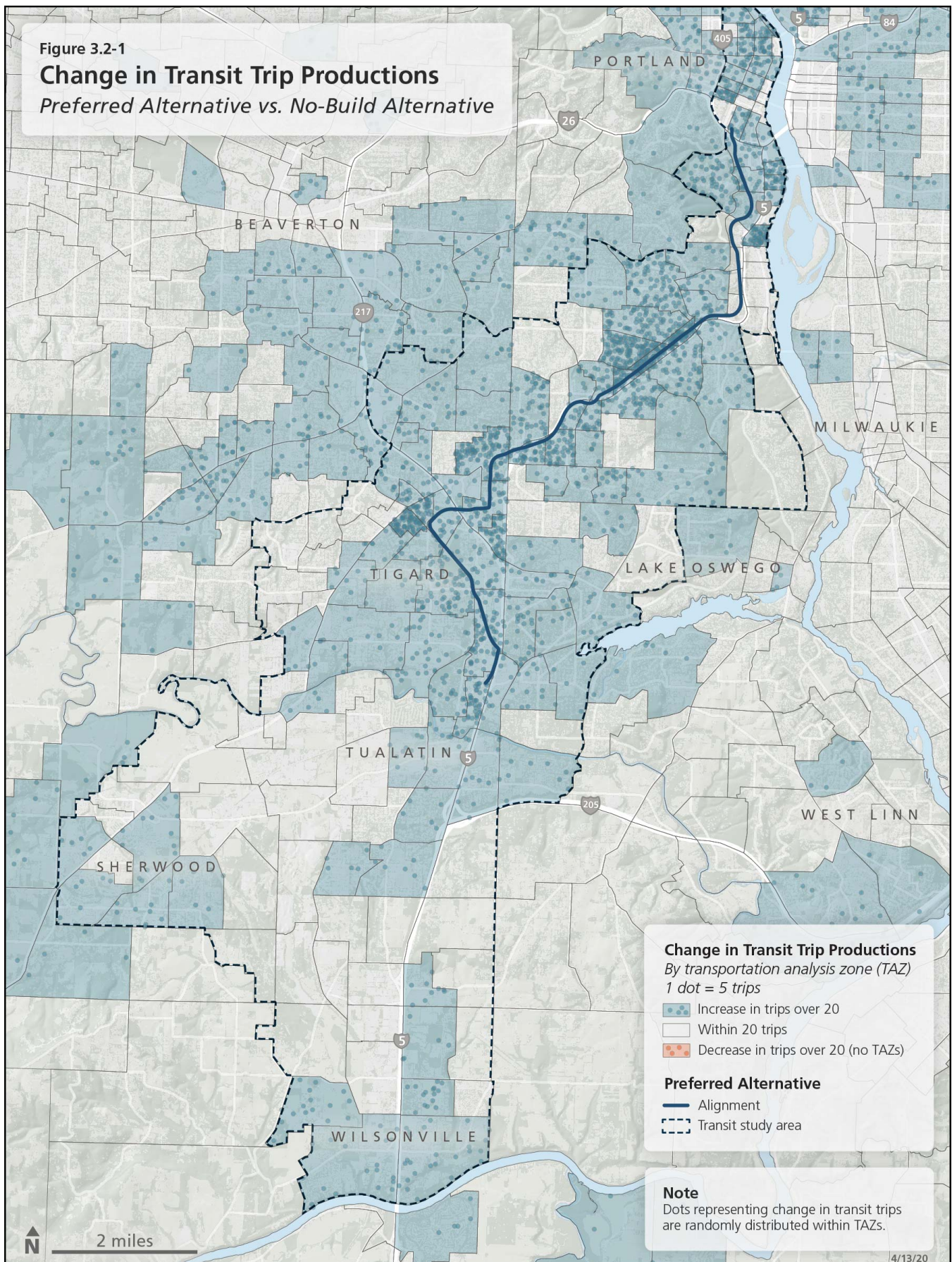
## Work and Non-Work Transit Trips and Mode Share

Table 3.2-4 shows corridor transit trips and transit mode share (percentage of total trips using transit) for trips either produced in the Southwest Corridor and destined to the Portland central business district (CBD) or vice versa. It shows work and non-work trips separately and then combined. The CBD is projected to have nearly 90,000 jobs in 2035, accounting for 28 percent of the jobs in the corridor. The transit service improvements due to the Preferred Alternative would result in more trips by transit for both home-based work and non-work trips than the No-Build Alternative. The Preferred Alternative would support the City of Portland’s citywide goal of increasing the share of travel by transit to 25 percent by 2035.



Figure 3.2-1

## Change in Transit Trip Productions Preferred Alternative vs. No-Build Alternative





**Table 3.2-4. Average Weekday Work and Non-Work Corridor Transit Trips and Transit Mode Share to or from the Portland Central Business District – Year 2035**

Measure	Existing (2015)	No-Build Alternative	Preferred Alternative	UBF Terminus Option	Hall Terminus Option
<b>Home-Based Work<sup>1</sup></b>					
Transit trips	5,950	10,100	11,120	10,900	10,840
Total trips	16,120	21,990	21,990	21,990	21,990
Transit mode share	37%	46%	51%	50%	49%
<b>Non-Work<sup>2</sup></b>					
Transit trips	5,040	10,520	11,870	11,730	11,590
Total trips	48,950	67,360	67,360	67,360	67,360
Transit mode share	10%	16%	18%	17%	17%
<b>Total</b>					
Transit trips	10,990	20,620	22,990	22,630	22,440
Total trips	65,080	89,350	89,350	89,350	89,350
Transit mode share	17%	23%	26%	25%	25%

Source: *Transit Impacts and Travel Demand Forecasting Results Report* (Attachment A).

Note: UBF = Upper Boones Ferry.

<sup>1</sup> Home-based work trips are defined as trips taken directly between one's home and one's place of work.

<sup>2</sup> Non-work trips are defined as all trips that are not home-based work trips.

## Station Usage

The most frequently used station with the Preferred Alternative would be the Bridgeport Station, which would account for 16 percent of the total corridor light rail on-and-off activity. Approximately half of the trips at the Bridgeport Station would be transfers from bus, and the remaining trips would be closely split between walk and auto access. The Gibbs Station in Portland, where riders could access the Marquam Hill Connection, is forecast to have 12 percent of the total corridor light rail on-and-off activity, making it the second busiest station with the Preferred Alternative. Nearly all of the trips at the Gibbs Station, 98 percent, would be walk access trips. Station-level on-and-off activity and the related access mode for the Preferred Alternative are included in Table 3.3-4 in Attachment A.

## Terminus Options

On an average weekday in 2035, the Upper Boones Ferry Terminus Option is projected to have 31,800 line riders and 19,800 more system transit trips than the No-Build Alternative. This would be 5,700 fewer line riders and 2,100 fewer new system transit trips than the Preferred Alternative. On an average weekday in 2035, the Hall Terminus Option is projected to have 29,300 line riders and 18,100 more system transit trips than the No-Build Alternative. This would be 8,200 fewer line riders and 3,700 fewer new system transit trips than the Preferred Alternative.

Compared to the Preferred Alternative, both terminus options would have added auto access trips at the Hall Station because the alignment would not connect to the Bridgeport Station and park and ride, and the existing park and ride at the Bridgeport Station would not be reconstructed as a structure with additional capacity. Both terminus options would have added transfer trips at the Barbur Transit Center Station as a result of changes in the background transit network, as described in both Appendix A and Attachment A. Station-level on-and-off activity and the related access mode for the terminus options are included in Attachment A.

### 3.2.3. Active Transportation Impacts

The following section compares the active transportation impacts of the Project with the No-Build Alternative. Overall, the Project would improve pedestrian crossing opportunities and close gaps in the bicycle and pedestrian networks. No active transportation mitigation measures are proposed.

#### No-Build Alternative

With the No-Build Alternative, pedestrian and bicycle activity would likely increase given the forecasted residential and employment growth in the corridor. RTP projects would result in limited improvements to pedestrian and bicycle facilities, mainly in Segment C. The lack of corridor-wide investments to improve facilities and address existing gaps would constrain growth in pedestrian and bicycle activity.

#### Preferred Alternative

The Preferred Alternative would include new or improved pedestrian and bicycle facilities in all three segments. “Improved” means an existing facility would be widened, users would be further separated from vehicle traffic, or other enhancements that improve user comfort and safety would be implemented. In general, improvements would be the following in each segment:

- **Segment A: Inner Portland.** In Segment A near downtown Portland, the Preferred Alternative would include 10-foot-wide sidewalks and 8-foot-wide buffered bicycle lanes south to the intersection of SW Naito Parkway and SW Barbur Boulevard. For most of the remainder of Segment A, the Preferred Alternative would include a 20-foot-wide combined sidewalk, landscaping and raised protected bicycle lane on both sides of SW Barbur Boulevard. This would create continuous sidewalks that meet current city and ADA standards. Widening bicycle facilities to increase separation from traffic would improve user comfort and safety. Intersection improvements would also benefit bicyclists and pedestrians. A new accessible pedestrian connection from SW Barbur Boulevard to SW Gibbs Street would be added.
- **Segment B: Outer Portland.** Much of the existing SW Barbur Boulevard through Segment B has 5- to 6-foot-wide bicycle lanes and 5- to 10-foot-wide sidewalks, with gaps. The Preferred Alternative would improve these facilities with a continuous 20-foot-wide combined sidewalk, landscaping and raised protected bicycle lane in both directions on SW Barbur Boulevard as far south as the Barbur Transit Center, which would improve user comfort and safety. South of the Barbur Transit Center, the Preferred Alternative would generally include a 12-foot-wide sidewalk on both sides of the road and 6- to 8-foot-wide bicycle lanes. Intersection improvements throughout Segment B would also benefit bicyclists and pedestrians. The Preferred Alternative would improve SW 53rd Avenue to include sidewalks and lighting, improving travel time and access for nonmotorized transportation.
- **Segment C: Tigard and Tualatin.** In Segment C, where the alignment would be along or adjacent to existing streets, the Preferred Alternative would include new or improved sidewalks and bicycle facilities. Intersection improvements would also benefit bicyclists and pedestrians.

The Preferred Alternative’s pedestrian and bicycle facilities would fill existing gaps and improve the corridor to meet current standards, which in turn would make areas along the corridor and near light rail stations better able to safely accommodate projected increases in pedestrian and bike activity.

Compared to the No-Build Alternative, the Preferred Alternative would increase the number of marked crossings in all segments and reduce the risk of unsafe crossings that result from the current long distance between marked crosswalks. The Preferred Alternative would also add curb ramps that are compliant with the ADA. Many locations would also feature improved intersections and new signals, increasing crossing safety. Locations where bicycles would cross the light rail tracks would be designed to minimize the risk of bicycle tires getting caught in the trackway.

OHSU and other facilities on Marquam Hill are a major concentration of employment and medical services for the Portland metropolitan area. The Preferred Alternative includes the Marquam Hill Connection, which would enhance pedestrian access between South Portland and Marquam Hill by constructing a new inclined elevator between SW Barbur Boulevard and SW Terwilliger Boulevard near the Gibbs Station. See Chapter 2 for more details on this connection.

### **Terminus Options**

The terminus options would generally include the same active transportation improvements as the Preferred Alternative. The Upper Boones Ferry Terminus Option would not rebuild as many of the sidewalks around the Upper Boones Ferry Station, because it would not require regrading of SW Upper Boones Ferry Road to accommodate a track crossing. The Hall Terminus Option would not rebuild any sidewalks at SW Upper Boones Ferry Road, SW 72nd Avenue or SW Bonita Road, because it would not cross these streets. Neither terminus option would include active transportation improvements at Bridgeport Village, including an overcrossing of SW Lower Boones Ferry Road. Transit-related pedestrian activity at Bridgeport Village and near TriMet's existing Tualatin Park and Ride would be similar to or lower than the No-Build Alternative for both terminus options.

### **Related Transportation Improvements**

#### ***Ross Island Bridgehead Reconfiguration***

The Ross Island Bridgehead Reconfiguration would modify connections and circulation between SW Naito Parkway and streets leading to the Ross Island Bridge, and would improve pedestrian and bicycle travel and safety by introducing new signalized intersections and crossings, sidewalks and bicycle facilities (see Chapter 2).

#### ***Station Access Improvements***

In all three segments, the Project includes optional station access improvements featuring a mix of bicycle lanes, sidewalks, marked pedestrian crossings and shared-use bicycle routes, as well as pedestrian bridges over I-5 and a multi-use path on the light rail structure over Highway 217. The station access improvements would increase pedestrian and bicycle trips from neighborhoods to the light rail stations. They would all be designed to meet current standards, including ADA requirements. Most of the station access improvements would intersect with the pedestrian and bicycle facilities improved by the Preferred Alternative, enhancing the overall connectivity of the active transportation networks throughout the Southwest Corridor. Appendix A describes the station access improvements in detail.

### **3.2.4. Motor Vehicle Intersection Operations Impacts**

The analysis of impacts to intersections operations combines regional travel forecasts and traffic analysis and simulation models to predict future conditions in the year 2035 (and 2045 for interstate ramps) for the

No-Build Alternative, the Preferred Alternative, the terminus options and the Ross Island Bridgehead Reconfiguration. The station access improvements would not have significant effects on intersection operations and were therefore not analyzed with these models. Attachment B provides more detail on the types of models that were used and the technical results of this analysis.

The Project's method for assessing impacts to intersection operations is based on mobility targets that are determined by the operating jurisdiction or agency, typically using V/C measures. Mobility targets from five operating jurisdictions or agencies apply to the study area intersections; the controlling jurisdiction's standard is applied to each intersection. For more information about where an agency's mobility targets apply, see Attachment B. When intersections are operating below targets, delays increase as cars wait through multiple signal cycles to pass through an intersection. An intersection that operates at the mobility target specified is considered to meet that target.

Traffic operations were assessed at specific intersections throughout the Southwest Corridor; low-traffic or minor intersections are not considered for mitigation. Mobility targets are used to determine whether mitigation may be needed based on the following considerations:

- If the V/C ratio with the Project exceeds the mobility target for a given intersection, mitigation may be required; however, if the No-Build Alternative and the Project both exceed mobility targets, mitigation is required only if the Project is significantly worse (greater than 0.03 degradation in V/C ratio at ODOT ramp terminals or greater than 0.05 at all other intersections) than the No-Build Alternative.
- If the Project improves operations relative to the No-Build Alternative but still does not meet mobility targets, no mitigation is required.

The City of Portland Bureau of Transportation (PBOT) mobility targets are used for the mainline of SW Barbur Boulevard, because the City of Portland and ODOT are expected to complete a jurisdictional transfer of the roadway from ODOT to Portland prior to the 2035 forecast year used for most of the analysis.

Table 3.2-5 shows the mobility performance for certain intersections in the study area that would not meet mobility targets in 2035 under the No-Build Alternative, the Preferred Alternative, the terminus options or the scenario of the Preferred Alternative with the Ross Island Bridgehead Reconfiguration. Section 3.6 identifies the mitigation measures to be implemented with the Project.

**Table 3.2-5. Intersection Operations Not Meeting V/C Mobility Targets – Forecast Year 2035 (*multipage table*)**

Intersection	Mobility Target (V/C Ratio)	No-Build Alternative	Preferred Alternative	Terminus Options	Ross Island Bridgehead Reconfig. <sup>1</sup>	Mitigation Required?
<b>Segment A: Inner Portland</b>						
SW Kelly Ave. and SW Water Ave.	0.99 PBOT 1st hour	1.41 (AM)*, <sup>2</sup> 1.33 (PM)*	1.61 (AM)* 1.03 (PM)*	Same as Preferred Alternative	0.77 (AM) 0.75 (PM)	No. The mitigation criteria are based on overall intersection V/C ratio, but this is an unsignalized intersection where the primary movements would not be impacted by the Preferred Alternative. The Ross Island Bridgehead Reconfiguration would improve operations compared to No-Build.

**Table 3.2-5. Intersection Operations Not Meeting V/C Mobility Targets – Forecast Year 2035 (*multipage table*)**

Intersection	Mobility Target (V/C Ratio)	No-Build Alternative	Preferred Alternative	Terminus Options	Ross Island Bridgehead Reconfig. <sup>1</sup>	Mitigation Required?
Ross Island Bridge access at SW Naito Pkwy. <sup>3</sup>	0.99 ODOT/PBOT 1st hour	1.35 (AM)* 3.09 (PM)*	1.29 (AM)* 2.78 (PM)*	Same as Preferred Alternative	Westbound 0.77 (AM) 0.60 (PM)  Eastbound 0.52 (AM) 0.71 (PM)	No. The Preferred Alternative and Ross Island Bridgehead Reconfiguration would both improve operations compared to No-Build.
Ross Island Bridge access at SW Kelly Ave. ramps	0.99 ODOT/PBOT 1st hour	1.07 (AM)* 4.25 (PM)*	1.10 (AM)* 4.25 (PM)*	Same as Preferred Alternative	0.74 (AM) 1.15 (PM)	No. Preferred Alternative operations would not exceed No-Build operations by >0.03 V/C. The Ross Island Bridgehead Reconfiguration would improve operations compared to No-Build.
SW Corbett Ave. and SW Bancroft St.	0.99 PBOT 1st hour	0.44 (AM)* 1.32 (PM)*	0.34 (AM)* 0.61 (PM)*	Same as Preferred Alternative	0.34 (AM) 0.50 (PM)	No. The Preferred Alternative and Ross Island Bridgehead Reconfiguration would both improve operations compared to No-Build.
SW Corbett Ave. and SW Hamilton St.	0.99 PBOT 1st hour	1.37 (AM)* 1.39 (PM)*	0.73 (AM)* 1.16 (PM)*	Same as Preferred Alternative	0.73 (AM) 1.03 (PM)	No. The Preferred Alternative and Ross Island Bridgehead Reconfiguration would both improve operations compared to No-Build.
<b>Segment B: Outer Portland</b>						
SW Barbur Blvd. and SW Terwilliger Blvd.	0.99 PBOT 1st hour <sup>4</sup>	1.03 (AM) 1.05 (PM)	0.96 (AM) 1.08 (PM)	Same as Preferred Alternative	N/A	No. The Preferred Alternative operations either would improve (AM) or would not exceed No-Build by >0.05 V/C ratio (PM).
SW Barbur Blvd. and SW Bertha Blvd./I-5 ramps	0.85 ODOT ramp	0.93 (AM) 0.84 (PM)	0.93 (AM) 0.81 (PM)	Same as Preferred Alternative	N/A	No. The Preferred Alternative operations would be the same (AM) or would improve (PM) compared to No-Build.
SW Terwilliger Blvd. and I-5 northbound off-ramp	0.85 ODOT ramp	0.67 (AM) 0.87 (PM)	0.65 (AM) 0.85 (PM)	Same as Preferred Alternative	N/A	No. The Preferred Alternative would improve operations compared to No-Build.
SW Barbur Blvd. and SW 19th Ave.	0.99 PBOT 1st hour <sup>4</sup>	0.87 (AM) 0.85 (PM)	1.02 (AM) 1.03 (PM)	Same as Preferred Alternative	N/A	Yes.
SW Barbur Blvd. and SW 22nd Ave.	0.99 PBOT 1st hour <sup>4</sup>	>2 (AM)* >2 (PM)*	0.63(AM) 0.60 (PM)	Same as Preferred Alternative	N/A	No. The Preferred Alternative would improve operations compared to No-Build.
SW Barbur Blvd. and SW 24th Ave./I-5 southbound off-ramp	0.85 ODOT ramp	0.87 (AM) 0.62 (PM)	0.88 (AM) 0.70 (PM)	Same as Preferred Alternative	N/A	No. The Preferred Alternative operations either would not exceed No-Build by >0.03 V/C ratio (AM), or would not exceed mobility target (PM).
SW Barbur Blvd. and SW Taylors Ferry Rd./SW Baird St.	0.99 PBOT 1st hour <sup>4</sup>	1.80 (AM)* 0.82 (PM)*	0.61 (AM) 0.54 (PM)	Same as Preferred Alternative	N/A	No. Preferred Alternative would improve operations compared to No-Build.
SW Barbur Blvd. and SW Taylors Ferry Rd./Barbur Transit Center	0.99 PBOT 1st hour <sup>4</sup>	0.71 (AM) 0.91 (PM)	1.08 (AM) 1.14 (PM)	Same as Preferred Alternative	N/A	Yes.



**Table 3.2-5. Intersection Operations Not Meeting V/C Mobility Targets – Forecast Year 2035 (multipage table)**

Intersection	Mobility Target (V/C Ratio)	No-Build Alternative	Preferred Alternative	Terminus Options	Ross Island Bridgehead Reconfig. <sup>1</sup>	Mitigation Required?
SW Taylors Ferry Rd. and I-5 southbound off-ramp	0.85 ODOT ramp	0.28 (AM)* 1.28 (PM)*	0.31 (AM)* 1.24 (PM)*	Same as Preferred Alternative	N/A	No. The Preferred Alternative operations would not exceed mobility target (AM) or would improve operations compared to No-Build (PM).
SW Taylors Ferry Rd. and SW Capitol Hwy.	0.99 PBOT 1st hour <sup>4</sup>	1.06 (AM) 1.33 (AM)	1.06 (AM) 1.33 (PM)	Same as Preferred Alternative	N/A	No. The Preferred Alternative operations would be the same as No-Build.
<b>Segment C: Tigard and Tualatin</b>						
SW 65th Ave. and SW Haines St./I-5 northbound ramps	0.85 ODOT ramp	0.88 (AM)* 1.04 (PM)*	0.88 (AM)* 1.05 (PM)*	0.93 (AM)* 1.05 (PM)*	N/A	The Preferred Alternative operations would not exceed No-Build by >0.03 V/C ratio. The terminus options would exceed No-Build by >0.03 in the AM peak period. Mitigation is proposed.
SW Upper Boones Ferry Rd. and I-5 northbound ramps	0.85 ODOT ramp	0.88 (PM)	0.88 (PM)	Same as No-Build Alternative	N/A	No. The Preferred Alternative operations would be the same as No-Build.
SW Lower Boones Ferry Rd. and I-5 northbound ramps	0.85 ODOT ramp	0.91 (PM)	0.93 (PM) <sup>5</sup> 0.94 (PM) <sup>6</sup>	Same as No-Build Alternative	N/A	No. The Preferred Alternative operations would not exceed No-Build by >0.03 V/C ratio.
SW Lower Boones Ferry Rd. and P&R access at SW Travelers Ln.	0.99 Wash. County	1.11 (PM)*	0.77 (PM) <sup>5</sup> 0.86 (PM) <sup>6</sup>	Same as No-Build Alternative	N/A	No. The project design incorporates changes that eliminated impacts identified in the Draft EIS.

Note: EIS = Environmental Impact Statement; I-5 = Interstate 5; N/A = not applicable; ODOT = Oregon Department of Transportation; P&R = park and ride; PBOT = City of Portland Bureau of Transportation; V/C = volume-to-capacity.

\* Stop-controlled intersection; V/C ratio for the worst approach is reported.

<sup>1</sup> Modeling of the Ross Island Bridgehead Reconfiguration includes the Preferred Alternative. The Ross Island Bridgehead Reconfiguration would not affect intersection operations in Segments B and C.

<sup>2</sup> "AM" and "PM" refer to the morning (7 a.m. to 9 a.m.) and evening (4 p.m. to 6 p.m.) peak travel periods.

<sup>3</sup> The Ross Island Bridgehead Reconfiguration includes the construction of two new signal-controlled intersections where there is currently one stop-controlled intersection.

<sup>4</sup> SW Barbur Boulevard is currently under ODOT's jurisdiction, but it will be transferred to the City of Portland. The City of Portland's mobility targets were used for this analysis because of this anticipated transfer.

<sup>5</sup> Assumes a 710-space Bridgeport Park and Ride.

<sup>6</sup> Assumes a 960-space Bridgeport Park and Ride.

## No-Build Alternative

In Segment A, the No-Build Alternative would have five intersections that would not meet mobility targets in 2035 (see Table 3.2-5). The worst-performing intersection would operate at a V/C ratio of greater than 4 compared to a target of 0.99.

In Segment B, the No-Build Alternative would have three locations that do not meet mobility targets in 2035 in both the AM peak hour and the PM peak hour; three intersections that would not meet targets in the AM peak hour; and two intersections that would not meet targets in the PM peak hour.

In Segment C, the No-Build Alternative would have four locations that do not meet mobility targets in 2035.

## Preferred Alternative

### *Segment A*

The Preferred Alternative would improve intersection operations at three intersections in both the AM peak (7 a.m. to 9 a.m.) and PM peak (4 p.m. to 6 p.m.), and at one intersection in the PM peak only, relative to the No-Build Alternative. However, mobility targets would not be met at these intersections, except for the intersection of SW Corbett Avenue and SW Bancroft Street. This intersection would not meet mobility targets under the No-Build Alternative, but it would meet the target with the Preferred Alternative.

The intersection of SW Kelly Avenue and SW Water Avenue would be worse with the Preferred Alternative than with the No-Build Alternative in terms of overall V/C ratio. However, this is an unsignalized intersection where the primary movements (along SW Kelly Avenue) would not be impacted by the Preferred Alternative.

In Segment A, intersection operations in the study area under the Preferred Alternative would not require mitigation.

### *Segment B*

With the Preferred Alternative, performance would improve or be the same as the No-Build Alternative at six of the eight intersections in one or both peak hours. Three intersections would improve enough with the Preferred Alternative to meet mobility targets in one or both peak hours due to providing new signals and reconfiguring intersections and turn lanes.

There are two locations in Segment B where the No-Build Alternative would meet operating targets, but the Preferred Alternative would not meet operating targets:

- **SW Barbur Boulevard and SW 19th Avenue (AM).** Estimated pedestrian demand at this intersection is expected to result in a reduced intersection capacity that cannot serve the demand. Mitigation has been identified.
- **SW Barbur Boulevard and SW Taylors Ferry Road (AM).** High pedestrian demand accessing the light rail station along with a heavy volume of left turns from SW Taylors Ferry Road to SW Barbur Boulevard would result in a delay for turning movements at this intersection. Mitigation has been identified.

### *Segment C*

Two scenarios were used in analyzing the impacts of the Bridgeport Park and Ride (710 spaces and 960 spaces) to understand the impacts on intersection operations of different options (see Table 3.2-5).

With the Preferred Alternative, traffic volumes associated with new park and rides at the 68th Station and the Bridgeport Station would contribute to very small increases in the V/C ratio at the intersections of SW 65th Avenue and SW Haines Street/I-5 northbound ramps, and SW Lower Boones Ferry Road and I-5 northbound ramps. The intersection of SW Hall Boulevard and SW Hunziker/SW Scoffins Streets would similarly experience a small decrease in V/C ratio in the AM peak period and a small increase in the PM peak period. However, these small increases would not exceed the mitigation threshold.

In Segment C, intersection operations in the study area with the Preferred Alternative would not require mitigation.

### **Terminus Options**

In Segments A and B, the terminus options would have the same intersection operations as the Preferred Alternative.

In Segment C, both terminus options would degrade intersection performance at the intersection of SW 65th Avenue and SW Haines Street/I-5 northbound ramps. The V/C ratio at this location would increase 0.05 compared to the No-Build Alternative, exceeding the mitigation threshold. Mitigation has been identified.

### **Related Transportation Improvements**

#### ***Ross Island Bridgehead Reconfiguration***

The Ross Island Bridgehead Reconfiguration was analyzed with the assumption that the Preferred Alternative would also be constructed. Compared to the No-Build Alternative, the Ross Island Bridgehead Reconfiguration would improve intersection operations at all five intersections in Segment A that would not meet mobility targets with the No-Build Alternative. Two of these five intersections would continue to exceed the mobility target of 0.99 in the PM peak hour.

#### ***Station Access Improvements***

No impacts are expected related to intersection operations for the station access improvements

### **3.2.5. Motor Vehicle Queuing Impacts**

Three thresholds were used to assess the Project's queuing impacts compared to the No-Build Alternative, and to determine whether the impacts would require mitigation. These three thresholds are:

- queues associated with the Project that would extend out of turn lanes into adjacent through lanes
- queues within the freeway safe stopping distance on ODOT freeway off-ramps that would be more than 25 feet longer with the Project than with the No-Build Alternative
- queues that would result in other motor vehicle operations issues or safety issues

#### **No-Build Alternative**

In Segment A, the No-Build Alternative would result in increased traffic volumes and queuing compared to existing conditions. This would occur at the I-405 northbound on-ramp at SW Sixth Avenue during the AM peak (7 a.m. to 9 a.m.) and would include corresponding impacts to the westbound Ross Island Bridge and northbound SW Barbur Boulevard. During the PM peak (4 p.m. to 6 p.m.), the westbound movement from U.S. 26 near the Ross Island Bridge to U.S. 26 westbound towards the Vista Ridge Tunnel, northbound SW Macadam Avenue, and northbound SW Corbett Avenue at SW Hamilton Street would all experience substantial queuing.

In Segment B, queuing was assessed for the 2035 and 2045 forecast years. and the analysis focused on the I-5 ramps in the vicinity of SW Barbur Boulevard and SW Terwilliger Boulevard, at SW Barbur Boulevard

and SW 24th Avenue, and in the vicinity of SW Barbur Boulevard and SW Capitol Highway (the Crossroads area) in the PM peak hour. Queuing and congestion would stem from capacity constraints at the intersection of SW Terwilliger Boulevard and SW Barbur Boulevard. The congestion would lead to significant queuing on eastbound and westbound SW Barbur Boulevard approaches and the northbound SW Terwilliger Boulevard approach.

In Segment C, queuing along SW Hall Boulevard at the existing WES Commuter Rail crossing could extend beyond the next adjacent intersection (SW Commercial Street) for vehicles traveling southbound in 2035. In both 2035 and 2045 modeled conditions, the queue on the I-5 southbound off-ramp to SW Barbur Boulevard at SW 64th Avenue would extend into the safe stopping sight distance of the ramp in the PM peak period.

In the 2035 AM peak period in the vicinity of SW Upper Boones Ferry Road, queuing would be substantial on the I-5 northbound ramp terminal for the northbound left-turn onto SW Carman Drive/SW Upper Boones Ferry Road. In the PM peak period, queuing would occur along SW Upper Boones Ferry Road in both directions, with westbound traffic queues extending east of the study area. Traffic in both the eastbound and westbound directions would extend across the existing at-grade railroad crossing, and the intersection of SW Upper Boones Ferry Road at SW Durham Road would experience particularly long queues for the eastbound through movement. In 2045, queuing would be similar to the No-Build Alternative in 2035 but with slightly longer queues for most movements.

In the 2035 AM peak period in the vicinity of Bridgeport Village, the intersection of SW 72nd Avenue at SW Lower Boones Ferry Road was analyzed for the No-Build Alternative. At this intersection, the northbound queue would extend beyond the adjacent access and the southbound left-turn to spill out of the storage bay at that intersection. In the PM peak period, the queue would begin to back into adjacent intersections in both directions between SW 72nd Avenue and SW 65th Avenue. In 2045, queuing would be comparable to the No-Build Alternative in 2035; however, there would be a significant increase in queuing on the I-5 northbound off-ramp, where the queue would extend onto the interstate mainline.

## **Preferred Alternative**

### ***Segment A – 2035 Forecast Year AM Peak***

In the AM peak period, the Preferred Alternative would generally improve conditions compared to the No-Build Alternative. The Preferred Alternative includes measures to mitigate queuing and delay impacts previously identified in the Draft EIS. The total motor vehicle delay would decrease by about 18 percent, and the percentage of trips that are unable to enter the network due to congestion would be reduced.

The Preferred Alternative would change queuing compared to the No-Build Alternative at the following key locations in Segment A:

- **Northbound SW Corbett Avenue at the northbound I-5 off-ramp.** The queuing at this location would significantly improve due to the new signal at the intersection of SW Corbett Avenue and SW Hamilton Street.
- **Westbound SE Powell Boulevard at SE Milwaukie Avenue.** The queuing at this location would improve due the benefits gained from reducing northbound left turns at SW Barbur Boulevard and SW Caruthers Street. Westbound queues from the SW Barbur Boulevard and SW Caruthers Street

intersection currently extend back to the Ross Island Bridge and can create long vehicle queues that extend back to the east side of the river. The northbound left turns at SW Barbur Boulevard and SW Caruthers Street reduce the efficiency of the westbound U.S. 26 movement. Because the Preferred Alternative would reduce these northbound left turns, it would increase the efficiency of the westbound U.S. 26 movement, with benefits extending back across the Ross Island Bridge and onto westbound SE Powell Boulevard.

- **Northbound SW Macadam Avenue at SW Curry Street.** Queuing would degrade due to some drivers avoiding northbound SW Barbur Boulevard by exiting I-5 at this location, as opposed to exiting at the Terwilliger or Corbett exits. This change would not trigger mitigation, because queuing would not exceed the available vehicle storage. Queuing would also increase on the I-5 northbound off-ramp but would be contained within the safe sight stopping distance of the off-ramp, and therefore mitigation is not proposed.
- **I-405 northbound off-ramp at SW Sixth Avenue and SW Jackson Street.** The queuing at this location would extend into the safe stopping distance of the I-405 off-ramp. This impact would be due to the pedestrian signal that would be constructed at the intersection of SW Jackson Street and SW Sixth Avenue, as well as queue spillback from the SW College Street and SW Sixth Avenue intersection. Mitigation is proposed for this impact.
- **Northbound SW Barbur Boulevard between SW Capitol Highway (in the Woods area) and SW Naito Parkway.** The queuing on this segment would increase due to added signals and reduction from a three-lane to a two-lane section for northbound auto traffic. However, mitigation is not proposed because the queuing would be in the through lanes and not caused by vehicle queues extending out of turn lanes into the travel lanes.
- **Eastbound SW Capitol Highway at SW Barbur Boulevard (in the Woods area).** Queuing would increase on eastbound SW Capitol Highway due to spillback from northbound queuing on SW Barbur Boulevard. Mitigation is not proposed because the queuing would be in the through lanes and not caused by vehicle queues extending out of turn lanes into travel lanes.

#### ***Segment A – 2035 Forecast Year PM Peak***

The modeled network performance of the Preferred Alternative is similar to that of the No-Build Alternative for the PM peak period in 2035. The total number of vehicles served, total vehicle delay and the percentage of trips that are unable to enter the network due to congestion would be virtually the same for the two alternatives.

The Preferred Alternative would change queuing compared to the No-Build Alternative at the following key locations:

- **Northbound SW Terwilliger Boulevard at SW Sheridan Street.** The northbound queues would increase at this location due to increased demand on SW Terwilliger Boulevard from some traffic that would avoid SW Barbur Boulevard (see Section 3.2.1). This traffic previously used lower classification streets such as SW Condor Lane and SW Hamilton Terrace. However, shifting regional traffic off these local streets is a project benefit. No mitigation is proposed for this location.



- **Southbound left turn from SW Barbur Boulevard to SW Hooker Street.** The queuing for this movement at the new signal would occasionally extend up SW Barbur Boulevard. This would impact eastbound SW Sheridan Street when multiple light rail trains pass through the intersection in a short time frame. Mitigation is proposed for this impact.
- **Eastbound SW Hamilton Street at SW Barbur Boulevard.** Queuing would degrade at this location because adding light rail to the intersection would reduce the amount of signal “green time” allocated to traffic crossing SW Barbur Boulevard. This impact would not meet the mitigation threshold, and no mitigation is proposed.

### ***Segment A – 2045 Forecast Year***

Along with the analysis for 2035, the intersections at the I-405 ramp terminals at SW Fourth Avenue and SW Sixth Avenue were analyzed for the 2045 forecast year to be consistent with FHWA and ODOT requirements for managing interstates, looking 20 years from the date of project opening. The 2045 ramp terminal analysis showed no queuing differences between the 2035 and 2045 Preferred Alternative conditions, because the changes in demand for the I-405 ramps into downtown Portland would not change enough to impact the queues. Therefore, the queuing results from the 2035 Segment A analysis were used to identify the need for mitigation at these ramp locations.

### ***Segment B – 2045 Forecast Year***

The queuing assessment in Segment B focused on the 2045 PM peak period at I-5 ramp intersections on SW Barbur Boulevard at the following intersections: SW Terwilliger Boulevard, SW 24th Avenue, and in the vicinity of SW Capitol Highway (the Crossroads area). Data collection during the Draft EIS indicated that the PM peak period experiences the greatest queuing issues at these locations.

At the southbound off-ramp from I-5 at the Terwilliger exit, the existing northbound auxiliary lane on SW Barbur Boulevard between SW Bertha Boulevard and SW Terwilliger Boulevard is important to preventing excessive queuing. The Preferred Alternative would retain this auxiliary lane, and highway off-ramp queues would be shorter than those with the No-Build Alternative. However, ODOT and PBOT have permitting authority in this ramp location, and the Project would still be required to meet their permitting conditions, which would include operating, safety and design standards.

At the SW 24th Avenue off-ramp, the queues with both the No-Build Alternative and the Preferred Alternative would extend into the safe stopping distance. The Preferred Alternative queue would be slightly longer (10 feet) than the No-Build Alternative queue; however, no mitigation is proposed, because this queue length is less than the mitigation threshold. ODOT and PBOT have permitting authority in this ramp location, and the Project would still be required to meet their permitting conditions, which would include operating, safety and design standards.

In the Crossroads area, the I-5 southbound off-ramp queue would exceed the ramp length with the No-Build Alternative, causing vehicles to back on to the mainline of I-5, which is a safety concern. The queue with the Preferred Alternative would be slightly shorter than the queue with the No-Build Alternative as a result of reduced demand associated with the reduction in parking capacity at the Barbur Transit Center park and ride compared to the No-Build Alternative. The off-ramp intersection at SW Taylors Ferry Road and the adjacent intersection of SW Capitol Highway and SW Taylors Ferry Road both would operate above capacity

for the No-Build Alternative and the Preferred Alternative. Because the Preferred Alternative would not worsen queuing compared to the No-Build Alternative, mitigation is not proposed.

### ***Segment C – 2035 Forecast Year***

Intersections where I-5 ramps intersect with the local street system were analyzed using 2035 modeled traffic. The Preferred Alternative would have the following queuing impacts in Segment C:

- **Exit 294 off-ramp.** Both the No-Build Alternative and the Preferred Alternative would result in southbound queues on the exit ramp at Exit 294 from southbound I-5 to Pacific Highway of approximately 1,130 feet, which would impact the safe stopping distance on the interstate during the PM peak. This is a safety concern, but it would not trigger mitigation, because the Preferred Alternative would not worsen the queues compared to the No-Build Alternative.
- **SW 72nd Avenue at SW Elmhurst Street.** The Preferred Alternative would extend northbound and southbound queues on SW 72nd Avenue at the new gated crossing near SW Elmhurst Street during the PM peak. Mitigation is not proposed, because the queue impacts would not cause a motor vehicle operations problem.
- **SW Hunziker Street at the Hall Park and Ride.** The Preferred Alternative would increase westbound queues and vehicle delay during the PM peak on SW Hunziker Street in the vicinity of the Hall Park and Ride compared to the No-Build Alternative. Mitigation is not proposed, because the queues would not cause a safety or operational concern.
- **SW Upper Boones Ferry Road and southbound I-5 off-ramp.** Both the No-Build Alternative and the Preferred Alternative would result in AM and PM peak period queues on SW Upper Boones Ferry Road and the I-5 ramp near the intersection with SW 72nd Avenue. Queues would start at the SW 72nd Avenue (north) traffic signal and extend across the existing heavy rail tracks. With the Preferred Alternative, during peak periods, queues would extend across both the heavy rail tracks and the light rail tracks. These queues could extend to the I-5 southbound off-ramps when light rail train cross SW Upper Boones Ferry Road frequently. The level of impact would depend on the time between light rail trains crossing the road, which could be variable depending on operations. When a light rail train crosses the intersection, it will increase queuing. If a second light rail train passes too soon after the first, queuing impacts would worsen. Mitigation is proposed for this impact.
- **SW Lower Boones Ferry Road and northbound I-5 off-ramp.** The Preferred Alternative, assuming a 710-space Bridgeport Park and Ride, would extend PM peak period queues on the I-5 northbound ramp at SW Lower Boones Ferry Road, but the queues would not impact I-5 operations in 2035. Mitigation is not proposed, because the queuing would not impact the safe stopping distance on the exit ramp.

The Preferred Alternative, assuming a 960-space Bridgeport Park and Ride, would extend PM peak period queues on the I-5 northbound ramp at SW Lower Boones Ferry Road enough to impact the safe stopping distance from the interstate in 2035. Mitigation is proposed for this impact.

### ***Segment C – 2045 Forecast Year***

The 2045 ramp terminal analysis for Segment C showed no differences in queuing impacts between the 2035 and 2045 Preferred Alternative, because there would be minimal changes in demand at the I-5 ramps, with the exception of the vicinity of the terminus at the Bridgeport Station. The 2045 analysis shows:

- **SW Lower Boones Ferry Road and northbound I-5 off-ramp.** The Preferred Alternative, assuming a 710-space Bridgeport Park and Ride, would extend PM peak period queues on the I-5 northbound ramp at SW Lower Boones Ferry Road enough to impact the safe stopping distance from the interstate in 2045. Mitigation is proposed for this impact.

The Preferred Alternative, assuming a 960-space Bridgeport Park and Ride, would extend PM peak period queues on the I-5 northbound ramp at SW Lower Boones Ferry Road to the interstate mainline in 2045. Mitigation is proposed for this impact.

## **Terminus Options**

Queuing conditions with the terminus options would be the same in Segments A and B as with the Preferred Alternative. Segment C queuing with the terminus options would be similar to the Preferred Alternative at the Exit 294 off-ramp, SW 72nd Avenue at SW Elmhurst Street, and SW Hunziker Street at the Hall Park and Ride. Segment C queuing with the terminus options would be similar to No-Build Alternative conditions at the southbound I-5 off-ramp at SW Upper Boones Ferry Road and at the northbound I-5 off-ramp at SW Lower Boones Ferry Road.

## **Related Transportation Improvements**

### ***Ross Island Bridgehead Reconfiguration – 2035 Forecast Year AM Peak***

The Ross Island Bridgehead Reconfiguration was analyzed with the assumption that the Preferred Alternative would also be constructed. The modeled network performance for the AM peak period with the Ross Island Bridgehead Reconfiguration would generally improve compared to both the stand-alone Preferred Alternative and the No-Build Alternative. The total motor vehicle delay would be similar to the No-Build Alternative, because the congestion-reduction benefits of the bridgehead design would be offset by added delay resulting from several new signals. Compared to the No-Build Alternative conditions, the percentage of trips that would be unable to enter the network due to congestion would be very slightly reduced, while the net throughput on the Ross Island Bridge would increase by about 5 percent. There are no locations where AM peak-period queuing for the Preferred Alternative with the Ross Island Bridgehead Reconfiguration would require mitigation. However, ODOT and the City of Portland coordination during final design would further assess operational measures to prevent the Ross Island Bridgehead Reconfiguration from worsening system queue backups on surrounding street network, which under the No-Build Alternative extend back to I-5 and I-405 during peak periods. See Attachment B for more details.

### ***Ross Island Bridgehead Reconfiguration – 2035 Forecast Year PM Peak***

The PM peak-period performance of the Ross Island Bridgehead Reconfiguration (with the Preferred Alternative in place) would generally improve conditions compared to both the Preferred Alternative and the No-Build Alternative because it would address additional congestion points adjacent to the areas improved by the Preferred Alternative. The total motor vehicle delay would decrease by about 9 percent compared to the No-Build Alternative conditions. The share of trips that are unable to enter the network due to congestion would be very slightly reduced, while the net throughput on the Ross Island Bridge would increase by about 1 percent.

The Ross Island Bridgehead Reconfiguration would impact PM queuing compared to the No-Build Alternative at the following key locations:

- **Northbound SW Terwilliger Boulevard at SW Sheridan Street.** The queues at this location would increase slightly over the No-Build Alternative, but the mitigation threshold would not be reached, and no mitigation would be required.
- **Southbound left turn from SW First Avenue onto SW Arthur Street.** The queue for this movement would exceed the storage length of the left-turn lane, causing a safety concern. Mitigation is proposed for this impact.
- **Westbound SW Macadam Avenue at SW Kelly Avenue.** Queuing at this location would exceed that of both the Preferred Alternative and the No-Build Alternative due to the new signal. Intersection modifications that allow for a short signal cycle length would alleviate the queuing issue. Mitigation is proposed for this impact.
- **Northbound left turn at SW Naito Parkway and SW Sheridan Street.** Westbound SW Sheridan Street would experience queuing between SW First Avenue and SW Naito Parkway. Northbound left-turn queues at SW Naito Parkway and SW Sheridan Street would exceed the storage length of the left-turn lane, ultimately impacting operations at the westbound Ross Island Bridge connection to SW Naito Parkway. Mitigation is proposed for this impact.
- **Westbound SE Powell Boulevard.** The queues on westbound SE Powell Boulevard would increase compared to the No-Build Alternative conditions due to increased demand caused by queue spillback from new signals. This increase in queuing does not meet the criteria for mitigation, but it could be improved with adaptive signal timing included in the final design for both the westbound U.S. 26 movement and westbound Ross Island Bridge to northbound SW Naito Parkway.

#### ***Ross Island Bridgehead Reconfiguration – 2045 Forecast Year***

No 2045 travel demand modeling was performed for the Ross Island Bridgehead Reconfiguration, but the 2035 travel demand modeling did not indicate changes in demand at either the SW Fourth Avenue or SW Sixth Avenue off-ramps between the Preferred Alternative and the Ross Island Bridgehead Reconfiguration. Therefore, the Ross Island Bridgehead Reconfiguration ramp queuing results for the I-405 off-ramps at SW Fourth and SW Sixth Avenues are assumed to be identical to the Preferred Alternative results.

#### ***Station Access Improvements***

No impacts are expected related to motor vehicle queuing for the station access improvements.

### **3.2.6. Parking Impacts**

Parking impact analysis focused on on-street parking immediately along the light rail alignment and on the streets affected by the Ross Island Bridgehead Reconfiguration. Parking surveys were conducted in 2017 and updated based on desk review of recent aerial photography in 2020. The assessment of impacts considered where on-street parking may be removed as a result of the Project.

## No-Build Alternative

With the No-Build Alternative, there would be no substantial change to the on-street parking supply. However, demand for parking would be expected to increase, particularly if there are no major transit improvements and people remain reliant on automobiles for travel.

## Preferred Alternative

In Segment A, 24 on-street parking spaces on SW Barbur Boulevard near Duniway Park would be removed, though off-street parking would be retained. Eliminating these 2-hour limited parking spaces could increase demand for on-street spaces on nearby streets. Six 2-hour visitor spaces along SW Pennoyer Street also would be removed. However, this reduction in supply is low, and a combination of improved transit and improved bicycle and pedestrian facilities would help offset the transportation impact of reduced street parking spaces.

In Segment B, approximately 80 on-street parking spaces on SW Barbur Boulevard between SW 13th Avenue and SW 60th Avenue would be removed. On-street parking is generally used by people accessing businesses along SW Barbur Boulevard. Parking utilization was studied during the Draft EIS, revealing that this on-street parking is not heavily used (it is between 0 percent and 26 percent occupied depending on time of day and location). The impact of this lost parking would be partially offset by park and ride lots at the 53rd Station and 68th Station, as well as by the improvements in bicycle and pedestrian access to stations, which can reduce the need to drive and therefore park.

In Segment C, 30 existing parallel parking spaces would be eliminated on SW 70th Avenue between SW Clinton Street and SW Elmhurst Street. To offset this loss of parking, 18 diagonal parking spaces would be provided underneath the light rail structure that would be over SW Dartmouth Street.

Table 3.2-6 describes existing on-street parking immediately adjacent to each proposed light rail station for the Preferred Alternative. These parking areas present the potential for riders to use this parking as informal park and ride opportunities. Mitigation for this impact is proposed. While unrestricted off-street parking areas could be used by transit users, as well as other parties, property owners already have the ability to manage or restrict the use of their parking areas.

**Table 3.2-6. Preferred Alternative Potential for Increased Use of On- and Off-Street Parking (*multipage table*)**

Station	On-Street Parking	Off-Street Parking
<b>Segment A: Inner Portland</b>		
Gibbs	<ul style="list-style-type: none"><li>· SW Second Ave.</li><li>· SW Gibbs St.</li><li>· SW Wood St.</li></ul>	<ul style="list-style-type: none"><li>· Several small commercial parking lots</li></ul>
Hamilton	<ul style="list-style-type: none"><li>· SW Viewpoint Rd.</li><li>· SW Bancroft St.</li><li>· SW Hamilton St.</li></ul>	<ul style="list-style-type: none"><li>· Swan Mart</li><li>· Community Counseling Center</li></ul>

**Table 3.2-6. Preferred Alternative Potential for Increased Use of On- and Off-Street Parking (multipage table)**

Station	On-Street Parking	Off-Street Parking
<b>Segment B: Outer Portland</b>		
13th	<ul style="list-style-type: none"> <li>· SW Custer Dr.</li> <li>· SW 13th Ave.</li> </ul>	<ul style="list-style-type: none"> <li>· Fred Meyer</li> <li>· Other commercial parking lots</li> </ul>
19th	<ul style="list-style-type: none"> <li>· SW 19th Ave.</li> <li>· SW Evans St.</li> </ul>	<ul style="list-style-type: none"> <li>· Safeway</li> <li>· Several small commercial parking lots</li> </ul>
30th	<ul style="list-style-type: none"> <li>· SW 30th Ave.</li> <li>· SW Primrose St.</li> <li>· SW Marigold St.</li> </ul>	<ul style="list-style-type: none"> <li>· Several small commercial parking lots</li> </ul>
Barbur Transit Center	<ul style="list-style-type: none"> <li>· SW 41st Ave.</li> <li>· SW Collins St.</li> <li>· SW 40th Ave.</li> <li>· SW Taylors Ferry Rd.</li> </ul>	<ul style="list-style-type: none"> <li>· Barbur Boulevard park and ride</li> <li>· Several small commercial parking lots</li> </ul>
53rd	<ul style="list-style-type: none"> <li>· SW 53rd Ave.</li> <li>· SW Pomona St.</li> <li>· SW Arnold St.</li> <li>· SW 51st Ave.</li> </ul>	<ul style="list-style-type: none"> <li>· PCC-Sylvania parking lots</li> </ul>
<b>Segment C: Tigard and Tualatin</b>		
68th	<ul style="list-style-type: none"> <li>· SW Pine St.</li> </ul>	<ul style="list-style-type: none"> <li>· Several small commercial parking lots</li> </ul>
Elmhurst	<ul style="list-style-type: none"> <li>· SW 69th Ave.</li> <li>· SW Hermoso Way</li> </ul>	<ul style="list-style-type: none"> <li>· Several small commercial parking lots</li> </ul>
Hall	<ul style="list-style-type: none"> <li>· SW Commercial St.</li> </ul>	<ul style="list-style-type: none"> <li>· Several small commercial parking lots</li> </ul>
Bonita	<ul style="list-style-type: none"> <li>· SW Milton Ct.</li> <li>· SW 74th Ave.</li> </ul>	<ul style="list-style-type: none"> <li>· Several small commercial parking lots</li> </ul>
Upper Boones Ferry	<ul style="list-style-type: none"> <li>· None</li> </ul>	<ul style="list-style-type: none"> <li>· Several small commercial parking lots</li> </ul>
Bridgeport	<ul style="list-style-type: none"> <li>· None</li> </ul>	<ul style="list-style-type: none"> <li>· Several small commercial parking lots</li> </ul>

Note: PCC = Portland Community College.

## Terminus Options

Both terminus options would remove the same on-street parking spaces as the Preferred Alternative. Because the terminus options would construct fewer new park and ride spaces in the corridor and would have fewer total park and ride spaces available at the light rail stations, they could result in more demand for on-street spaces by transit riders than the Preferred Alternative.

## Related Transportation Improvements

### *Ross Island Bridgehead Reconfiguration*

The Ross Island Bridgehead Reconfiguration would result in a net loss of 34 on-street parking spaces on SW Naito Parkway, SW Pennoyer Street and SW Corbett Avenue. Utilization of these on-street parking spaces is generally low in the morning and heavier in the evening, based on surveys conducted in 2018. The reconfiguration would offset the transportation impact of reduced parking by developing nonmotorized facilities that improve access to transit, remove physical barriers, and improve safety for walkers and bicyclists. No mitigation is proposed.

### *Station Access Improvements*

Individual station access improvements could remove on-street parking depending on the final designs selected by local jurisdictions.

### **3.2.7. Freight Facility Impacts**

Only the Preferred Alternative would impact roadway or railroad freight, as discussed below. Unless noted otherwise, the impacts of the terminus options would be the same as those of the Preferred Alternative. The related transportation improvements would not have negative impacts on railroad or roadway freight. No mitigation measures are proposed for impacts to freight facilities.

#### **Roadway Freight**

The Preferred Alternative would maintain horizontal and vertical clearances large enough to accommodate freight traffic throughout the corridor. Where light rail would operate in the median of roadways, impacts would be related to right-in, right-out restrictions from driveways and unsignalized side streets without frequent access by large trucks. Additional impacts would occur as a result of the restricted left-turn movements caused by median-running light rail. In Segment A, freight access to properties would be affected by median-running light rail, but access would not be otherwise restricted or closed. The Ross Island Bridgehead Reconfiguration would improve freight mobility by routing traffic away from local streets and reducing vehicle congestion.

In Segment B, the Preferred Alternative would alter the streetscape and relocate truck accesses. Truck access would be altered but maintained at two gas stations. The Preferred Alternative would not affect truck access to the Fred Meyer grocery store at SW Barbur Boulevard and SW Bertha Boulevard. Throughout Segment B, the Preferred Alternative would affect turning movements onto properties abutting SW Barbur Boulevard due to the median-running light rail. The Preferred Alternative would turn most accesses on SW Barbur Boulevard to right in/right out, with U-turns permitted at some intersections. Trucks with wheelbases in excess of standard U-turn limits may travel longer distances or use alternate routes to reach certain properties.

In Segment C, the Preferred Alternative would be located primarily in exclusive right of way adjacent to local streets, major highways or railroads. No impacts to roadway freight access or circulation are anticipated in Segment C with the Preferred Alternative.

The Preferred Alternative would preserve vehicle and freight capacity on I-5 and Pacific Highway, and adjacent and overcrossing structures would meet the current design clearance requirements for height and width.

#### **Railroad Freight**

The Preferred Alternative would not have impacts to freight railroads within Segments A and B.

Within Segment C, the Preferred Alternative would parallel a portion of the Portland and Western Railroad right of way. The Preferred Alternative includes a minimum 25-foot separation, which is required by Union Pacific Railroad, between the light rail tracks and the freight railroad tracks where they would run parallel. The Preferred Alternative would also provide at least 23.5 feet of vertical clearance for bridges crossing over freight railroad tracks, consistent with applicable railroad design standards.

The Preferred Alternative would not have any at-grade light rail crossings of the main freight rail lines. In locations where the light rail alignment would cross existing spur lines, either the light rail would be grade-separated, or the existing spur line would be acquired and removed. At two locations (SW 72nd



Avenue and SW Upper Boones Ferry Road) the existing at-grade crossings would be widened to accommodate light rail. These modifications to at-grade freight rail crossings would require approval from the Federal Railroad Administration (FRA) and ODOT. The wider crossings would not impact freight rail operations. Both terminus options would not cross SW Upper Boones Ferry Road and would not widen the existing at-grade freight rail crossing at that location. The Hall Terminus Option would not cross SW 72nd Avenue and would not widen the existing at-grade freight rail crossing at that location.

### **3.2.8. Safety Impacts**

The following sections describe the impacts the Project would have on traffic safety. Personal safety and security issues (i.e., related to personal or property crime) are discussed in Section 4.17, Safety and Security.

Safety impacts related to the terminus options would be the same as the Preferred Alternative unless otherwise noted.

#### **Pedestrians and Bicyclists**

The Preferred Alternative would improve pedestrian and bicycle safety by increasing the number of marked pedestrian crossings of SW Naito Parkway and SW Barbur Boulevard, and providing bicycle facilities along all portions of at-grade light rail. Median-running light rail in portions of Segment A and along SW Barbur Boulevard in Segment B would provide a barrier that would preclude some turning movements and reduce collision risk. ODOT, the City of Tigard and PBOT have permitting authority along Pacific Highway from SW 64th to 68th Avenues, and the Project would be required to meet their permitting conditions, which would include operating, safety and design standards.

The station access improvements would improve safety for pedestrians and bicyclists accessing light rail stations from adjacent neighborhoods. The Ross Island Bridgehead Reconfiguration also would improve safety for nonmotorized users by creating signalized crossings, wider sidewalks and bicycle facilities where there are currently few of these facilities. The station access improvements also would add new and improved bicycle and pedestrian facilities, such as sidewalks and bicycle lanes, that would increase user separation from vehicle traffic.

#### **Interstate Facilities**

The Preferred Alternative would develop three new bridges for light rail over interstate freeways and their associated rights of way: one bridge over I-405 and two bridges over I-5. These new bridges would not change the configurations of the interstate roadways, and they would not permanently affect traffic-operating conditions on the mainline of the interstates. However, they would make structural and visual changes to parts of the interstates' roadside environment, which could affect safety conditions. New retaining walls, safety barriers, guardrails or columns would be constructed along the roadway, including in median or off-roadway areas within the interstate rights of way. Although design measures may help reduce the safety concerns presented by a new fixed object near active freeway lanes, they may not fully remove them. For example, a guardrail in front of a structure may reduce the hazard presented by a new column along the roadway, but guardrails are also potential hazards. Federal regulations for interstates require that any new features within the right of way conform to FHWA's requirements for managing the right of way. Therefore, during final design TriMet would prepare Interchange Access Modification

Requests and meet other applicable design and documentation requirements of ODOT and FHWA, including a detailed safety analysis and hazard minimization assessment, as part of ODOT and FHWA review and approval processes for modifications to I-405 and I-5 rights of way.

Safety analysis would also be required during final design for the station access improvements that would construct pedestrian bridges over I-5 (SA08, SA19 and SA20). The Ross Island Bridgehead Reconfiguration and the remaining station access improvements are not anticipated to impact safety on interstate facilities.

## **Motor Vehicles**

Median-running light rail in Segments A and B would reduce turning movements and the number of potential conflict points along SW Barbur Boulevard. The addition of new traffic signals at multiple locations on SW Barbur Boulevard would increase the safety of turning movements at those locations.

PBOT and ODOT have permitting authority at the SW Sixth Avenue on-ramp to northbound I-405, and the Project would be required to meet their permitting conditions, which would include operating, safety and design standards.

Near Fulton Park (in the vicinity of SW Third Avenue and SW Barbur Boulevard), where several serious injury and fatal accidents have occurred mostly due to speeding, the intersection of SW Third Avenue/SW Miles Street and SW Barbur Boulevard would be modified by adding a new signal, modifying an existing signal and realigning SW Miles Street to intersect with SW Barbur Boulevard at a 90-degree angle.

The Preferred Alternative would introduce at-grade crossings of roadways by light rail that would be similar to other existing at-grade light rail crossings elsewhere on the MAX system. In Segment C, the Preferred Alternative would add at-grade light rail crossings adjacent to existing freight rail crossings at SW 72nd Avenue and SW Upper Boones Ferry Road. These shared crossings would be implemented based on current safety rules and the TriMet Design Criteria, which were used to develop similar shared light rail and freight rail crossings on the MAX Orange Line project. TriMet will also coordinate with ODOT and Tigard to ensure that any queues on SW Hall Boulevard across the existing freight rail are avoided or safely managed. The Upper Boones Ferry Terminus Option would not add a light rail crossing at SW Upper Boones Ferry Road. The Hall Terminus Option would not add light rail crossings at SW 72nd Avenue or SW Upper Boones Ferry Road.

## **Emergency Vehicle Operations**

Operations of and access for emergency vehicles (police, fire, etc.) with the Preferred Alternative would be similar to those with the No-Build Alternative, except on SW Barbur Boulevard, where light rail in Segments A and B would operate in the roadway median and where left-turn/U-turn access would be limited to intersections and designated emergency crossings for emergency vehicles only. In Segment C, the SW Hunziker Street/SW Hall Boulevard intersection would have congestion and queuing with the No-Build Alternative as well as the Preferred Alternative, in part due to the nearby at-grade crossing of WES Commuter Rail with SW Hall Boulevard, which could affect emergency vehicle response times. ODOT and the City of Tigard have permitting authority in this location, and the Preferred Alternative would be required to meet their permitting conditions, which would include operating, safety and design standards.

### 3.3. Short-Term Impacts

#### 3.3.1. Preferred Alternative

The Preferred Alternative would have several years of impacts to local and regional transportation operations, but they would be temporary. These impacts could include temporary lane closures, detours, truck traffic, and related travel time impacts to motor vehicles and buses, as well as inconveniences to bicyclists and pedestrians. Mitigation measures and other best management practices are proposed to minimize these impacts (see Section 3.6.2).

Table 3.3-1 lists the major construction (short-term) impacts to transportation of the Preferred Alternative by segment. The common impacts of construction on transportation in all segments would result in temporary:

- changes to local and area circulation patterns and traffic conditions due to detours, lane closures and some limited full street or facility closures
- disruption or revised access to local businesses/properties
- loss of on-street parking
- increase in construction truck traffic
- detours for bicyclists and pedestrians

**Table 3.3-1. Summary of Short-Term Impacts of the Preferred Alternative (*multipage table*)**

Location	Short-Term Impacts	Approximate Time Frame
<b>Segment A: Inner Portland</b>		
SW Barbur Blvd. and cross-streets	Lane closures and nighttime and weekend full closures; street and intersection closures; sidewalk and bicycle lane closures	1 to 2 years
Light rail overcrossing over I-405	Intermittent short-term closures of I-405 lanes and ramps; intermittent shoulder or traffic lane closures; temporary nighttime and weekend closures and detours, including SW Barbur Blvd., SW Fifth Ave. and cross streets	1 to 2 years
Reconfigured intersection at SW Barbur Blvd./SW Naito Pkwy.	SW Barbur Blvd. and SW Naito Pkwy.: lane closures; multiple weekend closures; nighttime closures	1 to 2 years
Replacement of SW Barbur Blvd./SW Capitol Hwy. eastbound flyover structure	Eastbound flyover closed for 2 years; likely maintain westbound connection	Multiple phased construction stages over 2 years
Replacement of SW Barbur Blvd. trestle bridges	SW Barbur Blvd. at the Newbury and Vermont trestle bridges: maintain one auto lane in each direction	Multiple phased construction stages over 2 years
<b>Segment B: Outer Portland</b>		
SW Barbur Blvd. and cross streets	Lane closures and nighttime closures; street and intersection closures; sidewalk and bicycle lane closures	1 to 2 years
Replacement of SW Barbur Blvd. bridge over SW 26th Way	SW Barbur Blvd.: one lane each direction SW 26th Ave.: weekend closures	1 year
Barbur Transit Center	Partial to full closure of parking during construction; potential changes could include relocated transit bays, bus stops, and temporary changes to routes and service levels	1 to 2 years

**Table 3.3-1. Summary of Short-Term Impacts of the Preferred Alternative (multipage table)**

Location	Short-Term Impacts	Approximate Time Frame
Light rail overcrossing over I-5 at SW Barbur Blvd. and SW Capitol Hwy. at Crossroads	I-5: intermittent lane closures and lane shifts; potential nighttime and weekend closures and detours SW Barbur Blvd.: potential nighttime and weekend closures and detours (maintain one lane in each direction) I-5 on-ramps: potential nighttime and weekend closures; detours SW Capitol Hwy: nighttime closures and detours	1 to 2 years
<b>Segment C: Tigard and Tualatin</b>		
Light rail overcrossing at SW 68th Pkwy./SW Barbur Blvd. over I-5; undercrossing of Pacific Hwy.	SW 68th Pkwy.: full or partial closure and detours I-5: lane closures and lane shifts; potential nighttime and weekend closures and detours	1 to 2 years
Light rail overcrossing at SW Dartmouth St.	SW Dartmouth St.: intermittent closures	6 months to 1 year
Light rail overcrossing at Hwy. 217	Hwy. 217: intermittent shoulder or traffic lane closures and temporary nighttime closures SW 72nd Ave.: intermittent closures	1 to 2 years
Light rail overcrossing at SW Bonita Rd.	SW Bonita Rd.: full or partial closures and detours	3 to 6 months
At-grade light rail crossings at SW 72nd Ave. and SW Upper Boones Ferry Rd.	SW 72nd Ave. and SW Upper Boones Ferry Rd.: lane closures; detours; potential nighttime and weekend closures Southbound on-ramp to I-5: right-turn closure and detours	1 year
Pedestrian bridge over SW Lower Boones Ferry Rd. connecting Bridgeport Park and Ride and Bridgeport Station	SW Lower Boones Ferry Rd.: temporary intermittent lane closures; temporary nighttime closures	3 to 6 months
Bridgeport Park and Ride	Partial to full closure of park and ride during construction; potential changes could include relocated transit bays, bus stops, and temporary changes to routes and service levels	1 to 2 years

Note: I-5 = Interstate 5; I-405 = Interstate 405.

### 3.3.2. Terminus Options

The short-term impacts of the terminus options would generally be the same as the Preferred Alternative, except in Segment C, where there would be few to no construction impacts south of SW Upper Boones Ferry Road for the Upper Boones Ferry Terminus Option and south of the Hunziker O&M Facility for the Hall Terminus Option.

### 3.3.3. Related Transportation Improvements

#### Ross Island Bridgehead Reconfiguration

Construction of the Ross Island Bridgehead Reconfiguration would be conducted in phases over three to four years, due to the multiple facilities that would be involved. The initial phases would include some access closures and lane shifts to accommodate demolition and rebuilding of existing structures. Closures would impact vehicle circulation and access in the vicinity of the west end of the Ross Island Bridge, and would result in slower travel times and longer delays in this area during the construction period. Access would be revised and restored as the reconfiguration work progresses.

The following facilities would be affected:

- eastbound and westbound ramps to Ross Island Bridge
- northbound and southbound SW Naito Parkway ramps and frontage road

- SW Macadam Avenue off-ramp to SW Kelly Avenue
- SW Corbett Avenue and SW Woods Street
- SW Grover Street, including the loop and pedestrian path/underpass below SW Naito Parkway
- SW Macadam Avenue off-ramp at SW Corbett Avenue
- SW Kelly Avenue
- SW Water Avenue

### **Station Access Improvements**

Construction of station access improvements would result in minor short-term impacts, including loss of on-street parking, temporary lane closures and detours, and construction vehicle traffic. Construction of pedestrian bridges across highways would include greater impacts, including short-term lane closures.

## **3.4. Indirect and Cumulative Impacts**

For discussion of the Project's anticipated indirect and cumulative impacts related to the resources addressed in Chapter 4, Environmental Impacts and Mitigation, see Section 4.18, Indirect and Cumulative Impacts.

### **3.4.1. Indirect Impacts**

The Project would support increased transit-oriented development, which in turn would increase transportation activity levels in areas that are less developed today. These developments would increase trips on all modes of travel, including more transit, bicycle/pedestrian, freight and auto trips. However, these increases in trips due to station area development are already anticipated in the population, employment and transportation growth assumed in local and regional land use plans and in accompanying zoning that is in place in station areas. Therefore, increases in traffic due to transit-oriented development are already accounted for in the long-range transportation forecasts and impact analysis. In addition, some auto trips would be avoided at the local level when drivers shift to transit for their trips. Throughout the corridor, the Project would improve bicycle and pedestrian facilities, accommodating increased demand. There would be no additional long-term indirect or cumulative effects anticipated from the Project, beyond those already considered in the regional travel model.

Short-term construction impacts, such as lane closures or detours for pedestrians and bicyclists, could result from station area redevelopments.

### **3.4.2. Cumulative Impacts**

As stated in Section 3.4.1, regional growth and resulting localized changes in transportation demand, as well as changes due to other transportation projects, are already assumed in the forecasts used for the analysis of long-term impacts (see Appendix 4.18, Indirect and Cumulative Impacts Background Information, for a list of projects considered). Metro's regional travel demand model includes other planned transportation projects, and it accounts for land use plans that encourage focused growth and development in the corridor to meet future population and employment needs. Therefore, no additional long-term cumulative transportation impacts are anticipated.

Shorter-term, cumulative construction impacts could occur if station area redevelopment projects or other agencies' transportation projects are constructed at the same time as the Southwest Corridor Light Rail Project. However, the anticipated projects that could be constructed in the same timeframe are mostly localized projects of shorter duration and scale than the Southwest Corridor Light Rail Project, and would be unlikely to result in increased cumulative impacts in most areas.

No additional mitigation would be needed for long-term cumulative impacts. For potential short-term construction impacts, TriMet would coordinate construction activities and mitigation programs with other projects, including other agencies' transportation projects and station area redevelopment projects.

### 3.5. Comparison to Impacts of the Draft EIS Light Rail Alternatives

Table 3.5-1 summarizes key differences in transportation impacts between the Draft EIS light rail alternatives and the Preferred Alternative in this Final EIS.

**Table 3.5-1. Comparison of Impacts Between Draft EIS Light Rail Alternatives and Preferred Alternative**  
(multipage table)

Impacts by Segment	Draft EIS Light Rail Alternatives	Preferred Alternative
<b>Segment A: Inner Portland</b>		
Intersections exceeding V/C ratio targets	2–6 intersections	4 intersections
Impacts due to queue lengths that would require mitigation	4 queuing impacts	2 queuing impacts
Parking	2–21 parking stalls removed	24 parking stalls removed
Public transportation	New pedestrian connection to Marquam Hill via various options combining pedestrian tunnels, elevators and bridges, with below-grade or at-grade pedestrian crossings of SW Terwilliger Blvd.	New pedestrian connection to Marquam Hill via dual inclined elevators, with at-grade signalized pedestrian crossing of SW Terwilliger Blvd.
Active transportation	Improved pedestrian and bicycle facilities; new and improved existing crossings	Similar to Draft EIS, though additional improvements on SW Barbur Blvd. include raised protected bicycle lanes
Freight	No significant impacts	Similar to Draft EIS
<b>Segment B: Outer Portland</b>		
Intersections exceeding V/C ratio targets	9–10 intersections	7 intersections
Impacts due to queue lengths that would require mitigation	1 queuing impact	No queuing impacts
Parking	12–113 parking stalls removed	80 parking stalls removed
Active transportation	Improved pedestrian and bicycle facilities; new and improved existing crossings	Similar to Draft EIS, though additional improvements on SW Barbur Blvd. include raised protected bicycle lanes
Freight	Convert access to properties on SW Barbur Blvd. to right in/right out	Similar to Draft EIS

**Table 3.5-1. Comparison of Impacts Between Draft EIS Light Rail Alternatives and Preferred Alternative**  
(multipage table)

Impacts by Segment	Draft EIS Light Rail Alternatives	Preferred Alternative
<b>Segment C: Tigard and Tualatin</b>		
Intersections exceeding V/C ratio targets	8 intersections	3 intersections
Impacts due to queue lengths that would require mitigation	4–6 queuing impacts	1–2 queuing impacts
Parking	8–63 parking stalls removed	12 parking stalls removed
Active transportation	Improved pedestrian and bicycle facilities; new and improved existing crossings	Similar to Draft EIS
Freight	Some alignment alternatives impacted store loading zone areas, freight access	No impacts

Note: V/C = volume-to-capacity.

The Draft EIS identified impacts from the alignment alternatives that ultimately formed the Preferred Alternative. Many of these impacts were reduced by making refinements to the design of the Preferred Alternative. Chapter 2 and Appendix I include descriptions of these refinements, and they are summarized starting on the second page of this chapter.

## 3.6. Mitigation Measures

This section identifies proposed mitigation measures to address the anticipated impacts of the Project. No mitigation measures are needed for public transportation, active transportation or freight facilities or for indirect and cumulative impacts.

### 3.6.1. Long-Term Impacts Mitigation

This section describes the proposed mitigation measures to address the Project’s anticipated impacts on motor vehicle operations, parking and safety.

#### Motor Vehicle Mitigation

Potential mitigation strategies for motor vehicle impacts correspond to locations where the Project would exceed the transportation performance standards of the managing jurisdiction and would worsen conditions compared to the No-Build Alternative. The Preferred Alternative was designed to incorporate mitigations involving additional capital improvements (see Appendix I for more details). The mitigation measures in Table 3.6-1 involve management strategies or signal/technical refinements that would be further explored in final design, in coordination with the jurisdictions involved.

Motor vehicle operations for the Ross Island Bridgehead Reconfiguration were analyzed with the assumption that the Preferred Alternative would also be constructed. All mitigation measures identified for the Preferred Alternative in Table 3.6-1 would still be required if the Ross Island Bridgehead Reconfiguration were constructed in addition to the Preferred Alternative. Table 3.6-1 identifies three mitigation measures attributed to the Ross Island Bridgehead Reconfiguration that would not be required for the Preferred Alternative alone. In addition, the Ross Island Bridgehead Reconfiguration may require further evaluation and design refinement in order to attain all necessary permits from ODOT and the City of Portland.



**Table 3.6-1. Long-Term Motor Vehicle Mitigation (multipage table)**

Project Element and Location	Issue	Mitigation Measures
<b>Segment A: Inner Portland</b>		
<b>Preferred Alternative and terminus options:</b> I-405 northbound off-ramp at SW Sixth Ave. and SW Jackson St.	Increased queuing caused by new pedestrian signal	TriMet would coordinate with ODOT during final design to avoid increasing queues within the safe stopping distance zone of the off-ramp, compared to queues under the 2035/2045 No-Build Alternative. Mitigation could include adding a queue dump detector to hold the pedestrian phase when queuing conditions are present on SW Sixth Ave. north of SW Jackson St. or on the I-405 off-ramp.
<b>Preferred Alternative and terminus options:</b> SW Barbur Blvd. at SW Hooker St.	Queue spillback from the signalized southbound left turn	TriMet would coordinate with ODOT and PBOT during final design to ensure vehicle throughput (V/C ratio) would not exceed both the No-Build Alternative and the jurisdictional standards, and to ensure that queues would be prevented from extending back into the intersection of SW Sheridan St./SW Barbur Blvd.
<b>Preferred Alternative and terminus options:</b> South Portland from I-405 to SW Hamilton St.	Potential through traffic diversions to neighborhood streets	TriMet would work with the City of Portland to establish a South Portland Neighborhood Monitoring and Management Program during project testing and year of opening.
<b>Ross Island Bridgehead Reconfiguration:</b> SW Naito Pkwy. at SW Sheridan St.	Queues from signalized northbound left turn	The City of Portland and ODOT would coordinate during final design to ensure queues would not result in safety concerns. Mitigation could include adding a second westbound lane on SW Sheridan St. between SW First Ave. and SW Naito Pkwy. and extending the northbound left-turn lane storage bay by 100 feet, and/or another design mutually agreed upon by the City of Portland and ODOT that would improve the safety of the roadway system, and avoid worsening surrounding street system congestion affecting ramp queue backups on I-5 and I-405 compared to the No-Build Alternative.
<b>Ross Island Bridgehead Reconfiguration:</b> SW Kelly Ave. at SW Macadam Ave.	Westbound queuing due to limited dual lane storage	The City of Portland and ODOT would coordinate during final design to ensure queues would not result in safety concerns. Mitigation could include channelizing the westbound right turn and converting the south-leg pedestrian crossing to a Z-crossing two-stage crosswalk. These modifications would facilitate shorter signal cycle lengths. Mitigation could also involve another design mutually agreed upon by the City of Portland and ODOT that would improve the safety of the roadway system, and avoid worsening surrounding street system congestion affecting ramp queue backups on I-5 and I-405 compared to the No-Build Alternative.
<b>Ross Island Bridgehead Reconfiguration:</b> SW First Ave. at SW Arthur St.	Southbound left-turn queues	The City of Portland and ODOT would coordinate during final design to ensure queues would not result in safety concerns. Mitigation could include restriping the southbound left-turn lanes as a drop lane and an option lane, and/or another design mutually agreed upon by the City of Portland and ODOT that would improve the safety of the roadway system, and avoid worsening surrounding street system congestion affecting ramp queue backups on I-5 and I-405 compared to the No-Build Alternative.
<b>Segment B: Outer Portland</b>		
<b>Preferred Alternative and terminus options:</b> SW 19th Ave./SW Barbur Blvd. intersection	Pedestrian crossing increases vehicle delay	TriMet would coordinate with the City of Portland during final design to confirm operational and design details for pedestrian access and safety, intersection vehicle delay and general operations. Mitigation could include creating Z-crossing two-stage crosswalks, with the light rail platforms as the refuges.

**Table 3.6-1. Long-Term Motor Vehicle Mitigation (multipage table)**

Project Element and Location	Issue	Mitigation Measures
<b>Preferred Alternative and terminus options:</b> SW Barbur Blvd./Barbur Transit Center/SW Taylors Ferry Rd.	Pedestrian crossing increases vehicle delay	During final design and permitting, TriMet would coordinate with ODOT and PBOT to confirm operational and design details for pedestrian access and safety, intersection vehicle delay, general operations, and queuing levels on I-5 exit ramps to achieve conditions that do not exceed both the No-Build Alternative and jurisdictional standards.
<b>Segment C: Tigard and Tualatin</b>		
<b>Terminus options:</b> SW 65th Ave./SW Haines St./I-5 northbound ramps	Minor increased delay at this all-way stop-controlled intersection; no queuing issues would occur	TriMet would coordinate with ODOT to further define design and operational details, such as a traffic signal or roundabout at this location.
<b>Preferred Alternative:</b> I-5/SW Upper Boones Ferry Rd./railroad crossing/SW 72nd Ave.	New at-grade light rail crossing of SW Upper Boones Ferry Rd. would increase queues on I-5 southbound off-ramp, where a freight rail crossing and intersections with SW Upper Boones Ferry Rd. already result in delays and queues for the No-Build Alternative.	TriMet would coordinate with ODOT, the City of Tigard and other local jurisdictions to secure design approvals for a light rail crossing that avoids worsening ramp queue backups on the I-5 southbound ramp compared to the No-Build Alternative. Options to mitigate the impact include participating in a larger regional roadway improvement project that would grade separate SW Upper Boones Ferry Rd. above light rail and the existing at-grade freight rail crossing, and/or reconfiguring nearby intersections and signal control systems.
<b>Preferred Alternative:</b> SW Lower Boones Ferry Rd./I-5 northbound ramp	Impacts are dependent on the number of park and ride spaces and forecast year of analysis <sup>1</sup> <i>2035 Forecast Year:</i> <ul style="list-style-type: none"> <li>710-space park and ride would not require mitigation.</li> <li>960-space park and ride would need mitigation to remedy queuing issues.</li> </ul> <i>2045 Forecast Year:</i> <ul style="list-style-type: none"> <li>710-space park and ride would need mitigation to remedy queuing issues.</li> <li>960-space park and ride would need mitigation to remedy queuing issues.</li> </ul>	TriMet would coordinate with ODOT to avoid having queues back up into the safe stopping distance on the off-ramp beyond what the queues would be under the 2035/2045 No-Build Alternative. Mitigation options include reconfiguring and/or reconstructing ramps to add adequate vehicle storage, adjusting signal timing of the interchange and local connecting roads, and/or reducing the size of the park and ride to 710 spaces.

Note: I-5 = Interstate 5; I-405 = Interstate 405; ODOT = Oregon Department of Transportation; PBOT = Portland Bureau of Transportation; V/C = volume-to-capacity.

<sup>1</sup> Two scenarios (710-space park and ride and 960-space park and ride) were used in analyzing impacts from the Bridgeport Park and Ride to understand the impacts of different options.

## Parking Mitigation

To mitigate impacts of drivers using side street parking or off-street parking lots as informal park and rides, TriMet would work with local jurisdictions after project opening to assess parking impacts and implement parking management policies as required. For example, time-limited parking and residential parking permits could mitigate on-street parking impacts.

## Safety Mitigation

TriMet would coordinate with the local roadway authorities during design and comply with regulations related to the safety of in-street light rail operations.

For modifications to I-405 and I-5 rights of way, TriMet would prepare Interchange Access Modification Requests and meet other applicable design and documentation requirements of ODOT and FHWA, including a detailed safety analysis and hazard minimization assessment, as part of ODOT and FHWA review and approval processes.

TriMet also would coordinate during design and comply with regulations related to new or modified rail roadway crossings and locations where light rail would run adjacent to freight rail. This coordination would include the railroad, local roadway authorities, the State Safety Oversight Agent and the Federal Railroad Administration during the design and permitting phases. In addition, all light rail at-grade roadway crossings and any modifications to existing freight rail at-grade roadway crossings would require permitting through ODOT and would be required to meet applicable design standards to ensure safety for all travel modes.

### **3.6.2. Short-Term Impacts Mitigation**

Most of the short-term transportation impacts would be avoided or minimized through compliance with state and local permitting requirements, and would not require additional mitigation. Mitigation is proposed for impacts to transit service and park and rides during construction.

#### **Mitigation**

TriMet would work with agencies with jurisdiction and the public to develop plans for bus stop closures required during construction, including identifying temporary stop and bus layover locations and identifying alternative mobility options, to minimize disruption to riders.

TriMet would mitigate the temporary loss of parking at park and ride lots through one or more of the following measures, determined in consultation with local jurisdictions and facility owners:

- construction period rider notices and public communication strategies, including information about alternative park and ride locations
- implement service increases, routing modifications or other measures to encourage transit trips that do not require automobile access
- develop temporary parking for transit riders to use during construction
- build new park and ride spaces before removing existing spaces
- lease parking lots and/or new parking areas near the closed park and ride lots

#### **Regulatory Requirements and Best Management Practices to Avoid and Minimize Impacts**

Construction-related transportation impacts would be prevented or minimized by complying with state and local permitting requirements, including the following construction-related best management practices:

- develop and implement construction mitigation plans in coordination with ODOT and local jurisdictions during final design and permitting, incorporating best practices for construction traffic control, safety, nonmotorized and transit activity, and local access

- use lighted or reflective signage to direct construction vehicle drivers to truck haul routes to ensure visibility during nighttime work hours
- in coordination with ODOT and local jurisdictions, communicate public information about construction activities affecting transportation conditions through tools such as print, radio, posted signs, websites, email and direct communication with other affected parties, and update interested parties by providing ongoing communications regarding street or freeway lane closures, detours, hours of construction, business access and parking impacts
- coordinate access closures with affected businesses and residents<sup>2</sup>
- provide parking areas for construction workers, where necessary, which may include remote parking with shuttle service to and from the construction site when on-site parking cannot be provided
- post signs prior to construction in areas where surface construction activities would affect access to surrounding businesses
- schedule traffic lane closures and high volumes of construction truck traffic during off-peak hours to the extent practicable
- cover potholes and open trenches, where possible, and use protective barriers to protect drivers from trenches that remain uncovered
- provide temporary parking to mitigate loss due to construction staging or work activities, as appropriate

Where the Project would have impacts to interstate or state highways during construction, TriMet (or the project sponsor for related transportation improvements) would comply with applicable federal and state permitting requirements, including:

- obtain ODOT and FHWA approval of the Project's Maintenance of Traffic plan for I-5 and I-405
- coordinate construction with ODOT incident management, construction staging and traffic control
- in areas with high levels of traffic congestion, schedule traffic lane closures and high volumes of construction traffic during off-peak hours to minimize delays where practical
- disseminate construction closure information to the public as needed
- coordinate with ODOT and FHWA during final design and construction planning in areas where construction detours and delays could affect freeway operations

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<sup>2</sup> If access closures are required, property access to residences and businesses would be maintained to the extent possible. If access to the property cannot be maintained, the specific construction activity would be reviewed to determine if it could occur during nonbusiness hours, or if the parking spaces and users of this access could be provided at an alternative location.

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