

### 3.1 Transportation

This section describes how the No-Build Alternative and the Modified LPA and design options would affect travel patterns and mobility for cars, trucks/freight, transit vehicles, transit riders, pedestrians, and bicyclists. This analysis represents average weekday travel conditions and recurring congestion patterns. As such, it does not explicitly capture short-duration, non-recurring operational events, such as periodic bridge openings and gate closures, traffic incidents, work zones or lane closures, bad weather, and special events. New information developed since 2013 is identified and anticipated long-term and temporary reasonably foreseeable effects of the proposed Modified LPA and design options compared to the No-Build Alternative are summarized. Design options are incorporated into the analysis of the proposed Modified LPA, and any differences in long-term or temporary reasonably foreseeable effects attributable to specific design options, are identified and disclosed when the impact analysis differs. Potential measures to avoid, minimize, and/or mitigate impacts, as well as to increase the mobility benefits of the proposed Modified LPA, are presented.

Unless otherwise defined, the assessment of reasonably foreseeable effects in this section is based upon the geographic and temporal proximity parameters detailed in the Chapter 3 introduction. The primary study area, shown in Figure 3.1-1, is centered on I-5 and the bridge crossing of the Columbia River between Oregon and Washington. The primary study area also encompasses other interstate and state highways, transit, local roadways, bicycle and pedestrian facilities, and other facilities that serve this study area and influence travel behavior and conditions, including the TriMet Ruby Junction Light-Rail Operations and Maintenance Facility (OMF) in Gresham, Oregon. The IBR Program analyzed the TriMet Ruby Junction Light-Rail OMF, which would be expanded to provide operations and maintenance for new light-rail vehicles associated with the Modified LPA extension of the Yellow Line. The expansion within the existing Ruby Junction Light-Rail OMF footprint would not involve changes to local roadways or other transportation conditions.

Because reasonably foreseeable effects for transportation could extend beyond the primary study area, additional study areas were developed to measure these effects. In addition to the primary study area, the following geographic areas are used in the transportation analysis:

- Portland Metropolitan Region, shown in Figure 3.1-2, reflects a boundary area that encompasses Multnomah, Clackamas and Washington Counties in Oregon and Clark County in Washington.
- Traffic Subarea, shown in Figure 3.1-3, is within the most densely developed areas of Portland and Vancouver. It covers the triangle area extending south from the I-5/I-205 interchange in Washington bounded on the west by I-5, on the east by I-205, and on the south by I-84. The traffic subarea allows for a more focused look at areas with the most reasonably foreseeable effects and benefits that may be minimized when looking at the entire four-county region.
- I-5 Freeway Analysis Study Area, shown in Figure 3.1-4, covers a 17-mile section of I-5 between the I-205 junction in Washington north of Vancouver and the Marquam Bridge in Oregon on the south end. This larger freeway analysis study area was chosen as congestion and volumes within and outside of the primary study area influence each other. The freeway analysis study area includes 21 interchanges, including seven that are in the primary study area.
- Intersection Analysis Study Areas for both Vancouver (Figure 3.1-5) and Portland (Figure 3.1-6) include 80 intersections (58 in Vancouver and 22 in Portland) that were identified based on their potential to be affected by the proposed Modified LPA. While some of these fall within the primary study area, many extend beyond and are included in this broader area for the purpose of intersection analysis. The study intersections were determined based on an initial list of intersections analyzed as part of the CRC project, followed by consultation with partner agency staff as part of the review of the IBR Transportation Methods Report and the Final SEIS.

Figure 3.1-1. Primary Study Area

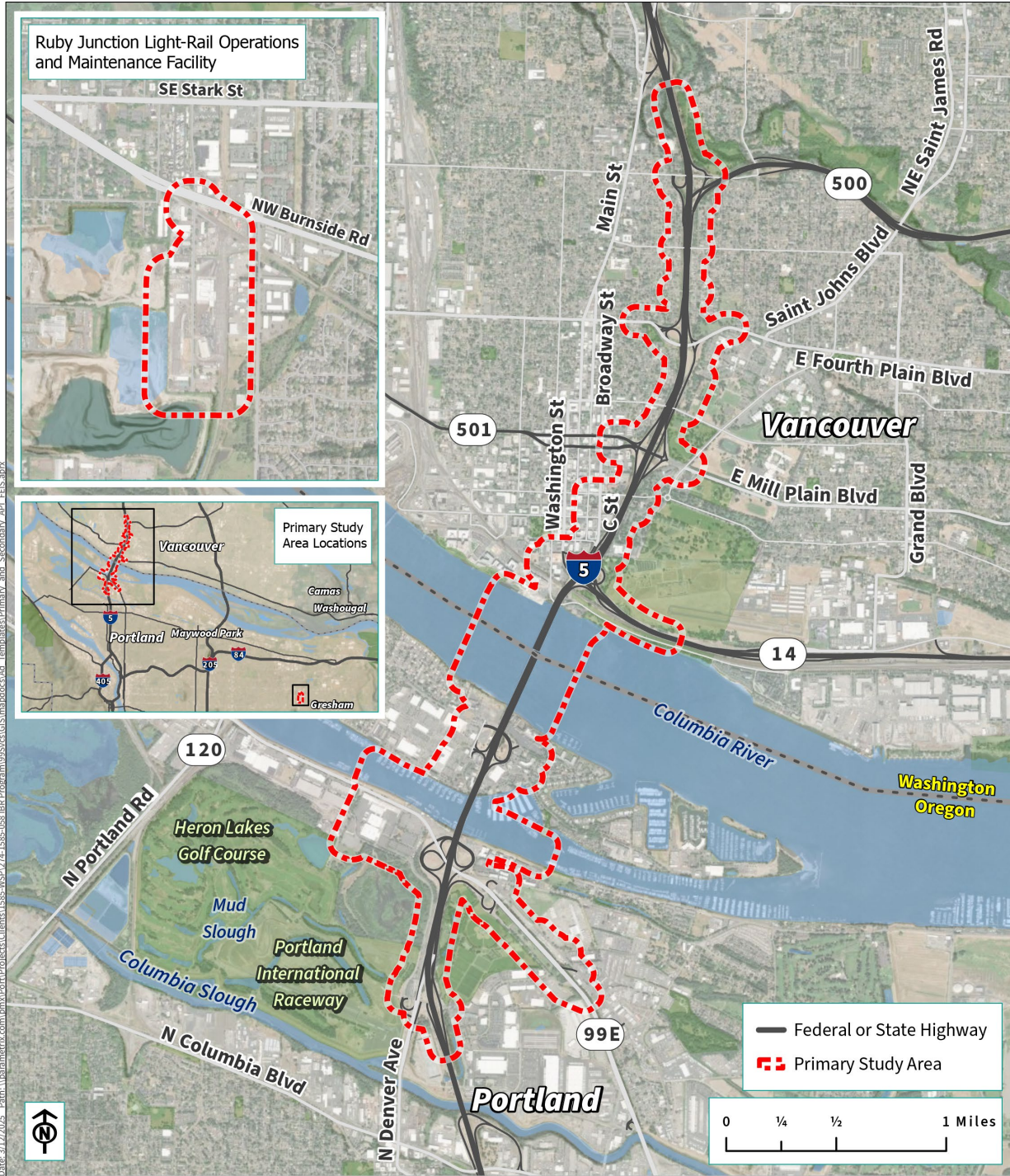


Figure 3.1-2. Portland Metropolitan Region

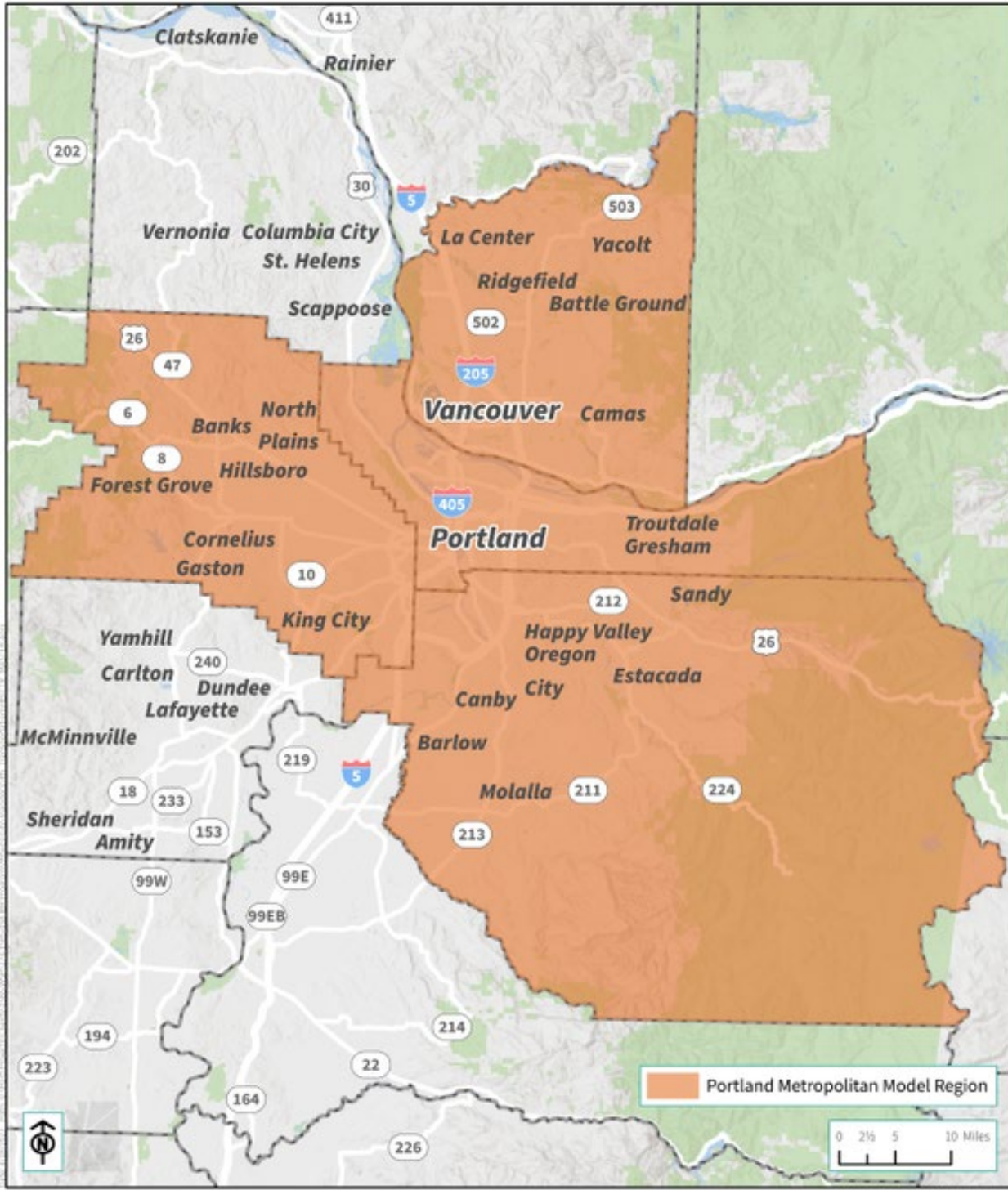


Figure 3.1-3. Traffic Subarea

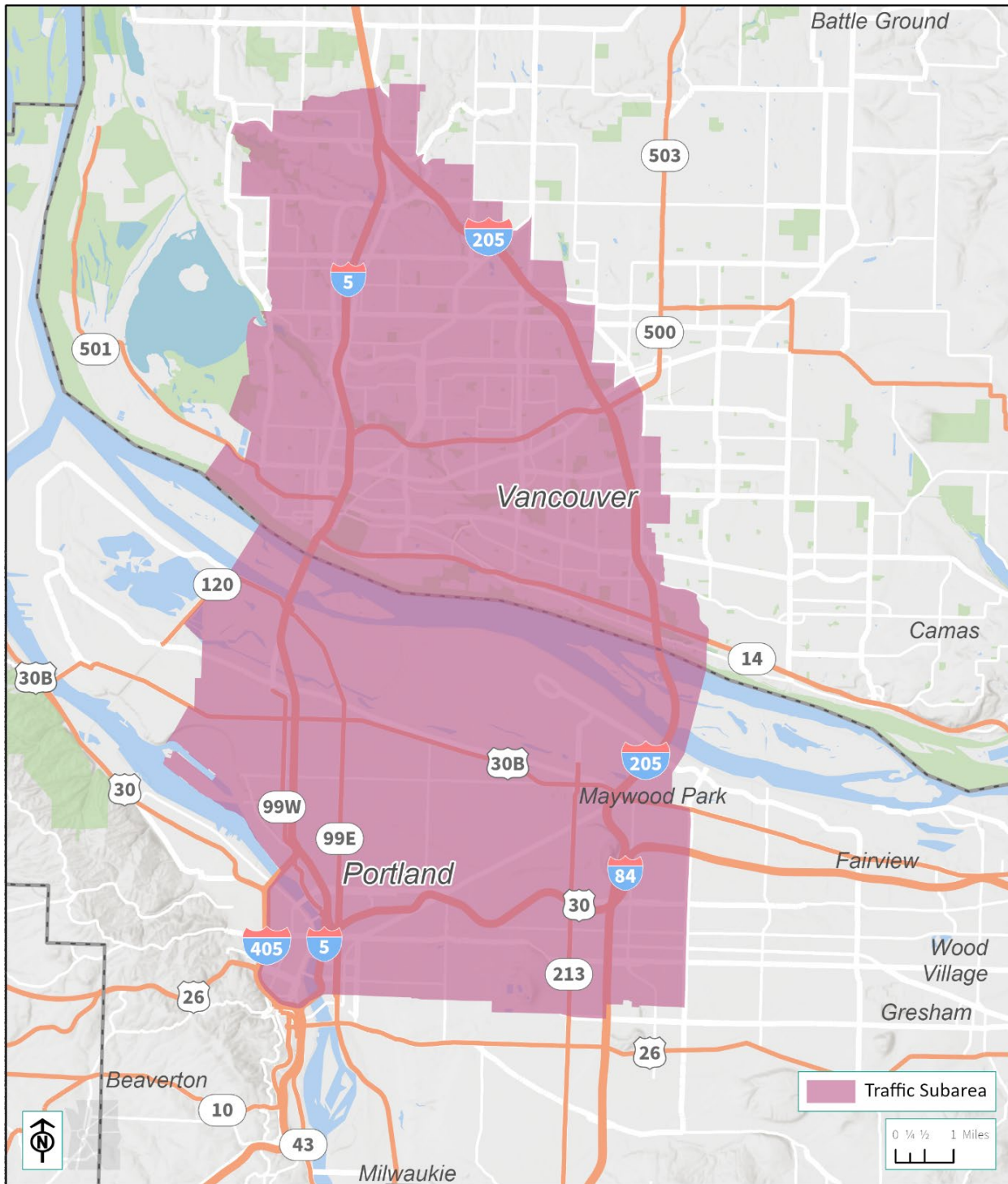


Figure 3.1-4. I-5 Freeway Analysis Area



Figure 3.1-5. Intersection Analysis Study Intersections – Vancouver

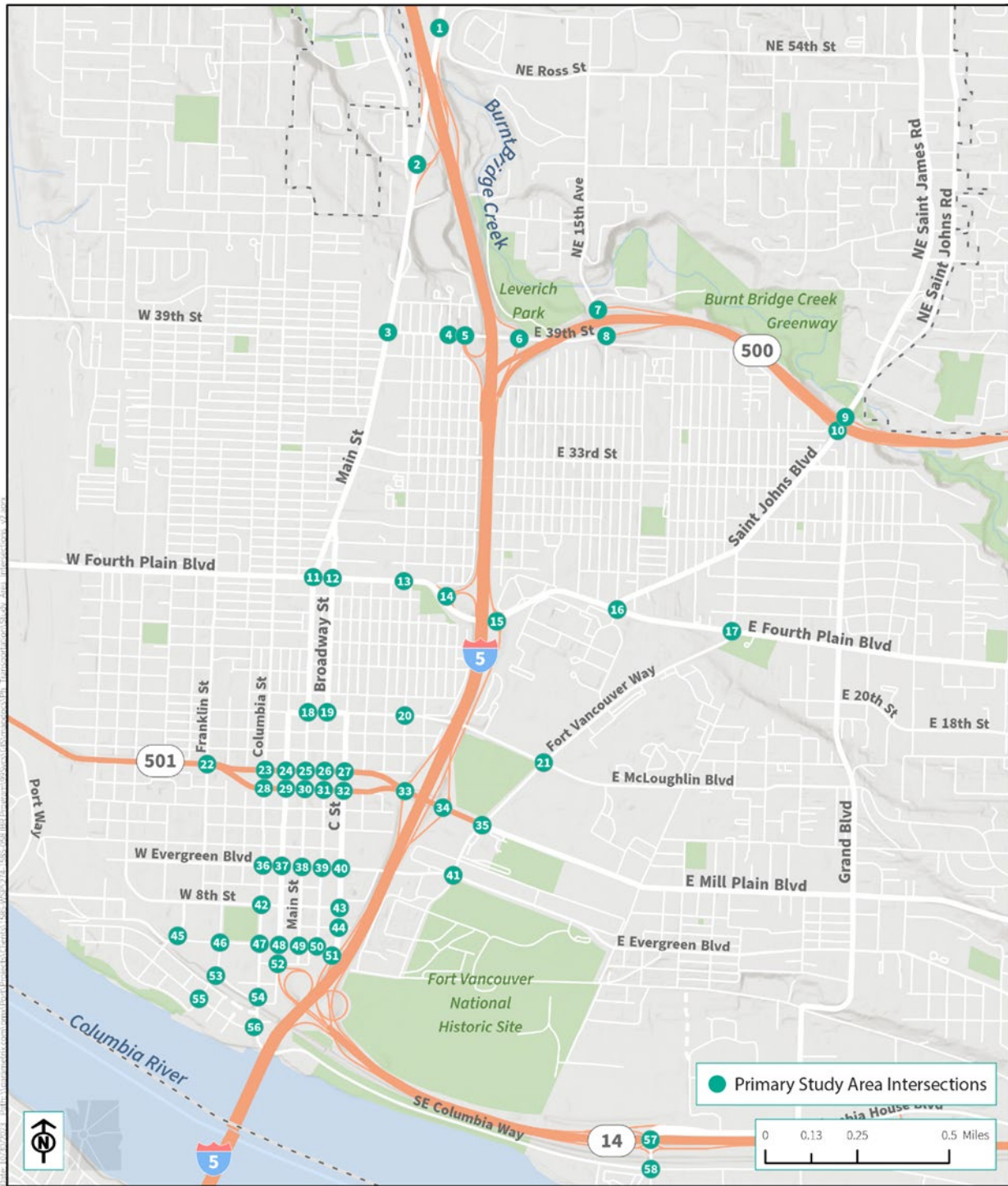
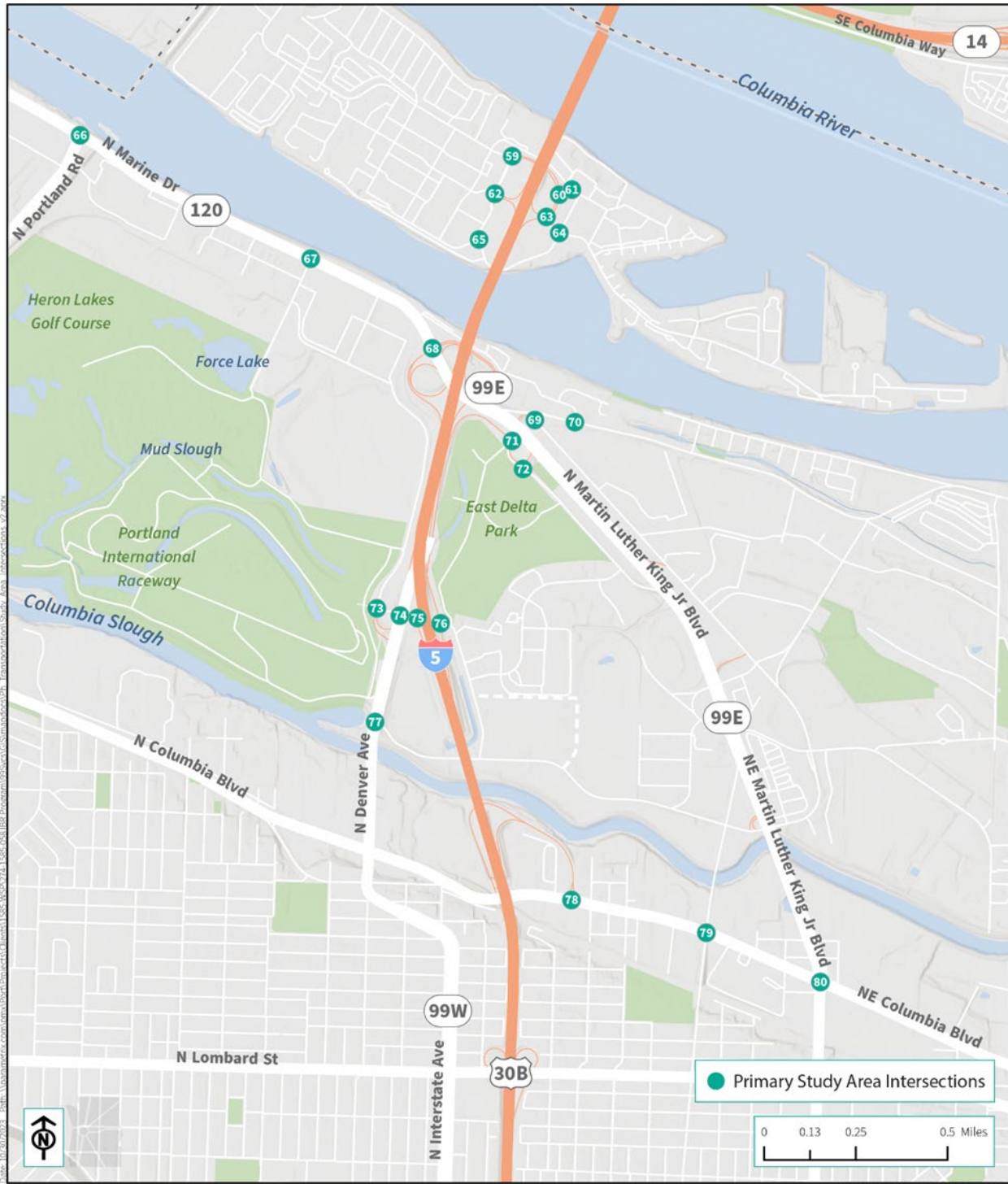


Figure 3.1-6. Intersection Analysis Study Intersections – Portland



The information presented in this section is based on the Transportation Technical Report, which provides additional details on the following aspects of transportation, to evaluate transportation impacts and benefits from the proposed Modified LPA and No-Build Alternative within the applicable study area:

- Regional transportation, including major freeway and highway facilities, vehicle miles of travel, vehicle hours of travel, vehicle hours of delay, and mode share.
- Freeway operations, including I-5 vehicle and person-trip volumes, bottlenecks, level of service (LOS), volume-to-capacity (V/C) ratios, travel times, and speeds.
- Freight mobility and access.
- Bridge openings and gate closures, including yearly and hourly frequency as well as average event duration.
- Arterial and local streets, including corridor analysis, intersection operations, and impacts to local roadways caused by freeway congestion.
- Transit, including regional and local transit services, corridor and station ridership, and transit operations.
- Sufficiency and quality of active transportation (bicycle and pedestrian facilities) around stations as well as circulation/connections to existing networks.
- Safety.
- Transportation demand management (TDM) and transportation system management (TSM).
- Tolling and diversion.

### 3.1.1 Changes and New Information Since 2013

The Columbia River Crossing (CRC) Final Environmental Impact Statement and Record of Decision were completed in 2011. Since then, changes that have occurred near the Interstate Bridge<sup>1</sup> since the previous planning effort and NEPA evaluation necessitated several design modifications, as described in Chapter 2, Section 2.5. These include proposed changes to the design of interchanges and access configurations, and in changes to the alignment of light-rail transit in downtown Vancouver. Several design options for the proposed Modified LPA are also being evaluated, including three proposed bridge configurations, two proposed auxiliary lane configurations (i.e., either one or two auxiliary lanes in specified portions of the I-5 mainline), potential elimination of the C Street ramps, a proposed westward shift of I-5 near the SR 14 interchange, and options for park and rides near the light-rail stations in Vancouver. See Chapter 2 for additional details on the proposed modifications from the CRC Selected Alternative to address changed conditions and the design options being considered for the IBR Program.

### 3.1.2 Existing Conditions

Transportation analyses generally incorporate the most recent available data. However, due to the influence of the COVID-19 pandemic on travel patterns between 2020 and 2023, the federal agencies and local leads supported using 2019 as the baseline year for existing conditions.<sup>2</sup> This is because 2019 most closely

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<sup>1</sup> For purposes of this SEIS, the existing I-5 bridges over the Columbia River are referred to as the “Interstate Bridge”. The new replacement I-5 bridges over the Columbia River are referred to as the “new Columbia River bridges”.

<sup>2</sup> Examples of existing conditions data for 2019 include details on the regional transportation network (roadways, transit), I-5 mainline and ramp vehicle volumes and freeway operations (including bottlenecks and speeds), origin-destination travel patterns, travel times, freight mobility and access, bridge openings and gate closures, local roadways and intersection vehicle volumes and operations, transit (facilities, routes, ridership, travel times) active transportation facilities, safety data (crashes), and existing transportation demand management and transportation system management programs.

resembles historical average weekday conditions and better represents current trends than traffic volumes observed during the COVID-19 pandemic.<sup>3</sup>

The COVID-19 pandemic that began in 2020 altered travel patterns and trends, traffic volumes, and transit ridership in the region and in the primary study area for the IBR Program. In the immediate aftermath of the closures and travel restrictions that began in March 2020, traffic volumes and transit ridership dropped substantially below historical levels, then began to increase as health emergency restrictions gradually eased over the following years since. As of March 2023, according to traffic count data from both WSDOT and ODOT (WSDOT 2022a; ODOT 2021), traffic volumes were close to pre-pandemic levels for auto and freight traffic within the primary study area (see Figure 2 in Section 1.4 of the Transportation Methods Report included in Appendix A of the Transportation Technical Report). Transit has been slower to recover, with 2023 ridership levels at approximately 60% of ridership levels in the fall of 2019 for the four-county region. Routes that provide bi-state service across the Columbia River in the primary study area saw average weekday ridership levels in 2023 that were approximately 48% of what was experienced in the fall of 2019. Four of the six C-TRAN express routes that were in operation in 2019 were removed post-COVID so ridership in the primary study area now operates on only two express routes. But according to both the Clark County Public Transportation Benefit Area Authority (C-TRAN) and the Tri-County Metropolitan Transportation District of Oregon (TriMet), and as reported to the National Transit Database<sup>4</sup>, transit service levels and ridership continue to see increases as more time goes by since the start of the pandemic (C-TRAN n.d.; TriMet n.d.; FTA n.d. [a], FTA n.d. [b]). C-TRAN reported a 10% systemwide ridership increase in 2024 compared to 2023<sup>5</sup> and reported a 6.3% systemwide ridership increase in 2025 compared to 2024<sup>6</sup>. TriMet reported an 8.7% systemwide ridership increase from 2024 compared to 2023<sup>7</sup> and a 4.6% systemwide ridership increase in 2025 compared to 2024<sup>8</sup> (TriMet n.d.).

Exceptions to the use of the 2019 base year data in the analyses include the following:

- Regional Travel Demand Model (RTDM) outputs that rely on the 2018 Oregon Metro (Metro)/Southwest Washington Regional Transportation Council (RTC) Regional Transportation Plan (Metro/RTC 2018 RTP) RTDM that uses a 2015 base year.<sup>9</sup>
- Safety data which summarize 5 years of data from 2015 through 2019.

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<sup>3</sup> It is appropriate to look at long-term historical patterns rather than short-term anomalies like a pandemic when forecasting travel demand. During early parts of the COVID-19 pandemic, some questioned whether current plans or project designs needed revision. Because long-range forecasts are built from historical patterns and present-day behavior, they aim to capture long-term conditions and areas of uncertainty. To avoid mistaking temporary disruptions, such as economic swings, wildfires, extreme weather, or the pandemic, for lasting change, it is necessary to examine data over an extended period. Consistent with this, the IBR Program has examined data over an extended period for purposes of the SEIS analysis, an approach that is reasonable and was approved by the Federal Highway Administration and the Federal Transit Administration.

<sup>4</sup> <https://www.transit.dot.gov/ntd/transit-agency-profiles/clark-county-public-transportation-benefit-area-authority> and <https://www.transit.dot.gov/ntd/transit-agency-profiles/tri-county-metropolitan-transportation-district-oregon>

<sup>5</sup> <https://mail.c-tran.com/about-c-tran/news/news-releases/1777-c-tran-ridership-growth>

<sup>6</sup> <https://mail.c-tran.com/about-c-tran/news/news-releases/1868-c-tran-ridership-grows-fourth-consecutive-year>

<sup>7</sup> <https://trimet.org/about/performance.htm?#FY2024>

<sup>8</sup> <https://es.trimet.org/about/pdf/2025/Jun%202025%20MMPR.pdf>

<sup>9</sup> The Metro/RTC 2018 RTP RTDM base year, in this case 2015, reflects the most recent year for which comprehensive and internally consistent demographic, network, and observed travel data were available for model calibration and validation. Because development of a base year requires finalized datasets and quality-controlled observations, base years typically precede current conditions. This approach is consistent with FHWA and FTA-accepted practice and provides a stable foundation for evaluating future conditions and comparing the relative effects of project alternatives. While the model base year precedes existing conditions 2019 data, it provides a well-calibrated foundation for evaluating future transportation scenarios and comparing alternatives consistent with FHWA-accepted modeling practice. The purpose of the base year is to demonstrate that the model can reasonably replicate observed travel patterns and system performance.

## Interstate Bridge Replacement Program

- Bridge lift/gate closure data which summarize 12 years of data (2012–2023).

All regional travel demand modeling and traffic analysis presented in the Draft SEIS and this Final SEIS is based on the 2018 RTP,<sup>10</sup> adopted by Metro in 2018 and by RTC in 2019,<sup>11</sup> which was the most current information available when the IBR Program initiated the IBR Program SEIS. For all project studies conducted in the region, Metro and RTC control the model process, coding inputs, and running the model through final assignments, at which point model outputs are provided to project teams for development of metrics to support the project-specific analysis.

Metro and RTC subsequently updated their respective RTPs as part of their 5-year update cycle as required under 23 CFR § 450.324. The 2023 RTP was adopted by Metro in 2023 and RTC in 2024, several years after the IBR Program Draft SEIS analysis was initiated in early 2021. Therefore, the NEPA lead agencies exercised their discretion and determined, based on their technical expertise, that the Metro/RTC 2018 RTP RTDM continued to be the most appropriate base tool for the purposes of comparing the No-Build Alternative to the proposed Modified LPA and design options in the Final SEIS. Additional details on the transportation analysis methods, including details about the use of the 2018 RTP, are presented in the Transportation Technical Report and its appendices.

### Regional Roadways

Regional roadways within the primary study area include I-5, SR 500, SR 14, and Martin Luther King Jr. Boulevard (Highway 99E), all of which are limited-access corridors. Table 3.1-1 summarizes their characteristics in the study area.

The primary study area covers a 5-mile section of I-5 between the Interstate Avenue/Victory Boulevard interchange in Portland and the SR 500/39th Street interchange in Vancouver. It includes seven interchange areas: Interstate Avenue/Victory Boulevard, Marine Drive, Hayden Island, City Center/SR 14, Mill Plain Boulevard, Fourth Plain Boulevard, and SR 500/39th Street.

Most of the traffic (between 77% and 86%) crossing the existing Interstate Bridge in peak directions during the AM and PM peak periods is entering and/or exiting I-5 at one of these seven interchanges.

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<sup>10</sup> The IBR Program used the RTDM that is developed, maintained and implemented for projects in the Portland metropolitan region. The model is jointly developed between Oregon Metro (Metro), the Portland, Oregon metropolitan planning organization (MPO) and the Southwest Washington Regional Transportation Commission (RTC), the MPO for southwest Washington. The RTDM is a traditional four-step demand model with trip generation, destination choice, mode choice, and assignment steps. The version of the RTDM being used for the IBR Program, including planned regional highway and transit networks and service levels, was developed for the Regional Transportation Plan adopted in 2018 by Metro and in 2019 by RTC (Metro/RTC 2018 RTP RTDM). The Metro/RTC 2018 RTP RTDM applied to this analysis uses a 2015 base year and reflects pre-COVID conditions. New surveys and RTDM development efforts that include post-COVID travel behavior are planned to be incorporated in the 2028 RTP update. Additional details on the Metro/RTC 2018 RTP RTDM are found in Appendix H to the Transportation Technical Report.

<sup>11</sup> Regional transportation plans—such as the Metro/RTC 2018 RTP—identify and prioritize long-range transportation needs for all modes in the region. These plans are the basis for planning efforts in the region, serving as the blueprint for how transportation resources are funded and projects are selected for implementation.

Table 3.1-1. Existing Regional Roadways in the Primary Study Area

| Regional Roadway            | Roadway Classification     | Number of Travel Lanes | Speed Limit (mph) | Average Weekday Daily Traffic <sup>a</sup> | Bicycle Facilities <sup>b</sup> | Pedestrian Facilities <sup>b</sup> |
|-----------------------------|----------------------------|------------------------|-------------------|--|---------------------------------|------------------------------------|
| I-5                         | Interstate                 | 4-9                    | 50-60             | 60,000-146,500                             | Yes                             | Yes                                |
| SR 500                      | State Highway (Washington) | 4-6                    | 55                | 35,000-52,000                              | No                              | No                                 |
| SR 14                       | State Highway (Washington) | 4-6                    | 60                | 58,000-73,000                              | No                              | No                                 |
| MLK Jr. Boulevard (Hwy 99E) | State Highway (Oregon)     | 4                      | 30-55             | 16,200-18,400                              | Yes                             | No                                 |

Source: WSDOT Online Map Center Historic Traffic Counts. ODOT Traffic Volume Tables for State Highways 2019

a A range of average weekday daily traffic volumes is shown, as the volumes differ along freeway segments in the Portland metropolitan region.

b Shared-use paths exist on the Interstate Bridge over the Columbia River.

Hwy = Highway; I-5 = Interstate 5; MLK = Martin Luther King; mph = miles per hour; ODOT = Oregon Department of Transportation; SR = State Route; WSDOT = Washington State Department of Transportation

## Regional Travel Measures

The typical measures of travel performance on a regional level are vehicle miles traveled (VMT), vehicle hours traveled (VHT), and vehicle hours of delay (VHD). These measures are calculated using the Metro/RTC 2018 RTP RTDM. As noted above, 2015 is the current base year available from the Metro/RTC 2018 RTP RTDM.

Table 3.1-2 shows 2015 VMT, VHT, and VHD outputs from the Metro/RTC 2018 RTP RTDM at two regional scales, both of which extend beyond the primary study area. The first study area, Portland Metropolitan Model Region (Figure 3.1-2) includes the entire region covered by the Metro/RTC 2018 RTP RTDM. The second study area, Traffic Subarea (Figure 3.1-3), is a smaller traffic subarea within the most densely developed areas of Portland and Vancouver, covering the triangle area extending south from the I-5/I-205 interchange in Washington bounded on the west by I-5, on the east by I-205, and on the south by I-84.

Table 3.1-2. Regional Travel Measures –2015 Daily Vehicle Miles Traveled, Vehicle Hours Traveled, and Vehicle Hours of Delay

| Area                                   | Vehicle Miles Traveled | Vehicle Hours Traveled | Vehicle Hours of Delay <sup>a</sup> |
|--|------------------------|------------------------|-------------------------------------|
| Portland Metropolitan Region           | 43,115,600             | 1,225,400              | 19,400                              |
| Traffic Subarea (I-5, I-205, and I-84) | 11,277,600             | 326,900                | 10,100                              |

Source: Metro/RTC 2018 RTP RTDM

a Delay is measured as time spent in congestion on network links that exceed 0.9 volume/capacity ratio.

I-5 = Interstate 5; I-84 = Interstate 84; I-205 = Interstate 205; Metro = Oregon Metro; RTC = Southwest Washington Regional Transportation Council

## Traffic Volumes

The analysis of traffic volumes uses several measures to describe existing conditions and allow comparisons to future conditions. These measures (screenlines, I-5 mainline and ramp volumes, and daily person throughput) are described below.

### **Screenlines**

Screenlines are imaginary lines drawn across major roadways (highways and arterials) within the Traffic Subarea (Figure 3.1-3) to measure the total amount of traffic moving in each direction across multiple facilities. These north-south and east-west screenlines are a snapshot of typical existing AM and PM peak traffic conditions. The Transportation Technical Report includes figures and lists of the screenlines used for this traffic analysis. The screenlines represent the existing east-west corridors that intersect I-5 and I-205 in Vancouver and North Portland, or that parallel I-5 in the north-south direction.

### **I-5 Mainline and Ramp Vehicle Volumes**

The IBR Program team collected data from ODOT and WSDOT for 2019. ODOT and WSDOT maintain permanent traffic counters throughout their freeway and highway systems that collect hourly traffic counts 365 days a year, 24 hours a day. This information was used to estimate average weekday daily traffic volumes in 2019 for I-5 mainline and ramps in the study area. Figure 3.1-7 and Figure 3.1-8 show the 4-hour northbound and southbound peak-period mainline and ramp demand volumes in the freeway analysis area, respectively.

### **Daily Person Throughput**

Person throughput measures the number of people that a transportation facility serves within a given time frame. The number of vehicles (passenger cars, freight trucks, and buses) crossing the existing Interstate Bridge was multiplied by average vehicle occupancy assumptions to calculate total person throughput. Southbound, daily person throughput across the existing Interstate Bridge is 93,400 people. Northbound, the daily person throughput is 92,400 people. Consistent with historical traffic counts on the existing Interstate Bridge, the northbound and southbound traffic volumes are slightly different due to external through-trip patterns and different transit routing between the AM and PM peak periods.

Figure 3.1-7. 2019 Existing Conditions Northbound Peak Period Mainline and Ramp Demand Volumes (vehicles per hour)

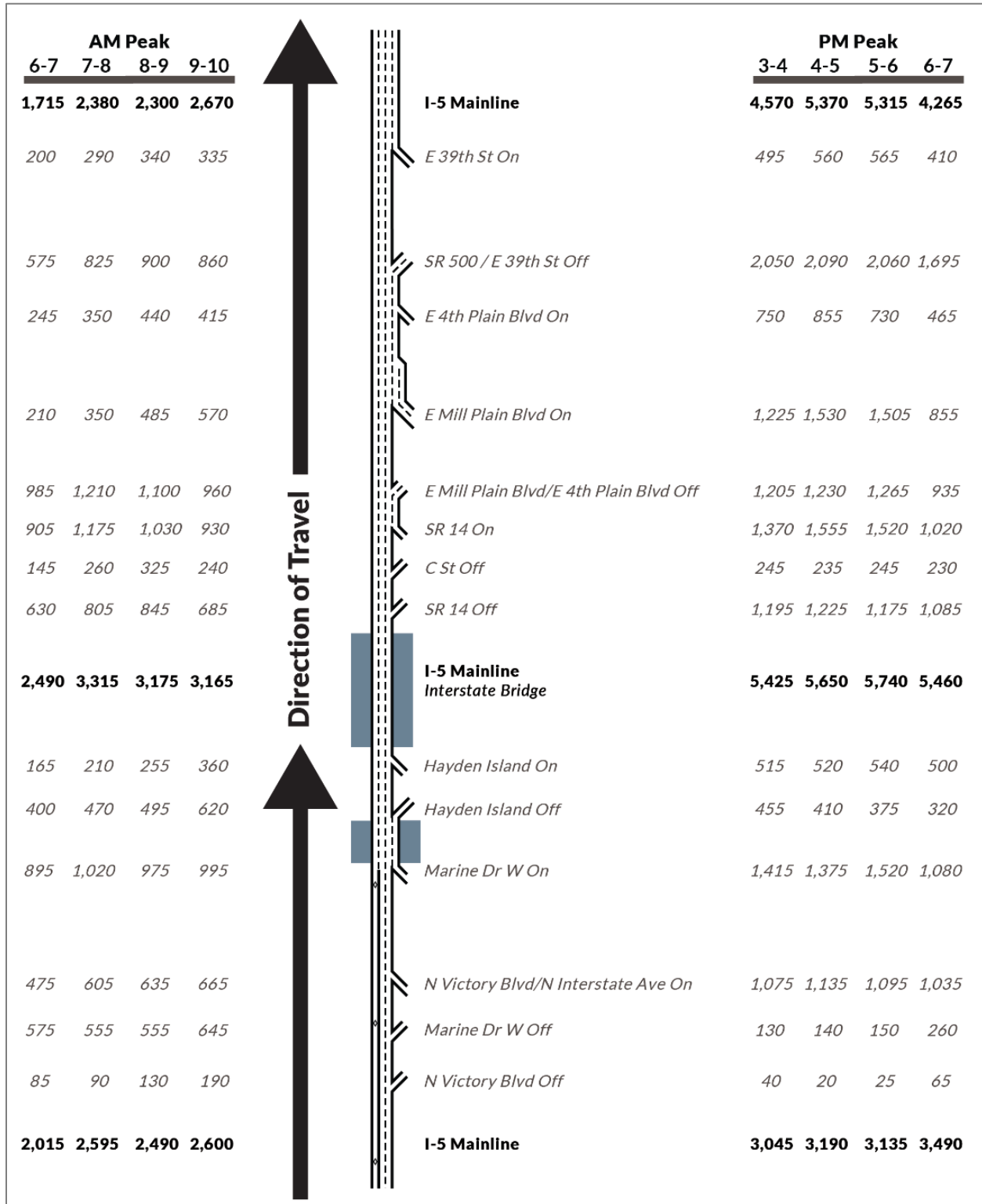
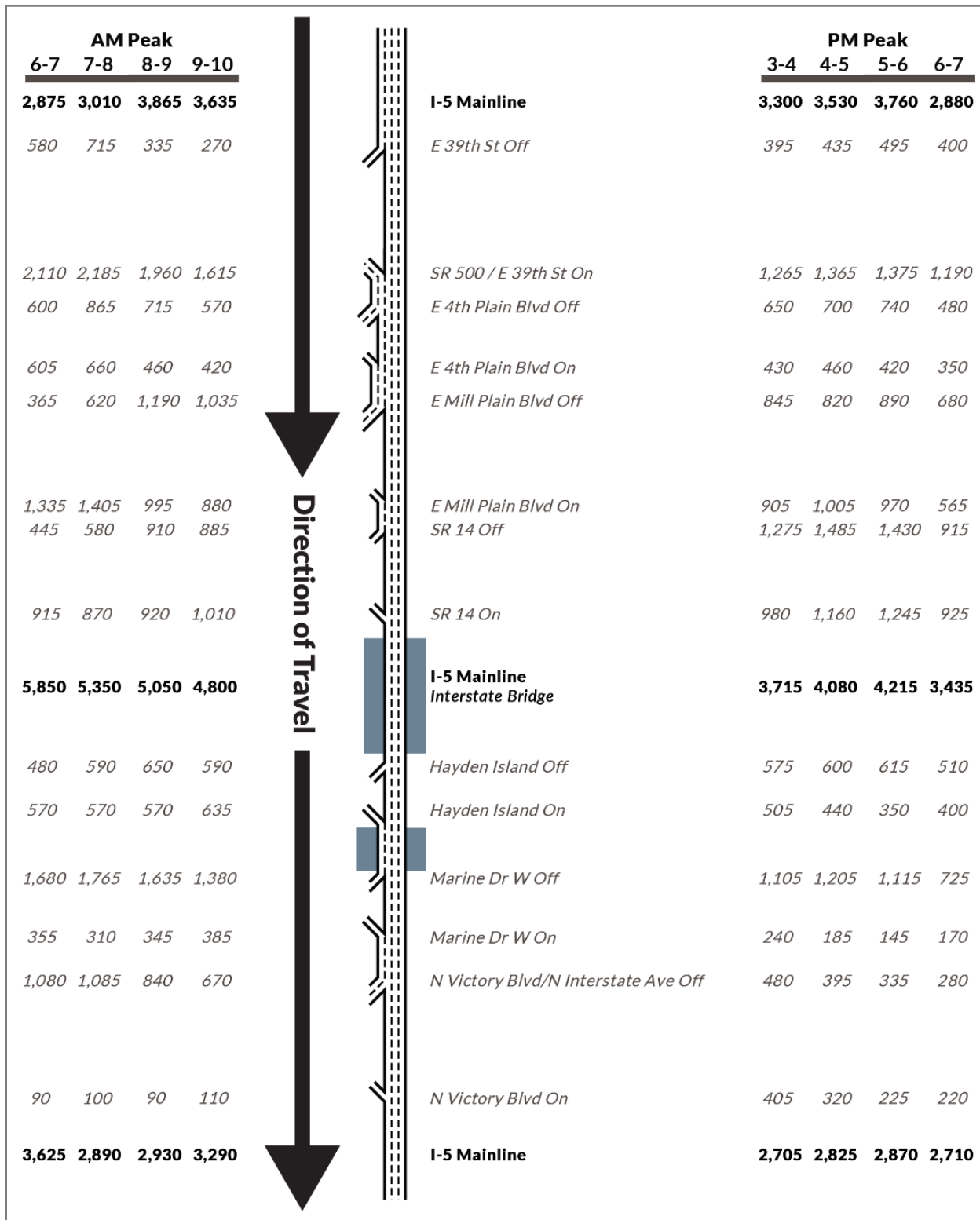


Figure 3.1-8. 2019 Existing Conditions Southbound Peak Period Mainline and Ramp Demand Volumes (vehicles per hour)



### I-5 Operations

As noted above, the primary study area is the approximately 5-mile section of I-5 between the SR 500/39th Street interchange in Vancouver and the Interstate Avenue/Victory Boulevard interchange in Portland. Because traffic volumes and congestion within and outside of the primary study area influence each other, these interactions were captured by analyzing a different geographic region than the primary study area that is a longer section of I-5. This study area (referred to as the I-5 Freeway Analysis Area, Figure 3.1-4) consists of a 17-mile length of I-5 between the I-205 interchange north of Vancouver and the Marquam Bridge in Portland. These extents were chosen to capture the influence of upstream and downstream impacts, as well as for consistency with the freeway analysis area used during the CRC project analysis.

Existing conditions for freeway operations for I-5 within the freeway analysis area were evaluated using VISSIM microsimulation models. The models were developed and calibrated for all travel modes to simulate the observed and regularly occurring traffic operations along northbound and southbound I-5 during the 6 to 10 a.m. and 3 to 7 p.m. peak periods. These models incorporate average traffic volumes and simulate the recurring congestion that occurs when vehicle volumes approach the capacity of the facility at a given location or bottleneck. They account for the effects of on- and off-ramps, merging/diverging segments, weaving segments, lane adds and drops, and design constraints such as curves, grades, underpasses, and narrow or nonexistent shoulders. However, the models do not account for non-recurring congestion caused by traffic incidents, work zones or lane closures, bad weather, special events, or bridge closures or openings.

ODOT and WSDOT measure congestion as speeds below a certain threshold. ODOT and WSDOT have historically measured congestion as when speeds drop below 75% of the posted speed limit due to constrained conditions. In the CRC EIS analysis, congestion was defined as occurring when travel speeds were below 35 mph. To develop a consistent threshold across the region, ODOT and WSDOT measure congestion at 45 mph as most of the posted speed limits in the greater Portland Metro Region are 60 mph (75% of 60 mph is 45 mph). This applies to all freeway locations even if the posted speed limits are lower than 60 mph. This is current ODOT and WSDOT standard practice and is being completed for all projects across the Portland Metro Region. Therefore, the IBR Program measured congestion as speeds below 45 mph and summarized the hours of congestion at bottlenecks.

Table 3.1-3 shows the critical bottleneck locations under existing conditions and summarizes the hours of congestion at bottlenecks according to this definition.

Table 3.1-3. Weekday AM and PM Peak-Period Bottleneck Locations When Speeds Are below 45 mph – 2019 Existing Conditions

| Direction  | Location                          | Time of Day         | Duration (hours) | Maximum Extent (miles) |
|------------|-----------------------------------|---------------------|------------------|------------------------|
| Southbound | Interstate Bridge                 | 6–9 a.m.            | 3 hours          | 3 miles                |
|            | I-5/I-405 Split in North Portland | 6:30 a.m.–1 p.m.    | 6.5 hours        | 3 miles                |
|            | Rose Quarter                      | 7:15 a.m.–7:45 p.m. | 12.5 hours       | 3 miles                |
| Northbound | Interstate Bridge                 | 11:15 a.m.–8 p.m.   | 8.75 hours       | 10+ miles              |

Source: IBR Program Transportation Technical Report  
 I-5 = Interstate 5; I-405 = Interstate 405; IBR = Interstate Bridge Replacement; mph = miles per hour

### Southbound Congestion

In the southbound direction, the existing Interstate Bridge experiences 3 hours of congestion between 6 and 9 a.m. The congestion extends from the existing Interstate Bridge back to the SR 500/39th Street interchange, and vehicle speeds vary from zero to 10 to 20 mph for much of that time. The congestion is caused by approaching traffic that is above the bridge’s limited capacity, limited sight distance, substandard shoulders, short merge and diverge locations north and south of the bridge, heavy on- and off-ramp flows north of the river, and heavy truck volumes.

Southbound travel in the study area is also affected by backups from regional bottlenecks south of the primary study area near the I-5/I-405 split in North Portland, which results in 6.5 hours of congestion between 6:30 a.m. and 1 p.m. that can extend north and combine with the existing Interstate Bridge bottleneck. Another southbound regional bottleneck is near the Rose Quarter, where I-5 is reduced from three to two travel lanes, congestion occurs for 12.5 hours from 7:15 a.m. to 7:45 pm.

### Northbound Congestion

In the northbound direction, the existing Interstate Bridge bottleneck lasts for 8.75 hours between 11:15 a.m. and 8 p.m. The congestion extends south from the existing Interstate Bridge and influences traffic flows south of the study area, back to I-405 and I-84. The northbound congestion at the existing Interstate Bridge occurs for similar reasons as the southbound congestion, including limited bridge capacity; limited sight distance; substandard shoulders; short merge and diverge locations north and south of the bridge; heavy merging, diverging, and weaving flows of traffic; and heavy freight flows. As with southbound conditions, northbound speeds through the congested segments of the corridor vary between 0 and 20 mph.

### Peak-Period Travel Times

The VISSIM traffic operations model was used to determine AM and PM peak-period travel times along the I-5 corridor, northbound and southbound. Table 3.1-4 shows travel times on I-5 between I-205 in Vancouver and I-405 in North Portland in the AM and PM peak periods for both northbound and southbound travel. Southbound AM peak-period travel times are the most affected by congestion, while southbound PM peak-period travel times are similar to free-flow conditions. Northbound peak-period travel times are free flow during the AM peak period and affected by congestion during the PM peak period.

Table 3.1-4. I-5 Average Weekday AM and PM Peak-Period Travel Times between I-205 and I-405 in North Portland – 2019 Existing Conditions

| Direction  | Metric <sup>a</sup>             | 6 a.m. | 7 a.m. | 8 a.m. | 9 a.m. | 3 p.m. | 4 p.m. | 5 p.m. | 6 p.m. |
|------------|---------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Southbound | Hourly Average Travel Time      | 24     | 38     | 32     | 21     | 13     | 13     | 14     | 13     |
|            | Peak 2-hour Average Travel Time | 35     | 35     | 35     | 35     | 14     | 14     | 14     | 14     |
| Northbound | Hourly Average Travel Time      | 13     | 13     | 13     | 13     | 36     | 40     | 31     | 19     |
|            | Peak 2-hour Average Travel Time | 13     | 13     | 13     | 13     | 35     | 35     | 35     | 35     |

Source: IBR Program Transportation Technical Report

<sup>a</sup> Travel time metric is minutes.

I-5 = Interstate 5; I-205 = Interstate 205; I-405 = Interstate 405; IBR = Interstate Bridge Replacement Program

### **Level of Service and Volume-to-Capacity Ratios**

As described in the Transportation Technical Report, WSDOT uses LOS as its standard for highway performance, while ODOT uses V/C ratios to set mobility standards and performance targets. WSDOT's LOS standard for I-5 in Washington is LOS D. ODOT's performance standard for I-5 in Oregon is a V/C ratio of 1.1 for the highest peak hour and 0.99 for all other hours. The Transportation Technical Report and its appendices provide more information on how these standards are defined and evaluated.

Table 3.1-5 and Table 3.1-6 list the I-5 study area highway segments with below-standard performance (shown with bold text) for southbound and northbound traffic during peak periods. Results for Washington segments are shown in terms of LOS, and results for Oregon segments are shown in terms of V/C. At the existing Interstate Bridge freeway segment, both LOS and V/C ratios are reported. The Transportation Technical Report provides additional information, including maps of the segments.

### **Impacts to Local Roads**

During the AM peak period, I-5 mainline congestion affects the ability of vehicles to enter the freeway on southbound on-ramps. This routinely affects the operations of local roads and intersections leading to Vancouver area interchanges at Washington Street, SR 14, Mill Plain Boulevard, Fourth Plain Boulevard, and SR 500.

On the Oregon side, during the PM peak period congestion on I-5 northbound and backups on northbound on-ramps impact the operations of local roads and intersections at Marine Drive, Martin Luther King Jr. Boulevard, and the Victory Boulevard/Interstate Avenue on-ramps.

### **Freight Mobility and Access**

The I-5 crossing is critical to national and international freight flow. I-5 serves direct international land connections to Mexico and Canada. The Portland-Vancouver region is the fourth largest freight hub for domestic and international trade on the West Coast behind Los Angeles/Long Beach, Seattle/Tacoma, and San Francisco/Oakland. National, West Coast, and regional freight flows depend on the efficient functioning of I-5 within the study area.

I-5 is the primary truck route for local, regional, national, and international movement of goods through the Portland-Vancouver region. Trucks carry 55% of all freight in Clark County and 74% of all freight in the Portland-Vancouver region. Approximately \$133 million in commodity value was transported daily across the existing Interstate Bridge in 2019.

Approximately 14,000 heavy and medium trucks crossed the existing Interstate Bridge on an average weekday in 2019, accounting for approximately 10% of all bridge traffic. About 70% of the truck trips using the existing Interstate Bridge either start or end in the Portland-Vancouver metropolitan area. Freight traffic does not peak during typical commute hours (6 to 9 a.m. and 3 to 6 p.m.). Instead, the highest freight volumes occur during the middle of the day as freight truck operators try to avoid the most congested periods.

The busiest interchanges for truck traffic are at Mill Plain Boulevard, City Center/SR 14, and Marine Drive, which all provide access to the Ports of Vancouver and Portland and surrounding industrial areas. These interchanges are also important for oversized loads that move through the Portland-Vancouver metropolitan area. Many of these oversized loads are related to industrial and manufacturing facilities and the Ports of Portland and Vancouver.

Table 3.1-5. I-5 Highway Performance for Southbound AM and PM Peak – 2019 Existing Conditions

| Location  | Segment Type | 6 a.m.                            | 7 a.m.                            | 8 a.m.                           | 9 a.m.                      | 3 p.m.         | 4 p.m.         | 5 p.m.         | 6 p.m.         |
|---|--------------|-----------------------------------|-----------------------------------|----------------------------------|-----------------------------|----------------|----------------|----------------|----------------|
| Main St. on-ramp to 39th St. off-ramp             | Weave        | C                                 | E <sup>a</sup>                    | B                                | B                           | B              | B              | B              | B              |
| 39th St. off-ramp to SR 500/39th St. on-ramp      | Basic        | F <sup>a</sup>                    | F <sup>a</sup>                    | D                                | C                           | B              | C              | C              | B              |
| SR 500/39th St. on-ramp to Fourth Plain off-ramp  | Weave        | F <sup>a</sup>                    | F <sup>a</sup>                    | E <sup>a</sup>                   | B                           | B              | B              | B              | B              |
| Fourth Plain off-ramp to Fourth Plain on-ramp     | Basic        | F <sup>a</sup>                    | F <sup>a</sup>                    | E <sup>a</sup>                   | B                           | B              | B              | B              | B              |
| Fourth Plain on-ramp to Mill Plain off-ramp       | Weave        | F <sup>a</sup>                    | F <sup>a</sup>                    | E <sup>a</sup>                   | B                           | B              | B              | B              | B              |
| Mill Plain off-ramp to Mill Plain on-ramp         | Basic        | F <sup>a</sup>                    | F <sup>a</sup>                    | F <sup>a</sup>                   | C                           | B              | C              | C              | B              |
| Mill Plain on-ramp to SR 14 off-ramp              | Weave        | F <sup>a</sup>                    | F <sup>a</sup>                    | F <sup>a</sup>                   | C                           | C              | C              | C              | B              |
| SR 14 off-ramp to SR 14/Washington St on-ramp     | Basic        | F <sup>a</sup>                    | F <sup>a</sup>                    | F <sup>a</sup>                   | C                           | C              | C              | C              | B              |
| SR 14/Washington St on-ramp merge                 | Merge        | F <sup>a</sup>                    | F <sup>a</sup>                    | F <sup>a</sup>                   | C                           | B              | C              | C              | B              |
| Interstate Bridge                                 | Basic        | <b>0.90-1.0</b><br>E <sup>a</sup> | <b>0.90-1.0</b><br>E <sup>a</sup> | <b>&gt;1.1</b><br>F <sup>a</sup> | 0.50-0.75<br>D              | 0.50-0.75<br>C | 0.50-0.75<br>C | 0.50-0.75<br>D | 0.50-0.75<br>C |
| Hayden Island off-ramp to Hayden Island on-ramp   |              | 0.75-0.80                         | 0.75-0.80                         | 0.90-1.0                         | 0.50-0.75                   | 0.25-0.50      | 0.50-0.75      | 0.50-0.75      | 0.25-0.50      |
| Hayden Island on-ramp to Marine Dr. off-ramp      | Weave        | 0.50-0.75                         | 0.50-0.75                         | <b>&gt;1.1</b> <sup>a</sup>      | 0.50-0.75                   | 0.25-0.50      | 0.25-0.50      | 0.25-0.50      | 0.25-0.50      |
| Marine Dr. off-ramp to Marine Dr. on-ramp         | Basic        | 0.50-0.75                         | 0.75-0.80                         | <b>&gt;1.1</b> <sup>a</sup>      | 0.50-0.75                   | 0.25-0.50      | 0.25-0.50      | 0.25-0.50      | 0.25-0.50      |
| Marine Dr. on-ramp to Interstate Ave off-ramp     | Weave        | 0.50-0.75                         | <b>1.0-1.1</b> <sup>a</sup>       | <b>&gt;1.1</b> <sup>a</sup>      | 0.75-0.80                   | 0.25-0.50      | 0.25-0.50      | 0.25-0.50      | 0.25-0.50      |
| Interstate Ave. off-ramp to Victory Blvd. on-ramp | Basic        | 0.50-0.75                         | <b>&gt;1.1</b> <sup>a</sup>       | <b>&gt;1.1</b> <sup>a</sup>      | <b>&gt;1.1</b> <sup>a</sup> | 0.25-0.50      | 0.25-0.50      | 0.25-0.50      | 0.25-0.50      |

Source: IBR Program Transportation Technical Report

Performance standards are shown as LOS for locations in Washington and V/C for locations in Oregon. Both metrics are shown for the Interstate Bridge.

<sup>a</sup> Cells with text in bold do not meet performance standard.

Ave. = Avenue; Blvd. = Boulevard; Dr. = Drive; I-5 = Interstate 5; IBR = Interstate Bridge Replacement; LOS = level of service; SR = State Route; St. = Street; V/C = volume to capacity

Table 3.1-6. I-5 Highway Performance for Northbound AM and PM Peak – 2019 Existing Conditions

| Location  | Segment Type | 6 a.m.         | 7 a.m.         | 8 a.m.         | 9 a.m.         | 3 p.m.                                 | 4 p.m.                                 | 5 p.m.                                 | 6 p.m.                                  |
|---|--------------|----------------|----------------|----------------|----------------|--|--|--|---|
| Victory Blvd. off-ramp to Marine Dr. off-ramp     | Diverge      | <0.75          | <0.75          | <0.75          | <0.75          | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                       |
| Marine Dr. off-ramp to Int./Victory Blvd. on-ramp | Basic        | <0.2.5         | 0.25-0.50      | 0.25-0.50      | <0.25          | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                       |
| Int./Victory Blvd. on-ramp merge                  | Merge        | 0.25-0.50      | 0.25-0.50      | 0.25-0.50      | 0.25-0.50      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                       |
| Int./Victory Blvd. on-ramp to Marine Dr. on-ramp  | Merge        | 0.25-0.50      | 0.25-0.50      | 0.25-0.50      | 0.25-0.50      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                       |
| Marine Dr. on-ramp to Hayden Island off-ramp      | Weave        | 0.25-0.50      | 0.25-0.50      | 0.25-0.50      | 0.25-0.50      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                       |
| Hayden Island off-ramp to Hayden Island on-ramp   | Basic        | 0.25-0.50      | 0.25-0.50      | 0.25-0.50      | 0.25-0.50      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                       |
| Hayden Island on-ramp merge                       | Merge        | 0.25-0.50      | 0.25-0.50      | 0.25-0.50      | 0.25-0.50      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                      | >1.1 <sup>a</sup>                       |
| Interstate Bridge                                 | Basic        | 0.25-0.50<br>B | 0.50-0.75<br>C | 0.50-0.75<br>C | 0.25-0.50<br>C | <b>1.0-1.1</b><br><b>F<sup>a</sup></b> | <b>1.0-1.1</b><br><b>F<sup>a</sup></b> | <b>1.0-1.1</b><br><b>F<sup>a</sup></b> | <b>0.90-1.0</b><br><b>E<sup>a</sup></b> |
| SR 14 off-ramp to C St. off-ramp                  | Diverge      | B              | B              | B              | B              | C                                      | C                                      | C                                      | C                                       |
| C St. off-ramp to SR 14 on-ramp                   | Basic        | A              | B              | B              | B              | C                                      | C                                      | C                                      | C                                       |
| SR 14 on-ramp to Mill Plain/Fourth Plain off-ramp | Weave        | B              | B              | B              | B              | C                                      | C                                      | C                                      | C                                       |
| Mill/Fourth Plain off-ramp to Mill Plain on-ramp  | Basic        | A              | B              | B              | B              | C                                      | C                                      | C                                      | C                                       |
| Mill Plain on-ramp merge                          | Merge        | A              | A              | A              | A              | B                                      | C                                      | B                                      | B                                       |
| Mill Plain on-ramp to Fourth Plain on-ramp        | Merge        | A              | B              | B              | B              | C                                      | C                                      | C                                      | B                                       |
| Fourth Plain on-ramp merge                        | Weave        | A              | A              | A              | B              | B                                      | C                                      | C                                      | B                                       |
| Fourth Plain on-ramp to SR 500/39th St. off-ramp  | Weave        | A              | B              | B              | B              | C                                      | D                                      | C                                      | B                                       |
| SR 500/39th St. off-ramp to 39th St. on-ramp      | Basic        | A              | B              | A              | B              | C                                      | C                                      | C                                      | B                                       |
| 39th St. on-ramp to Main St. off-ramp             | Weave        | A              | A              | A              | B              | B                                      | C                                      | B                                      | B                                       |

Source: IBR Program Transportation Technical Report

Performance standards are shown as LOS for locations in Washington and V/C for locations in Oregon. Both metrics are shown for the Interstate Bridge.

<sup>a</sup> Cells with text in bold do not meet performance standard.

Ave. = Avenue; Dr. = Drive; I-5 = Interstate 5; IBR = Interstate Bridge Replacement; Int. = Interstate Avenue; LOS = level of service; SR = State Route; St. = Street; V/C = volume to capacity

## Bridge Openings and Gate Closures

Bridge openings occur when I-5's movable spans are physically raised for the passage of commercial and non-commercial maritime vessels that exceed the available vertical clearance between the water level and the bridge in its closed position. When bridge openings occur, they stop all northbound and southbound traffic, freight, transit, and active transportation on the existing Interstate Bridge.

The maximum vertical navigation clearance under the Interstate Bridge at any time depends on the water level in the Columbia River (higher river levels result in less clearance) and which of the three navigation channels a vessel is using (the primary navigation channel, the barge channel, or the alternate barge channel). The alternate barge channel, which is aligned with the highest point of the bridge, has a vertical clearance of up to 72 feet above the Columbia River. The primary navigation channel, which aligns with the existing Interstate Bridge lift spans, provides a maximum vertical navigation clearance of 39 feet when the lift spans are in the closed position and 178 feet when the spans are fully raised.

In addition to vertical clearance, vessels passing beneath the bridge must also consider horizontal clearance between the existing Interstate Bridge piers and the piers of the BNSF Railway Bridge located approximately 0.9 miles downstream. The existing horizontal clearances for the existing Interstate Bridge are approximately 263 feet for the primary channel, 511 feet for the barge channel, and 260 feet for the alternate barge channel. The alignments of the navigation channels factor into vessel passage of both the existing Interstate Bridge and the BNSF Railway Bridge; due to the proximity of the two, vessel operators typically plan their route based on navigation factors associated with both bridges. Vessels needing less than 33 feet of vertical navigation clearance to pass the BNSF Railway Bridge may take a route other than the primary navigation channel, while vessels needing additional vertical navigation clearance require the BNSF Railway Bridge swing span to be opened and must use the primary navigation channel.

Frequent river traffic (tug and tows, river cruise ships, and recreational craft) typically does not require a bridge opening, as these vessels often opt to pass the bridge using either the alternate barge channel or the barge channel. However, bridge openings are needed for some government vessels, tall ships and sailboats, floating construction equipment, larger ocean-going tugs or vessels, and specialty shipments from area fabricators that require more than 72 feet of vertical navigation clearance. A bridge opening is also needed if a vessel requiring more than 39 feet of clearance must use the primary navigation channel to pass through the existing Interstate Bridge and the BNSF Railway Bridge for maneuverability and safety considerations.

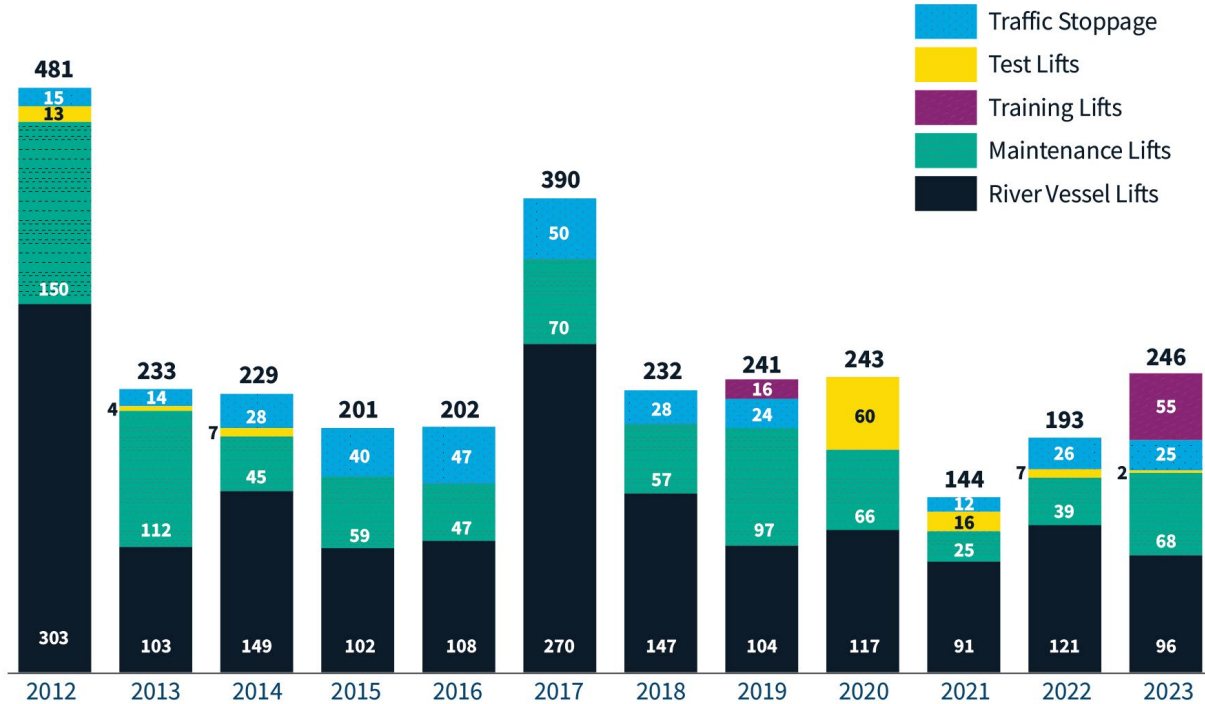
In addition to bridge openings, traffic on the bridge is affected by gate closure events, where traffic is stopped to allow for bridge-related activity without the bridge being raised. These gate closure events occur for several reasons, including bridge maintenance and on-site training of department of transportation personnel. Training and practice openings are performed during the day and overnight periods. Depending on the reason for the event, traffic may be stopped in one or both directions.

For the 12-year period from January 1, 2012, to December 31, 2023,<sup>12</sup> there were 3,035 bridge opening and gate closure events due to vessels transiting under the bridge, traffic stoppages, test lifts, training, and maintenance. On average, the bridge was opened/gate closed 252 times per year, with the range over the 12-year period fluctuating between 144 and 481 bridge openings and gate closures per year. Above-average high-water levels occurred in 2012 and 2017, resulting in more bridge openings in those 2 years. Figure 3.1-9 displays bridge opening and gate closure events for each year, by reason, from 2012 to 2023.

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<sup>12</sup> For the transportation analysis in the Final SEIS, existing Interstate Bridge opening and gate closure events for the years 2012 to 2023 from ODOT's Interstate Drawbridge Operators Report were evaluated to describe existing conditions and reasonably foreseeable effects.

Figure 3.1-9. Interstate Bridge Opening and Gate Closure Events 2012–2023



Source: ODOT and WSDOT Bridge Lift Data 2012-2023.

The average bridge opening and gate closure duration during this period was 13.2 minutes. While bridge openings are not allowed during peak periods (6:30 a.m. to 9 a.m. and 2:30 p.m. to 6 p.m.) on Monday to Friday (except in emergencies and federal holidays), they are allowed before and after the peaks. Depending on the closure time and duration as well as traffic levels, it can take between 5 and 110 minutes for traffic to recover from a bridge opening and gate closure. A closure just before the peak period can last even longer, affecting conditions throughout the peak.

### Arterial and Local Street Network and Intersection Operations

In addition to the regional roadways that connect population and employment centers, the following two study areas, Intersection Analysis Study Intersections – Vancouver (Figure 3.1-5) and Intersection Analysis Study Intersections – Portland (Figure 3.1-6) contain ODOT and WSDOT highways and City of Portland and City of Vancouver arterials and local streets that serve travel to and from the regional network, as well as providing for local access and circulation. These two subareas are different than the primary study area. Many of these roads and highways include bicycle and pedestrian facilities.

The Intersection Analysis Study Intersections – Vancouver and Intersection Analysis Study Intersections - Portland include 80 intersections: 58 in Vancouver and 22 in Portland. These include intersections originally evaluated in the CRC Final EIS and additional intersections that were identified for analysis in this Final SEIS based on data reviews, consultations with partner agency staff, and the potential for intersection operations to be affected by I-5 operations or IBR Program improvements. More information on how intersections were identified for inclusion in the analysis of reasonably foreseeable effects can be found in Section 3.6 of the

Transportation Technical Report. The study intersections are either located in Vancouver or Portland, which have different partner agencies with different performance standards.

Under existing conditions, four intersections that were analyzed do not meet the applicable agency performance standards. Three Vancouver area intersections do not meet agency standards under existing conditions (Table 3.1-7), and one Portland area intersection does not meet agency standards (Table 3.1-8). Intersection performance standards differ by agency. WSDOT, City of Vancouver, and City of Portland use LOS and ODOT uses intersection capacity utilization and volume to capacity. The study area intersections were analyzed without adding the impacts of freeway congestion spilling back onto local roadways, and some intersections may operate worse than shown. The Transportation Technical Report has further information on existing peak-hour intersection volumes as well as intersection operations.

Table 3.1-7. Vancouver Intersections Not Meeting Agency Standards (2019 Existing Conditions)

| Peak | Intersection                                     | Control Type | Standard       | LOS | Delay (seconds) | Meets Standard |
|------|--|--------------|----------------|-----|-----------------|----------------|
| AM   | I-5 SB Ramp and 39th Street (#5)                 | TWSC         | LOS D<br>WSDOT | F   | 286             | No             |
| PM   | Main Street and 39th Street (#3)                 | Signal       | LOS E<br>COV   | F   | 89              | No             |
| PM   | I-5 SB Ramp and 39th Street (#5)                 | TWSC         | LOS D<br>WSDOT | F   | 259             | No             |
| PM   | Columbia Shores Boulevard and Columbia Way (#58) | Signal       | LOS E<br>COV   | F   | 294             | No             |

Source: IBR Program Transportation Technical Report

Note: Study intersections were analyzed without considering the impacts of freeway congestion spilling back into local roadways and may operate worse than shown.

COV = City of Vancouver; I-5 = Interstate 5; IBR = Interstate Bridge Replacement; LOS = level of service; NB = northbound; SB = southbound; TWSC = two-way stop-control; WSDOT = Washington State Department of Transportation

Table 3.1-8. Portland Intersections Not Meeting Agency Standards (2019 Existing Conditions)

| Peak | Intersection   | Control Type | Standard/Target    | LOS | Delay (seconds) | ICU / V/C | Meets Standard |
|------|--|--------------|--------------------|-----|-----------------|-----------|----------------|
| AM   | Marine Drive/Martin Luther King Jr. Boulevard and I-5 NB/SB on/off-ramps (#68) | Signal       | V/C = 0.85<br>ODOT | F   | 137             | 1.56      | No             |
| PM   | Marine Drive/Martin Luther King Jr. Boulevard and I-5 NB/SB on/off-ramps (#68) | Signal       | V/C = 0.85<br>ODOT | D   | 51              | 1.15      | No             |

Source: IBR Program Transportation Technical Report

Note: Study intersections were analyzed without considering the impacts of freeway congestion spilling back into local roadways and may operate worse than shown.

ICU = intersection capacity utilization; I-5 = Interstate 5; LOS = level of service; NB = northbound; ODOT = Oregon Department of Transportation; SB = southbound; V/C = volume to capacity

## Transit

### *Transit Providers and Systems*

Transit service in the region and the primary study area is provided by TriMet and C-TRAN.

To serve its three-county service area in metropolitan Portland, TriMet has a bus fleet of approximately 700 vehicles and operates the 60-mile-long Metropolitan Area Express (MAX) light-rail transit (LRT) system. The MAX system has five lines that operate at frequencies of 15 minutes or less between approximately 5 a.m. and 1 a.m., 7 days a week. This includes the Yellow Line, also known as Interstate MAX, which runs northbound and southbound from downtown Portland (Portland State University) to the Expo Center. South of downtown, the Yellow Line transitions to the Orange Line and continues south to Milwaukie. The TriMet MAX system does not provide service across North Portland Harbor to Hayden Island or across the Columbia River into Clark County. TriMet has five operations and maintenance facilities: three for buses and two for rail.

C-TRAN is the transit provider in the Clark County service area, with a fixed-route fleet of approximately 122 buses that serve 28 bus lines and The Vine bus rapid transit (BRT) service. The Vine service began operations in 2017 between downtown Vancouver and the Vancouver Mall Transit Center, primarily along Fourth Plain Boulevard. New Vine BRT service along Mill Plain Boulevard began in October 2023. (Note that for consistency with existing data reflecting 2019 conditions, this service is not included in BRT summaries for existing conditions in the Final SEIS, but it is reflected in future-year forecasts for both the No-Build Alternative and the proposed Modified LPA.) In addition to local bus and BRT service, C-TRAN operates three regional routes that provide transit service crossing the Columbia River to connect with the TriMet rail system and Portland International Airport, as well as seven express routes that provide connections between regional park and rides, downtown Vancouver, and the downtown Portland area. C-TRAN has a fleet of 64 demand-responsive vehicles and 40 vanpool vehicles. C-TRAN currently operates one bus operations and maintenance facility.

Several transit centers and park and rides are used for travel between Clark County and Portland. These are served by various combinations of local, express, and regional bus routes as well as MAX. Tables detailing each of these facilities and routes that serve them are available in the Transportation Technical Report.

### *Transit Service in the Study Area*

There are 27 bus routes and one MAX light-rail line that serve the study area, including BRT, local, express, and regional service provided by C-TRAN and local bus and LRT service provided by TriMet. Both C-TRAN and TriMet provide special access and shared mobility services (i.e., paratransit, on-demand ridesharing, neighborhood shuttles, and vanpools) in the study area. Tables detailing each of these routes and their service assumptions (headways) are available in the Transportation Technical Report.

Table 3.1-9 shows the existing 2019 transit trips served by C-TRAN and TriMet in the study area. Approximately 4,800 people travel across the Columbia River via bus each weekday on express bus and regional routes using either I-5 or I-205. For transit trips between Vancouver and Portland on I-5, buses operate along with other vehicles in general-purpose travel lanes. On I-205, C-TRAN buses operate on the shoulder when peak-period congestion warrants. As a result, congestion impacts bus travel times and the reliability of trips, which are key measures of service quality for transit systems.

Table 3.1-9. Existing 2019 Average Weekday Transit Ridership

| Organization | Transit Service                          | Regional System | Study Area Routes <sup>a</sup> |
|--------------|--|-----------------|--------------------------------|
| TriMet       | Local Bus                                | 189,200         | 50,400                         |
|              | Light-Rail                               | 122,000         | 13,200                         |
|              | Westside Express Service (Commuter Rail) | 1,400           | N/A                            |
|              | <b>Total</b>                             | <b>312,600</b>  | <b>63,600</b>                  |
| C-TRAN       | Local Bus                                | 10,400          | 7,100                          |
|              | The Vine BRT                             | 4,500           | 4,500                          |
|              | Regional Bus                             | 2,100           | 1,500                          |
|              | Express Bus                              | 2,900           | 2,400                          |
|              | <b>Total</b>                             | <b>19,900</b>   | <b>15,500</b>                  |

Source: TriMet Spring 2019 Route Ridership Report, C-TRAN 2019 April Boarding Report

a Includes boardings for entire route, not just the portion within the study area.

BRT = bus rapid transit; N/A = not applicable

Transit travel time within the study area varies by time of day. For all trips between Vancouver and Portland, congestion on I-5 affects both transit travel time and the reliability of transit trips. Currently, only transit trips destined for downtown Portland have the possibility of a one-seat ride (i.e., a single ride with no transfers) on express buses that operate in mixed traffic on I-5. Total transit travel times (including in-vehicle, walking, and waiting) range between 38 and 65 minutes southbound during the AM peak period and between 46 and 71 minutes northbound during the PM peak period. Nearly all of the transit travel times currently require a transfer to complete the trip exclusively on transit. Transfer time is included in the travel times as walk and wait time but is generally perceived as being more onerous than initial walk and wait or in-vehicle time.

### Active Transportation

Active transportation facilities in the study area include sidewalks, on-street bicycle facilities, and shared-use paths. The analysis of these facilities extended over 3 miles beyond the study area to account for local network conditions and the potential for active transportation modes to reach the Interstate Bridge from locations outside of the study area.

In Portland, the width and condition of active transportation facilities vary. Most existing sidewalks are between 4 and 6 feet wide, but there are areas with no sidewalks, as well as segments with missing connections. The Portland bicycle network in the study area comprises a mixture of bike lanes and off-street shared-use paths. These facilities are meant not only for biking but also for other small mobility devices (such as skateboards, scooters, e-devices, bikeshare bikes, or cargo bikes) that can travel at a speed faster than pedestrians. Part of the 40-Mile Loop Trail, which is planned to create a route around the Portland region, runs through the primary study area on the south edge of the Columbia River but has a gap within this study area through the Marine Drive interchange.

Land uses in the area south of North Portland Harbor (e.g., the Columbia Slough Watershed, Delta Park, the Expo Center, and industrial lands) have limited the overall roadway network development. As a result of large block spacing and historically lower standards, there are limited sidewalk connections. An incomplete

network of shared-use paths connects to and through this portion of the study area, with some non-standard segments.

Bike lanes connect North and Northeast Portland with the North Portland Harbor bridge via N Denver Avenue, Martin Luther King Jr. Boulevard, and N Marine Drive. Access to the shared-use path on the North Portland Harbor bridge is circuitous and non-continuous on both ends of the structure (in North Portland and on Hayden Island). On Hayden Island, the path connecting the bridge with mainland Portland is narrow and does not meet applicable standards. The pedestrian network on the island is largely absent despite the grid-like nature of the street network.

The existing Interstate Bridge over the Columbia River between Vancouver and Hayden Island has substandard shared-use paths on the outside edges of the northbound and southbound bridge structures. While the design of each path is different, neither meets the American Association of State Highway and Transportation Officials (AASHTO) standards for shared-use paths. The “clear” (or unobstructed) widths of the paths on the existing bridges are less than 4 feet. The mixing of pedestrians and bicycles in this constrained space can result in safety conflicts and an uncomfortable traveling environment for many users. Still, an estimated 410 bicyclists and pedestrians, on average, make trips across the bridge daily.

In Vancouver, sidewalks are present in the downtown core and on most major arterials west of I-5, but gaps or non-standard facilities are present on several major routes. I-5 is a major barrier to pedestrian travel between Vancouver neighborhoods and destinations on the east and west sides of the freeway. Pedestrian facilities are provided at some I-5 crossing locations, but not consistently. The bicycle network in Vancouver comprises a mixture of shared roadways (designated bikeways in which people biking share the road space with cars and other vehicles), bike lanes, and off-street paved paths providing access to the existing Interstate Bridge.

The Transportation Technical Report has additional information on existing conditions for active transportation access to, from, and across the existing Interstate Bridge. These 5-, 10-, 15-, and 20-minute pedestrian and bicycle travel-shed analyses are tied to the local walking, biking, and rolling networks—rather than general, linear distances to create a more accurate measure of how people would travel those distances using available facilities. Furthermore, these travelsheds are stress-adjusted to account for how the quality of facilities (i.e., how stressful or comfortable they are) affects travel times and distances. Higher-stress facilities can make trips feel longer than they are, increasing perceived travel time or distance. To reflect this, the analysis modifies network distances so they better represent how people actually experience walking and bicycling using available facilities. This analysis considers connectivity and stress related to how active transportation users perceive different facility types and contexts, which helps forecast the likely distance a typical user may walk, bike, or roll in the area.

## Safety

For existing safety-related conditions in the study area, the IBR Program collected crash data records from WSDOT and ODOT from January 2015 to December 2019 (pre-pandemic). Within the study area, there were 2,270 total crashes on the I-5 mainline, ramps, and at study area intersections for the 5-year period evaluated, with rear-end crashes comprising about half of the total. Most crashes occurred between 6 and 9 a.m. and 12 and 7 p.m. The highest concentration of rear-end crashes occurred on the existing Interstate Bridge. Sideswipe crashes also commonly occur near access points and weaving areas between interchanges. Fixed-object crashes were the most prevalent type of crash occurring on the ramps. About 38% of total crashes resulted in injury, with 2% fatal or serious. The analysis also found that crashes in both northbound and southbound directions are approximately two times more likely when a bridge opening and gate closure occurs than when it does not. The Transportation Technical Report details existing crash data by type, severity, and location, including crashes occurring during bridge openings and gate closures.

## Transportation Demand Management and Transportation System Management

A variety of demand- and system-management programs and measures are currently in use in the study area. Demand-management programs can be categorized according to four basic strategies to alter transportation choices:

- Programs to improve public awareness of transportation choices.
- Programs to improve access to or availability of alternative transportation choices.
- Incentives and disincentives that cause changes in transportation choices by individuals.
- Institutional and organizational approaches, including employer-based or area-based programs, as well as transit-oriented or land use-based programs.

System-management measures and actions are used to increase the operational efficiency of the transportation system, especially the street and highway network, including signals and signal systems. These systems are owned or operated by the local agencies and the states and include:

- System monitoring and traveler information systems (e.g., web-based information systems, variable message signs).
- Facility management systems (e.g., active traffic management system, bus-on-shoulder operations, optimized signal systems, ramp meters, signal priority for special users such as transit).
- Incident management systems (e.g., incident response and recovery teams).

### 3.1.3 Long-Term Reasonably Foreseeable Effects

The primary study area as well as the other identified study areas and the 2045 horizon year as described in the Chapter 3 introduction are used to assess reasonably foreseeable long-term benefits and effects to transportation. All regional travel demand modeling data used in support of the SEIS were developed using the Metro/RTC 2018 RTP RTDM as described in Section 3.1.2. Regional transportation plans identify and prioritize long-range transportation needs for all modes in the region. These plans serve as the blueprint for how transportation resources are invested and projects are selected for implementation, and they are the basis for planning efforts in the region. To extend to year 2045 the Metro/RTC 2018 RTP RTDM includes population and employment growth, land use factors, tolling, fare policies, parking, transit and highway capacity constraints, and other regional system investments that are based on the region's adopted regional transportation plans. All these factors influence the forecasts of future travel demand conditions, including the results for vehicle and transit demand in this corridor and across the region. Year 2045 RTDM assumptions incorporate the 2040 Financially Constrained assumptions adopted by both Metro and RTC from the 2018 RTP with updates to extend the land use forecasts to 2045. In addition to land use forecasts, these updates to the Metro/RTC 2018 RTP RTDM include transit capacity constraints to better represent feasible transit ridership relative to transit investments described in the 2018 RTP. Without accounting for capacity constraints of the regional transit system, the model would have generated estimates of transit ridership that could only be supported if additional capital investment projects were added to the 2018 RTP. Metro/RTC 2018 RTP RTDM assumptions are described in more detail in the Transportation Technical Report and Appendix H to the Transportation Technical Report. Transit capacity constraints are discussed in Section 3.8 of Appendix H to the Transportation Technical Report.

The evaluation of the reasonably foreseeable effects of the proposed action is organized by the element of the transportation system for the No-Build Alternative<sup>13</sup> and proposed Modified LPA and design options. The proposed Modified LPA with design options is compared to the No-Build Alternative. The proposed Modified LPA with Recommended Design Options comprise a single-level fixed-span bridge configuration, one auxiliary lane, ramps at C Street, I-5 centered alignment, and 570 parking spaces near Waterfront Station at three sites and 700 parking spaces near Evergreen Station at two sites. Three of the Modified LPA design options—those that would remove the C Street ramps, add a second auxiliary lane, and replace the existing Interstate Bridge with a new movable-span bridge configuration—would operate differently than the Modified LPA with Recommended Design Options in some categories and are discussed below where their impacts would differ. The reasonably foreseeable transportation effects of the other proposed design options (i.e., double-level fixed-span bridge configuration and I-5 shifted west), described in Chapter 2 of this Final SEIS, would not have different transportation effects than the Modified LPA with Recommended Design Options, and therefore, are not discussed in further detail here. The Transportation Technical Report has more detailed discussion by design options.

Consistent with standard practice for RTDMs, the Metro/RTC 2018 RTP RTDM reflects typical average weekday conditions. Regional modeling is not designed to simulate infrequent, short-duration operational events such as bridge openings, traffic incidents, work zones or lane closures, bad weather, and special events. Because bridge openings occur intermittently and do not meaningfully affect average daily traffic patterns, they are not explicitly represented in the Metro/RTC 2018 RTP RTDM. Evaluation of localized and short-term delay associated with bridge openings is more appropriately addressed through operational analyses rather than regional modeling.

The No-Build Alternative would not provide multimodal improvements assumed in regional transportation and land use plans, which seek to manage growth through coordinated land use and transportation actions that encourage transit-oriented development patterns in areas such as downtown Vancouver and Hayden Island. These multimodal improvements are intended to manage travel demand by increasing access to transit, walking, and biking, and thereby increasing the use of such modes as alternatives to vehicle use. As noted in Section 3.4, Land Use and Economic Activity, the complementary patterns of land use and transportation systems would be less likely to be achieved if the multimodal improvements of the IBR Program were not in place.

Under the No-Build Alternative, without these multimodal improvements, population and employment may not reach anticipated levels or occur within districts planned for higher density growth. Although denser growth patterns are already occurring in areas such as downtown Vancouver, future growth under the No-Build Alternative is expected to be more limited and less dense than under the proposed Modified LPA with all design options, where development is expected to be focused around centers of multimodal activity such as high-capacity transit stations. The lack of multimodal improvements under the No-Build Alternative would also reduce the options available for travel via transit or active transportation. Thus, continued reliance on driving for future trips would be more likely with the No-Build Alternative. This continued reliance on driving under the No-Build, in contrast to the Modified LPA, would tend to encourage more dispersed patterns of development, often referred to as urban sprawl.

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<sup>13</sup> The Regional Transportation Plan (RTP) developed by Metro/RTC reflect a Financially Constrained project list, which identifies projects and programs that can be funded with the resources the region expects to have through the planning horizon year, in this case 2045. For the Metro/RTC 2018 RTP RTDM, the financially constrained 2045 network includes the IBR Program. The No-Build Alternative is the Financially Constrained condition in the Metro/RTC 2018 RTP RTDM without the IBR Program. Specifically, the Metro/RTC 2018 RTP RTDM network is adjusted to remove the highway, transit, and toll elements of the IBR Program such that the study area reflects conditions without the improvements associated with the IBR Program. The Metro/RTC 2018 RTP RTDM is run for this No-Build condition to compare against the Modified LPA, which is reflected in the Financially Constrained scenario. Metro/RTC 2018 RTP RTDM ridership reflects demand that is not able to be accommodated by No-Build service levels in the corridor which leads to discussion about increased pressure on bus and rail service. The addition of service in the Modified LPA allows for cross-river demand to be accommodated.

Other potential reasonably foreseeable effects of the No-Build Alternative related to transportation include the following:

- Delays in local and regional freight transportation because of increased congestion on I-5, with potential economic implications.
- Increased pressure on bus service in Vancouver and light rail service in Portland as travel demand increases without corresponding growth in transit infrastructure. The No-Build Alternative would not be able to provide enough service to meet the future transit demand due to the fact that the Modified LPA would not be constructed and there are no other fiscally constrained transit projects in the primary study area in the RTP that would be undertaken.
- Potential for severe regional congestion, with resulting economic and social effects, particularly if the existing bridge spans were damaged in an earthquake or other catastrophic event.

Completion of the Modified LPA with all design options—including improved highway facilities and safety on I-5, enhanced transit solutions (light-rail service and increased express bus service), and improved active transportation facilities—would improve regional transportation between Vancouver and Portland.

The reasonably foreseeable effects analysis also considered the potential for induced demand resulting from the proposed Modified LPA with all design options. The IBR Program forecasted future travel demand using the 2018 RTP that includes regionally adopted land use assumptions. This demand-forecasting approach is reinforced by long-standing federal and state-level guidance and by transportation and environmental planning best practices. While there are differences in how induced demand is defined, the FHWA Environmental Review Toolkit (FHWA 2025) provides interim guidance that includes the following definition of induced demand: “the volume of traffic that is drawn to a new or expanded road by providing additional capacity. Induced demand comes from a number of sources, including trips diverted from other routes, discretionary trips that might not have been made without the service improvement, and improved access to employment and other activity location choices.” ODOT has a similar working definition.

These sources note that the potential for induced demand differs by location but is typically greatest when new corridors/accesses are created or when an existing corridor has substantial increases in regional system capacity. The operational and safety improvements in a highway segment for the Modified LPA with all design options would have a limited potential for induced demand because the overall corridor remains capacity-constrained at three lanes at its north and south limits. They also would remain consistent with the Regional Transportation Plan definition of the purposes of an auxiliary lane: “An auxiliary lane is the portion of the roadway adjoining the through lanes for speed change, turning, weaving, truck climbing, maneuvering of entering and leaving traffic, and other purposes supplementary to through-traffic. An auxiliary lane provides a direct connection from one interchange ramp to the next. The lane separates slower traffic movements from through traffic, helping smooth the flow of traffic and reduce the potential for crashes and is not intended to function as a general-purpose travel lane.”

Further, the IBR Program’s proposed Modified LPA with Recommended Design Options includes integrated multimodal improvements with transportation management elements to meet the Program’s Purpose and Need. These improvements would enhance safety and mobility without increasing regional highway capacity. The safety and operational improvements to I-5 were developed to work in conjunction with high-capacity transit, active transportation facilities, variable-rate tolling, TDM, and TSM. The non-highway elements of the IBR Program (transit, active transportation, tolling, TDM, and TSM) would all help minimize the potential for induced demand by providing multimodal choices and management tools to limit demand. They would also be tools the region could adjust over time to manage higher levels of highway demand if they were to occur.

## Regional Transportation Impacts in 2045

Table 3.1-10 shows the Metro/RTC 2018 RTP RTDM outputs reflecting daily measures of travel demand (VMT, VHT, and VHD) in year 2045 for the No-Build Alternative, the proposed Modified LPA with Recommended Design Options, and the proposed Modified LPA with two auxiliary lane design option. The other proposed design options under consideration have the same results as the proposed Modified LPA with Recommended Design Options and are not shown separately. Further details on the key elements of the design options can be found in Chapter 2, Description of Alternatives.

Table 3.1-10. 2045 Weekday Daily Vehicle Miles Traveled, Vehicle Hours Traveled, and Vehicle Hours of Delay

| Alternatives and Design Options  | Study Area                   | Vehicle Miles Traveled | Vehicle Hours Traveled | Vehicle Hours of Delay |
|--|------------------------------|------------------------|------------------------|------------------------|
| 1. No-Build Alternative  | Portland Metropolitan Region | 59,042,000             | 1,803,600              | 65,500                 |
|  | Traffic Subarea              | 14,349,500             | 439,600                | 24,900                 |
| 2. IBR Program Recommended Design Options <sup>a</sup>   | Portland Metropolitan Region | 58,950,700             | 1,792,300              | 58,300                 |
|  | Traffic Subarea              | 14,270,500             | 428,000                | 17,400                 |
| 3. Proposed Modified LPA (Two Auxiliary Lane Design Option) <sup>b</sup>   | Portland Metropolitan Region | 58,960,800             | 1,791,900              | 58,000                 |
|  | Traffic Subarea              | 14,279,300             | 427,400                | 17,000                 |
| 4. Change between No-Build (Row 1) and IBR Program Recommended Design Options (Row 2)                                      | Regional Difference          | -91,300 (<-1%)         | -12,100 (<-1%)         | -7,300 (-11%)          |
|  | Subarea Difference           | -79,000 (<-1%)         | -11,600 (-3%)          | -7,500 (-30%)          |
| 5. Change between No-Build (Row 1) and Proposed Modified LPA Two Auxiliary Lane Design Option (Row 3)                      | Regional Difference          | -83,300 (<-1%)         | -12,600 (-1%)          | -7,600 (-11%)          |
|  | Subarea Difference           | -70,900 (<-1%)         | -12,200 (-3%)          | -7,900 (-32%)          |
| 6. Change between IBR Program Recommended Design Options (Row 2) and Modified LPA Two Auxiliary Lane Design Option (Row 3) | Regional Difference          | 10,100 (<1%)           | -400 (<-1%)            | -300 (<-1%)            |
|  | Subarea Difference           | 8,800 (<1%)            | -600 (<-1%)            | -400 (-2%)             |

Source: Metro/RTC 2018 RTP RTDM

The design option combinations shown in rows 2 and 3 are those that would have differing effects on transportation; other combinations of design options (without C Street Ramps, I-5 alignment, bridge configuration, and park-and-ride design options) would have the same effects as the design options shown in rows 2 and 3.

a IBR Program Recommended Design Options includes: Modified LPA with Single-Level Fixed-Span Bridge Configuration, One Auxiliary Lane, with C Street Ramp, Centered I-5, and All Five Park and Rides

b Proposed Modified LPA (Two Auxiliary Lane Design Option) includes: Modified LPA with Single-Level Fixed-Span Bridge Configuration, with Two Auxiliary Lanes, with C Street Ramp, Centered I-5, and All Five Park and Rides

LPA = Locally Preferred Alternative; Metro = Oregon Metro; RTC = Southwest Washington Regional Transportation Council

Compared to the No-Build Alternative, the proposed Modified LPA with Recommended Design Options would decrease motor vehicle travel (measured by VMT) and travel times (measured by VHT) by 1% in the Portland metropolitan model region (Figure 3.1-2) and up to 3% in the traffic subarea (Figure 3.1-3). This decrease is due to the transit improvements and the tolls assumed with the proposed Modified LPA with Recommended

Design Options; transit would accommodate a larger share of the daily trips compared to the No-Build Alternative (see the section, Daily Person Throughput). The Modified LPA with any combination of design options (including combinations with one or two auxiliary lanes) would result in an 11% decrease in delay (measured in VHD) in the Portland metropolitan region, and a 30% to 32% decrease in delay in the traffic subarea, compared to the No-Build Alternative. The Transportation Technical Report includes more information on the modeling analysis and results.

### ***Screenline Peak-Hour Traffic Volume Forecasts in 2045***

The AM and PM peak-hour screenline volumes within the study area were analyzed using outputs from the Metro/RTC 2018 RTP RTDM to determine the relative differences in traffic volumes between the No-Build Alternative and the proposed Modified LPA with Recommended Design Options. The proposed Modified LPA with any design options would improve freeway operations which tend to attract more people to I-5 and away from the nearby arterials. Below is a summary of results from the screenline analysis, which shows the comparison of the No-Build Alternative to the Modified LPA with any design options.

The screenlines in Vancouver capture north-south travel and east-west travel on facilities as follows: travel north and south on facilities that run just north of 39th Street, north of Fourth Plain Boulevard, north of 15th Street, north of Evergreen Boulevard from the west end of downtown Vancouver to just east of I-205; travel east and west on facilities that run west of Franklin Street, west of I-5 and east of I-5 between SR 14 on the south end and 39th Street on the north end. The screenlines in Portland capture north-south travel and east-west travel on facilities as follows: travel north and south on facilities that run north of Columbia Boulevard, north of Rosa Parks Way, north of Skidmore Street/Prescott Street from the Greeley Avenue on the west end to just east of I-205 on the east end; travel east and west on facilities that run west of Interstate Avenue, east of I-5 and east of Martin Luther King Jr. Boulevard between Columbia Boulevard on the north end to Going Street/Prescott Street on the south end. Figure 3.1-10 and Figure 3.1-11 show the Vancouver and Portland screenline locations, respectively, and Table 3.1-11 and Table 3.1-12 provide the details of the screenline analysis that are provided in a high-level summary in bullets below.

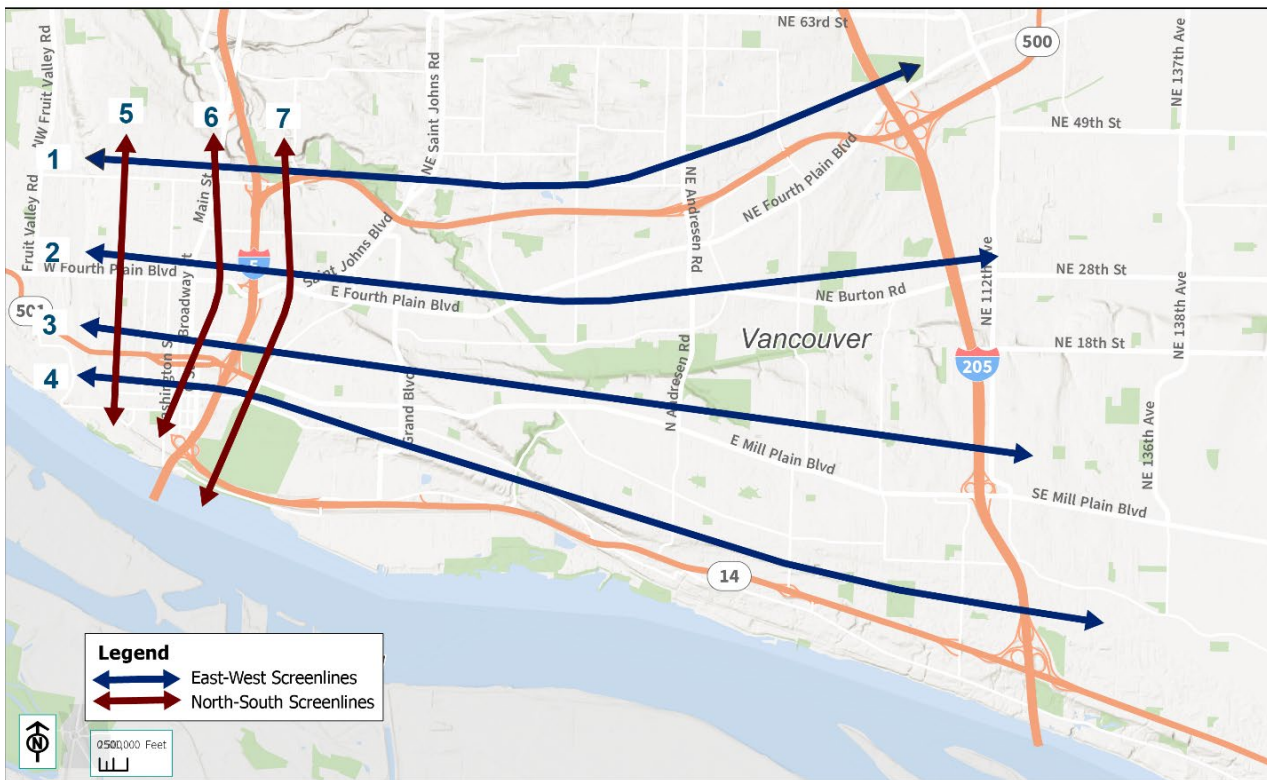
- For the Vancouver screenlines that reflect travel in the northbound and southbound direction on facilities summarized, the Modified LPA with all design options would result in increased volumes in the peak directions (southbound in the AM peak and northbound in the PM peak) for all screenlines compared to the No-Build Alternative (+4% to +11%, respectively). These forecast increases would be primarily on I-5 rather than on surrounding north south arterial facilities, which for the most part would see decreases in volumes. These changes reflect the ability for more vehicles to be accommodated on I-5 during the peak period with the proposed Modified LPA with Recommended Design Options, compared to the No-Build Alternative.
- For the Vancouver screenlines that reflect travel in the eastbound and westbound direction on facilities summarized, most eastbound and westbound volumes would experience increases in both the AM and PM peak hours with the Modified LPA with all design options compared to the No-Build Alternative. This is because of additional traffic using these facilities to access I-5, which has improved operations in the Modified LPA with all design options. SR 500 east of I-5 would have an increased volume of just under 300 vehicles (approximately +20%) in the peak direction in both the AM and PM peaks, and SR 14 east of I5 would have an increased volume of just under 200 vehicles (+7%) in the peak direction of the AM peak but the increase would be much smaller in the peak direction during the PM peak when the difference is fewer than 50 vehicles (+2%) with the Modified LPA with all design options compared to the No-Build Alternative.

- Compared to the No-Build Alternative, the Modified LPA with all design options would not see large changes in vehicle volumes on I-205 on any screenline location in the peak period (-3% to + 12%). There would not be a significant shift to I-205 or other east-west facilities such as SR 14, SR 500, and US 30/Lombard Street.
- For Portland screenlines that reflect travel in the northbound and southbound direction on facilities summarized, the Modified LPA with all design options would increase vehicle volumes compared to the No-Build Alternative in the peak direction, but total changes would be below 10%. The increases would occur on I-5 and on the arterials. The increases on I-5 reflect the ability for more vehicles to be accommodated on I-5 during the peak period with the proposed Modified LPA with Recommended Design Options, compared to the No-Build Alternative. The increases on arterials in this area are due to Hayden Island area access and circulation changes that would occur with the Modified LPA with Recommended Design Options.
- For Portland screenlines that reflect travel in the eastbound and westbound direction on facilities summarized, nearly every facility in the peak and off-peak directions in the AM and PM peak would have differences of fewer than 50 vehicles in the Modified LPA with all design options compared to the No-Build Alternative.

Screenline volume totals in Vancouver and Portland are summarized Table 3.1-11 and Table 3.1-12.

At a screenline level, these findings suggest that differences between the No-Build Alternative and Modified LPA with all design options would not be substantial. Traffic volumes have been analyzed at an individual facility and intersection level as well and are summarized in the Arterials and Local Streets in 2045 section of this chapter.

Figure 3.1-10. Screenline Locations – Vancouver



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Figure 3.1-11. Screenline Locations – Portland

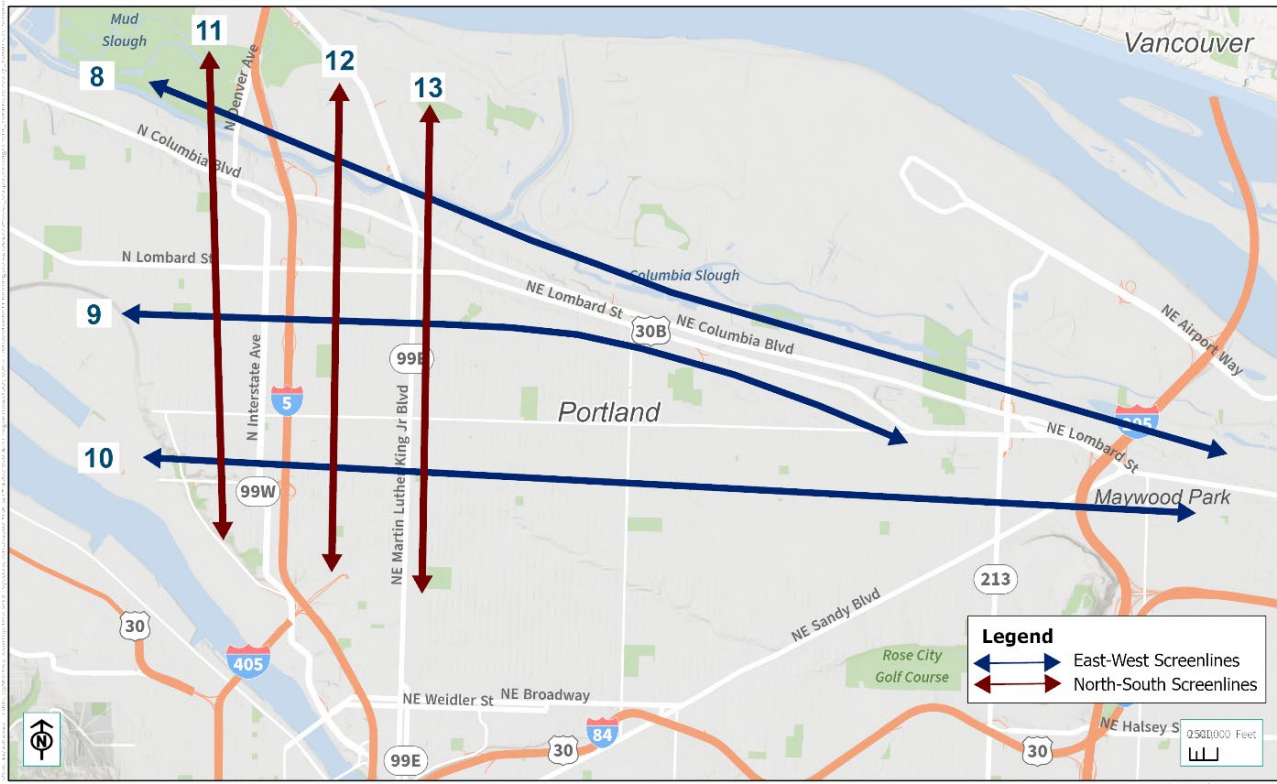


Table 3.1-11. 2045 Vancouver Screenline Traffic Volumes – AM and PM

| Screenline                                    | Direction            | No-Build Volumes (AM peak) | IBR Program Recommended Design Options <sup>a</sup> Volumes (AM peak) | Difference between IBR Program Recommended Design Options <sup>a</sup> – No-Build (AM peak) | No-Build Volumes (PM peak) | IBR Program Recommended Design Options <sup>a</sup> Volumes (PM peak) | Difference between IBR Program Recommended Design Options <sup>a</sup> – No-Build (PM peak) |
|---|----------------------|----------------------------|---|---|----------------------------|---|---|
| East-West #1: North of 39th Street            | Northbound Arterials | 2,600                      | 2,550   | -50   | 4,350                      | 4,200   | -150  |
|   | Northbound I-5       | 3,200                      | 3,150   | -50   | 4,700                      | 5,700   | 1,000   |
|   | Northbound I-205     | 2,600                      | 2,650   | 50  | 3,550                      | 3,450   | -100  |
|   | Northbound Total     | 8,350                      | 8,350   | -   | 12,650                     | 13,350  | 700   |
|   | Southbound Arterials | 4,550                      | 4,300   | -250  | 3,000                      | 2,900   | -100  |
|   | Southbound I-5       | 5,200                      | 6,600   | 1,400   | 3,900                      | 4,100   | 200   |
|   | Southbound I-205     | 4,200                      | 4,150   | -50   | 2,950                      | 2,950   | -   |
|   | Southbound Total     | 13,950                     | 15,100  | 1,150   | 9,850                      | 9,950   | 100   |
| East-West #2: North of Fourth Plain Boulevard | Northbound Arterials | 3,100                      | 3,100   | -   | 5,550                      | 5,100   | -450  |
|   | Northbound I-5       | 4,150                      | 3,900   | -250  | 6,000                      | 7,500   | 1,500   |
|   | Northbound I-205     | 4,000                      | 4,250   | 250   | 5,250                      | 5,150   | -100  |
|   | Northbound Total     | 11,200                     | 11,300  | 100   | 16,800                     | 17,750  | 950   |
|   | Southbound Arterials | 5,950                      | 5,500   | -450  | 4,200                      | 4,250   | 50  |
|   | Southbound I-5       | 6,500                      | 7,800   | 1,300   | 4,950                      | 4,500   | -450  |
|   | Southbound I-205     | 5,400                      | 5,300   | -100  | 4,000                      | 4,150   | 150   |
|   | Southbound Total     | 17,850                     | 18,600  | 750   | 13,100                     | 12,900  | -200  |

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| Screenline                                 | Direction            | No-Build Volumes (AM peak) | IBR Program Recommended Design Options <sup>a</sup> Volumes (AM peak) | Difference between. IBR Program Recommended Design Options <sup>a</sup> - No-Build (AM peak) | No-Build Volumes (PM peak) | IBR Program Recommended Design Options <sup>a</sup> Volumes (PM peak) | Difference between IBR Program Recommended Design Options <sup>a</sup> - No-Build (PM peak) |
|--|----------------------|----------------------------|---|--|----------------------------|---|---|
| East-West #3: North of 15th Street         | Northbound Arterials | 3,750                      | 3,750   | -  | 4,550                      | 4,300   | -250  |
|  | Northbound I-5       | 3,750                      | 3,550   | -200   | 5,450                      | 6,800   | 1,350   |
|  | Northbound I-205     | 4,000                      | 4,250   | 250  | 5,250                      | 5,150   | -100  |
|  | Northbound Total     | <b>11,500</b>              | 11,550  | 50   | 15,250                     | 16,300  | 1,050   |
|  | Southbound Arterials | 4,550                      | 4,150   | -400   | 3,700                      | 3,600   | -100  |
|  | Southbound I-5       | 6,250                      | 8,500   | 2,250  | 4,850                      | 4,850   | -   |
|  | Southbound I-205     | 5,400                      | 5,300   | -100   | 4,000                      | 4,150   | 150   |
|  | Southbound Total     | 16,200                     | 17,950  | 1,750  | <b>12,550</b>              | 12,650  | 100   |
| East-West #4: North of Evergreen Boulevard | Northbound Arterials | 3,750                      | 3,800   | 50   | 5,200                      | 5,250   | 50  |
|  | Northbound I-5       | 3,100                      | 2,850   | -250   | 4,200                      | 5,200   | 1,000   |
|  | Northbound I-205     | 4,250                      | 4,750   | 500  | 6,550                      | 6,600   | 50  |
|  | Northbound Total     | 11,100                     | 11,350  | 250  | 15,900                     | 17,050  | 1,150   |
|  | Southbound Arterials | 5,150                      | 5,100   | -50  | 4,150                      | 4,000   | -150  |
|  | Southbound I-5       | 5,000                      | 6,800   | 1,800  | 3,650                      | 3,600   | -50   |
|  | Southbound I-205     | 6,550                      | 6,700   | 150  | 4,350                      | 4,750   | 400   |
|  | Southbound Total     | 16,750                     | 18,600  | 1,850  | 12,200                     | 12,350  | 150   |
| North-South                                | Eastbound            | 1,150                      | 1,200   | 50   | 1,950                      | 1,850   | -100  |

| Screenline                  | Direction | No-Build Volumes (AM peak) | IBR Program Recommended Design Options <sup>a</sup> Volumes (AM peak) | Difference between IBR Program Recommended Design Options <sup>a</sup> - No-Build (AM peak) | No-Build Volumes (PM peak) | IBR Program Recommended Design Options <sup>a</sup> Volumes (PM peak) | Difference between IBR Program Recommended Design Options <sup>a</sup> - No-Build (PM peak) |
|-----------------------------|-----------|----------------------------|---|---|----------------------------|---|---|
| #5: West of Franklin Street | Westbound | 2,100                      | 2,000   | -100  | 1,250                      | 1,250   | -   |
| North-South #6: West of I-5 | Eastbound | 1,600                      | 2,100   | 500   | 2,750                      | 3,150   | 400   |
|                             | Westbound | 3,000                      | 3,300   | 300   | 2,450                      | 2,600   | 150   |
| North-South #7: East of I-5 | Eastbound | 5,650                      | 5,700   | 50  | 6,900                      | 7,450   | 550   |
|                             | Westbound | 6,550                      | 7,400   | 850   | 5,950                      | 5,550   | -400  |

Source: Metro/RTC 2018 RTP RTDM

Table volumes are from the Metro/RTC 2018 RTP RTDM, which is not calibrated to individual facilities and does not reflect post-processing. The RTDM assignments use an equilibrium process whereby the resulting volumes reflect a condition where no traveler can improve their travel time or cost by switching paths. Traffic loads onto the network via zone connectors that represent all traffic coming in and out of an area and does not reflect exact loading to and from the network via local connector facilities or driveways. Differences in assignments may simply be the result of the equilibrium process and how trips enter and exit the network. The assignments do not reflect real-world traffic conditions and should be used to gauge general changes between alternatives.

a IBR Program Recommended Design Options includes: Modified LPA with Single-Level Fixed-Span Bridge Configuration, One Auxiliary Lane, with C Street Ramp, Centered I-5, and All Five Park and Rides. The effects of the Modified LPA with Recommended Design Options would occur with any other combination of design options (two auxiliary lanes, C Street ramps, I-5 alignment, bridge configuration, and park-and-ride design options).

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Table 3.1-12. 2045 Portland Screenline Traffic Volumes – AM and PM

| Screenline                             | Direction            | No-Build Volumes (AM Peak) | IBR Program Recommended Design Options <sup>a</sup> Volumes (AM Peak) | Difference between IBR Program Recommended Design Options <sup>a</sup> – No-Build (AM Peak) | No-Build Volumes (PM Peak) | IBR Program Recommended Design Options <sup>a</sup> Volumes (PM Peak) | Difference between IBR Program Recommended Design Options <sup>a</sup> – No-Build (PM Peak) |
|--|----------------------|----------------------------|---|---|----------------------------|---|---|
| East-West #8: Columbia Slough          | Northbound Arterials | 5,750                      | 5,750   | -   | 3,750                      | 4,350   | 600   |
|  | Northbound I-5       | 4,200                      | 3,700   | -500  | 4,350                      | 4,250   | -100  |
|  | Northbound I-205     | 4,950                      | 5,450   | 500   | 6,500                      | 6,600   | 100   |
|  | Northbound Total     | 14,900                     | 14,900  | -   | 14,600                     | 15,200  | 600   |
|  | Southbound Arterials | 2,900                      | 3,550   | 650   | 5,300                      | 5,200   | -100  |
|  | Southbound I-5       | 5,100                      | 5,250   | 150   | 4,400                      | 3,950   | -450  |
|  | Southbound I-205     | 6,350                      | 6,500   | 150   | 5,450                      | 6,000   | 550   |
|  | Southbound Total     | 14,300                     | 15,350  | 1,050   | 15,150                     | 15,150  | -   |
| East-West #9: North of Rosa Parks      | Northbound Arterials | 4,350                      | 4,200   | -150  | 3,500                      | 3,850   | 350   |
|  | Northbound I-5       | 4,950                      | 4,700   | -250  | 5,150                      | 5,100   | -50   |
|  | Northbound Total     | 9,300                      | 8,900   | -400  | 8,700                      | 8,950   | 250   |
|  | Southbound Arterials | 3,050                      | 3,550   | 500   | 4,300                      | 4,000   | -300  |
|  | Southbound I-5       | 5,800                      | 5,950   | 150   | 5,400                      | 5,200   | -200  |
|  | Southbound Total     | 8,850                      | 9,500   | 650   | 9,700                      | 9,200   | -500  |
| East-West #10: South of Alberta Street | Northbound Arterials | 7,800                      | 7,750   | -50   | 7,550                      | 7,850   | 300   |
|  | Northbound I-5       | 5,450                      | 5,350   | -100  | 5,800                      | 5,900   | 100   |
|  | Northbound I-205     | 6,100                      | 6,250   | 150   | 6,250                      | 6,350   | 100   |
|  | Northbound Total     | 19,350                     | 19,350  | -   | 19,600                     | 20,100  | 500   |

| Screenline  | Direction            | No-Build Volumes (AM Peak) | IBR Program Recommended Design Options <sup>a</sup> Volumes (AM Peak) | Difference between IBR Program Recommended Design Options <sup>a</sup> – No-Build (AM Peak) | No-Build Volumes (PM Peak) | IBR Program Recommended Design Options <sup>a</sup> Volumes (PM Peak) | Difference between IBR Program Recommended Design Options <sup>a</sup> – No-Build (PM Peak) |
|---|----------------------|----------------------------|---|---|----------------------------|---|---|
|   | Southbound Arterials | 6,850                      | 7,200   | 350   | 7,550                      | 7,450   | -100  |
|   | Southbound I-5       | 6,350                      | 6,550   | 200   | 5,800                      | 5,650   | -150  |
|   | Southbound I-205     | 6,350                      | 6,550   | 200   | 6,050                      | 6,300   | 250   |
|   | Southbound Total     | 19,600                     | 20,300  | 700   | 19,350                     | 19,400  | 50  |
| North-South #11: West of Interstate Avenue                | Eastbound            | 3,200                      | 3,300   | 100   | 3,800                      | 3,950   | 150   |
|   | Westbound            | 4,000                      | 4,200   | 200   | 3,200                      | 3,250   | 50  |
| North-South #12: East of I-5                              | Eastbound            | 3,100                      | 3,400   | 300   | 3,250                      | 3,350   | 100   |
|   | Westbound            | 3,150                      | 3,300   | 150   | 3,300                      | 3,450   | 150   |
| North-South #13: East of Martin Luther King Jr. Boulevard | Eastbound            | 3,750                      | 4,150   | 400   | 4,400                      | 4,350   | -50   |
|   | Westbound            | 4,400                      | 4,300   | -100  | 4,000                      | 4,250   | 250   |

Source: Metro/RTC 2018 RTP RTDM

Table volumes are from the Metro/RTC 2018 RTP RTDM, which is not calibrated to individual facilities and does not reflect post-processing. The RTDM assignments use an equilibrium process whereby the resulting volumes reflect a condition where no traveler can improve their travel time or cost by switching paths. Traffic loads onto the network via zone connectors that represent all traffic coming in and out of an area and does not reflect exact loading to and from the network via local connector facilities or driveways. Differences in assignments may simply be the result of the equilibrium process and how trips enter and exit the network. The assignments do not reflect real-world traffic conditions and should be used to gauge general changes between alternatives.

<sup>a</sup> IBR Program Recommended Design Options includes: Modified LPA with Single-Level Fixed-Span Bridge Configuration, One Auxiliary Lane, with C Street Ramp, Centered I-5, and All Five Park and Rides. The effects of the Modified LPA with Recommended Design Options would occur with any other combination of design options (two auxiliary lanes, C Street ramps, I-5 alignment, bridge configuration, and park-and-ride design options).

### I-5/I-205 Travel Forecasts in 2045

As described in the Transportation Technical Report, year 2045 forecast volumes were calculated using outputs from the Metro/RTC 2018 RTP RTDM along with post-processing methods described in *NCHRP<sup>14</sup> 765 Analytical Travel Forecasting Approaches for Project-Level Planning and Design*. Post processed values (following guidance outlined in Chapter 6 of ODOT’s Analysis Procedures Manual) reflect accepted professional practice and provide a sound basis for evaluating traffic impacts. Post-processing is a well-established industry standard practice in traffic forecasting that ensures regional travel demand model outputs are appropriately applied to project-level analysis. In general, post-processing involves determining the rate of change between two travel demand models (typically an existing-year model and a future-year model) and then applying that rate of change to existing 2019 baseline counts, grounding future volume estimates to actual 2019 data. Post-processing is necessary because regional travel demand models are most accurate at broad scales. Year 2045 forecast volumes were developed for the No-Build Alternative and the proposed Modified LPA with all design options. The Transportation Technical Report (Section 4.3.3) has additional information on the methods used and the forecast results.

#### Daily and Peak-Period Cross-River Demand Volume Forecasts in 2045

Both daily and during peak periods, outputs from the Metro/RTC 2018 RTP RTDM forecast increased trips across the Columbia River by 2045 in both the No-Build Alternative and the proposed Modified LPA, driven in large part by continued urban growth. Table 3.1-13 shows year 2045 average weekday traffic demand volumes for new Columbia River bridges, I-205 Glenn Jackson Bridge, and total Columbia River crossings.

Table 3.1-13. 2045 Forecast Average Weekday Daily Traffic Volumes on I-5 and I-205

| Location                         | Existing AWDT | 2045 No-Build AWDT <sup>a</sup> | 2045 Modified LPA (All Design Options) AWDT <sup>b</sup> |
|----------------------------------|---------------|---------------------------------|--|
| Total River Crossing             | 313,000       | 400,000 (+28%)                  | 389,000 (-3%)  |
| New Columbia River Bridges (I-5) | 143,400       | 180,000 (+26%)                  | 175,000 (-3%)  |
| I-205 Glenn Jackson Bridge       | 169,600       | 220,000 (+30%)                  | 214,000 (-3%)  |

Source: ODOT/WSDOT, Metro/RTC 2018 RTP RTDM, IBR Program Analysis

a Percentages reflect change from existing conditions.

b Values in table reflect change for the Modified LPA and all design options, compared to the 2045 No-Build Alternative. The effects of the Modified LPA with Recommended Design Options would occur with any other combination of design options (two auxiliary lanes, C Street ramps, I-5 alignment, bridge configuration, and park-and-ride design options).

AWDT = average weekday daily traffic; I-5 = Interstate 5; I-205 = Interstate 205; IBR = Interstate Bridge Replacement Program; LPA = Locally Preferred Alternative; ODOT = Oregon Department of Transportation; WSDOT = Washington State Department of Transportation

In the 2045 No-Build Alternative, average weekday daily traffic volumes are forecast to increase 26% over 2019 conditions for the existing Interstate Bridge.

The IBR Program’s analysis assumed that 45% of the daily traffic would use the existing Interstate Bridge or new Columbia River bridges and 55% would use the I-205 Glenn Jackson Bridge under both the No-Build Alternative and the Modified LPA. The bridge volume distributions would be similar for the No-Build Alternative and the Modified LPA with all design options. The traffic split assumption was made due to the magnitude of the increase in the 2045 No-Build Alternative volumes (Table 3.1-13) and the uncertainty of

<sup>14</sup> National Cooperative Highway Research Program

system performance under projected levels of congestion. For more information on post-processing see Appendix K to the Transportation Technical Report.

The Modified LPA would have 3% lower traffic volumes crossing the river on I-5 and I-205 than the No-Build Alternative in 2045. This reduction is due to more investment in high-capacity transit to connect across the river into central Vancouver (LRT, express bus on shoulder, new park and rides and increased transit service levels), variable-rate tolls on the new Columbia River bridges, and improved active transportation facilities. As noted above, average weekday daily traffic volumes are forecast to be similar across the design options. The Transportation Technical Report Section 4.3 has an additional description of the factors involved in forecasts of reduced traffic across the river, including tolling, shifts in travelers' choice of mode, or the potential for diversion.

### ***I-5 Peak-Period Mainline and Ramp Volumes in 2045***

The regional demand model was also used to forecast peak period mainline and ramp volumes by location, with refinements based on observed 2019 traffic volumes under current conditions. In general, ramps that have the highest proportion of demand relative to others in the existing condition would continue to have the highest proportion of demand relative to other ramps under the No-Build Alternative and the Modified LPA and design options. Further details about the forecast volumes at individual mainline locations and ramps can be found in the Transportation Technical Report (Section 4.3.3).

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

Figure 3.1-12 and Figure 3.1-13 show the forecast No-Build Alternative northbound and southbound peak period I-5 mainline and ramp hourly demand volumes in the freeway analysis area, respectively. For southbound travel during the AM peak period and northbound travel during the PM peak period, hourly demand volume crossing the existing Interstate Bridge would increase between 17% and 28%, respectively, under the No-Build Alternative compared to existing conditions. Hourly demand volume crossing the existing Interstate Bridge in the reverse commute period and direction, northbound during the AM peak period and southbound during the PM peak period, would increase between 34% and 58%, respectively, compared to existing conditions. Overall, the southbound I-5 mainline and ramp travel demand volumes would continue to be highest during the AM peak, and northbound mainline and ramp travel demand volumes would continue to be highest during the PM peak. However, in some locations near downtown Vancouver, such as Mill Plain Boulevard and the SR 14 ramps, there would be more balanced AM and PM peak volumes, with some on-ramps slightly higher during the off-peak period versus the peak period.

#### ***Modified LPA with Recommended Design Options***

Figure 3.1-14 and Figure 3.1-15 show the forecast Modified LPA with Recommended Design Options peak-period mainline and ramp demand volumes in the freeway analysis area on I-5 northbound and southbound, respectively. Similar to the 2045 No-Build Alternative, southbound I-5 mainline and ramp volumes would be highest during the AM peak period and northbound mainline and ramp volumes would be highest during the PM peak period under the Modified LPA with all design options. Exceptions to this include near downtown Vancouver, including Mill Plain Boulevard and the SR 14 ramps, which would see higher volumes during the off-peak period versus the peak period. All proposed Modified LPA design options would have similar peak-period traffic volumes, except for the proposed Modified LPA without C Street ramps.

The Modified LPA with two auxiliary lanes would have the same peak-period mainline and ramp volumes as the Modified LPA with Recommended Design Options.



Figure 3.1-13. 2045 Forecast Southbound Peak-Period Mainline and Ramp Demand Volumes (vehicles per hour) – No-Build Alternative

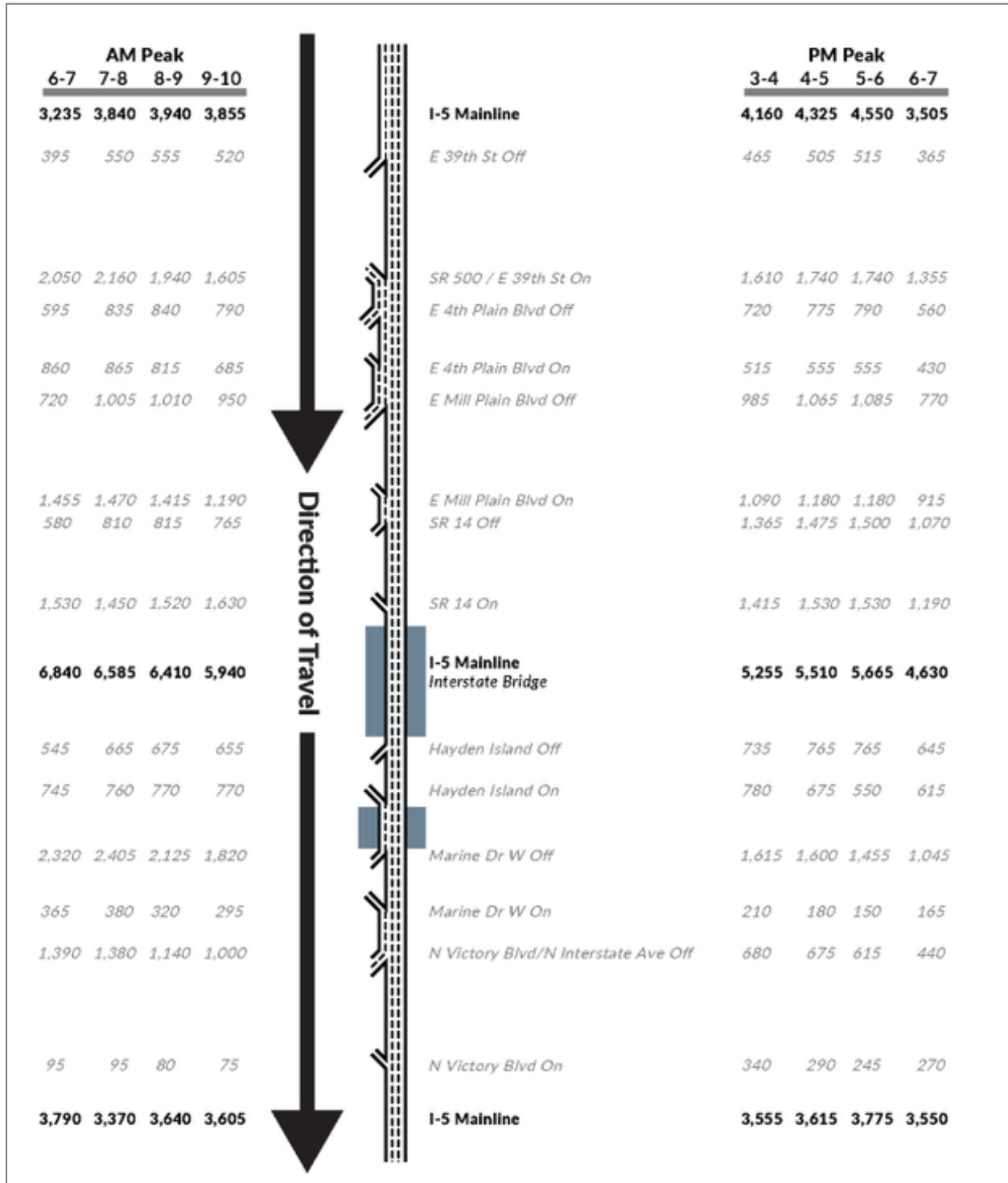


Figure 3.1-14. 2045 Forecast Northbound Peak-Period Mainline and Ramp Demand Volumes (vehicles per hour) – Modified LPA with Recommended Design Options

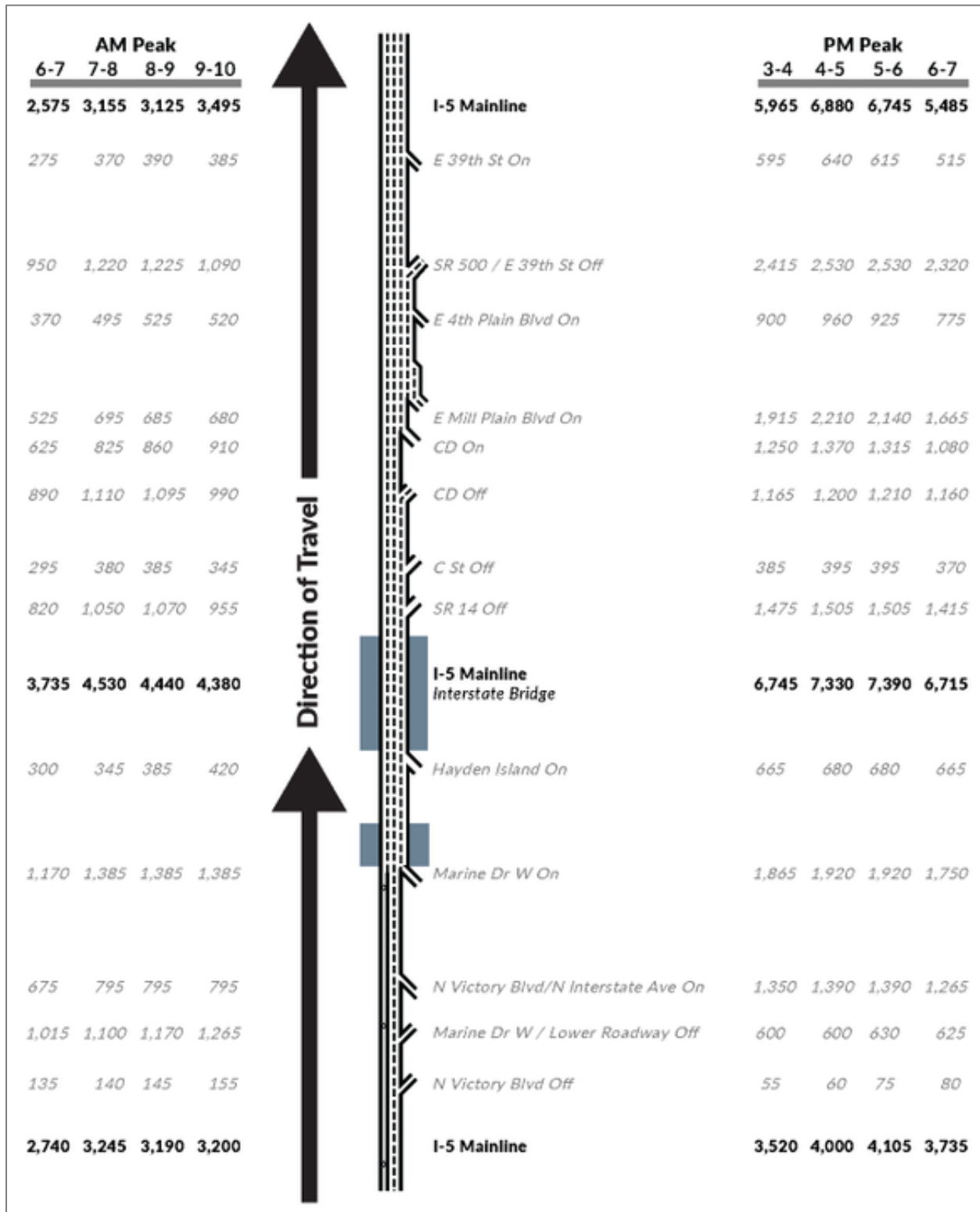
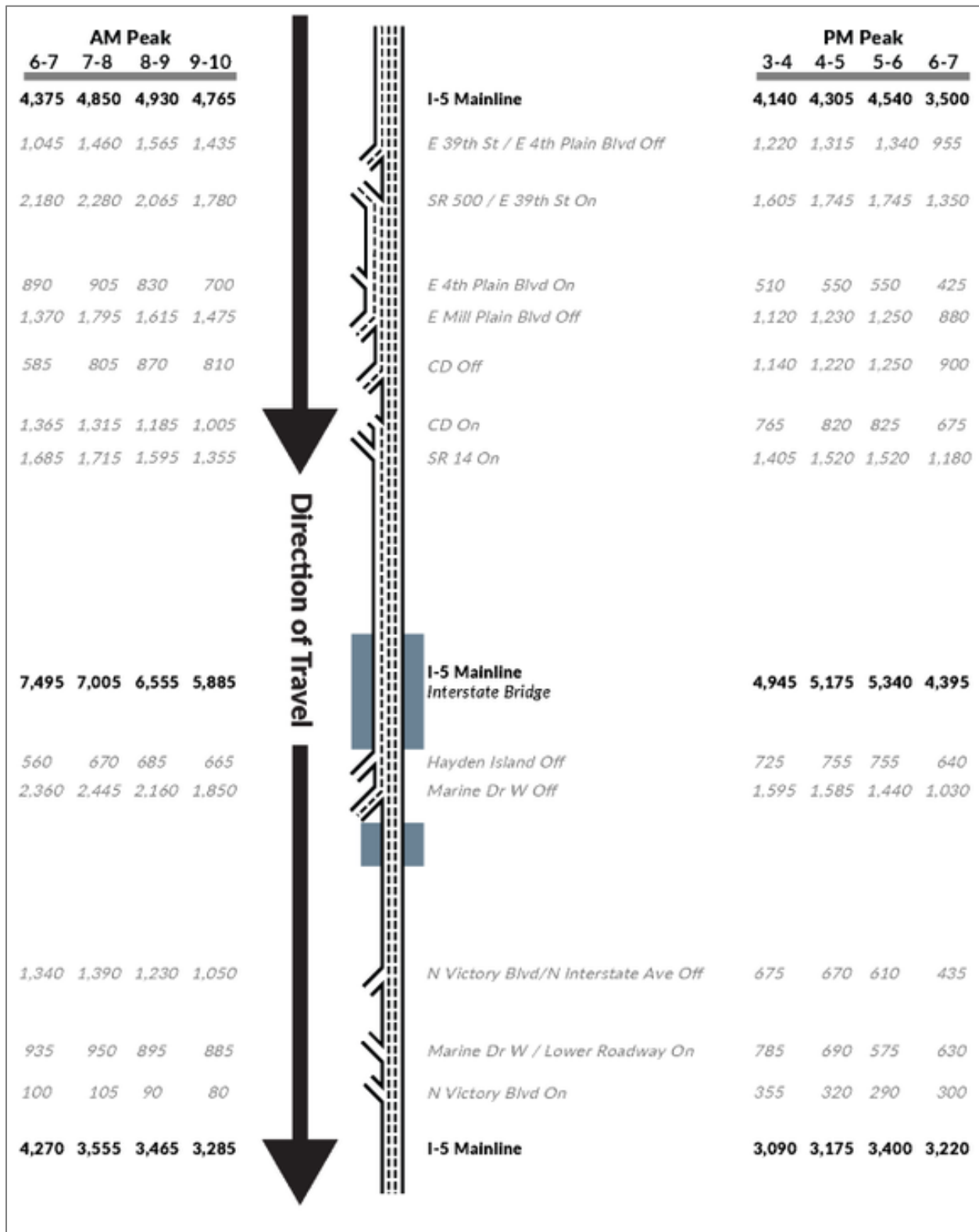


Figure 3.1-15. 2045 Forecast Southbound Peak-Period Mainline and Ramp Demand Volumes (vehicles per hour) – Modified LPA with Recommended Design Options



The Modified LPA without C Street ramps would add between 300 and 600 vehicles per hour to the collector-distributor (C-D)<sup>15</sup> roadways and the Mill Plain Boulevard ramps during the peak periods but otherwise would have similar volumes to the Modified LPA with Recommended Design Options throughout the rest of the primary study area including the river crossing. For detailed figures see Section 4.3.3 of the Transportation Technical Report.

Hourly traffic volumes crossing the new I-5 Columbia River bridges and existing I-205 Glenn Jackson Bridge in the peak period and peak direction (southbound during the AM peak period and northbound during the PM peak period) would be up to 10% higher in the Modified LPA and all design options compared to No-Build Alternative. This would be due to operational improvements that would be made by the Modified LPA with Recommended Design Options within the Program limits on I-5, allowing more vehicles to cross on I-5 during the peak periods. Hourly traffic volumes crossing the bridges in the reverse commute direction (northbound during the AM peak period and southbound during the PM peak period) would be between 4% and 6% lower, respectively, in the Modified LPA and all design options compared to the No-Build Alternative. The reason that the number of vehicles crossing the bridges would decrease in the off-peak direction under the Modified LPA and all design options during the peak period is the cost of variable-rate tolls and the forecast congestion levels on both river crossings. In the No-Build Alternative, congestion in the peak period and peak direction would continue to limit the traffic volumes on the new Columbia River bridges.

Under the proposed Modified LPA and all design options, the forecasts reflect the additional person-moving capacity offered by transit and the improvements in traffic operations from the addition of an auxiliary lane in each direction. Tolling is anticipated to reduce the daily demand volume crossing the river on the I-5 corridor, but the forecasts still assume growth in commute trips during peak periods in the peak direction, because these trips are less affected by tolls than periods with more discretionary trips. The result would be an increase in vehicle demand volume during the peak periods in the peak direction even though daily volume demand crossing the river on the I-5 corridor is decreasing.

### Daily Person Throughput in 2045

Person throughput measures the number of people (as opposed to the number of vehicles) that a transportation facility carries. The number of vehicles (passenger cars and freight trucks) crossing the existing Interstate Bridge was multiplied by average vehicle occupancy assumptions to calculate total person throughput in vehicles. For all vehicle modes, the same average vehicle occupancy used to calculate existing (2019) daily person throughput was applied to future-year vehicle volumes. The number of people crossing the bridge in transit (buses and light-rail) and via active transportation was included in the total number of people crossing the bridge to calculate 2045 daily person throughput for the No-Build Alternative and the proposed Modified LPA and all design options. Person throughput for transit, which is an output of the Metro/RTC 2018 RTP RTDM, was used to forecast transit person trips for both the No-Build Alternative and proposed Modified LPA (Section 4.7.4 of the Transportation Technical Report). Conditions for active transportation on the existing Interstate Bridge and in connecting areas would continue to worsen under the No-Build Alternative. This deterioration in user experience would limit the potential for active transportation trips over the bridge and further reinforce the bridge as a barrier to active travel. Therefore, to be conservative, the No-Build Alternative assumes average daily active transportation bridge trips to be the same as the existing 2019 conditions (410 daily trips). The IBR Program team estimated bicycle and pedestrian trips across the Columbia River with the proposed Modified LPA and Recommended Design Options. The team used two methods to develop a range of forecasts representing conservative, moderate, and optimistic estimates for future active transportation trips on the new bridge. Based on the two evaluation methods used,

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<sup>15</sup> A collector-distributor roadway parallels and connects the main travel lanes of a highway and frontage roads or entrance ramps.

future active transportation trips across the bridge are estimated to range between 740 and 1,600 trips per day (Transportation Technical Report Section 4.8.2).

The existing Interstate Bridge is forecast to carry 241,900 people per day under the No-Build Alternative and the new Columbia River bridges are forecast to carry 251,100 people per day under all design options of the proposed Modified LPA.

Daily person throughput across the existing Interstate Bridge is forecast to increase by 30.5% with the 2045 No-Build Alternative compared to the 2019 existing conditions. The person throughput with the proposed Modified LPA and all design options is forecast to increase an additional 3.8% compared to the No-Build Alternative and 35.4% compared to the 2019 existing conditions. High-capacity transit, improved active transportation facilities, and variable-rate tolling under the Modified LPA would increase the number of people crossing the new Columbia River bridges using transit or active transportation while reducing the daily number of vehicles. The increase in the number of transit and active transportation users compared to the No-Build Alternative would be greater than the decrease in the number of people crossing the new Columbia River bridges in vehicles. This would result in a net increase in the number of people crossing the new Columbia River bridges with the Modified LPA and all design options compared to the No-Build Alternative.

### **I-5 Operations in 2045**

The 2045 I-5 operations analysis includes congestion estimates, peak-period speeds, peak-period travel times, LOS and V/C ratios, and impacts to local roads.

This analysis provides support for the Program's compliance with FHWA procedures for approving changes to interstate access and operations (23 CFR Part 624). Preserving and enhancing safety and operations on the interstate system are central policy considerations in FHWA's access modification approval procedures. Following the conclusion of the NEPA process, the Program is required to submit technical documentation justifying the proposed changes to FHWA, and FHWA approval is required before construction can begin. The documentation must include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute, and accommodate traffic on the Interstate facility and its ramps, including intersection of ramps with the local street network. Based on the analysis conducted for this SEIS and described in detail below, the IBR Program concluded that the Modified LPA and all design options would improve Interstate operations and safety compared to No-Build Alternative.

### ***Bottlenecks and Speeds in 2045***

I-5 traffic performance within the freeway analysis area was evaluated using VISSIM during the 4-hour peak periods and estimated speeds during midday. Key information about forecast bottlenecks—including the location, time of day, duration, and extent of the congestion when speeds are below 45 mph—is summarized in Table 3.1-14 for the No-Build Alternative, proposed Modified LPA with Recommended Design Options, proposed Modified LPA without C Street ramps design option, and the proposed Modified LPA with two auxiliary lanes design option. The other proposed design options (i.e., movable-span, double-level fixed-span bridge configuration, and I-5 shifted west) would not have different transportation effects than the Modified LPA with Recommended Design Options and are not discussed in further detail here. This analysis shows the maximum levels of congestion at the peaks, but congestion levels would build over time and then dissipate as traffic demand volumes begin decreasing after peak periods.

To see the results in more detail, the Transportation Technical Report Section 4.3 has maps of average vehicle speeds by segment and location, and it also shows the hours of congestion by alternative and design option.

Table 3.1-14. Future-Year 2045 Average Weekday Bottleneck Summary When Speeds Are below 45 Miles per Hour

| 0a<br><br>Location   | 0b<br><br>Metric       | 1<br><br>No-Build Alternative  | 2: IBR Program Recommended Design Options<br><br>Modified LPA with Single-Level Fixed-Span Bridge Configuration, One Auxiliary Lane, with C Street Ramp, Centered I-5, and All Five Park and Rides | 3<br><br>Proposed Modified LPA with Single-Level Fixed-Span Bridge Configuration, One Auxiliary Lane, <u>without C Street Ramps</u> , Centered I-5, and All Five Park and Rides | 4<br><br>Proposed Modified LPA with Single-Level Fixed-Span Bridge Configuration, <u>with Two Auxiliary Lanes</u> , with C Street Ramp, Centered I-5, and All Five Park and Rides |
|--|------------------------|--------------------------------|--|---|---|
| Northbound I-5 (Existing Interstate Bridge/New Columbia River Bridges) | Time of Day            | 7 a.m.–9 p.m.                  | 12–9 p.m.  | 12–9 p.m.   | 1:30–7:30 p.m.  |
|  | Duration of Congestion | 14 hours                       | 9 hours  | 9 hours   | 6 hours   |
|  | Extent of Congestion   | 10+ miles                      | 5 miles  | 5 miles   | 0.75 miles  |
| Southbound I-5 (Existing Interstate Bridge/New Columbia River Bridges) | Time of Day            | 5 a.m.–9 p.m.                  | 6–10:45 a.m.   | 6–10:45 a.m.  | 6:15–10:45 a.m.   |
|  | Duration of Congestion | 16 hours                       | 4.75 hours   | 4.75 hours  | 4.5 hours   |
|  | Extent of Congestion   | 8+ miles                       | 4.5 miles  | 4.5 miles   | 1 mile  |
| Southbound I-5 (Mill Plain/SR 14 Collector-Distributor)                | Time of Day            | N/A – no collector-distributor | 6 a.m.–12 p.m.   | 6 a.m.–12 p.m.  | 7–11 a.m.   |
|  | Duration of Congestion | N/A– no collector-distributor  | 6 hours  | 6 hours   | 4 hours   |
|  | Extent of Congestion   | N/A– no collector-distributor  | 4 miles  | 4.5 miles   | 1.5 miles   |
| Southbound I-5 (I-5/I-405 Split in North Portland)                     | Time of Day            | 5 a.m.–1 p.m.                  | 5 a.m.–1:30 p.m.   | 5 a.m.–1:30 p.m.  | 5 a.m.–1:30 p.m.  |
|  | Duration of Congestion | 8 hours                        | 8.5 hours  | 8.5 hours   | 8.5 hours   |

| 0a<br><br>Location            | 0b<br><br>Metric       | 1<br><br>No-Build Alternative | 2: IBR Program Recommended Design Options<br><br>Modified LPA with Single-Level Fixed-Span Bridge Configuration, One Auxiliary Lane, with C Street Ramp, Centered I-5, and All Five Park and Rides | 3<br><br>Proposed Modified LPA with Single-Level Fixed-Span Bridge Configuration, One Auxiliary Lane, <u>without C Street Ramps</u> , Centered I-5, and All Five Park and Rides | 4<br><br>Proposed Modified LPA with Single-Level Fixed-Span Bridge Configuration, <u>with Two Auxiliary Lanes</u> , with C Street Ramp, Centered I-5, and All Five Park and Rides |
|-------------------------------|------------------------|-------------------------------|--|---|---|
|                               | Extent of Congestion   | 5 miles                       | 6 miles  | 6 miles   | 6 miles   |
| Southbound I-5 (Rose Quarter) | Time of Day            | 1:30–9 p.m.                   | 1:30-9 p.m.  | 1:30-9 p.m.   | 1:30-9 p.m.   |
|                               | Duration of Congestion | 7.5 hours                     | 7.5 hours  | 7.5 hours   | 7.5 hours   |
|                               | Extent of Congestion   | 1 mile                        | 1 mile   | 1 mile  | 1 mile  |

Source: IBR Program Transportation Technical Report

Note: The underlined design options shown in columns 3 through 4 identify the specific effects on transportation for that particular design option compared to the Modified LPA with Recommended Design Options (column 2). For example, the effects of two auxiliary lanes (column 4) would occur with any other combination of the C Street ramps, I-5 alignment, bridge configuration, and park-and-ride design options. The design option combinations shown in columns 2 through 4 are those that would have differing effects on transportation; other combinations of design options (I-5 alignment, bridge configuration, and park-and-ride design options) would have the same effects as those described in columns 2 through 4.

I-5 = Interstate 5; I-405 = Interstate 405; IBR = Interstate Bridge Replacement; LPA = Locally Preferred Alternative; N/A = not applicable; SR = State Route

### *No-Build Alternative*

In the southbound direction, the existing Interstate Bridge would be congested throughout the 4-hour AM and PM peak periods. Congestion at the bridge would continue to be caused by overall high traffic volumes, the structure's limited capacity, limited sight distance, substandard shoulders, short merge and diverge locations north and south of the bridge, high-volume on- and off-ramp flows north of the river, and high truck volumes.

Southbound congestion would span both peaks, from 5 a.m. until 9 p.m. (16 hours). This is an increase of 13 hours, compared to the 3 hours of southbound congestion under 2019 existing conditions. At times, congestion from the existing Interstate Bridge would extend north from the existing Interstate Bridge beyond the I-5/I-205 interchange north of Vancouver, a distance of over 8 miles.

Beyond the primary study area, a regional southbound bottleneck at the I-5/I-405 split in North Portland would continue to affect I-5 operations backing up traffic toward the existing Interstate Bridge and into the existing Interstate Bridge congestion throughout the AM peak period and into midday from 5 a.m. to 1 p.m. (8 hours).

In the northbound direction under the No-Build Alternative, the existing Interstate Bridge bottleneck would remain the primary bottleneck and would be congested for most of the 4-hour AM peak period and all of the 4-hour PM peak period. The northbound congestion on the bridge is caused by similar factors as the southbound congestion and would last from 7 a.m. until 9 p.m. (14 hours). This is an increase of 5.25 hours over the 8.75 hours of congestion that existed in 2019. Congestion from the existing Interstate Bridge would extend south of the study area beyond the Marquam Bridge (over 10 miles) and combine with other northbound I-5 bottlenecks near downtown Portland.

### *Proposed Modified LPA with Recommended Design Options*

During the AM peak period, overall southbound congestion would be reduced compared to the No-Build Alternative, but congested conditions would occur. For the AM peak period, most segments of I-5 would operate with less congestion than the No-Build Alternative. However, the improved traffic flow at the new Columbia River bridges—combined with higher peak period volumes forecast with the proposed Modified LPA with Recommended Design Options over the No-Build Alternative—would lead to a slightly longer duration and greater extent of congestion at the downstream I-5/I-405 bottleneck in North Portland compared to the No-Build Alternative.

Southbound congestion from the I-5/I-405 bottleneck in North Portland during the AM peak period would extend into and influence the primary study area. While the southbound congestion would remain in North Portland and at the new Columbia River bridges with the Modified LPA with Recommended Design Options, the overall duration and extent of congestion along the I-5 corridor would be substantially reduced compared to the No-Build Alternative as summarized in Table 3.1-14.

The new Columbia River bridges would be congested during the AM peak period for 4.75 hours from 6 a.m. to 10:45 a.m. and would lead to backups to the new southbound C-D system in Vancouver. This is a reduction in duration and length of southbound congestion compared to the No-Build Alternative, which is forecast to have southbound congestion last all day at the existing Interstate Bridge from 5 a.m. to 9 p.m. with its maximum extent of congestion being the I-5/I-205 split in North Vancouver.

While traffic congestion on southbound I-5 through North Portland and the existing bottleneck near the I-5/I-405 split in North Portland would be impacted by improved travel flow on southbound I-5 within the primary study area, several features of the Modified LPA with Recommended Design Options would help reduce the severity of the downstream traffic congestion near the I-5/I-405 split in North Portland, relative to the No-Build Alternative. These features of the Modified LPA with Recommended Design Options include the extension of the MAX Yellow Line LRT to Vancouver, express bus enhancements, active transportation improvements, and variable-rate tolling on the new Columbia River bridges. These new multimodal options

give commuters options besides passenger vehicles. Forecasts also show that the variable-rate tolls would encourage drivers to choose other modes or time of day to travel. This shift would reduce auto traffic on I-5 across the river and along the entire corridor, including at the other southbound bottleneck locations.

During the PM peak period, there would be no southbound congestion at the bridge or to the north.

During the PM peak period, the northbound bottleneck at the new Columbia River bridges would be less with the Modified LPA with Recommended Design Options compared to the No-Build Alternative, improving northbound traffic flow at the bridges. However, the new Columbia River bridges would be a bottleneck for northbound traffic for 9 hours, with congestion forecast to occur between the new Columbia River bridges and the I-5/I-405 split in North Portland with the Modified LPA with Recommended Design Options. During the AM peak period, there would be no northbound congestion at the bridge.

The bridge configuration design options including the movable-span design option, the I-5 alignment design option, and park and rides options would have the same effects as the Modified LPA with Recommended Design Options.

#### *Proposed Modified LPA Without C Street Ramps*

Under the Modified LPA without C Street ramps, congestion would be similar to the Modified LPA with Recommended Design Options except for the southbound congestion at the C-D system in Vancouver. The removal of the C Street ramps would result in higher volumes at the Mill Plain Boulevard on-ramp to southbound I-5 and would also increase demand volumes through the southbound C-D system. The higher demand through the southbound C-D would cause congestion at the C-D off-ramp to extend further north (4.5 miles compared to 4 miles) than under the Modified LPA with Recommended Design Options, where the C Street Ramps would be included.

#### *Proposed Modified LPA With Two Auxiliary Lanes*

Under the Modified LPA with two auxiliary lanes, forecasted congestion during the AM peak would be reduced compared to the Modified LPA with Recommended Design Options for the southbound direction. Within the areas where auxiliary lanes would be added approaching and across the new Columbia River bridges, operations would improve compared to the Modified LPA with Recommended Design Options at the on- and off-ramps and there would be fewer hours of congestion and shortened backups. Peak-period AM congestion would last for 4 hours (compared to 6 hours with the Modified LPA with Recommended Design Options) and would extend 1.5 miles (compared to 4 miles with the Modified LPA with Recommended Design Options). Similar to the proposed Modified LPA with Recommended Design Options, no southbound congestion is forecast during the PM peak period.

Northbound PM peak-period congestion would be substantially reduced compared to both the Modified LPA with Recommended Design Options and No-Build Alternative. Northbound PM peak congestion would be reduced from 9 to 6 hours and would only extend back to Hayden Island which is less than 1 mile, rather than 4.5 miles to the I-5/I-405 merge in North Portland under the Modified LPA with Recommended Design Options. Similar to the proposed Modified LPA with Recommended Design Options, no northbound congestion is forecast during the AM peak period.

#### ***Effects of Freeway Congestion on Local Streets***

Freeway congestion also has the potential to worsen operations on local streets when traffic backs up and impacts freeway on- and off-ramps. This would be in addition to the effects described in the section on Arterials and Local Roads.

For the No-Build Alternative, AM peak period I-5 southbound experiences congestion that would prevent entering traffic from being served, with queues then affecting local streets and intersections. In downtown

Vancouver at Washington Street, congestion would spill back through downtown streets to Mill Plain Boulevard. SR 14 would back up to approximately Grand Boulevard. Mill Plain would back up east of I-5 to MacArthur Boulevard and west of I-5 as far as Lincoln Avenue. Fourth Plain Boulevard would back up east of I-5 to Stapleton and west of I-5 past Main Street. Congestion on SR 500 is estimated to extend as far as Andresen Road.

With the proposed Modified LPA with Recommended Design Options and proposed Modified LPA without C Street ramps, the bottleneck at the new Columbia River bridges is reduced during the AM peak period compared to the No-Build Alternative, but congestion spilling back from the I-5/I-405 interchange in North Portland still impacts I-5 operations through Vancouver. Congestion spillback from I-5 onto local roadways would be similar to the No-Build Alternative. Congestion on Mill Plain west of I-5 would be worse under the Modified LPA without C Street ramps compared to the Modified LPA with Recommended Design Options because traffic volume would shift from the removed C Street on-ramp to the Mill Plain corridor. Congestion levels on Fourth Plain and on SR 500 would be reduced compared to the No-Build Alternative because congestion on I-5 would be reduced. Under the Modified LPA with two auxiliary lanes, congestion levels on local streets during the AM peak period would be improved compared to the Modified LPA with Recommended Design Options on SR 500, Fourth Plain, and Mill Plain due to the addition of the second auxiliary lane on I-5.

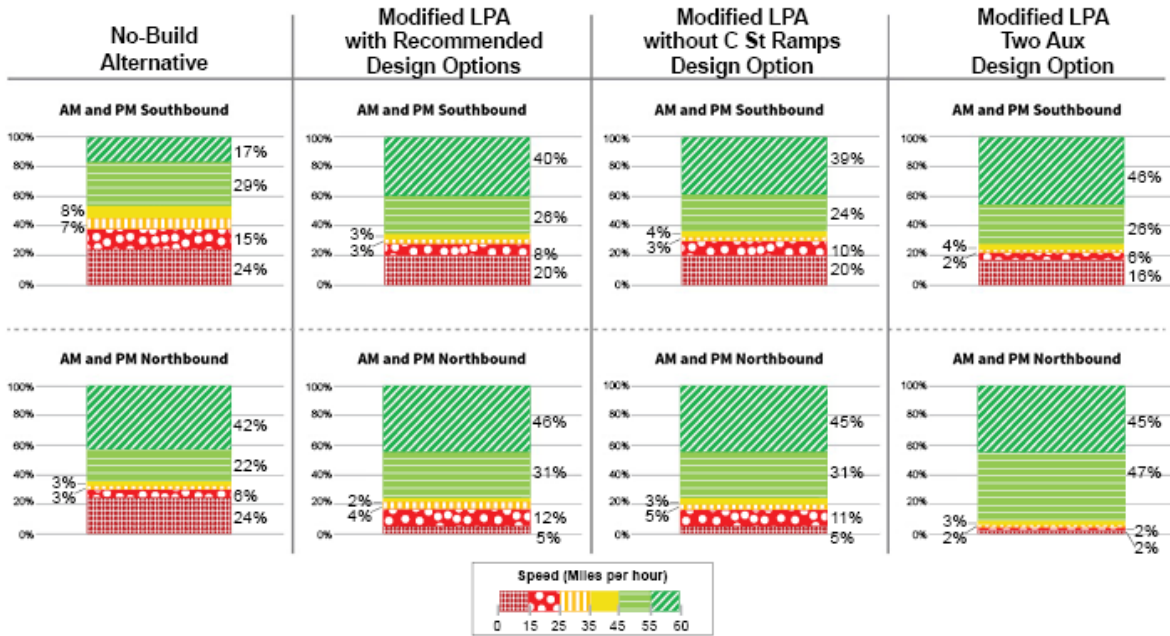
During the PM peak period, the existing Interstate Bridge is the major bottleneck for I-5 northbound traffic in the No-Build Alternative. I-5 mainline congestion impacts adjacent northbound on-ramps through the primary study area. With the Modified LPA with Recommended Design Options and Modified LPA without C Street ramps, the bottleneck at the new Columbia River bridges would be reduced during the PM peak period compared to the No-Build Alternative, and the extents of congestion on the local system are estimated to be less, but would generally still impact the same streets. Under the proposed Modified LPA with two auxiliary lanes, congestion on I-5 during the PM peak period is contained on the freeway and on the on-ramps, so no congestion is anticipated to extend onto the local roadway network.

The Transportation Technical Report (Section 4.3.4.5) has additional details on which streets would be impacted during each of the peak periods for all alternatives.

### ***Congestion Index in 2045***

Figure 3.1-16 provides a congestion index for No-Build Alternative, the proposed Modified LPA with Recommended Design Options, and with the proposed design options without C Street ramps and with two auxiliary lanes. The other proposed design options (i.e., movable-span, double-deck fixed-span bridge configuration and I-5 shifted west), would not have different transportation effects than the Modified LPA with Recommended Design Options and are not discussed in further detail here. The index aggregates the levels of congestion on I-5 during the 8 peak hours, including the 4-hour AM peak (6 to 10 a.m.) and the 4-hour PM peak period (3 to 7 p.m.). These indices are a summary of northbound and southbound congestion and how long any given section of I-5 in the analysis area is operating at a particular speed. Overall, all Modified LPA design options would improve conditions compared to the No-Build Alternative, and the addition of a second auxiliary lane would offer the highest level of improvement in reducing congestion, particularly for northbound travel.

Figure 3.1-16. Forecast I-5 2045 Peak Period Congestion Index



**2045 Forecast Peak-Period Travel Times**

I-5 travel time comparisons from I-405 in North Portland to I-205 generally mirror the congestion results described above, but they also provide an additional measure of how different the travel experience would be by alternative and design option, based on the time of day.

Table 3.1-15 through Table 3.1-18 show the 2045 forecast southbound and northbound I-5 average travel times between I-205 in Vancouver and I-405 in North Portland in the AM and PM peak periods. Southbound travel time differences are less varied than northbound travel differences, largely due to the southbound constraints caused by backups at the I-5/I-405 split in North Portland.

- For the Modified LPA with Recommended Design Options, southbound travel times during the 2-hour AM peak period would be 4 minutes faster (or 7%) than the No-Build Alternative, as would all other proposed design options except for the proposed two auxiliary lane design option. The proposed two auxiliary lane design option would be 8 minutes faster (or 14%) than the No-Build Alternative.
- The southbound PM peak period 2-hour travel time on I-5 between I-205 in Vancouver and I-405 in North Portland would be 15 minutes faster (or 52%) than the No-Build Alternative under the Modified LPA with Recommended Design Options and all other proposed design options including the proposed two auxiliary lane design option.
- The northbound AM peak period 2-hour travel time on I-5 between I-405 in North Portland and I-205 in Vancouver would be 5 minutes faster (or 28%) than the No-Build Alternative under the Modified LPA and all design options.
- The northbound travel times during the 2-hour PM peak period would be between 16 to 17 minutes faster (or 38% to 40%) than the No-Build Alternative under the Modified LPA with Recommended Design Options or Modified LPA without C Street ramps. The Modified LPA with two auxiliary lanes would be 28 minutes faster (or 67%) than the No-Build Alternative.

The Transportation Technical Report (Section 4.3.4.3) has hour-by-hour details, which provide more comparisons, including for periods when travel is closer to free-flow conditions.

Table 3.1-15. 2045 Forecast I-5 Weekday Southbound AM Peak-Period Average Travel Times

| Alternative/Design Option                      | Peak 2-hour Average Travel Time (minutes) |
|--|---|
| No-Build Alternative                           | 58  |
| IBR Program Recommended Design Options         | 54 (7% reduction)                         |
| Proposed Modified LPA without C Street Ramps   | 54 (7% reduction)                         |
| Proposed Modified LPA with Two Auxiliary Lanes | 50 (14% reduction)                        |

Source: IBR Program Transportation Technical Report

Note: The design option combinations shown are those that would have differing effects on transportation; other combinations of design options (I-5 alignment, bridge configuration, and park-and-ride design options) would have the same effects as the design options shown in the table.

I-5 = Interstate 5; IBR = Interstate Bridge Replacement Program; LPA = Locally Preferred Alternative

Table 3.1-16. 2045 Forecast I-5 Weekday Southbound PM Peak-Period Average Travel Times

| Alternative/Design Option                      | Peak 2-hour Average Travel Time (minutes) |
|--|---|
| No-Build Alternative                           | 29  |
| IBR Program Recommended Design Options         | 14 (52% reduction)                        |
| Proposed Modified LPA without C Street Ramps   | 14 (52% reduction)                        |
| Proposed Modified LPA with Two Auxiliary Lanes | 14 (52% reduction)                        |

Source: IBR Program Transportation Technical Report

Note: The design option combinations shown are those that would have differing effects on transportation; other combinations of design options (I-5 alignment, bridge configuration, and park-and-ride design options) would have the same effects as the design options shown in the table.

I-5 = Interstate 5; IBR = Interstate Bridge Replacement; LPA = Locally Preferred Alternative

Table 3.1-17. 2045 Forecast I-5 Weekday Northbound AM Peak-Period Average Travel Times

| Alternative/Design Option                      | Peak 2-hour Average Travel Time (minutes) |
|--|---|
| No-Build Alternative                           | 18  |
| IBR Program Recommended Design Options         | 13 (28% reduction)                        |
| Proposed Modified LPA without C Street Ramps   | 13 (28% reduction)                        |
| Proposed Modified LPA with Two Auxiliary Lanes | 13 (28% reduction)                        |

Source: IBR Program Transportation Technical Report

Note: The design option combinations shown are those that would have differing effects on transportation; other combinations of design options (I-5 alignment, bridge configuration, and park-and-ride design options) would have the same effects as the proposed design options shown in the table.

I-5 = Interstate 5; IBR = Interstate Bridge Replacement; LPA = Locally Preferred Alternative

Table 3.1-18. 2045 Forecast I-5 Weekday Northbound PM Peak-Period Average Travel Times

| Alternative/Design Option                      | Peak 2-hour Average Travel Time (minutes) |
|--|---|
| No-Build Alternative                           | 42  |
| IBR Program Recommended Design Options         | 26 (38% reduction)                        |
| Proposed Modified LPA without C Street Ramps   | 25 (40% reduction)                        |
| Proposed Modified LPA with Two Auxiliary Lanes | 14 (67% reduction)                        |

Source: IBR Program Transportation Technical Report

Note: The design option combinations shown are those that would have differing effects on transportation; other combinations of design options (I-5 alignment, bridge configuration, and park-and-ride design options) would have the same effects as the design options shown in the table.

I-5 = Interstate 5; IBR = Interstate Bridge Replacement Program; LPA = Locally Preferred Alternative

### **Forecast 2045 Level of Service and Volume-to-Capacity Ratios**

As described in the Transportation Technical Report (Section 3.3.4), WSDOT uses LOS for its highway performance standard, and ODOT uses V/C ratios for mobility standards and performance targets. The ODOT performance standard depends on the implementation of project improvements. ODOT sets the V/C standard for acceptable performance for the No-Build Alternative at 1.1 for the peak hour and 0.99 for all other hours. For segments of I-5 in Oregon that are reconstructed as part of an infrastructure improvement project, ODOT sets the V/C standard for acceptable performance at 0.75.

In general, the VISSIM freeway analysis performance measures (LOS and V/C ratios) show results similar to other freeway performance measures (see the previous sections). Where bottlenecks are forecasted and speeds and travel times are slow, the LOS and V/C ratios would be below standards.

Congestion on the I-5 mainline causes queuing at freeway on-ramps, which in turn can cause congestion and backups on the local cross streets at interchanges. The local streets are not included in the VISSIM model; however, the impact of freeway congestion on the local street network in the vicinity of model extents can be estimated by measuring the number of unserved vehicles at the model input points (i.e., the on-ramps). See the subsection Arterials and Local Streets in 2045, as well as the Transportation Technical Report (Section 4.6), for more details on freeway impacts on local roads and intersection operations.

More detail on freeway performance measures and congestion locations is available in the Transportation Technical Report (Section 4.3.4) Figures 4-9 through 4-16 and Table 4-8.

### **AM Peak Period**

- Southbound I-5 approaching the existing Interstate Bridge would not meet WSDOT performance standard under the No-Build Alternative due to over-capacity conditions at the bridge. The Modified LPA with all design options would not meet ODOT performance standards due to congestion spilling back to the bridge from the downstream bottleneck at the I-5/I-405 split in North Portland, which limits the potential for improved mobility offered by improved I-5 geometry, roadway configurations, and ramp connections with the Modified LPA with Recommended Design Options. Some mainline segments in Vancouver north of SR 500 during the AM peak period and north of the new Columbia River bridges during the midday and afternoon peak periods would, nevertheless, improve compared to the No-Build Alternative.
- Northbound I-5 approaching the existing Interstate Bridge would not meet ODOT's performance standard under the No-Build Alternative due to over-capacity conditions at the existing Interstate Bridge.

## Interstate Bridge Replacement Program

- The Modified LPA and all design options would improve conditions on northbound I-5 to levels that meet performance standards.
- The Modified LPA and all design options would not meet performance standards on the southbound C-D system between Mill Plain Boulevard and SR 14 in Vancouver. The northbound C-D between SR 14 and Mill Plain Boulevard would meet performance standards.

### *PM Peak Period*

- Southbound I-5 at the existing Interstate Bridge in the No-Build Alternative would not meet the WSDOT performance standards.
- Under the Modified LPA with the Recommended Design Options and most of the other design options, nearly all southbound I-5 segments would meet performance standards in Washington and Oregon during the PM peak period. However, under the Modified LPA without C Street ramps, the segment approaching the C-D roadway off-ramp would operate below performance standard due to congestion on the southbound C-D system backing up onto the I-5 mainline.
- Northbound I-5 in the No-Build Alternative, the Modified LPA with Recommended Design Options, and the Modified LPA without C Street ramps would not meet ODOT's performance standard from Victory Boulevard to the existing Interstate Bridge or new Columbia River bridges. The Modified LPA with two auxiliary lanes would meet ODOT's performance standards, except from Hayden Island to the new Columbia River bridges. North of the new Columbia River bridges, all alternatives would meet WSDOT performance standards.
- The Modified LPA with other bridge configuration options, I-5 alignment, or park and rides would have similar operational results as the Modified LPA with Recommended Design Options.

### ***Freight Mobility and Access in 2045***

Freight transportation in the Portland-Vancouver metropolitan region is estimated to increase substantially in the next 25 to 30 years, based on the 2022 *Washington Freight System Plan* (WSDOT 2022b) and the 2022 *Oregon Freight Plan* update (ODOT 2023). The Metro/RTC 2018 RTP RTDM forecasts increasing truck volumes. This would exacerbate many challenges the state freight system currently faces, including those associated with traffic congestion and safety. Outputs from the Metro/RTC 2018 RTP RTDM forecast that by 2045, trucks will comprise almost 15% of total trips across the new Columbia River bridges, which is an increase of 50% in truck traffic compared to 2019. This means that freight truck traffic would grow more quickly than general traffic under the No-Build Alternatives and the Modified LPA with all design options.

With the No-Build Alternative, trucks would be subject to the same delays as general-purpose traffic on I-5, as described above in the I-5 Operations section, as well as in the following discussion in the Arterials and Local Streets in 2045 section.

Under the Modified LPA and all design options, I-5 in the primary study area would be improved to meet current design standards, which specifically consider freight vehicles. While the elevation of the freeway lanes above the river would be higher than on the existing Interstate Bridge, the grades would still meet design standards for freight vehicles. Lane and shoulder widths would be increased, and highway ramps and interchanges would be rebuilt to meet current design standards for freight vehicles. Compared to the No-Build Alternative, the Modified LPA with one auxiliary lane or with two auxiliary lanes would better accommodate freight movements to and from the mainline lanes, especially at the interchanges serving the ports and industrial areas near the bridge. In these major freight route locations, upgrades to C-D lanes as well as revised interchanges and ramps would benefit freight movements. All of these factors were accounted for in the traffic operations models, which assumed a mix of freight and other vehicles. Overall, the Modified LPA with all design options would improve access, mobility, and safety for freight throughout the Program Area.

While there would still be improved freight conditions compared to the No-Build Alternative, the Modified LPA without C Street ramps design option would shift additional general-purpose traffic to the Mill Plain interchange, causing additional delay and congestion that could impact freight traffic traveling on the Mill Plain corridor. The Modified LPA with two auxiliary lanes, in combination with the extended ramps and C-D lanes, would provide additional space on the I-5 mainline for trucks to get up to speed and merge with traffic in through lanes on the I-5 mainline. This would incrementally reduce disruptions to flows on I-5 mainline compared to the Modified LPA with one auxiliary lane.

Oversized or over-dimensional freight movements would also benefit from the improvements described above under the Modified LPA and design options. The operational differences between one versus two auxiliary lane design options does not notably alter the ability of the proposed Modified LPA to accommodate oversized or over-dimensional freight movements because such loads are generally restricted during peak periods when congestion would be highest.

Forecast improvements in congestion and travel times with the Modified LPA and all design options would help to reduce current impediments to freight mobility and provide greater travel time reliability for trucks crossing the bridge. Because of the importance of I-5 in West Coast freight transport, improved freight mobility across the new Columbia River bridges could contribute to more efficient, reliable, and predictable operations at local, regional, and national ports, as well as more reliable freight deliveries to local businesses and residences. These operational improvements could result in positive economic effects such as increased employment and tax revenues within the Portland-Vancouver metropolitan area.

## **Bridge Openings and Gate Closures in 2045**

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

Under the No-Build Alternative, bridge openings and gate closures would occur at a frequency and for durations similar to existing conditions, assuming no changes to the existing bridge opening restrictions. Bridge openings would avoid high traffic volume periods and would continue to be restricted on weekdays from 6:30 a.m. to 9 a.m. and from 2:30 p.m. to 6 p.m. (except for emergencies and federal holidays); training and bridge maintenance activities would occur similar to existing conditions during the midday and overnight periods. However, as the durations of future congestion events increase compared to existing conditions, the recovery periods associated with gate closures would be similarly extended, exacerbating overall congestion within the study area.

### ***Proposed Modified LPA***

The Modified LPA with Recommended Design Options and all other bridge configuration design options, except the single-level movable-span bridge configuration, would eliminate the lift spans on the new Columbia River bridges. For the Modified LPA with fixed-span bridge configurations, gate closures required for bridge openings and traffic stoppage events would no longer occur; therefore, recovery times associated with bridge openings and gate closures would no longer contribute to the number and duration of congestion events. Other non-recurring congestion caused by traffic incidents, work zones or lane closures, bad weather, and special events would continue to occur.

The proposed single-level movable-span bridge configuration would require periodic bridge openings and gate closures that would interrupt traffic operations outside of peak-hour periods. Bridge openings for the proposed single-level movable-span configuration would be restricted to certain times and days, except for emergencies, to minimize disruptions to peak travel periods when highway traffic volumes and transit LRT and bus frequencies are the highest. Additional timing restrictions, which would increase restrictions on the timing for and duration of bridge openings, except for emergencies, would be requested and coordinated with the U.S. Coast Guard (USCG). For the purposes of this analysis, it was assumed that the requested increased restrictions on the timing and duration of bridge openings would reduce the recovery times associated with

bridge openings and traffic stoppages from contributing to the number and duration of congestion events, to increase benefits to highway traffic and transit service during the highest volume times of the day.

As described in Section 3.2, Navigation, the number of bridge openings occurring from 2007 through 2024 (excluding openings for bridge maintenance during which no vessel transited) ranged from a high of 375 openings (2011) to a low of 59 openings (2024), with an average of 156 openings per year (see Figure 3.2-3 in Section 3.2, Navigation). Clearance of the proposed single-level movable span bridge configuration in the closed position would provide up to 99 feet of vertical navigation clearance, which would be higher than under the No-Build Alternative, thus allowing more vessels to pass without a bridge opening. Based on existing marine vessels transiting under the existing Interstate Bridge, the number of bridge openings would be reduced from an average of 156 per year to approximately 75 per year for marine vessels; however, this number of bridge openings could vary over time as maritime activities evolve over the 100+ year service life of the bridge. This estimate of total resulting openings would be approximately one-half the openings, on average, that would occur with the No-Build Alternative. The USCG would need to approve further restrictions on bridge openings (see Section 2.6.2 for more information on the process to change bridge opening restrictions).

Similar to the No-Build Alternative, daytime bridge openings under the Modified LPA with a movable-span bridge configuration could impact traffic congestion for an hour or more. The disruptions to highway traffic and transit service would occur outside the peak-hour periods. For the Modified LPA with a movable-span configuration, which assumes extended restrictions on when the bridge could be opened, the resulting congestion could occur further in time from peak-hour periods compared to the No-Build Alternative. Depending on when the bridge opening would occur and other traffic, roadway, and weather conditions, the length of recovery time would vary and some of the recovery time could spill into the peak-hour period. For example, a bridge opening just before or after the restricted period would disrupt greater highway traffic volumes and transit service and take longer to recover to pre-bridge opening conditions compared to early morning or later evening hours when traffic volumes and transit service frequencies would be lower and recovery would be quicker. Active transportation trips would similarly be affected. For transit, the bridge openings would disrupt Yellow Line service in the study area as well as cause a system-level disruption in service to other lines serving downtown Portland due to shared rail facilities where many LRT lines converge closer to the Portland city center. Bus connections would also be disrupted, increasing overall travel times for riders. Depending on when the disruptions occur (e.g., near the peak period or overnight), it could take hours for the system to recover. See Section 3.2.3 for more information on how expanded bridge opening restrictions would affect river navigation.

### Arterials and Local Streets in 2045

This section covers impacts to roadway network traffic patterns, study intersections, peak-hour volumes, and intersection operations under the No-Build Alternative and the proposed Modified LPA with all design options. The Transportation Technical Report (Section 4.6) provides more details on the analysis.

The freeway operations summarized previously identify areas of congestion on I-5 that could result in backup queuing at freeway on-ramps. This in turn could cause congestion and backups on the local cross streets at interchanges for the No-Build Alternative and the Modified LPA with all design options. The local street intersection operations analysis discussed in the following sections does not include potential backups from the freeway access points in areas where freeway congestion could occur during peak periods. The Transportation Technical Report (Section 4.3.4.5) provides more details and figures showing the backup queuing onto local streets for the No-Build Alternative and the proposed Modified LPA with all design options.

## **Changes to Local Traffic Patterns**

### *No-Build Alternative*

Under the No-Build Alternative, other projects would be implemented that would modify interchange and arterial geometries in the study area, but no major changes affecting traffic patterns and circulation would occur. The No-Build Alternative would continue to require all Hayden Island traffic to access I-5, because no other local access route would be available.

### *Proposed Modified LPA with All Design Options*

Within Oregon, the Modified LPA with all design options would similarly affect local traffic patterns within the Hayden Island, Bridgeton, and North and Northeast Portland neighborhoods in the study area. The changes to local traffic patterns would primarily result from the modified Hayden Island and Marine Drive interchanges and the proposed arterial bridge over North Portland Harbor. These improvements would alter access and circulation routes and patterns for the Hayden Island and Bridgeton neighborhoods but would also allow local access to be accommodated without requiring trips on I-5. The specific changes to local streets and traffic would be due to revised I-5 access, lane configurations, and ramp and interchange geometry, which are described in Chapter 2 and listed in further detail in the Transportation Technical Report (Section 4.6.1). The interstate access modification would alter ramp connections to local streets, including intersections, and involve extending or shortening local roads, realigning or relocating them, or changing the access point to a different street.

Within Washington, the Modified LPA with all design options would change local traffic patterns compared to the No-Build Alternative, primarily in the Shumway and Rose Village neighborhoods and the Esther Short and Arnada neighborhoods in downtown Vancouver. These changes would be the result of modifications to the interchanges in this area, including the SR 500 on-ramp and Fourth Plain off-ramp, with trips redirected to alternate routes via 39th Street and Main Street, St. Johns Boulevard, and Fourth Plain or exit at the Mill Plain interchange. The operational effects of these reconfigurations would be similar across design options except for the Modified LPA without the C Street ramps. The removal of C Street ramps would cause additional changes to traffic patterns by eliminating an access point to the downtown area and redirecting the trips to the Mill Plain interchange. See the Transportation Technical Report (Section 4.6.1) for further information on these changes to local streets and traffic patterns.

The proposed Modified LPA with all design options peak-period traffic forecasts and operations analysis also reflects five park and rides: three near the Waterfront Station and two near the Evergreen Station in Vancouver. The 1,270 total parking spaces would be dispersed among the five park and rides with 570 parking spaces divided among the three sites near Waterfront Station and 700 parking spaces divided among the two sites near Evergreen Station. The Hayden Island Station and the reconfigured Expo Station in Portland would not have park and rides, but all station areas would be designed for multimodal access including active transportation and bus connections.

The Transportation Technical Report includes a detailed description of local traffic pattern changes in the study area as well as the peak-period traffic forecasts.

### **Intersection Operations**

The local traffic analysis evaluated year 2045 conditions at 80 intersections for the No-Build Alternative and 86 intersections for the proposed Modified LPA with all design options. Due to interchange and access changes under the Modified LPA with all design options, some of the No-Build intersections would no longer exist, and other intersections would be added. The Transportation Technical Report (Section 4.6.3) provides details on these intersections, including the changes to traffic volumes, while discussion in this section focuses on locations where intersections would not meet agency standards in 2045.

The following summary identifies intersections that would operate below the applicable performance standards in 2045.

### *No-Build Alternative*

Of the 80 study intersections, all would operate at or better than the intersection performance standards in the AM and PM peak periods except for 10 intersections. Five intersections in Vancouver and 5 intersections in Portland would not meet performance standards:

1. Intersection #3 – 39th Street and Main Street (PM).
2. Intersection #5 – 39th Street and I-5 southbound on-/off-ramps (AM and PM).
3. Intersection #11 – Fourth Plain Boulevard and Main Street (AM).
4. Intersection #57 – Columbia Shores Boulevard and SR 14 eastbound off-ramp (PM).
5. Intersection #58 – Columbia Shores Boulevard and Columbia Way (PM).
6. Intersection #66 – Marine Drive and OR 120 (Portland Road) (PM).
7. Intersection #67 – Marine Drive and Force Avenue (PM).
8. Intersection #68 – Marine Drive/Martin Luther King Jr. Boulevard and I-5 northbound/southbound on-/off-ramps (AM and PM).
9. Intersection #78 – Columbia Boulevard and I-5 northbound/southbound on-/off-ramp (PM).
10. Intersection #79 – Columbia Boulevard and Vancouver Way (PM).

### *Proposed Modified LPA with Recommended Design Options and Proposed Modified LPA with Two Auxiliary Lanes*

Under the proposed Modified LPA with Recommended Design Options and proposed Modified LPA with two auxiliary lanes, there are 86 study intersections, which include new or modified intersections that would be developed by the IBR Program. All 86 study intersections would operate at or better than the intersection performance standards except for 6 intersections. Three intersections are in Vancouver and 3 intersections are in Portland.

1. Intersection #11 – Fourth Plain Boulevard and Main Street (AM).
2. Intersection #57 – Columbia Shores Boulevard and SR 14 eastbound off-ramp (PM).
3. Intersection #58 – Columbia Shores Boulevard and Columbia Way (PM).
4. Intersection #68 – Marine Drive/ Martin Luther King Jr. Boulevard and I-5 northbound/southbound on-/off-ramps (AM and PM).
5. Intersection #78 – Columbia Boulevard and I-5 northbound/southbound on-/off-ramp (PM).
6. Intersection #79 – Columbia Boulevard and Vancouver Way (PM).

For all six intersections mentioned above, except for intersection #68, the Modified LPA with Recommended Design Options or Modified LPA with two auxiliary lanes would not meet the performance standard but would perform the same as or better than the No-Build Alternative in terms of LOS or V/C ratio. Intersection #68 would be just below ODOT performance standards under the Modified LPA with all design options, but it would have improved intersection operations compared to the No-Build Alternative due to the revised design of the single-point urban interchange described in Chapter 2. Compared to the No-Build Alternative, the revised design for the Final SEIS would result in less back up along Marine Drive as well as the off-ramps and impacting adjacent intersections (Intersections #66 and #67) and I-5 freeway operations.

The operational evaluation of the proposed Modified LPA with all design options also includes two at-grade intersection crossings of the MAX Yellow Line extension. One crossing would be southeast of the Expo Center along Expo Road and used only to access the overnight facility, and the second would be west of the I-5 southbound on-ramp and Pier 99 Street intersection, which would be used during routine operations. With LRT service in the proposed Modified LPA assuming trains every 6.7 minutes, Pier 99 Street traffic is expected to experience delays of 20 to 30 seconds each time the MAX train crosses the roadway. Over the peak hour, this would have a minor impact to traffic operations on Pier 99 Street, as normal operations would quickly recover between the train crossings.

The proposed park and rides in downtown Vancouver would have minimal impact on intersection operations at study intersections for the Modified LPA with all design options because the number of additional trips from the park and rides would not add a sizeable volume increase to the overall intersection volumes at study area intersections. See Section 4.6.3.2 of the Transportation Technical Report for further details on park and ride trip development and Section 4.6.4 for the intersection operational results.

### *Proposed Modified LPA Without C Street Ramps*

If the C Street ramps were removed, a total of 13 study area intersections would operate below agency standards during the AM and/or PM peak hours compared to the Modified LPA with Recommended Design Options, which would retain the C Street ramps. The removal of the C Street ramps would redirect all trips between downtown Vancouver and I-5 to the Mill Plain Boulevard interchange. The six intersections identified under the Modified LPA with Recommended Design Options plus an additional seven intersections would not meet agency standards. The seven additional intersections are in Subarea 2 and include:

1. Intersection #22 – Franklin Street and Mill Plain Boulevard (PM).
2. Intersection #24 – Washington Street and 15th Street (AM).
3. Intersection #25 – Main Street and 15th Street (AM).
4. Intersection #28 – Columbia Street and Mill Plain Boulevard (PM).
5. Intersection #31 – Mill Plain Boulevard and Broadway Street (PM).
6. Intersection #33 – Mill Plain Boulevard and I-5 southbound on-/off-ramps (AM)
7. Intersection #34 – Mill Plain Boulevard at I-5 northbound ramps (PM).

In addition to the intersection level impacts, the elimination of C Street ramps would increase queuing through the Mill Plain Boulevard and 15th Street couplet, adversely affecting eastbound and westbound flows and intersection turning movements through the 15th Street and Mill Plain Boulevard couplet.

## **Transit in 2045**

The long-term effects described in this section are for the year 2045. All regional travel demand modeling data included in this section for the 2045 horizon year are from the Metro/RTC 2018 RTP RTDM as described above.

This section summarizes transit service effects in 2045 for the No-Build Alternative and the Modified LPA, including transit routing, ridership, station area mode of access, and transit transfer rates. Additional details about the transit networks, service and routing changes, and facilities are provided in the Transportation Technical Report (Section 4.7). The report also has information on TriMet and C-TRAN maintenance facilities, annual operating costs, and related factors.

For the purposes of this analysis, the transit networks and service assumptions, except for those that are components of the IBR Program, including new LRT service are the same for both the No-Build Alternative and proposed Modified LPA with Recommended Design Options. The Modified LPA would include service modifications and improvements in the study area, including new LRT service, more frequent higher capacity

express bus service on I-5, new LRT and express bus service facilities, and modifications to local transit service to integrate background bus service with the new LRT service and stations.

The Modified LPA with Recommended Design Options would include extending the Yellow line north from the current terminus at the Expo Center to a terminus location near Evergreen Boulevard along I-5 in Vancouver. The Yellow Line extension would include new light-rail stations at Hayden Island, Vancouver Waterfront, and Evergreen Boulevard. To accommodate additional transit demand in the Modified LPA with all design options, the Yellow Line LRT would operate at average 6.7-minute frequencies during the peak-hour period, up from 10-minute frequencies in the No-Build Alternative, and 15-minute frequencies during the off-peak period between downtown Portland and the Evergreen Station in Vancouver.

In addition to the LRT extension, C-TRAN express bus service would be included as part of the Modified LPA with all design options with Routes 101, 105, and 190 all using bus-on-shoulder for the portions of their routes that run on I-5 through the primary study area. Routes 101 and 105 would also include peak-period frequency increases from 15 minutes in the No-Build Alternative to 10 minutes in the Modified LPA with Recommended Design Options on Route 101 and from 10 minutes in the No-Build Alternative to 5 minutes on Route 105.

In Portland, the conceptual service plan assumes TriMet Line 6 would be modified with the extension of the Yellow Line LRT to Vancouver in the Modified LPA with all design options. With LRT extended north to Hayden Island, Line 6 would be truncated to end at the Expo Center Station. Connections to Hayden Island would be made via transfer at either Delta Park or the Expo Center. TriMet Route 11 could require slight modifications to maintain transfers to the Expo Center Station, depending on the final design of the station and surrounding area.

In Vancouver, several routes (Vine BRT, Route 101, Route 2, Route 25, Route 30, Route 32) would be adjusted as part of the Modified LPA with all design options. Routes 101, 2, 25 and 30 would be rerouted to provide transfer opportunities to and from the Modified LPA with all design options at Evergreen Station. The Vine BRT would be rerouted in and out of downtown Vancouver to serve the Evergreen Station via Evergreen Boulevard and Fort Vancouver Way rather than via McLoughlin Boulevard. Highway 99 Vine service would be modified to include an additional station at the Waterfront Station, and Route 32 would include a stop near the Waterfront Station as well. C-TRAN Route 60 would be eliminated.

The effects of the Modified LPA with Recommended Design Options on transit service would not differ substantially between the other design options, with two exceptions. The design option without C Street ramps would result in transit routing changes to access downtown Vancouver that would result in additional travel time for the express route in and out of downtown Vancouver as compared to the Modified LPA, and the two auxiliary lane design option would result in transit travel time improvements for all bus routes operating through the study area. The effects of the design option that include an assumption of a movable-span bridge would not differ substantially from the proposed Modified LPA with Recommended Design Options because bridge openings and gate closures, which would occur outside the peak-hour periods, are limited and periodic in nature and would primarily occur when transit service would be less impacted. RTDMs are designed to represent average weekday travel conditions and recurring congestion patterns. As such, they do not explicitly capture short-duration, non-recurring operational events, such as periodic bridge openings and gate closures.

### **Amount of Service**

The amount of service provided in the transit system can be measured by daily VHT in revenue service, daily VMT in revenue service, and daily place-miles of service which is calculated as the carrying capacity of the transit vehicles in service (seated and standing) multiplied by the VMT for each bus or train. Table 3.1-19 shows average weekday totals for all three of these measures for the Metro/RTC 2018 RTP RTDM base year (2015) as well as for the 2045 No-Build Alternative and proposed Modified LPA with Recommended Design Options. Transit service assumptions (e.g., routes, headways) would not vary for the Modified LPA design

options as compared to the Modified LPA with Recommended Design Options except for a routing change on the Route 101 under the design option without C Street ramps which would change how this line enters and exits downtown Vancouver. The base year is included to provide a point of comparison of service levels. As shown in Table 3.1-19, transit miles and hours in the No-Build Alternative increase over 50% as compared to existing conditions and place-miles increase just under 50%. This increase reflects the changes in the transit system planned in the Metro/RTC 2018 RTP that are not part of the IBR Program. The Transportation Technical Report, Section 4.7 (and its appendix with the Travel Demand Modeling Methods Report), has further details on the factors driving the forecasts for increased ridership levels by 2045. In part, increases in transit ridership between the base year and future year would be influenced by policies in the Metro/RTC 2018 RTP, such as parking policies and fare subsidy policies, that would have an impact on transit mode choice. The introduction of tolling on the new Columbia River bridges would also contribute to increases in transit ridership. Daily VHT and VMT are measured as time and distance, respectively, for transit vehicles in service on an average weekday. VMT would increase in 2045 with both the No-Build and the Modified LPA with Recommended Design Options, with the additional growth for the Modified LPA with Recommended Design Options due primarily to the extension of LRT and more frequent express service operating in bus-on-shoulder mode in the study area. Also, under the Modified LPA with Recommended Design Options VHT would decrease on local bus service and increase on LRT and express bus by a similar number of hours, resulting in approximately the same total VHT compared to the No-Build Alternative.

As noted above, place-miles reflect the carrying capacity of the vehicles in service (seated and standing) for each bus or train and are calculated by multiplying the vehicle capacity by the VMT. Place-miles can highlight differences in total available capacity between alternatives as shown in Table 3.1-19. The Modified LPA with Recommended Design Options would have more place-miles than the No-Build Alternative, in part because of the extension of LRT across the Columbia River and in part because additional express bus service between Vancouver and Portland would be provided under the Modified LPA with Recommended Design Options.

The Transportation Technical Report Section 5.8 has additional discussion.

Table 3.1-19. 2015 and 2045 Average Weekday Corridor<sup>a</sup> Transit Service Characteristics

| Measure                                | Mode                        | Existing (2015)  | 2045 No-Build Alternative | 2045 IBR Program Recommended Design Options <sup>b</sup> |
|--|-----------------------------|------------------|---------------------------|--|
| <b>Transit VMT (miles)</b>             | Local Bus                   | 9,250            | 13,350                    | 11,900   |
|  | Express Bus                 | 5,450            | 3,900                     | 7,650  |
|  | LRT <sup>c</sup>            | 800              | 850                       | 1,300  |
|  | BRT                         | 0                | 5,300                     | 5,250  |
|  | <b>Total</b>                | <b>15,500</b>    | <b>23,400</b>             | <b>26,100</b>  |
|  | <b>% Change<sup>d</sup></b> | <b>N/A</b>       | <b>51.0%</b>              | <b>11.5%</b>   |
| <b>Transit VHT (hours)</b>             | Local Bus                   | 650              | 850                       | 750  |
|  | Express Bus                 | 200              | 150                       | 250  |
|  | LRT                         | 50               | 50                        | 75   |
|  | BRT                         | 0                | 300                       | 300  |
|  | <b>Total</b>                | <b>850</b>       | <b>1,350</b>              | <b>1,400</b>   |
|  | <b>% Change<sup>d</sup></b> | <b>N/A</b>       | <b>57.3%</b>              | <b>0.9%</b>  |
| <b>Place-miles<sup>e</sup> (miles)</b> | Local Bus                   | 602,100          | 868,500                   | 773,200  |
|  | Express Bus                 | 545,300          | 388,900                   | 763,300  |
|  | LRT <sup>2</sup>            | 225,400          | 247,300                   | 380,300  |
|  | BRT                         | 0                | 530,200                   | 524,500  |
|  | <b>Total</b>                | <b>1,372,800</b> | <b>2,034,900</b>          | <b>2,441,300</b>   |
|  | <b>% Change<sup>d</sup></b> | <b>N/A</b>       | <b>48.2%</b>              | <b>20%</b>   |

Source: Metro/RTC Regional Travel Demand Model, IBR Program Transportation Technical Report

Totals may not add up due to rounding.

The design option combinations shown are those that would have differing effects on transportation; other combinations of design options would have the same effects as the Modified LPA with Recommended Design Options.

a Excludes Portland central business district.

b The Modified LPA with Recommended Design Options includes: Modified LPA with Single-Level Fixed-Span Bridge Configuration, One Auxiliary Lane, with C Street Ramp, Centered I-5, and All Five Park and Rides. Other combinations of design options (two auxiliary lanes, C Street ramps, I-5 alignment, bridge configuration, and park-and-ride design options) would have the same effects as the IBR Program Recommended Design Options.

c For LRT, transit VMT is measured in train miles rather than in car miles.

d For the No-Build Alternative, the percentage change is the change compared to existing conditions; for the Modified LPA the percentage change is compared to the No-Build Alternative.

e Place-miles = transit vehicle capacity (seated and standing) multiplied by VMT. Bus capacity = 55, BRT and express bus capacity = 100, LRT capacity = 288 (LRT consists of two-car trains; each car can carry 144 people).

BRT = bus rapid transit; IBR = Interstate Bridge Replacement; LPA = Locally Preferred Alternative; LRT = light-rail transit; Metro = Oregon Metro; N/A = not applicable; RTC = Southwest Washington Regional Transportation Council; VHT = vehicle hours traveled; VMT = vehicle miles traveled

### Regional Transit Ridership

The Metro/RTC 2018 RTP RTDM for 2045, was used to produce estimates of ridership for both the No-Build Alternative and the proposed Modified LPA with Recommended Design Options. Included in the model for both the No-Build Alternative and Modified LPA with Recommended Design Options are transit-capacity constraints to better represent feasible transit ridership relative to transit investments described in the 2018 RTP. The Transportation Technical Report (Section 4.7.1) has more details on the capacity constraint

implementation along with a variety of ridership performance measures, including station boardings; the comparison here in the Final SEIS focuses on the primary differences between the alternatives.

### *Travel Demand and Mode Choice*

Table 3.1-20 shows the 2045 daily person trips and transit trips for the No-Build Alternative and the proposed Modified LPA with Recommended Design Options, including corridor and systemwide totals. Compared to existing conditions, the future growth rates for transit show higher use of transit for both the No-Build Alternative and the proposed Modified LPA with Recommended Design Options. The daily systemwide and corridor transit trips would be the same for all the design options under the Modified LPA. The Transportation Technical Report (Section 4.7) has further details on ridership levels and the services assumed, including total trips across the river on both I-5 and I-205. It also identifies the other system investments and regional planning assumptions related to the regional system ridership forecasted for both the No-Build Alternative and the Modified LPA with Recommended Design Options.

Table 3.1-20. 2045 Weekday Daily Systemwide and Corridor Transit Trips

| Measure   | No-Build Alternative | IBR Program Recommended Design Options <sup>a</sup> |
|---|----------------------|---|
| Total Regional Person Trips (all modes)                         | 11,905,000           | 11,905,000  |
| Total Regional Linked Transit Trips <sup>b</sup>                | 626,300              | 638,800   |
| Regional Transit Mode Share                                     | 5.26%                | 5.37%   |
| Total Regional Daily Unlinked Transit Boardings <sup>c</sup>    | 991,900              | 1,021,100   |
| Percentage Change from No-Build                                 | N/A                  | 2.9%  |
| Total Daily Regional Unlinked Light-Rail Boardings <sup>c</sup> | 335,600              | 362,200   |
| Percentage Change from No-Build                                 | N/A                  | 7.9%  |
| Total Corridor Person Trips (All Modes)                         | 3,249,500            | 3,250,200   |
| Total Corridor Linked Transit Trips <sup>a</sup>                | 351,300              | 363,300   |
| Percentage Change from No-Build                                 | N/A                  | 3.3%  |

Source: Metro/RTC Regional Travel Demand Model, IBR Program Transportation Technical Report

- a IBR Program Recommended Design Options includes: Modified LPA with Single-Level Fixed-Span Bridge Configuration, One Auxiliary Lane, with C Street Ramp, Centered I-5, and All Five Park and Rides. Other combinations of design options (two auxiliary lanes, C Street ramps, I-5 alignment, bridge configuration, and park-and-ride design options) would have the same effects as the IBR Program Recommended Design Options.
- b Transit trips count each passenger only once between the origin and destination of their trip. Transit trips include all trips on any transit mode.
- c Boardings count each time a passenger boards a transit vehicle; passengers who transfer between transit lines in a single “linked” trip count as multiple transit boardings.

IBR = Interstate Bridge Replacement; LPA = Locally Preferred Alternative; N/A = not applicable; RTC = Southwest Washington Regional Transportation Council

### *LRT Station Use Levels and Mode of Access/Egress*

Light-rail stations are accessed by transit (local, regional, and express bus, BRT, LRT) and by active transportation modes including walking, biking, and rolling. Trips by automobile are also reflected, primarily based on trips to the five park and rides identified in the Recommended Design Options, but can also include drop-off or pick-up activities. The primary mode of access by station reflects key differences in the location of the station and the surrounding land uses served. Table 3.1-21 summarizes the forecast station use and mode of access and egress to the new LRT stations with the Modified LPA. The LRT station usage by mode of access

for the design options would be the same for all Modified LPA design options. The Evergreen Station is expected to be the most-used station and the one with the highest level of access by transit. This reflects the station’s connections to the C-TRAN system serving downtown, including BRT lines.

Table 3.1-21. 2045 Modified LPA with Recommended Design Options<sup>a</sup> Light-Rail Transit Station Usage (Boardings and Alightings) by Mode of Access and Egress

| Station Location | Station Boardings/Alightings | Percentage of Total Boardings/Alightings | Percentage Non-Motorized <sup>b</sup> | Percentage Transfer | Percentage Park and Ride <sup>c</sup> |
|------------------|------------------------------|--|---------------------------------------|---------------------|---------------------------------------|
| Hayden Island    | 3,300                        | 15%                                      | 100% <sup>d</sup>                     | N/A                 | N/A                                   |
| Waterfront       | 5,200                        | 24%                                      | 25%                                   | 60%                 | 15%                                   |
| Evergreen/I-5    | 13,100                       | 61%                                      | 16%                                   | 75%                 | 10%                                   |

Source: Metro/RTC Regional Travel Demand Model, IBR Program Transportation Technical Report

- a Values in table reflect the Modified LPA with all design options. The effects of the Modified LPA with Recommended Design Options would occur with any other combination of design options (two auxiliary lanes, C Street ramps, I-5 alignment, bridge configuration, and park-and-ride design options).
  - b Non-motorized includes walking, biking and rolling.
  - c Analysis assumes park and rides at Waterfront and Evergreen Stations. Park-and-ride numbers do not include numbers for drop-off (private vehicle, taxi, rideshare) or C-TRAN microtransit trips on The Current.
  - d 100% of trips are shown to come from non-motorized access because there was no transit connection or formal park and ride assumed in the Modified LPA for this station. As noted in footnote b to this table, the model does not include explicit assumptions about drop-off so while there will likely be some trips that come via that mode of access it is not reflected in the modeling.
- I-5 = Interstate 5; IBR = Interstate Bridge Replacement; LPA = Locally Preferred Alternative; Metro = Oregon Metro; RTC = Southwest Washington Regional Transportation Council

Areas in proximity to new LRT stations could experience new development and/or redevelopment. This development would facilitate growth and increased land use density, as encouraged by local and regional land use plans. The provision of high-capacity transit is expected to support development in already urbanized areas of Hayden Island and downtown Vancouver, while reducing the potential for urban sprawl. The growth that would occur in these areas is accounted for in current growth targets, which anticipate the extension of high-capacity transit service.

Increased development in areas near the transit stations is anticipated and included in the Metro/RTC 2018 RTP RTDM, which includes changes to overall transit ridership beyond the primary study area. The mode of access to and from stations may shift as a result of increased development near the new stations associated with the Modified LPA. This may result in a greater percentage of active transportation or transit transfers and a lower percentage of automobile access as population and employment densities increase within station area walksheds and bikesheds. Increased active transportation trips to stations, particularly if higher density residential and commercial development occurs in surrounding areas, may involve increased travel along streets that lack Americans with Disabilities Act (ADA) accessibility or facilities to accommodate active transportation. However, increased development and transportation activity along these streets could encourage infrastructure improvements by local jurisdictions.

### Transit Travel Time

Transit travel times used in the Metro/RTC 2018 RTP RTDM include both peak and midday (off-peak) times. For the purposes of the SEIS, peak travel periods were analyzed because they represent the time of day when congestion-related impacts are greatest. Transit travel times for both the AM and PM peak periods were summarized for the No-Build Alternative, the proposed Modified LPA with Recommended Design Options, and the proposed Modified LPA with two auxiliary lanes. The other design options under the Modified LPA would have similar transit travel times to the Modified LPA with Recommended Design Options. One exception to

this is that the Modified LPA without C Street ramps design option would require express bus transit to be rerouted to access downtown Vancouver via Mill Plain Boulevard. This would add more travel time for express bus transit trips in and out of downtown Vancouver on express bus because of added distance and congestion on the mainline. Regarding the Modified LPA with the movable-span bridge configuration, regional travel demand models reflect typical average weekday conditions and are not designed to simulate infrequent, short-duration operational events such as bridge openings. Because bridge openings occur intermittently and do not meaningfully affect average daily traffic patterns, they are not explicitly represented in the model. For this reason, travel times during the peak-hour period under the Modified LPA with the movable-span bridge configuration would be the same as the proposed Modified LPA with Recommended Design Options or the proposed Modified LPA with two auxiliary lanes discussed below.

The transit travel time summary in Table 3.1-22 shows the total transit travel time (including in-vehicle, walking, waiting, and transfer time) for trips between downtown Vancouver where the Evergreen LRT terminus is located and four locations in Portland, including Hayden Island, Lombard Transit Center, Rose Quarter, and downtown Portland. The latter three locations in Portland provide access to connections for travel to other regional locations via transfer to and from the TriMet system. The proposed Modified LPA with Recommended Design Options and proposed Modified LPA with two auxiliary lanes transit travel times are provided for both express bus and LRT.

Express bus transit travel times include highway delays identified above in the section, I-5 Operations in 2045, for both the No-Build Alternative and proposed Modified LPA with Recommended Design Options. The effects are highest for southbound trips in the AM peak hour through the area approaching the I-5/I-405 split in North Portland. Improved traffic flow under both the Modified LPA with Recommended Design Options and the two auxiliary lane design option would allow more southbound vehicles to cross the new Columbia River bridges. This would result in more vehicles reaching the bottleneck at the I-5/I-405 interchange during the peak period, meaning that southbound buses running in traffic would experience higher levels of congestion approaching the bottleneck. As a result, southbound express bus transit travel times would be higher compared to the No-Build Alternative, which would continue to constrain vehicle trips at the existing Interstate Bridge. Nevertheless, several features of the Modified LPA and design options would help reduce those bottlenecks, including the extension of the MAX Yellow Line LRT to Vancouver, express bus enhancements, and variable-rate tolling on the new Columbia River bridges.

Differences in transit travel time between the Modified LPA Recommended Design Options and the two auxiliary lane design option would be primarily in the PM peak period in the northbound direction, where the Modified LPA with two auxiliary lanes would result in faster transit travel times (12 minutes) than the Modified LPA. LRT travel times would be similar for all Modified LPA design options. In combination, express bus and LRT complement each other to connect North Portland, downtown Portland, and Clark County.

Section 4.7.5 of the Transportation Technical Report includes additional information on the development of transit travel times provided in Table 3.1-22.

Table 3.1-22. 2045 Average Weekday AM and PM Peak Total Transit Travel Time<sup>a</sup> for Selected Corridor Locations (minutes)

| Origin/Destination  | No-Build Alternative AM Peak SB | No-Build Alternative PM Peak NB | IBR Program Recommended Design Options <sup>b</sup> AM Peak SB | IBR Program Recommended Design Options <sup>b</sup> PM Peak NB | Proposed Modified LPA with Two Auxiliary Lanes <sup>b</sup> AM Peak SB | Proposed Modified LPA with Two Auxiliary Lanes <sup>b</sup> PM Peak NB |
|---|---------------------------------|---------------------------------|--|--|--|--|
| Between downtown Vancouver and Hayden Island  | 36 <sup>c</sup>                 | 21                              | 17 <sup>d</sup>  | 17 <sup>d</sup>  | 17 <sup>d</sup>  | 17 <sup>d</sup>  |
| Between downtown Vancouver and Lombard Transit Center   | 43 <sup>e</sup>                 | 41 <sup>e</sup>                 | 25 <sup>d</sup>  | 25 <sup>d</sup>  | 25 <sup>d</sup>  | 25 <sup>d</sup>  |
| Between downtown Vancouver and Rose Quarter:<br><ul style="list-style-type: none"> <li>Express Bus<sup>e</sup> (no stops between downtown Vancouver and Rose Quarter)</li> </ul>  | 43                              | 62                              | 52   | 38   | 52   | 26   |
| Between downtown Vancouver and Rose Quarter:<br><ul style="list-style-type: none"> <li>LRT (includes 13 stations between downtown Vancouver and Rose Quarter)</li> </ul>  | N/A                             | N/A                             | 37   | 37   | 37   | 37   |
| Between downtown Vancouver and Pioneer Square (Portland central business district):<br><ul style="list-style-type: none"> <li>Express Bus<sup>f</sup> (includes two stops between downtown Vancouver and Pioneer Square)</li> </ul> | 48                              | 67                              | 59   | 45   | 59   | 33   |
| Between downtown Vancouver and Pioneer Square (Portland central business district):<br><ul style="list-style-type: none"> <li>LRT (includes 16 stops between downtown Vancouver and Pioneer Square)</li> </ul>                      | N/A                             | N/A                             | 47   | 47   | 47   | 47   |

Sources: Metro/RTC Regional Travel Demand Model, IBR Program Transportation Technical Report

- a Total transit travel times include 10 minutes of walk access (1/4 mile walk on either end of the trip at 3 mph average walk speed) in addition to initial and transfer (if applicable) wait time. Wait times are based on half the headway.
- b IBR Program Recommended Design Options includes: Modified LPA with Single-Level Fixed-Span Bridge Configuration, One Auxiliary Lane, with C Street Ramp, Centered I-5, and All Five Park and Rides. The Proposed Modified LPA with Two Auxiliary Lanes includes: Modified LPA with Single-Level Fixed-Span Bridge Configuration, Two Auxiliary Lanes, with C Street Ramp, Centered I-5, and all Five Park and Rides. Except for the C Street ramp design option, other combinations of design options (I-5 alignment, bridge configuration, and park-and-ride design options) would have the same effects as the Modified LPA with Recommended Design Options or the Proposed Modified LPA with Two Auxiliary Lanes shown on the table. For all design options, removal of the C Street ramps would require express bus transit to be rerouted to access downtown Vancouver via Mill Plain Boulevard. This would add travel time for express bus transit trips in and out of downtown Vancouver.
- c Route 60 does not stop at Hayden Island southbound, so a trip from Vancouver to Hayden Island travels south to Delta Park and then back north to stop on Hayden Island.
- d Travel time is on Yellow Line LRT.
- e Route includes 60 Vancouver – Delta Park with transfer to Yellow Line LRT.
- f Route includes Route 101 from downtown Vancouver – Rose Quarter or Pioneer Square.

IBR = Interstate Bridge Replacement; LPA = Locally Preferred Alternative; LRT = light-rail transit; Metro = Oregon Metro; N/A = not applicable; NB = northbound; RTC = Southwest Washington Regional Transportation Council; SB = southbound

## Transit Reliability

Table 3.1-23 summarizes three measures of transit reliability in the corridor: (1) miles of exclusive or reserved right of way, (2) the number of passenger miles that would occur in the right of way, and (3) the percentage of passenger miles that would occur in the right of way. Under the Modified LPA with Recommended Design Options, the extension of the Yellow Line from the Expo Center north to the new terminus at the Evergreen/I-5 station would be completely in its own guideway, and new shoulders proposed as part of the Modified LPA would provide bus-on-shoulder operations that are reserved for express buses. These would both contribute to the increase in average weekday passenger miles in the Modified LPA with Recommended Design Options as compared to the No-Build Alternative.

Table 3.1-23. 2045 Measures of Transit Reliability in the I-5 Corridor

| Right-of-Way Measure                         | 2045 No-Build Alternative | 2045 IBR Program Recommended Design Options |
|--|---------------------------|---|
| Miles of Exclusive/Reserved Right of Way     | 20.07                     | 26.88                                       |
| Average Weekday Passenger Miles              | 69,500                    | 213,000                                     |
| Percentage of Total Corridor Passenger Miles | 12%                       | 31%   |

Note: Values in table reflect the No-Build Alternative and the Modified LPA with all design options. The effects of the Modified LPA with Recommended Design Options would occur with any other combination of design options (two auxiliary lanes, C Street ramps, I-5 alignment, bridge configuration, and park-and-ride design options).

I-5 = Interstate 5; LPA = Locally Preferred Alternative

On-time performance is an additional measure of reliability, particularly for multiline rail systems such as MAX. As part of ongoing regional system planning, TriMet previously conducted analysis using the Rail Traffic Controller model in 2018, which showed that on-time performance of the regional light-rail system would remain in an acceptable range under TriMet's performance policy when up to 56 trains per hour travel through the system where all lines converge at the Rose Quarter.

Key assumptions in the No-Build Alternative and Modified LPA with Recommended Design Options that would affect on-time performance are defined below:

- To meet demand in the peak periods when ridership is highest under the No-Build Alternative, the Yellow Line is assumed to operate at 10-minute frequencies. When combined with other LRT lines operating through the Rose Quarter (Blue, Red, and Green Lines), this results in 52 to 54 trains per hour (fewer than the 56 trains per hour threshold target at the Rose Quarter that has been identified as acceptable for on-time performance by TriMet).
- To meet demand in the peak periods when ridership is highest under the proposed Modified LPA which includes the extension of the Yellow Line across the Columbia River to a terminus near Evergreen Boulevard in Vancouver, 6.7-minute frequencies are assumed. When combined with other LRT lines operating through the Rose Quarter (Blue, Red, and Green Lines), this results in 58 to 60 trains per hour, which is two to four trains per hour over the target threshold at the Rose Quarter (based on forecasts of on-time performance and analysis using TriMet's Rail Traffic Controller model). Because 6.7-minute headways under the Modified LPA would result in two to four more trains per hour over the threshold target, this would likely contribute to lower on-time performance across the system.
- Because the number of trains that run in the off-peak in both the No-Build Alternative and proposed Modified LPA with Recommended Design Options is the same and is below the threshold target for acceptable on-time performance, it was not necessary to evaluate impacts for the off-peak time period.

## ***Operations and Maintenance Facilities***

- Compared to the No-Build Alternative, in the Modified LPA C-TRAN would continue to operate from its existing NE 65th Avenue facility with three additional bus bays and associated infrastructure to support C-TRAN service.
- Compared to the No-Build Alternative, TriMet operations in the Modified LPA would be accommodated through expansion of the existing Ruby Junction facility and/or an overnight yard near the Expo Center.

## **Active Transportation in 2045**

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

As the region experiences increased population growth and development intensifies, more pressure would be placed on the existing Interstate Bridge's deficient existing active transportation facilities, including the shared-use path for walking, rolling, and riding between the two cities. For the bridge crossing itself, an increase in the volume of people traveling on the narrow and constrained paths would result in increased conflict between users sharing space along the paths, which are not wide enough for two-way travel or for people to pass each other. This deterioration in user experience would limit the potential for active transportation trips over the bridge and further reinforce the bridge as a barrier to active travel. Therefore, to be conservative, the No-Build evaluation assumes future average daily bridge trips would be the same as the existing 2019 conditions (410 daily trips).

### ***Proposed Modified LPA***

With the proposed Modified LPA with all design options, future active transportation trips across the new Columbia River bridges are estimated to range between 740 and 1,600 trips per day. The Modified LPA with all design options would offer improved conditions for active transportation, improving capacity, access, safety, and user experience for trips across the bridge. These improvements would combine with the transit improvements offered by the Modified LPA with all design options to further improve mobility. Trains and buses would accommodate bicycle trips and allow active transportation travelers to use the new stations to reach a wider array of destinations on both sides of the river, compared to the No-Build Alternative. Measures for evaluating the perceived stress active transportation travelers experience would also improve.

The Modified LPA with all design options would include bicycle and pedestrian improvements for all ages and abilities on the new Columbia River bridges, as well as facilities to access these bridge connections. All Modified LPA design options would include a two-way shared-use path on the new Columbia River bridges, approximately 24 feet wide in total, which would be designed to meet ADA standards and would include other features to optimize user experience, safety, comfort, and directness. To prevent conflicts between path users traveling at varying speeds, the shared-use path would provide separate spaces for people walking and biking. The design elements of the path would buffer it from vehicle traffic, noise, and exposure to street debris and stormwater to provide a well-lit, attractive, and comfortable environment for all users. On each end of the bridge, the shared-use path would include improvements to existing and proposed network facilities and would also provide new connections that do not exist today.

In the Modified LPA with the recommended single-level fixed-span bridge configuration or the double-deck fixed-span bridge configuration, the shared-use path would be at an elevation of 135 feet above the river, while with the single-level movable-span bridge configuration would be up to 120 feet above the river. The paths in these design options would still be higher than under the No-Build Alternative; thus, all users must climb over a longer distance to get over the peak. The maximum grade for the fixed-span bridge configuration would be up to a maximum of approximately 4% on both sides of the river; for the movable-span bridge configuration, these grades would be up to approximately 1.5% on the Washington side and approximately 3% on the Oregon side of the river.

All Modified LPA design options would include bicycle and pedestrian improvements at reconstructed I-5 interchanges and crossings throughout the study area, as well as in areas around new transit stations. Where roadways are replaced or modified or where new roadways are developed (such as the new arterial bridge proposed over North Portland Harbor), active transportation facilities including sidewalks and bike facilities would meet applicable standards, at a minimum. These changes would reduce many of the perceived barriers to bicycle and pedestrian travel and would improve the connectivity of the active transportation network in North Portland and Vancouver within the study area.

The Transportation Technical Report (Section 4.8) has detailed listings and maps of the individual locations and facilities that would improve active transportation conditions with the Modified LPA with all design options.

### **Safety in 2045**

The Enhanced Interchange Safety Analysis Tool (ISATe) was used to calculate the predicted frequencies of vehicle crashes on the I-5 mainline, ramps, and ramp terminal intersections within the primary study area for the No-Build Alternative and the proposed Modified LPA with all design options. ISATe is based on the *Highway Safety Manual* (AASHTO 2010) predictive methodology for freeway facilities. The Transportation Technical Report includes additional detail on the results of the ISATe analysis, including predicted crash frequencies by design option.

The analysis and findings of safety for the SEIS are consistent with additional studies by the Program related to FHWA requirements for any new or modified points of access on an interstate. The Program's changes to interstate access must be approved by FHWA and developed in accordance with federal laws and regulations (23 CFR Part 624.) Following the conclusion of the NEPA process with the Record of Decision, the Program would submit further documentation with the justifications for the changes for FHWA's consideration, covering safety on the Interstate facility and its ramps, including intersection of ramps with the local street network. Based on the analysis discussed below, the Program concludes that the Modified LPA with Recommended Design Options would result in improved safety compared to the No-Build Alternative.

### **No-Build Alternative**

Crash patterns along the I-5 mainline, along ramps, and at ramp terminals within the primary study area for the No-Build Alternative are anticipated to be similar to existing conditions, but crash frequencies are predicted to increase due to increased traffic volumes and increased hours during which I-5 is operating at capacity. The total number of crashes in the primary study area is predicted to increase by up to 28% by 2045 under the No-Build Alternative compared to existing conditions.

### **Proposed Modified LPA**

ISATe was used to calculate the predicted crash frequency for the I-5 mainline, ramps, and ramp terminal intersections for the proposed Modified LPA with Recommended Design Options and other design options based on the proposed roadway geometry and estimated future traffic volumes. The results of this analysis can be compared directly to the No-Build Alternative analysis results to determine the change in predicted crash frequency.

The Modified LPA with Recommended Design Options proposes modifications to interstate access and the configuration of the network within the study area, including but not limited to new or removed ramps, reconfigured interchanges, and access point changes. These changes would make I-5 more consistent with modern design standards and would reduce weaving, thereby improving safety. As a result, the proposed Modified LPA with Recommended Design Options is predicted to reduce total crashes by 13% compared to the No-Build Alternative. Some of the interchange reconfigurations would also decrease the number of ramps and/or the lane mileage of those ramps; improve merging, diverging, and weaving distances; and separate

movements via braided ramps and C-D systems which would further contribute to improved safety conditions and fewer predicted crashes.

The Modified LPA with Recommended Design Options (fixed-span bridge configuration) would also eliminate the movable span from the new Columbia River bridges, the openings of which are correlated with an increased likelihood of crashes, while the No-Build Alternative would retain the movable span. However, the effect of eliminating the movable span cannot be quantified within the predictive analysis, and it is likely that the predicted number of crashes within the study area is underestimated in the No-Build Alternative predictive analysis. Therefore, the fixed-span bridge configurations would likely result in a larger reduction in crashes (above 13%) by reducing the congestion that would result from bridge openings.

The Modified LPA without C Street ramps design option would eliminate access between I-5 and C Street, removing two ramps and a ramp terminal intersection. The vehicles that would have previously used the C Street ramps would instead use the Mill Plain Boulevard interchange. While more traffic traveling through the Mill Plain Boulevard interchange could increase the likelihood of crashes at the Mill Plain Boulevard interchange ramps and intersections, the removal of the C Street northbound off-ramp and southbound on-ramp would reduce the number of crashes at the C Street interchange ramps and intersections due to the removal of the interchange.

The proposed Modified LPA with two auxiliary lanes design option is predicted to reduce crashes over the proposed Modified LPA with Recommended Design Options by up to 4% and up to 17% compared to the No-Build Alternative as a result of reduced congestion. This reduction in crashes assumes a fixed-span bridge configuration.

The Modified LPA with a double-level fixed-span bridge configuration would have similar safety performance to the Modified LPA with Recommended Design Options because they both include similar design components (e.g., auxiliary lanes, high-capacity transit, active transportation improvements, etc.).

The Modified LPA with a single-level movable-span bridge configuration would maintain movable-span operations, but otherwise it would have the same geometry and traffic volumes as the Modified LPA. As described previously, while the safety effects of the movable-span bridge configuration cannot be quantified within the predictive analysis, this bridge configuration is associated with a higher likelihood of crashes. An analysis of existing crashes during bridge openings and gate closures, summarized in Section 3.9.4 of the Transportation Technical Report, found crashes are approximately 2 times more likely when a bridge opening or gate closure occurs than when it does not. Additionally, the likelihood of a crash resulting in an injury was about 20 percent higher than when a gate closure or bridge lift did not occur. It is therefore likely that the movable-span bridge configuration would perform slightly worse (i.e., experience more crashes) than the Modified LPA, but it would perform better (i.e., would experience fewer crashes) than the No-Build Alternative due to the reduction in traffic congestion.

### Local Facility Safety in 2045

The safety effects of volume changes at local study intersections (non-ramp terminals) were assessed to identify intersections where the total crashes were predicted to change by one or more crashes per year. Overall, the change in the total crashes of all of the local study intersections was negligible, with no total change in total crashes across the network.

Changes to the active transportation facilities as part of the Modified LPA may also have an impact on safety conditions for users. In general, safety conditions for active transportation users are likely to improve with the proposed Modified LPA with all design options over No-Build conditions. This is primarily due to the proposed Modified LPA with all design options adding a wide shared-use path across the bridge that fully separates active transportation users from vehicle traffic. Users would no longer need to travel across the bridge on a narrow sidewalk adjacent to the travel lanes with a narrow barrier and minimal shoulders as a buffer. Other

proposed Modified LPA active transportation elements with safety benefits include the revised shared-use path ramp connections to local street, improved sidewalks, and local street intersection improvements.

### **Transportation Demand Management and Transportation System Management in 2045**

TDM and TSM systems would continue to be available to reduce travel demand and maximize system efficiency and are generally already incorporated in the analysis of impacts and performance for the proposed Modified LPA with all design options discussed in the preceding section.

Under the No-Build Alternative, existing TDM and TSM programs would continue to support trip reduction and shifts from single-occupancy vehicle use to more transit and active transportation. Existing established TSM programs including system monitoring and traveler information systems, facility management systems, and incident management systems would be maintained and advancements in technologies and infrastructure programs identified in the 2018 RTP.

The Modified LPA, under all design options, would develop physical infrastructure and provide operations that support non-single-occupancy vehicle modes for travel needs in the study area. These would include:

- Expanded connections and more frequent transit service via the extension of the MAX Yellow Line with three new stations in the study area, plus new express bus and more frequent feeder routes, and I-5 median shoulders that accommodate bus-on-shoulder operations through the study area between Victory Boulevard in Portland to State Route (SR) 500 in Vancouver (5 miles).
- New and improved bicycle and pedestrian facilities that accommodate a greater number of people walking, rolling, and biking, and supporting a wider range of users and devices, which would improve connectivity, safety, and travel time.
- Variable-rate tolling on the new Columbia River bridges.

The Modified LPA with all design options would also include facilities and equipment that could support or expand TSM programs, including:

- Replacement or expansion of traveler information systems.
- Active traffic management system expansion.
- Expanded use of ramp meters.
- Queue jumps or bypass lanes for transit vehicles at freeway ramp meters or bus-on-shoulder operations.
- Preferential traffic signal priority.
- Incident management.

### **Tolling and Diversion**

The Modified LPA assumes that time-of-day variable-rate tolling on a set schedule would be in place for vehicles using the new Columbia River bridges. This means that tolls would vary by time of day, with higher rates during peak travel periods and lower rates at other times based on a set schedule. The impact analysis for the proposed Modified LPA with all design options is based on toll rates used in the Metro/RTC 2018 RTP RTDM that, for passenger cars with transponders, would range from \$1.50 (in 2025 dollars) at its lowest during the off-peak, to \$3.15 at its highest (in 2025 dollars) during peak travel times. The toll rate structure used for the analysis of the Modified LPA is shown in Section 4.11.1 of the Transportation Technical Report. Medium and heavy trucks would be charged higher tolls than passenger vehicles. This toll rate structure was used in travel demand modeling simulations completed in support of this analysis. Additional details on the use of tolling in the Metro/RTC 2018 RTP RTDM may be found in the Travel Demand Modeling Methods appendix to the Transportation Technical Report.

Diversion analysis presented in this section reflects toll assumptions developed for the proposed Modified LPA with all design options; the final rates would be set by the Washington State Transportation Commission and Oregon Transportation Commission, and they may vary over time. While final toll rates may be different than what was assumed for this technical analysis, the rates used in the analysis are a reasonable approximation of values that would support the revenue-generation and congestion-management needs of the IBR Program.

Toll revenue provides a vital funding source for capital costs, operations, and maintenance for the replacement of the new Columbia River bridges. Multimodal improvements, including expanded transit options and shared-use path improvements, would provide non-tolled travel options across the Columbia River. While all travelers would benefit from the safety, reliability, and mobility elements of a replacement bridge, vehicle travelers paying a toll on the facility, especially during peak periods, would benefit the most from improved traffic flows and travel time reliability. Improvements to address the current bridge deficiencies would require multiple funding sources, with toll revenues playing a critical role as the contribution from bridge users, alongside state and federal funding.

Tolling on a highway often leads to diversion where drivers opt for alternative routes or transportation modes to avoid paying tolls. These diversion effects can result in several outcomes including reduced traffic congestion on tolled routes, increased traffic on parallel roads, or potential shifts to transit or active transportation modes, as well as changing where, or if, a trip is even made.

An assessment of the shift in traffic between the No-Build Alternative and the proposed Modified LPA with all design options was completed to understand whether there would be diversion impacts to other facilities. This assessment was completed using the Metro/RTC 2018 RTP RTDM outputs and traffic forecasts. Appendix K to the Transportation Technical Report (discussed in the I-5/I-205 Travel Forecasts in 2045 section) provides details on the traffic forecasts including assumptions on volume development and traffic bridge split assumptions. Given the current duration of congestion on both Columbia River bridges, existing and future origin and destination patterns for travelers using each Columbia River bridge (see Section 3.3.2 of the Transportation Technical Report) and no expected major capacity changes to the corridors that would alter current splits of traffic between the two bridges, it is reasonable to expect that future bridge splits will be similar to current splits in the No-Build Alternative.

Key findings related to tolling and diversion from the Metro/RTC 2018 RTP RTDM outputs and traffic forecasts indicate the following for the proposed Modified LPA with all design options compared to the No-Build Alternative:

- Reduced vehicle volumes on I-5 and, overall, across the Columbia River. Table 3.1-13 above in I-5/I-205 Travel Forecasts in 2045 section shows a 3% overall reduction in vehicle crossings on both I-5 and I-205 in the proposed Modified LPA with all design options as compared to the No-Build Alternative.
- Reductions on I-5 result from diversion to the I-205 Glenn Jackson Bridge and increased transit use. Specifically, diversion to the I-205 Glenn Jackson Bridge occurs in off-peak directions of peak hours where travel time savings from using the I-205 Glenn Jackson Bridge are more attractive than the toll on the new Columbia River bridges. Table 4-6 in Section 4.3.3.2 of the Transportation Technical Report provides additional details on the increased vehicle volumes on I-205 in the northbound AM peak period (+1.3%) and in the southbound PM peak period (+2.6%). Again, these increases are in the off-peak direction of the peak period.
- Overall river crossing for truck trips stay the same for the combined Columbia River crossings but there is a shift in truck trips from I-5 to I-205 in the proposed Modified LPA with all design options compared to the No-Build Alternative. This shift is in off-peak directions during peak hours.

- Changes in trip destinations are trips that no longer cross the river. These are primarily discretionary trips that do not involve commuting for work with reductions seen in trips produced in Oregon that have destinations in Clark County.
- Increased transit trips across the river. Table 4-39 in Section 4.7.4 of the Transportation Technical Report shows total transit river crossings on an average weekday with the proposed Modified LPA with all design options reflecting an 80% increase over the No-Build Alternative.
- The higher the toll rate on the new Columbia River bridges, the larger the reduction in cross-river auto trips and the higher the increase in cross-river transit trips. This finding was taken from the tolling sensitivity analysis documented in Appendix J to the Transportation Technical Report.

In addition to the analysis described above, prior to conducting the transportation analysis for the Modified LPA, the IBR Program completed a tolling sensitivity analysis. This was done to understand how the Metro/RTC RTDM responded to changes in toll rates and to assess the potential for diversion (at all points in the modeling process, including changes in destination choice, changes in mode choice and changes in route choice/assignment) as a result of tolling the new Columbia River bridges using different toll rate assumptions<sup>16</sup>. The findings from the sensitivity testing are consistent with the results from the diversion analysis findings from the Draft and Final SEIS which show a reduction in average weekday daily vehicles trips to I-205 in the proposed Modified LPA compared to the No-Build Alternative. Additional details on tolling and diversion are documented in Section 4.11 and Appendix J (Diversion Analysis Report) of the Transportation Technical Report.

### 3.1.4 Temporary Reasonably Foreseeable Effects

This section summarizes potential construction impacts for transportation modes and facilities affected by the construction of the proposed Modified LPA with all design options and the removal of the existing bridges. The geographic proximity and temporal scope described in the Chapter 3 introduction were used to assess temporary reasonably foreseeable effects to transportation. Temporary reasonably foreseeable effects on transportation would not differ among the proposed Modified LPA design options.

Typical construction methods would require road, ramp, or lane closures and detours. The intent is to maintain three through lanes of traffic in each direction of I-5 (accommodating personal vehicles, freight, and buses) during peak hours. Off-peak and weekend closures may be required during construction.

All modes of travel on the I-5 mainline and interchanges within the study area would be affected by changes associated with construction (e.g., temporary detours, lane closures, reduced shoulder and lane widths, reduced speeds). Most major interchanges would remain open during construction, with the exception of those ramps or travel routes that involve extensive changes to the connection to the interstate. Simultaneous closures of adjacent ramps or overcrossings would be avoided to the extent practicable. The public would receive advanced notification about restrictions, intermittent closures, and detours for highway, local roadway, transit, and active transportation users. Most of the areas with longer-duration closures and detours are near the approaches to the bridge, where reconstructed connections to local streets are required. The facilities with closures and detours of a year or longer include Jantzen Drive, Washington Street to I-5, I-5 northbound to Vancouver city center, Evergreen Boulevard, the 29th Street overpass, the 33rd Street

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<sup>16</sup> These tolling diversion analysis sensitivity tests did not include the same assumptions that were used for purposes of the SEIS analysis; rather, they are from test model scenarios used during design option development and screening. These scenarios, completed during the design options development and screening, were used to screen transit options (testing BRT, LRT, Express Bus modes as well as different alignment and station locations), test tolling levels (ranges of pricing), and highway design assumptions. The assumptions used for these test model scenarios included early definitions of transit (alignment and terminus), tolling, and highway components that have since changed. The Oregon Metro/RTC 2018 RTP RTDM for the IBR SEIS process reflected finalized assumptions for transit and highway components as well as toll rates on the new Columbia River bridges.

overpass, and the 39th Street overpass. See the Transportation Technical Report for more details on major roadway and ramp closures, approximate closure durations, and potential detours.

The Modified LPA with any of the design options would include a Maintenance of Traffic Plan addressing all modes of transportation. This would be prepared during subsequent IBR Program design and construction phases for agency approval. The Maintenance of Traffic Plan would include construction descriptions such as staging, access, lane or shoulder closures and transitions, hauling, traffic management (including general-purpose traffic, transit, bicycle, and pedestrian traffic), detours, lane modifications, and other construction zones or activities. The plan would incorporate guidance in FHWA's Manual on Uniform Traffic Control Devices, ODOT's and WSDOT's transportation management plan strategies, and the guidance and permit requirements of local partners.

Travelers would also be able to check for traffic impacts from construction on Washington highways using WSDOT's system Real Time Travel Data<sup>17</sup> and on Oregon highways using ODOT's notification system Trip Check<sup>18</sup> (WSDOT n.d., ODOT n.d.). Further details on construction-period communication and informational programs would also be developed as the IBR Program continues with final design and construction planning.

### Regional Travel

Construction of the proposed Modified LPA with all design options is anticipated to last 9 to 15 years, impacting all modes of transportation within the primary study area as well as adjacent corridors. In addition to I-5, several regional roadway facilities including I-205, SR 500, SR 14, I-405, and I-84 would be affected by construction as drivers may temporarily reroute I-5 trips to these other highways. The Modified LPA with all design options could require nighttime, weekend or periodic partial to full closures of regional roadways, interchanges, and local roads during construction. However, in most cases these would be of limited duration and detour routes would be provided. Construction-related truck traffic for delivery of materials, equipment and for removal of materials/debris from demolition could also increase congestion and delays, particularly during periods of major construction. Table 2-5 in Chapter 2 lists the expected durations of proposed Modified LPA with all design options construction components.

All modes of travel on the I-5 mainline and interchanges within the study area would be affected by changes associated with construction (e.g., temporary detours, lane closures, reduced shoulder and lane widths, reduced speeds).

### Freight Mobility and Access

Impacts of the proposed Modified LPA with all design options to freight truck movements on mainline I-5 would be similar to impacts to general traffic. Temporary closures, detours, or restrictions on primary truck traffic access corridors between I-5 and the Ports of Portland and Vancouver container terminals and to other industrial/commercial locations could result in delays to freight traffic. Affected designated freight corridors include Marine Drive, Mill Plain Boulevard and Fourth Plain Boulevard.

Temporary access closures or access modifications for businesses could also occur, affecting freight (such as deliveries). If driveway closures are required, access to these properties would be maintained to the extent possible. With driveway closures, detours for freight would cause similar impacts compared to what is described for general-purpose traffic impacts.

During construction across active rail lines, there could be temporary closures that result in delays to freight train traffic. Coordination plans with the rail operators would be required.

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<sup>17</sup> <https://wsdot.com/travel/real-time/>

<sup>18</sup> <https://www.tripcheck.com/>

## Bridge Openings and Gate Closures

All highway and active transportation users would be affected during construction by ongoing bridge openings and gate closures of the existing Interstate Bridge, similar to existing conditions. This would include bridge openings for maintenance activities until traffic is shifted onto the new Columbia River bridges, but it could also include additional openings to accommodate construction equipment.

## Arterials and Local Streets

As noted above, construction of the Modified LPA with all design options would require local road closures, lane closures, traffic detours, and property access modifications and closures. Construction staging plans would include coordination with local jurisdictions to minimize the effect of closures, including detour routes. If driveway closures are required, access to these properties would be maintained to the extent practical. If access to a business could not be maintained during construction, the specific construction activity would be conducted during non-business hours where feasible.

Construction truck traffic would use approved truck routes, and where necessary, local roadways to access the construction areas. This could result in increased congestion, queues, and delays for local traffic and access. Delivery of large items would occur via truck routes. There would be limited direct access to construction areas via the I-5 mainline, although trucks may use I-5 to access construction areas. During construction there may be some short-term closures (night/weekend) to on- and off-ramps to accommodate construction activities. As the design and construction plans are advanced, there could be a need for direct access between I-5 and construction areas. If direct access is required, the IBR Program would coordinate with WSDOT, ODOT, and FHWA.

## Transit Operations

Construction of the Modified LPA with all design options could involve lane closures, bus stop relocations, light-rail station closures, partial or full temporary closures of park and rides, schedule adjustments, and sidewalk and bicycle lane impacts that could affect transit operations and/or access to transit within the study area.

Buses on existing routes could experience delays from increased congestion due to potential roadway or interchange closures. Buses that travel through downtown Vancouver may encounter temporary closures and reroutes as LRT guideway is installed and I-5 is reconstructed.

The existing TriMet MAX Yellow Line could be adversely affected during construction. The current Yellow Line travels along Denver/Expo Road and has two stations in the south end of the primary study area. Construction along Expo Road and as part of the Marine Drive interchange may require temporary relocation or closure of the Yellow Line's station near Delta Park and its terminus station near the Expo Center. These temporary relocations, closures, or schedule adjustments could take place intermittently for up to 4 years.

## Active Transportation

Construction of the Modified LPA with all design options could temporarily close sidewalks, bicycle facilities, and/or shared-use paths or reduce facility widths within construction areas. Active transportation travel could be affected within the study area, including in the Expo Center and Delta Park light-rail station area, during station and guideway construction. Limited opportunities are available for active transportation crossings of I-5, but existing crossings would be maintained to the extent practical. Active transportation facilities would be temporarily rerouted during intermittent and temporary closures. Active transportation facilities temporarily rerouted during construction would be an equal or better facility, compared to existing, as required by agency standards and guidelines.

## Safety

Many of the construction modifications to facilities, routes and services would involve temporary conditions where safety would be an increased concern. Maintaining safety for travelers as well as construction workers is one of the primary elements of construction plans, including for traffic control. Traffic diversion caused by construction would lead to higher traffic volumes on detour streets. The higher traffic volumes could lead to a potential increase in collision frequency. In locations where there is no physical change to the roadway, the types of crashes would remain similar to existing conditions.

## Transportation Demand Management and Transportation System Management

During construction of the Modified LPA with all design options, the impacts to facilities, traffic, transit and other modes would affect TDM and TSM programs and operations, and modifications would be needed.

## Tolling and Diversion

Tolling is proposed to be implemented in two timeframes: during construction and after the new bridges are complete. The first time frame, referred to as “pre-completion tolling,” is proposed to start on the existing Interstate Bridge while the construction of the replacement bridge is underway. Pre-completion tolling would help manage traffic demand through the corridor and generate revenue to fund construction and pay for facility operations and maintenance. During the pre-completion tolling period while the new bridges are under construction, the existing Interstate Bridge is assumed to be tolled from 5 a.m. to 11 p.m. and operate toll-free between 11 p.m. and 5 a.m. During the hours when tolling is in place, the analysis assumes tolls would vary by time of day with higher rates during peak travel periods and lower rates at other times of day based on a set schedule. Final toll rates and policies (e.g., whether there would be differences in toll rates for different vehicle types, toll discounts) would be set by the Washington State Transportation Commission and the Oregon Transportation Commission. Diversion to I-205 or to other facilities in the study area could occur during construction as people try to avoid pre-completion tolling or congestion from construction impacts. Depending on the origin and destination of the trip, this could temporarily increase travel times, modify the time of day a trip is made, or potentially change the route or mode that is chosen.

### 3.1.5 Intentionally Left Blank

### 3.1.6 Avoidance, Minimization, and Mitigation Measures

Table 3.1-24 lists temporary and long-term avoidance and minimization measures. Table 3.1-25 lists long-term mitigation measures. No temporary mitigation measures within control of the IBR Program were identified. Avoidance, minimization, and mitigation measures for land use that could potentially affect transportation are described in Section 3.4 and are not included in Table 3.1-24 and Table 3.1-25.

Table 3.1-24. Avoidance and Minimization Measures

| Temporary or Long-Term | Impact Type   | Avoidance and Minimization Measure  |
|------------------------|---|---|
| Temporary              | Changes to local jurisdiction transportation facilities during construction | During construction activities, ODOT, WSDOT and TriMet will comply with permit requirements for maintenance of traffic and with local permit requirements when local jurisdictional transportation facilities are impacted. |

| Temporary or Long-Term | Impact Type   | Avoidance and Minimization Measure  |
|------------------------|---|---|
| Temporary              | Regional travel impacts during construction   | ODOT and WSDOT will develop detailed construction plans and maintenance of traffic plans to address all affected transportation facilities and their modes of transportation. Such plans will be prepared during subsequent design and construction phases. Plans will be developed to meet applicable agency standards. Plans will be coordinated with agencies with jurisdiction for review and applicable approvals. |
| Temporary              | Freight mobility and access impacts during construction   | To minimize potential freight impacts during construction, ODOT and WSDOT will communicate with the freight community and the public to notify them of closures or detours.   |
| Temporary              | Freight rail operations impacts during construction   | To minimize impacts to freight rail operations, ODOT and WSDOT will coordinate with the railroad owners and rail operators and will obtain all applicable required permits. Construction will be limited to the times approved and coordinated with freight rail operations.  |
| Temporary              | Bridge opening and gate closure impacts during construction   | ODOT and WSDOT will work with the USCG, the Ports, and other jurisdictions to minimize bridge openings and gate closures to overnight periods to lessen the impact to all transportation modes. ODOT and WSDOT will develop a construction plan that identifies available resources that could be used to inform the public of upcoming bridge openings and gate closures.  |
| Temporary              | Local road closures, lane closures, traffic detours, and property access modifications and closures during construction                   | ODOT and WSDOT will comply with state and local regulations governing construction traffic control and construction truck routing associated with constructing the Modified LPA.  |
| Temporary              | Transit operations impacts during construction  | ODOT and WSDOT will coordinate the transit service and facility modifications with TriMet and C-TRAN to minimize temporary impacts and disruptions to bus and light-rail facilities and service during construction. ODOT and WSDOT will also consider other potential strategies such as temporary transit priority treatments with the affected transit agencies during construction as feasible.                     |
| Temporary              | Temporary closure of sidewalks, bicycle facilities, and/or shared-use paths or active transportation facility impacts during construction | Contracting agencies, including ODOT, WSDOT, TriMet, and C-TRAN, will develop plans for, and implementation of, safe and accessible detour routes for active transportation users during construction to preserve access to businesses, transit, parks, and other destinations in the project area.   |
| Temporary              | Safety impacts during construction  | ODOT and WSDOT will comply with their agency construction manuals, FHWA and FTA guidance, and related practices and procedures during construction.   |

Interstate Bridge Replacement Program

| Temporary or Long-Term | Impact Type   | Avoidance and Minimization Measure  |
|------------------------|---|---|
| Temporary              | Disruption to TDM and TSM programs and operations during construction                             | ODOT and WSDOT will coordinate construction, pre-completion tolling, and TDM/TSM with partner agencies to identify opportunities to minimize the severity of transportation effects during construction.  |
| Long-Term              | Highway operations  | During Final Design, the IBR Program will further investigate opportunities to optimize freeway operations and safety in accordance with the Freeway Management and Operations Handbook (FHWA 2006) and other applicable laws and regulations for the Interstate. In addition, the IBR Program and partners will continue to look for opportunities beyond what the IBR Program already includes (variable-rate tolling, improved transit and active transportation systems, and enhanced TDM and TSM systems). |
| Long-Term              | Congestion at the southbound I-5 downstream bottleneck near the I-5/I-405 split in North Portland | ODOT and WSDOT will continue to work with regional and local agencies to assess the region’s transportation issues, such as the southbound I-5 downstream bottleneck near the I-5/I-405 split in North Portland and identify potential solutions.   |

FHWA = Federal Highway Administration; FTA = Federal Transit Administration; I-5 = Interstate 5; I-405 = Interstate 405; IBR = Interstate Bridge Replacement; LPA = Locally Preferred Alternative; ODOT = Oregon Department of Transportation; TDM = transportation demand management; TSM = transportation system management; USCG = U.S. Coast Guard; WSDOT = Washington State Department of Transportation

Table 3.1-25. Mitigation Measures

| Temporary or Long-Term | Impact Type   | Mitigation Measure   |
|------------------------|---|--|
| Long-Term              | Congestion on the southbound I-5 C-D roadway in Vancouver           | ODOT and WSDOT will consider potential mitigation measures to address congestion on the southbound I-5 C-D roadway in Vancouver which could include demand reduction and system management strategies, or design related enhancements such as braiding the Mill Plain on-ramp and SR 14 off-ramp and possibly providing a slip lane to continue providing access for trips traveling from the Mill Plain interchange to SR 14. |
| Long-Term              | Potential traffic congestion from bridge openings and gate closures | ODOT and WSDOT will request Congressional authorization, through the USCG, for different bridge opening and gate closure timing limitations for the single-level movable-span bridge configuration, if selected.   |
| Long-Term              | Potential transit disruption from bridge openings and gate closures | ODOT and WSDOT, in coordination with TriMet and C-TRAN, will incorporate bridge opening and gate closure limitations into transit service schedules for the single-level movable-span bridge configuration, if selected.   |

| Temporary or Long-Term | Impact Type  | Mitigation Measure  |
|------------------------|--|---|
| Long-Term              | Potential disruptions to the public, businesses, travel organizations, freight industry, and mariners from bridge openings and gate closures | ODOT and WSDOT will disseminate information concerning bridge openings and gate closures restrictions to the public, businesses, travel organizations, freight industry, and mariners for the single-level movable-span bridge configuration, if selected.  |
| Long-Term              | Disruption to interchange operations at Marine Drive and I-5 interchange   | As part of final design approval of the Marine Drive and I-5 interchange, ODOT will review interchange operations and conduct an updated traffic analysis in accordance with Agency requirements to determine final design of the Marine Drive and I-5 interchange.   |
| Long-Term              | Arterial and local street impacts along the Mill Plain Boulevard/15th Street east-west couplet   | In coordination with City of Vancouver, WSDOT will address impacts caused by the additional traffic volumes accessing the Mill Plain Boulevard/15th Street east-west couplet for the Modified LPA without C Street Ramps, if selected. These potential mitigation measures could include adding an additional lane both eastbound and westbound through the Mill Plain Boulevard and 15th Street couplet between Columbia Street and the I-5 interchange as well as turning lanes at intersections and I-5/Mill Plain interchange as needed. This would result in additional impacts that are not quantified at this point. As part of final design approval, additional NEPA impact analysis and traffic analysis may be needed in coordination with the City of Vancouver to confirm the final design and align mitigation and design measures with City of Vancouver goals and outcomes. Final mitigation will be determined and agreed upon by WSDOT and the City of Vancouver. |
| Long-Term              | Potential disruption to TriMet's LRT performance   | As the IBR Program continues with final design and transit operations planning, ODOT and WSDOT will coordinate with TriMet to incorporate the Yellow Line LRT extension's operational plan, in conjunction with TriMet's ongoing system planning and Capital Investment Program. If the IBR Program's LRT frequencies are projected to degrade TriMet's LRT on-time performance, it would provide a proportionate financial share toward a separate TriMet project to improve on-time performance at the Rose Quarter.  |

C-D = collector-distributor; I-5 = Interstate 5; IBR = Interstate Bridge Replacement; LRT = Light-Rail Transit; NEPA = National Environmental Policy Act; ODOT = Oregon Department of Transportation; SR = State Route; USCG = U.S. Coast Guard; WSDOT = Washington State Department of Transportation