I-205 Toll Project

Draft Supplemental Transportation Technical Report

June 2024

Urban Mobility
STRATEGY

Oregon
Department
of Transportation

This page intentionally left blank.

Supplemental Transportation Technical Report

June 2024

Prepared for:

Oregon Department of Transportation

Prepared by:

WSP USA
1300 SW 5th Avenue, Suite 3100
Portland, OR 97201

Si desea obtener información sobre este proyecto traducida al español, sírvase llamar al 503-731-4128.

Nếu quý vị muốn thông tin về dự án này được dịch sang tiếng Việt, xin gọi 503-731-4128.

Если вы хотите чтобы информация об этом проекте была переведена на русский язык, пожалуйста, звоните по телефону 503-731-4128.

如果您想瞭解這個項目，我們有提供繁體中文翻譯，請致電：503-731-4128

如果您想了解这个项目，我们有提供简体中文翻译，请致电：503-731-4128

For Americans with Disabilities Act or Civil Rights Title VI accommodations, translation/ interpretation services, or more information call 503-731-4128, TTY (800) 735-2900 or Oregon Relay Service 7-1-1.

Oregon Department of Transportation

www.OregonTolling.org

Table of Contents

Figures

Tables

Attachments

Attachment A	Existing Year (2021) Traffic Counts
Attachment B	Intersection Analysis Counts by Peak Hour, Month/Year
Attachment C	Peak-Hour System – Peak-Hour Distributions
Attachment D	Year 2021 Covid volume adjustments
Attachment E	Existing 2021 Peak-Hour Turn Movement Volumes
Attachment F	Existing 2021 Highway Operations
Attachment G	Existing 2021 Intersection Operations
Attachment H	Existing 2021 Heavy Vehicle 24-Hour Volume Profiles
Attachment I	Existing 2021 Segment Crash Rate
Attachment J	Future 2045 Peak-Hour Turn Movement Volumes – No Build
Attachment K	Future 2045 Peak-Hour Turn Movement Volumes – Revised Build
Attachment L	Future 2045 Highway Operations – No Build
Attachment M	Future 2045 Highway Operations – Revised Build
Attachment N	Future 2045 Intersection AM Peak-Hour Operations – No Build
Attachment O	Future 2045 Intersection AM Peak-Hour Operations – Revised Build
Attachment P	Future 2045 Intersection PM Peak-Hour Operations – No Build
Attachment Q	Future 2045 Intersection PM Peak-Hour Operations – Revised Build
Attachment R	Future 2027 and 2045 Peak-Hour 95th Percentiles Queues – Revised Build
Attachment S	Future 2027 Intersection AM Peak-Hour Operations – No Build
Attachment T	Future 2027 Intersection AM Peak-Hour Operations – Revised Build
Attachment U	Future 2027 Intersection PM Peak-Hour Operations – No Build
Attachment V	Future 2027 Intersection PM Peak-Hour Operations – Revised Build
Attachment X	Future 2045 Segment HSM Analysis
Attachment Y	Future 2045 Enhanced Interchange Safety Analysis Tool (ISATe) Results
Attachment Z	I-205 Toll Project Modeling Methodology and Assumptions

Acronyms and Abbreviations

Acronym/Abbreviation	Definition
API	area of potential impact
APM	Analysis Procedure Manual
ATR	automatic traffic recorder
BLTS	bicycle level of traffic stress
CAT	Canby Area Transit
CCC	Clackamas Community College
d/c	demand-to-capacity
DTA	dynamic traffic assignment
EB	eastbound
EMP	employment
GIS	Geographic Information System
HCM	Highway Capacity Manual
HCS7	Highway Capacity Software version 7
HDM	Highway Design Manual
HSM	Highway Safety Manual
I-205	Interstate 205
I-205 Improvements Project	I-205 Improvements: Stafford Road to OR 213 Project
I-5	Interstate 5
IND	industrial
ISATe	Enhanced Interchange Safety Analysis Tool
LOS	level of service
LTS	level of traffic stress
MP	milepost
MEV	million entering vehicles
MMLOS	multimodal level of service
mph	miles per hour
MVM	million vehicle miles
N/A	not applicable
NB	northbound
NCHRP	National Cooperative Highway Research Program
OCTC	Oregon City Transit Center
ODOT	Oregon Department of Transportation
OR	Oregon Route
pc/mi/ln	passenger cars per mile per lane
PDO	property damage only
PLTS	pedestrian level of traffic stress
Project	I-205 Toll Project, which consists of variable-rate tolls at the Abernethy Bridge
RITIS	Regional Integrated Transportation Intelligent System
RSI	Regionally significant industrial
RTDM	regional travel demand model
SB	southbound
SCTD	South Clackamas Transportation District
secs/veh	seconds per vehicle
SMART	South Metro Area Transit
SPIS	safety priority index system
TPAU	Transportation Planning and Analysis Unit
TriMet	Tri-County Metropolitan Transportation District of Oregon
TSP	Transportation System Plan
TTI	travel time index

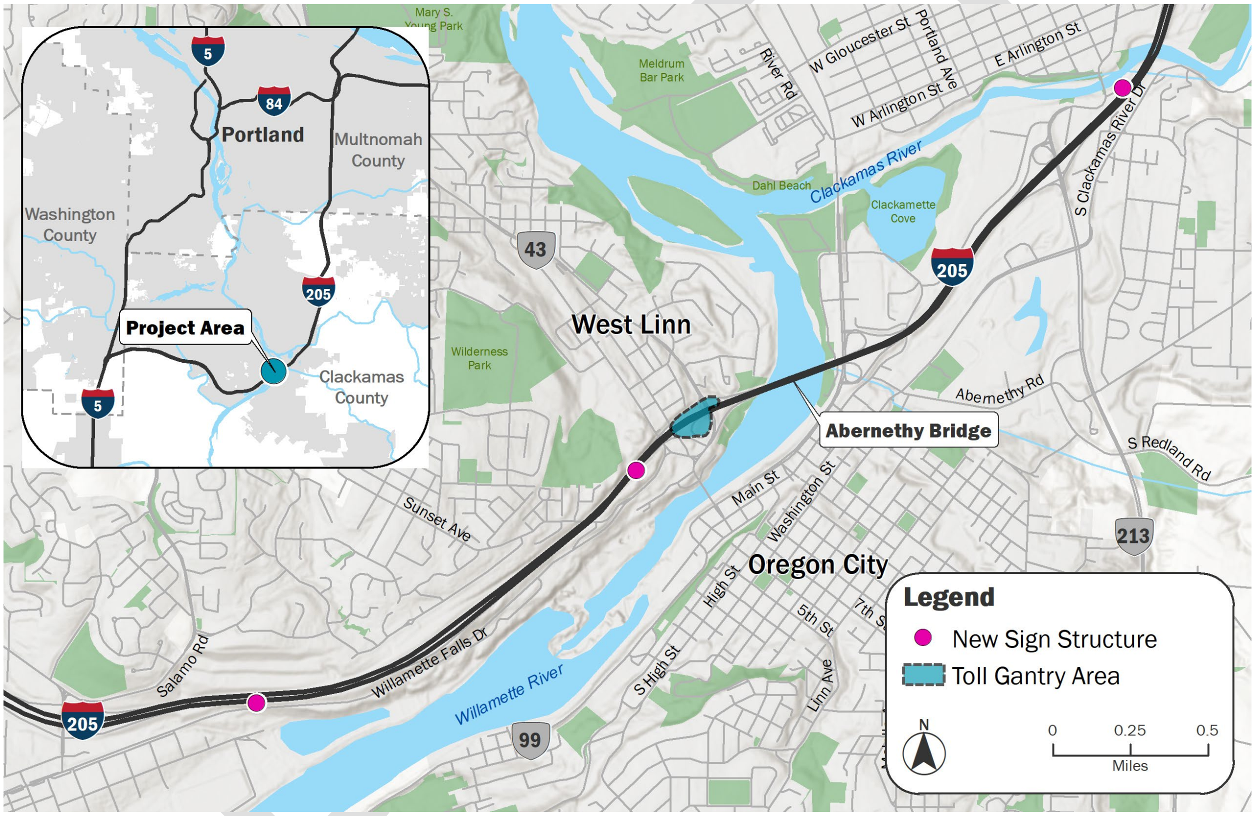
Acronym/Abbreviation	Definition
v/c	volume-to-capacity
VHT	vehicle hours traveled
VMT	vehicle miles traveled
WB	westbound
WFD	Willamette Falls Drive

1 Introduction

This document was initially drafted to support the I-205 Toll Project Supplemental Environmental Assessment. Text referencing the Supplemental Environment Assessment, as if it were published, has been left unchanged to reduce effort in the revision process. The focus here is the technical aspects of the analysis of the No Build and Revised Build alternatives.

This supplemental technical report supports the I-205 Toll Project Supplemental Environmental Assessment developed by the Oregon Department of Transportation (ODOT) in partnership with the Federal Highway Administration (FHWA). The Supplemental Environmental Assessment evaluates the effects of variable-rate tolls at the Abernethy Bridge on the human and natural environment in accordance with the National Environmental Policy Act (NEPA). Figure 1-1 illustrates the Project Area.

Figure 1-1. Project Area



This technical report describes the existing transportation conditions, discusses impacts and benefits the Project would have on those conditions, and identifies measures to mitigate impacts.

2 Project Alternatives

ODOT evaluated two alternatives in the I-205 Toll Project Supplemental Environmental Assessment and this supplemental technical report:

- No Build Alternative
- Revised Build Alternative

Section 2.1 describes the events that led to the Supplemental Environmental Assessment and associated technical analyses, and Sections 2.2 and 2.3 describe the alternatives in more detail.

2.1 Project Background and Environmental Review

The I-205 Toll Project is part of ODOT's Urban Mobility Strategy, which is a cohesive approach to making travel safer and more predictable in the Portland metropolitan area. In February 2023, ODOT in partnership with FHWA, issued an Environmental Assessment (2023 Environmental Assessment) for the I-205 Toll Project in accordance with NEPA (ODOT 2023). The Project proposed variable-rate tolls[1] on the Abernethy Bridge and Tualatin River Bridges to raise revenue for construction of planned improvements to I-205, including seismic upgrades and widening, and to manage congestion. The 2023 Environmental Assessment evaluated the effects of tolling and the toll-funded I-205 improvements on the human and natural environment (see Section 1.2 of the 2023 Environmental Assessment for more detailed information about the history and background of the Project; ODOT 2023).

Since that time, several key factors have changed and have had an impact on the costs and revenue sources for Urban Mobility Strategy projects:

- The scope of various elements of projects have changed, requiring design modifications that contribute to higher overall project costs.
- Very high inflation and supply chain issues have driven up costs of construction materials.
- Delays in projects due to ongoing design refinements and environmental review, as well as delays due to lack of construction funding, have further exacerbated cost pressures.
- Direction from Governor Kotek in May 2023 to delay toll collection on I-205 and I-5 until January 1, 2026, has impacted this critical revenue stream, and the reliability of timing and yield for tolling revenues has diminished.

In response to Governor Kotek's directive to delay toll collection, the ODOT Urban Mobility Office prepared an Urban Mobility Strategy Finance Plan[2] to answer key questions about how to pay for the Urban Mobility Strategy projects in both the short and long term. The June 2023 finance plan presents a phased approach to the Urban Mobility Strategy, reframing it as a long-term program of projects spanning more than a decade. In the first phase of funding identified in the finance plan, with respect to I-205 improvements, ODOT proposes to focus on completing the Abernethy Bridge reconstruction and to

---

1 Variable-rate tolls are fees charged to use a road or bridge that vary based on time of day and can be used as a strategy to shift demand to less congested times of day.

2 www.oregon.gov/odot/Get-Involved/OTCSupportMaterials/Agenda_B_UMS%20Finance%20Plan_Attach_01.pdf

reduce the I-205 Toll Project scope to tolling only at the Abernethy Bridge. Funding for the other I-205 improvements evaluated in the 2023 Environmental Assessment (highway widening and replacements/reconstruction of other bridges in the 7-mile segment of I-205) is no longer available in the near term, and, therefore, those improvements are not included in the Project.

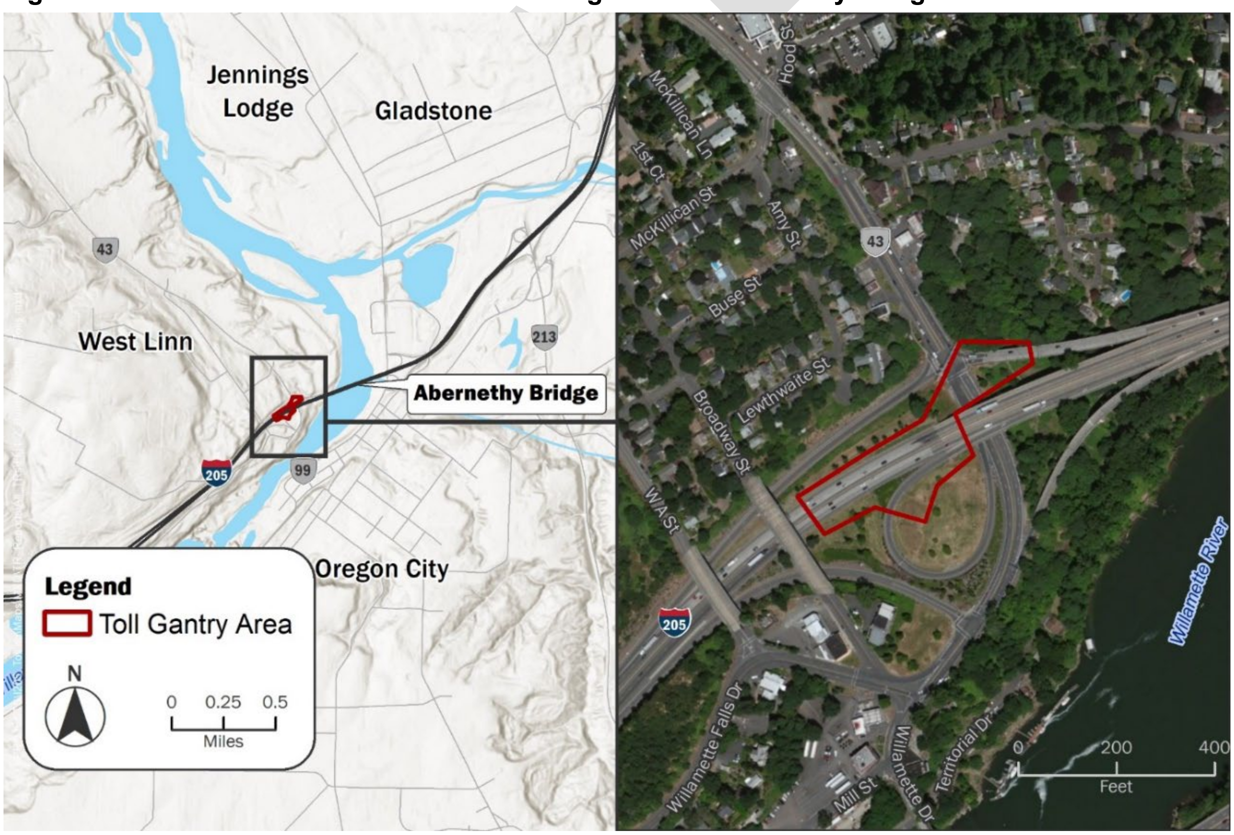
2.2 No Build Alternative

NEPA regulations require an evaluation of a no build alternative to provide a baseline to compare with the potential effects of a build alternative. The No Build Alternative consists of existing transportation infrastructure and any planned improvements that would occur regardless of the Project. Under the No Build Alternative, tolling at Abernethy Bridge would not be implemented.

2.3 Revised Build Alternative

The Revised Build Alternative is the implementation of tolling at the Abernethy Bridge. Under the Revised Build Alternative, drivers of vehicles on I-205 would be assessed a toll for crossing the Abernethy Bridge across the Willamette River between Oregon Route (OR) 43 and OR 99E. The toll gantries would be placed west of the Abernethy Bridge near the OR 43 interchange (see Figure 2-1). The gantries and supporting infrastructure would be located entirely within the existing I-205 right-of-way.

Figure 2-1. Revised Build Alternative: Bridge Tolls – Abernethy Bridge

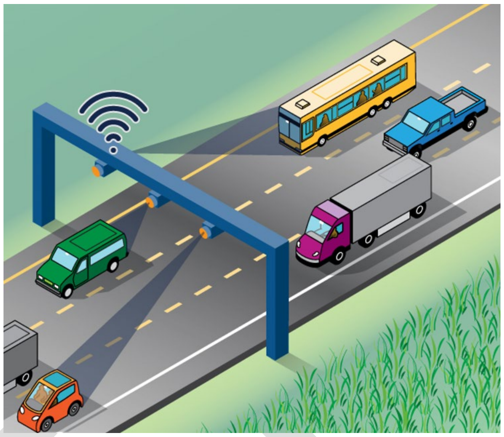


2.3.1 Tolling Technology

Under the Revised Build Alternative, tolling would consist of an all-electronic system that would automatically collect tolls from vehicles traveling across the Abernethy Bridge and passing under a gantry, as shown in Figure 2-2. There would be no toll booths requiring drivers to stop. Rather, antennae, cameras, lights, and other sensors would be mounted on the toll gantries spanning the roadway and would either (1) read a driver's toll account transponder (a small sticker placed on the windshield), or (2) capture a picture of a vehicle's license plate and send an invoice to the registered owner of the vehicle.

The I-205 toll system would be designed to be nationally interoperable. Drivers with an Oregon Toll Program transponder could use their transponder and associated account to pay tolls in other states, and drivers with transponders for tolling systems elsewhere in the country could use those transponders to pay tolls on I-205.

Figure 2-2. Electronic Toll System



How electronic tolling works. An all-electronic system would automatically collect tolls from vehicles that pass under a toll gantry. Equipment on the gantry reads a transponder (a small sticker placed on the windshield) and connects it to a prepaid account. If a vehicle doesn't have a transponder, a camera captures the car's license plate, and the registered owner is billed. This keeps traffic flowing without stopping to pay tolls.

2.3.2 Tolling Infrastructure

The Abernethy Bridge toll gantry area would include three toll gantries: a mainline gantry structure that spans all highway lanes, a gantry over the northbound on-ramp, and a gantry over the southbound off-ramp. Each toll gantry would include a single gantry structure.

Each toll gantry would consist of vertical columns on the outside of the travel lanes and a horizontal structure that would span the travel lanes to which the electronic tolling equipment would be attached. The toll gantries would be constructed of a metal framework with metal or concrete support structures. The gantries and supporting infrastructure would be designed to be consistent with other future planned improvements to I-205. The final structure type and design of the gantries would be determined during later design phases and would be based on cost, aesthetics, and ease of construction. The toll gantry area would include paved parking for service vehicles, which would typically be protected by a safety barrier or guard rail.

In addition to the toll technology mounted overhead on the gantry itself, each gantry would require some additional toll system equipment for data processing, storage, and network operations. This equipment would be enclosed within a small, access-controlled concrete structure, from which connections to existing ODOT data fiber and commercial power would be routed. ODOT currently operates a fiber data network with a 48-strand fiber-optic cable along the north side of I-205, to which the toll system equipment would be connected. A backup generator (typically fueled by diesel or natural gas) would be provided so the toll equipment would function during power outages. No relocation of existing utilities to accommodate construction of the gantry or any supporting infrastructure is expected. Three new sign structures would be constructed in the vicinity of the new toll gantries, as shown on Figure 1-1.

2.3.3 Toll Implementation

As Oregon's toll authority, the Oregon Transportation Commission will set toll rates, policies (including discounts and exemptions), and price escalation. If tolling is approved, the Oregon Transportation Commission would ultimately set toll rates at levels sufficient to meet all financial commitments, fund Project construction and maintenance, and manage congestion. Before the tolling project was paused the Oregon Transportation Commission was expected to finalize toll rates in 2025. ODOT could have begun tolling as early as January 2026.

2.3.4 Toll Rate Assumptions

Toll rates have not been determined and will be set by the Oregon Transportation Commission if tolling is approved. For environmental analysis and financial planning purposes, a baseline weekday variable-rate toll schedule was identified that balances the objectives of revenue generation to provide funding for capital construction, and to support congestion management on I-205 during peak travel times. Toll rates will ultimately be refined and adopted by the Oregon Transportation Commission to meet financial and policy objectives concurrent with a Level 3 toll traffic and revenue study.[3] For environmental analysis and financial planning purposes, the identified baseline toll rate schedule for the year of opening varies as follows:

- During off-peak hours (from 8 p.m. to 5 a.m. and from 10 a.m. to 2 p.m.), toll rates are assumed to be lowest ($0.75).
- During peak hours (6 a.m. to 9 a.m. and 3 p.m. to 7 p.m.), toll rates are assumed to be highest, varying from $1.75 to $2.25 depending on the hour.
- During the hours just before and after the peak periods (5 a.m. to 6 a.m., 9 a.m. to 10 a.m., 1 p.m. to 3 p.m., 7 p.m. to 8 p.m.), toll rates are assumed to be $1.25.

The assumed toll rates are provided in state fiscal year 2026 dollars, indicative of the year of opening, and are assumed to escalate annually with general price inflation, conservatively assumed to be 2.15% per year.

2.3.5 Construction

Construction of the Revised Build Alternative is expected to last approximately one year, beginning in early 2026. Most toll-related construction would be conducted alongside I-205 within the existing right-of-way. Staging areas for construction equipment and supplies for the Revised Build Alternative would be located primarily adjacent to I-205 in ODOT right-of-way.

[3] A Level 3 toll traffic and revenue study (also referred to as an "investment-grade" study) is the most detailed level of study and is expected to begin as the NEPA process ends. This deeper evaluation of a preferred toll scenario supports formal rate-setting, informs investors and lenders, helps to obtain a credit rating, and secures financing.

3 Methodology

This chapter provides an overview of the methodology used to assess transportation benefits and impacts of the Project. All place names used in descriptions below are in Oregon, unless specifically stated otherwise. The methodology for this analysis is generally the same as that used for the *I-205 Toll Project Transportation Technical Report* prepared in support of the 2023 Environmental Assessment. As discussed in the following subsections, the analysis uses newer data sources where available and is informed, in part, by comments received on the 2023 Environmental Assessment.

3.1 Project Area Regional Context

I-205 is a 37-mile-long auxiliary interstate highway that serves as a bypass of Interstate 5 (I-5) and travels north–south along the east side of the Portland metropolitan area, intersecting several major highways and serving Portland International Airport. The southern terminus is in the city of Tualatin, and the northern terminus is in Salmon Creek, north of Vancouver, Washington. In addition to serving as a major regional connector for commuter, freight, and other through trips, I-205 provides important access to and from many local jurisdictions within and adjacent to the Project area, such as West Linn, Oregon City, Lake Oswego, and Tualatin.

3.2 Area of Potential Impact

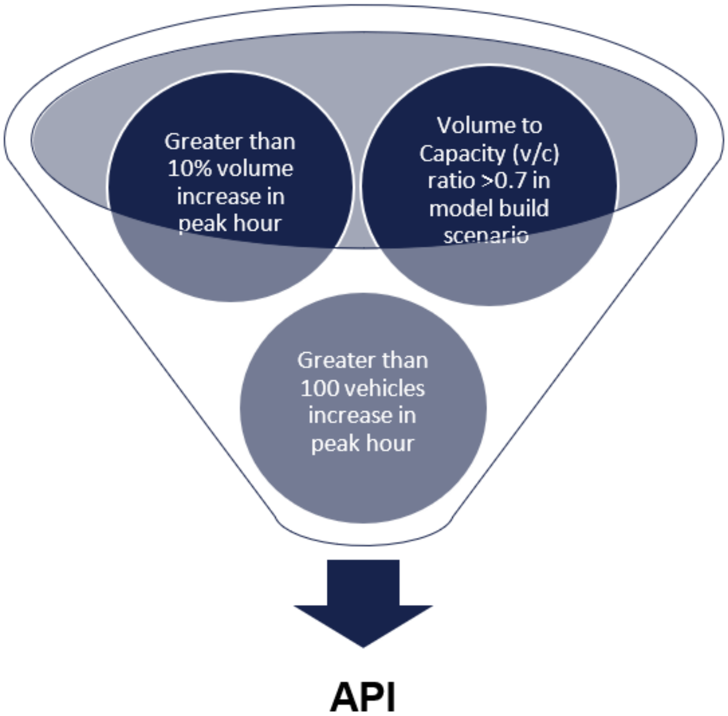
The transportation area of potential impact (API) of the Project was identified by examining the anticipated volume changes for daily, AM peak-hour, and PM peak-hour traffic from the Metro regional travel demand model (RTDM) developed for use on the 2018 Regional Transportation Plan. These changes were assessed for a near-term year of 2027 and a forecast year of 2045 under the No Build and Revised Build Alternatives. The modeled projected change in volumes identifies where traffic diversion, or rerouting, off I-205 may occur due to the Revised Build Alternative. Anticipated volume changes for AM peak-hour and PM peak-hour traffic from a dynamic traffic assignment (DTA) model were also utilized to determine the API. The DTA model was developed and used for the AM and PM peak periods because its characteristics are better suited for estimating potential diversion related to tolls under congested conditions.

The revised API generally extends south–north along I-205 from west of the Stafford Road interchange near Stafford to the SE 82nd Drive interchange near Gladstone and continues south along OR 99E about 10 miles to Aurora. The API also ranges from 0.75 to 3 miles on either side of I-205 and includes study intersections and study corridors in the I-205 vicinity that would be affected by traffic volume changes in 2027 and 2045 under the No Build and Revised Build Alternatives. To promote greater consistency with other Project environmental analyses that use U.S. Census data, the outer boundary of the API was generally drawn to the edges of the 2020 U.S. Census tracts that coincide with the study intersections and corridors, and adjusted to coincide with the outer boundaries of the RTDM modeling area.

Specific study corridors and study intersections were selected for further analysis in the API, based on the criteria in Figure 3-1. The corridors and intersections were selected if the change in AM or PM peak-hour volumes between the No Build and Revised Build Alternatives met all three of the following criteria in either the RTDM model or the DTA model in any of the peak hours:

- Greater than 10% volume increase
- Greater than 100 vehicles increase total
- Volume-to-capacity (v/c) ratio is greater than 0.7 in the Build Alternative model

Figure 3-1. Transportation Area of Potential Impact Criteria



The 15 study intersections and six study corridors within the API which met all three criteria are illustrated in Figure 3-2 and Figure 3-3. Figure 3-3 shows an inset of the API in the Oregon City, West Linn, and Gladstone areas. The intersections enumerated below correspond to the intersection numbers shown in the figures.

1. OR 43 and Hidden Springs Road
2. OR 43 and McKillican Street
3. OR 43 and Willamette Falls Drive
4. OR 99E and I-205 Northbound Ramps
5. OR 99E and 15th Street
6. OR 99E and 14th Street
7. OR 99E and 10th Street
8. OR 99E and Main Street
9. OR 99E and S 2nd Street
10. OR 99E and South End Road
11. OR 99E and S New Era Road
12. OR 99E and W Arlington Street
13. OR 99E and 12th Street
14. Main Street and 10th St
15. SW Stafford Road and I205 Southbound Ramps

The resulting API and study intersections were reviewed with agency partners and approved by ODOT.

The six study corridors are:

- I-205 between Stafford Road and SE 82nd Drive

- SW Stafford Road between Tualatin River and Mountain Road
- OR 43 (Willamette Drive) between Hidden Springs Road and Main Street
- Main Street (15th St to OR 99E)
- OR 99E between W Arlington Street and Liberty Street NE: *Dunes Drive to S 2nd Street (Oregon City); and SE Territorial Road to SW Berg Parkway (Canby)*
- OR 99E between W Arlington Street and Liberty Street NE: *S 2nd Street (Oregon City) to SE Territorial Road (Canby); and SW Berg Parkway to NE Liberty Street*

Figure 3-2. Transportation Area of Potential Impact

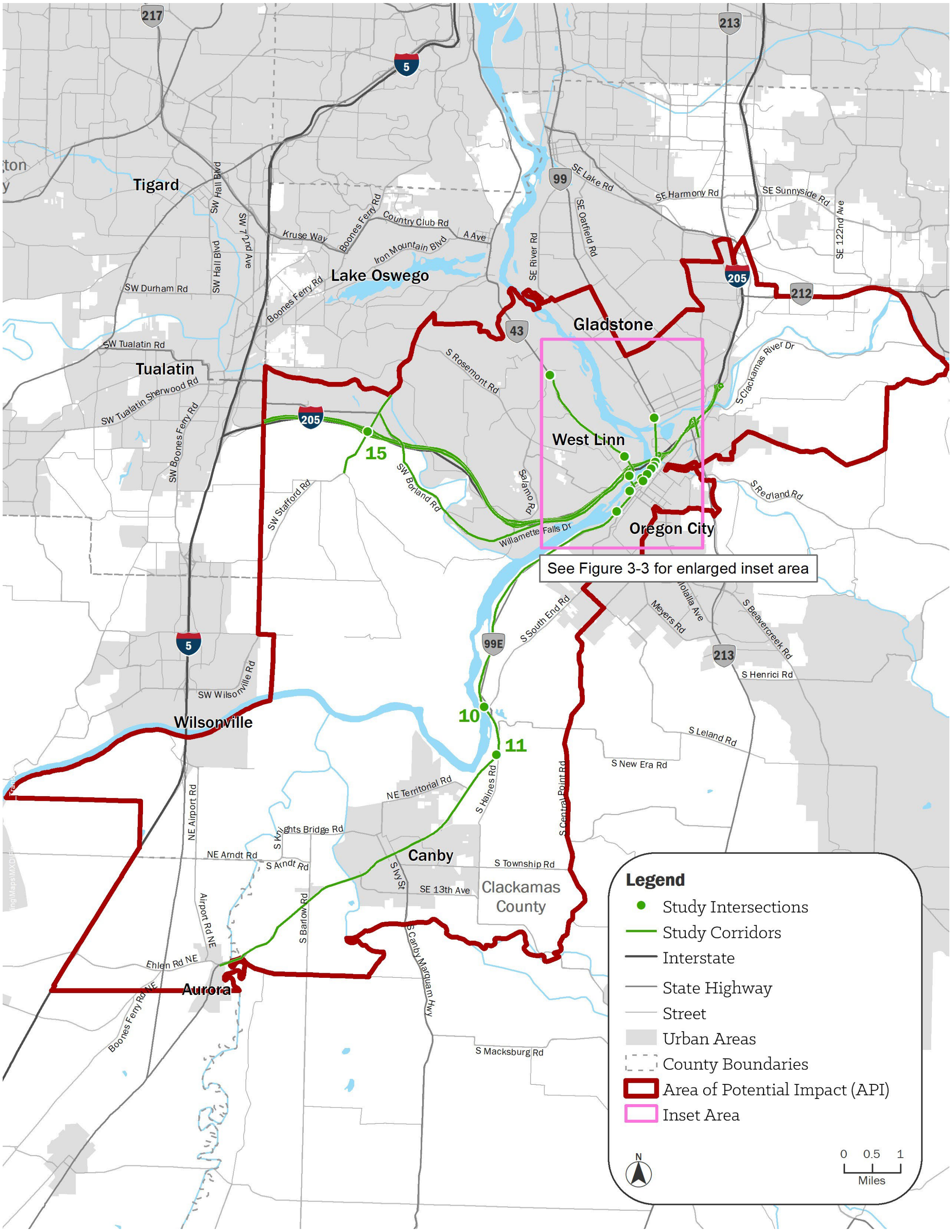


Figure 3-3. Transportation Area of Potential Impact – Inset Area (Oregon City, West Linn, and Gladstone Focus Area)

3.3 General Study Approach

The analysis and documentation process for examining transportation impacts follows ODOT guidelines and is outlined below. Key tasks associated with the analysis included the following:

- Review existing data and collect and compile new data (e.g., traffic counts, collision data, facilities inventory).
- List assumptions included in the Metro RTDM.
- Assess existing year (2021) transportation conditions (e.g., intersection traffic operations, active transportation facilities, transit routes, crash history)
- Consider transportation-related input from stakeholders as available (e.g., feedback from businesses, agencies, emergency responders, and the public regarding the state of the corridor, including challenges and opportunities for improvement).
- Develop forecasts for 2027 (for assessing near-term conditions after the I-205 Toll Project is complete) and 2045 traffic volumes (forecast year).
- Analyze and document future traffic for No Build and Revised Build conditions.
- Assess and document potential short-term effects of tolling during construction of I-205 Improvements Project (tolling assumed to begin in 2024).
- Monitor regional and national trends related to changes in commute travel patterns due to the COVID-19 pandemic.

3.4 Transportation Data

To conduct a comprehensive assessment of transportation conditions associated with the Project, transportation data was collected and/or compiled from the following resources:

- AM and PM peak-hour intersection turning movement volumes including bicycle, pedestrian, and heavy vehicle counts
- 24-hour tube counts on study roadways
- Updated vehicle classification volumes for I205
- Signal timing and phasing data for the signalized study intersections
- Roadway geometry data and pedestrian/bicycle facilities at study intersections and on roadway corridors that access or run parallel to I205 within the API
- Historical crash data from most recent 5 years available (2017 to 2021 at time of preparation) for I-205 and other study corridors identified as being affected by the Project
- Freight volumes and documentation on future freight system demands on I-205, as available
- Data from ODOT Over-dimensional Trip Permitting Program, as available
- Transit routes and ridership in the API, as available
- Key emergency responders within the Project vicinity
- Geographic information system (GIS) data representing parcel boundaries, rights-of-way, critical areas, topography, and utilities, as available

- Project area aerial imagery
- Travel time data along I205 and other corridors identified as being substantially affected by the Project
- Posted speed limits verified from Google Street view
- StreetLight data, including current users' origins and destinations and route choice by time of day

Because of COVID-19 pandemic restrictions, new data collected may not reflect typical weekday peak-hour conditions. Therefore, the transportation analysis used historical or adjusted data where appropriate. Details of this approach are discussed in Section 3.7.

3.5 Analysis Tools

The weekday peak-hour intersection traffic operations analysis for the study intersections was performed using Synchro (version 11) software, with results reflecting the Highway Capacity Manual Version 6 (HCM6) and Highway Capacity Manual Version 2000 (HCM2000) reporting methodology (TRB 2016). Synchro is an analysis software package developed by Trafficware that is widely used for evaluating intersection operational performance and supporting design decisions. Synchro requires key data input items such as motor vehicle traffic volumes, vehicle composition, traffic control, signal timing and phasing, lane geometry, transit stops, and non-motorized volumes (i.e., bicycle movements and pedestrian volumes). Typical performance measures and outputs generated by Synchro include average vehicle delays, v/c ratios, queues, and level of service (LOS) which are further defined within Section 3.9. Where v/c ratios exceed 0.90, SimTraffic is used to report queues.

To assess corridor operations on I-205 segments, including weave, merge, and diverge geometry, Highway Capacity Software version 7 (HCS7) highway facilities modeling tools were used.

The I-205 Subarea DTA model in Dynameq software was used to develop near-term year (2027) and forecast year (2045) peak-hour volumes for I-205 and its ramps, as well as at the study intersections. The Metro RTDM was used for any analysis requiring average weekday daily volumes, and for locations outside of the DTA subarea, as needed.

3.6 Analysis Scenarios

The following scenarios were analyzed as a part of this study:

- Existing Year (2021) Conditions (Adjusted 2021)
- No Build Alternative in 2027
- No Build Alternative in 2045
- Revised Build Alternative in 2027
- Revised Build Alternative in 2045

Table 3-1 lists these scenarios along with the level of analysis that was conducted for each. These levels include running and utilizing output from the RTDM—which addresses performance measures based on daily traffic and systemwide analysis needs; use of the DTA model—which provides a more detailed look at peak-period traffic operations; I-205 mainline and ramp operations conducted for the AM and PM peak hours; AM and PM peak-hour intersection operations using microsimulation models; multimodal analysis addressing pedestrian, bicycle, and transit performance; and safety analysis, identifying existing and predicted crashes within the API.

Table 3-1. Analysis Scenarios and Level of Analysis for Each

	Types of Analyses Conducted by Scenario					
	RTDM	DTA Model	AM/PM I-205 Mainline Operations	AM/PM Intersection Operations	Multi-modal	Safety
Existing Year Conditions (2021)	X*	X*	X	X	X	X
No Build Alternative in 2027	X	X		X		X
No Build Alternative in 2045	X	X	X	X	X	X
Revised Build Alternative in 2027	X	X		X		X
Revised Build Alternative in 2045	X	X	X	X	X	X

* For calibration purposes
DTA = dynamic traffic assignment; RTDM = regional travel demand model

Detailed AM and PM peak-hour intersection level traffic analysis was conducted for the 2027 and 2045 scenarios. I-205 corridor level traffic analysis was conducted for the 2045 scenarios.

The 2027 scenarios were developed and analyzed in the RTDM to provide data for traffic operations, safety analysis, preliminary toll revenue estimates, as well as for the air quality, energy and greenhouse gases, and economic impact analyses. DTA analysis was also performed for the 2027 scenarios. Because the Project was expected to have a positive effect on mainline operations, the impact assessment was determined to be necessary for only the 2045 timeframe.

3.7 Traffic Volume Development

Due to substantial changes in travel behavior and traffic volumes during the COVID-19 pandemic, the Project Team looked for alternative sources to adjust the 2021 traffic count data that would represent normal pre-pandemic conditions.

3.7.1 Existing Year (2021) Conditions

For existing year (2021) conditions, traffic volume information was compiled using existing resources in accordance with the ODOT Analysis Procedure Manual (APM) (ODOT 2020a). Once the API and study intersections were finalized, data sources and post-processing methodology for each study corridor and intersection were coordinated with ODOT.

The API for the Project includes 15 study intersections that were identified using the methods described in Section 3.2 and are shown in Figure 3-2 and Figure 3-3. Two-hour morning and afternoon peak-period turning movement counts were collected in June 2021 at seven study intersections, in October 2021 for three study intersections, and in April 2023 for three additional intersections because they were added later to the API. 2021 counts for the OR 99E and 12th Street intersection were obtained from Tri-County Metropolitan Transportation District of Oregon (TriMet) (TriMet 2022). Intersection counts collected in October 2021 were also counted in June 2021 to gain an understanding of whether and how the travel patterns might have changed. Intersection volumes were similar for the intersections counted for both months. The higher October 2021 volumes were used for the AM peak-period analysis because they were higher than June 2021 counts. Counts collected in 2023 were also compared to 2021 traffic data; however, there was not a significant increase in 2023, and the counts were not adjusted further. Attachment A provides traffic counts collected for 2021 and 2023. Attachment B illustrates which counts were used for the analysis at all of the study intersections.

The two-hour peak-period counts for the 15 intersections as well as the I-205 ramp termini intersections within the API were adjusted to a single system peak hour, which is the peak single hour of the day that has the highest hourly volume across the API facilities to be analyzed. The system peak hour was determined by counting the time frame with the highest count of intersection peak hours as shown on Table 3-2. The system peak also considered existing 2021 volumes collected at the I-205 intersection ramps that are part of the freeway operational analysis and a total of 28 intersections throughout the API. Attachment C presents a comprehensive list of ramps and study intersections used to derive the system peak. Based on this examination, the AM peak hour was determined to be 7:15 a.m. to 8:15 a.m. and the PM peak hour was determined to be 5:00 p.m. to 6:00 p.m. Heavy vehicle percentages, as well as bicycle and pedestrian volumes, at each study intersection were obtained from the turn movement counts during the system peak hour.

Table 3-2. Intersections Peak-Hour Count

Beginning of Peak-Hour Count	Number of Intersections**
AM Peak-Hour Count	
7:00 a.m.	0
7:15 a.m.*	**10**
7:30 a.m.	7
7:45 a.m.*	6
8:00 a.m.	5
PM Peak-Hour Count	
4:00 p.m.	7
4:15 p.m.	1
4:30 p.m.	6
4:45 p.m.	3
5:00 p.m.*	**11**

Notes:
* **Bold** font and an asterisk indicate peak hour.
** Number of intersections does not include the intersection at OR 99E and 12th Street.

3.7.2 Traffic Volume Adjustments

To assess whether the traffic counts collected in June 2021 are representative of normal pre-pandemic traffic conditions, recent historical data available within the API was reviewed for years 2017, 2018, and 2019 (pre-pandemic).[4] Based on the historical data review, June 2021 counts were adjusted as appropriate to represent normal pre-pandemic traffic conditions. Adjustment factors were derived by comparing historical data to June 2021 data as available. For example, historical data for years 2017, 2018, and 2019 from Automatic Traffic Recorder (ATR) 03-016 located on I-205 near Stafford Road were used to compare with June 2021 data to determine the adjusted June 2021 volumes. To obtain the most conservative results, volumes were only factored up. Due to the pandemic, it was assumed that no growth has occurred since 2018/2019 and hence if June 2021 volumes were higher than the historical data, no adjustments were made. When June 2021 volumes were lower than the historical data, an adjustment factor was applied. Volumes obtained through traffic counts in 2023 were not adjusted because comparison data suggested those counts were in line with 2021 volumes.

Although there were several comparisons across various data sets of different times and seasons, only 24-hour count data was used to derive adjustment factors, due to it providing a more comprehensive picture of volumes and minimizing typical temporal shifting of peak hours. Furthermore, volumes were adjusted only at locations with multiple datasets and where there was a discernible pattern. These sets included ODOT MS2 database counts at a specific corridor location that had available data for the years 2017, 2018, and/or 2019 that could be compared to June 2021 counts. Counts from other ODOT projects were also evaluated for trends, but no clear trends were discerned from the data. Table 3-3 and Figure 3-4 show volume adjustments by location and data source; further adjustment details are presented in Attachment D.

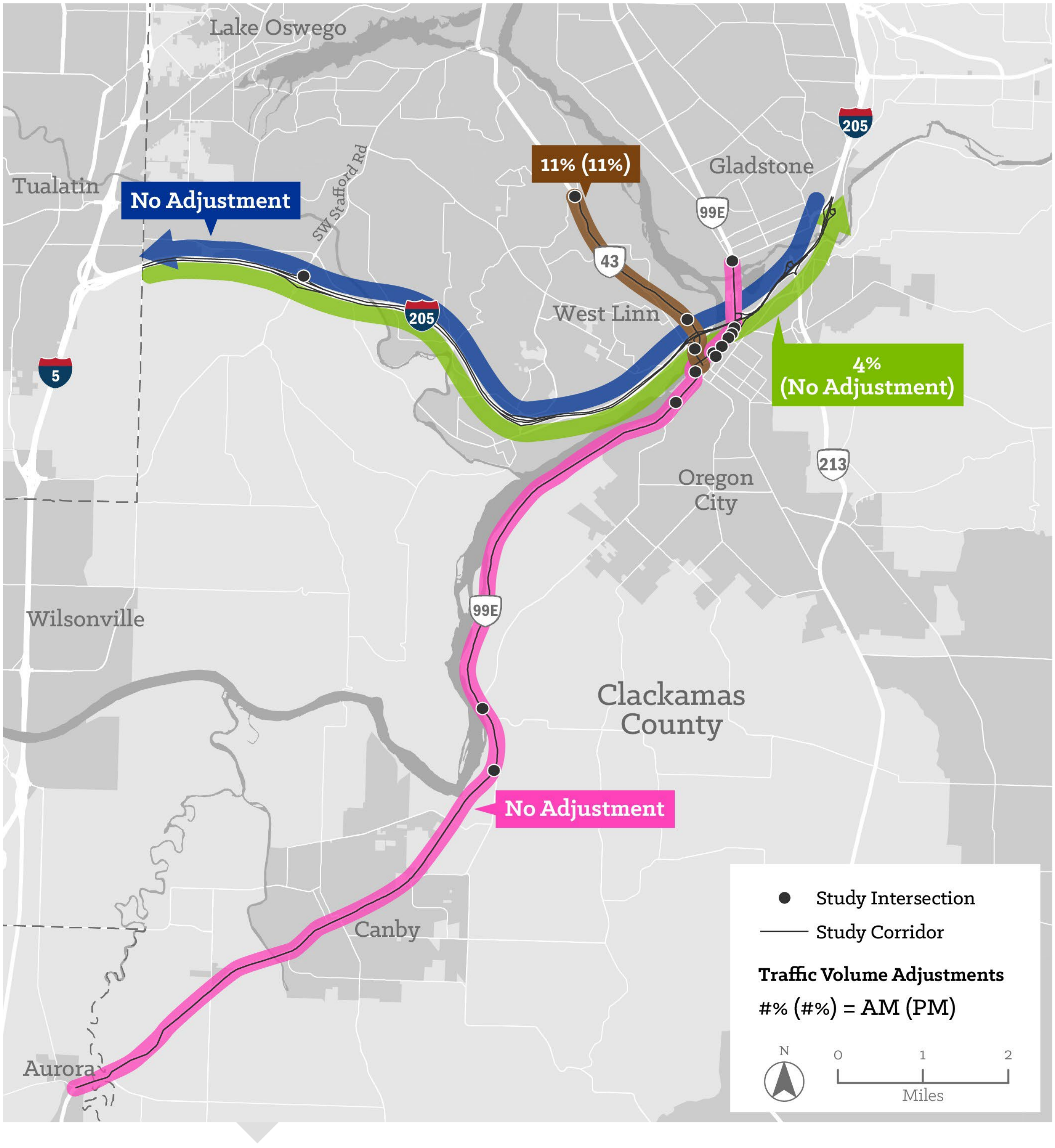
Table 3-3. Study Area Roadway Peak-Hour Adjustment Factors

Street Name	Data Comparison	Data Type	AM	PM
I-205 NB	June 2019	24-Hour	4%	*
I-205 SB	June 2019	24-Hour	*	*
OR 43	July/May 2018	24-Hour	11%	11%
OR 99E (McLoughlin Blvd/1st Ave)	April/May 2019	24-Hour	*	*

* No adjustments were made at these locations because existing year (2021) counts were higher than historical data.
NB = northbound; SB = southbound

[4] ODOT MS2 database - https://ordot.ms2soft.com/TDMS.UI/OneLogin/home/?target=%2fTDMS.UI_Core%2fportal

Figure 3-4. Volume Adjustments

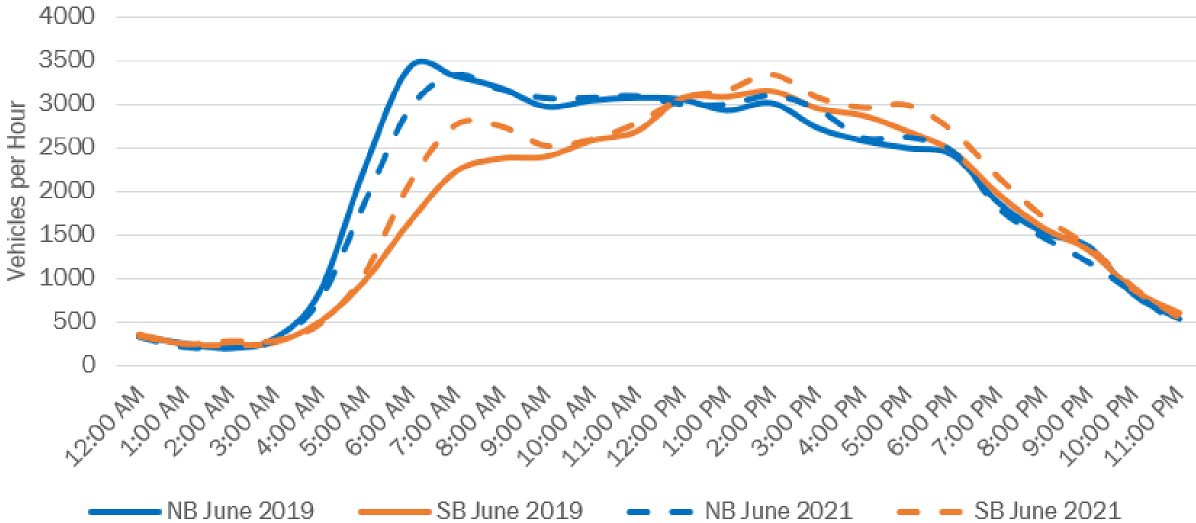


The Project Team obtained 24-hour volume data from ODOT's ATR on I-205 between the I-5 junction and Stafford Road interchange for northbound and southbound traffic. Figure 3-5 illustrates the average weekday daily distribution of traffic in June 2019 (pre-pandemic) and June 2021. In June 2019 (pre-pandemic), at this location, the northbound AM peak hour occurs at about 6:00 a.m. and there is no distinct PM peak hour. In the southbound direction, the AM peak hour occurs around 7:00 or 8:00 a.m.

(the subsequent midday hourly volumes are higher, however) and PM peak, though also not distinct at this location, occurs around 2:00 p.m. This is different from the PM peak hour for the system, including corridor arterials and other locations along I-205, for which the PM peak hour is generally between 4:00 and 6:00 p.m.

In the northbound direction, compared to June 2019 (pre-pandemic) traffic volume data, June 2021 traffic volumes were lower during the AM peak hour and were either similar or higher during the PM peak hour. In the southbound direction, June 2021 traffic volumes were higher than June 2019 (pre-pandemic) volumes during both the AM and the PM peak hour.

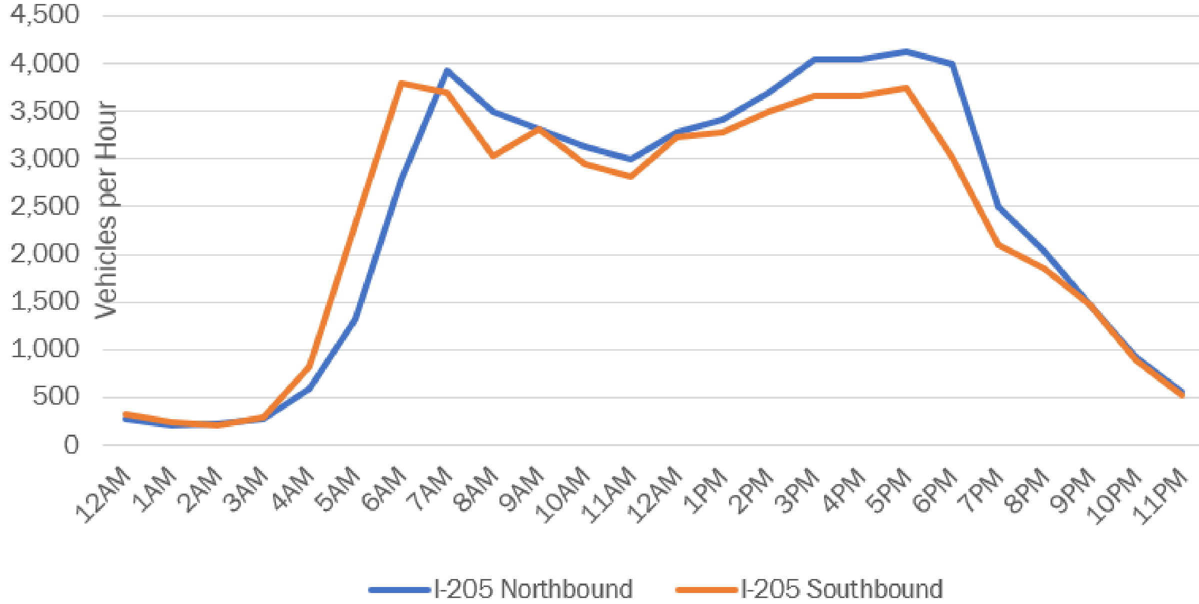
Figure 3-5. Pre-Pandemic (June 2019) and during Pandemic (June 2021) I-205 Average Weekday 24-Hour Traffic Profile West of SW Stafford Road



Source: ODOT ATR 03-016, Weekday Days June 2019 and June 2021.

Directional patterns of traffic flow were observed along other segments of the corridor, with the southbound direction having higher volumes in the AM peak and the northbound direction having higher volumes in the PM peak. Figure 3-6 shows a 24-hour profile at the Abernethy Bridge in May 2017, prior to the pandemic. The AM and PM peak hours were more prominent (they are distinctly higher than the volumes in the time frames adjacent to them) in each direction than the peak hours on I-205 between I-5 and SW Stafford Road are in Figure 3-5, with the AM peak volumes occurring from 6:00 a.m. to 7:00 a.m. southbound and from 7:00 a.m. to 8:00 a.m. northbound. The PM peak occurred roughly from 3:00 p.m. to 6:00 p.m. for both the northbound and southbound directions.

Figure 3-6. I-205 Average Weekday 24-Hour Traffic Profile on Abernethy Bridge – Historical Data (2017)



3.7.3 Future Conditions

Future weekday AM and PM peak-hour traffic volume forecasts were developed for 2027 and 2045 for the No Build Alternative and Revised Build Alternative based on model results from the I-205 Subarea DTA model. Standardized methods described in the APM and the National Cooperative Highway Research Program Report 765 (NCHRP 765) were used to post-process raw model link volumes. The difference or growth between the model base year (2015) and 2027 and 2045 model outputs was calculated and compared on a relative percentage or increment basis. The difference in volume was then applied to the existing year (2021) volumes to develop No Build 2027 and 2045 post-processed volumes. More details on this approach are contained in Attachments J and K. Additional details on modeling methodology can be found in Attachment Z, I-205 Toll Project Modeling Methodology and Assumptions for Environmental Assessment.

After the forecasting step, the turning movement volumes were balanced between the intersections as appropriate. The No Build turning movement forecast volumes for 2027 and 2045 were used as the base, and the No Build and Revised Build DTA model volumes for 2027 and 2045 were used following the APM and the NCHRP 765 method to develop Revised Build turning movement forecasts for 2045. In situations where No Build and Revised Build Alternative link volumes for 2027 and 2045 were lower as a result of constrained flow due to congestion, the link volumes were adjusted as appropriate based on demand and observed queuing in the DTA model. Detailed steps related to the post-processing methodology used to develop the No Build and Revised Build turning movement forecast volumes for 2027 and 2045 are included in Attachments J and K, respectively.

3.8 Analysis Parameters

Because the Project involves a robust multi-resolution modeling approach that covers transportation analysis at the regional, corridor, and intersection level, performance measures were produced to assess each facility within and outside the transportation API. Transportation analysis parameters were determined from varying sources and methodologies. Data was gathered via turning movement counts collected in June 2021, October 2021; and April 2023; aerial photos; GIS; ODOT inventory; collision reports; and other sources. Table 3-4 lists analysis parameters and data sources.

Table 3-4. Analysis Parameters

Parameter	Analysis Element	Data Sources
Intersection/Roadway Geometry	Number of lanes, lane configuration, presence of crosswalks, cross-sectional information	Field work, aerial photos, Google street view, ODOT TransGIS
Operational Data	Posted speeds, intersection control	Field work, aerial photos, Google street view
Peak-Hour Factor	Peak-hour factor	Calculated from traffic counts
Traffic Volumes (including heavy vehicle percentages, etc.)	30 Highest Hour Volume, Design Hour Volumes	Traffic counts, ODOT MS2, travel demand/traffic modeling
Traffic Operations	v/c ratio, LOS, delay, 95th percentile queues, travel-time reliability	Calculated using HCM6 methodology for signalized intersections and unsignalized intersections, StreetLight Insight Platform; v/c ratios to be manually calculated at signalized intersections per guidance provided by ODOT TPAU
Crash Data	Intersection/segment crashes, SPIS	ODOT Crash Data Reporting Unit, ODOT TransGIS
Bicycle and Pedestrian Facilities Data	Multimodal assessment, location and type of facilities	Aerial imagery, ODOT-provided data
Transit Data	Transit assessment, transit routes, frequency/span, reliability, speed, transit centers, park-and-ride facilities, and ridership on routes within the API	Aerial imagery, ODOT-provided data, information from transit operators
Freight	API freight routes and volumes	ODOT functional classification designations, traffic counts

LOS = level of service; ODOT = Oregon Department of Transportation; SPIS = Safety Priority Index System; TPAU = Transportation Planning and Analysis Unit; v/c = volume-to-capacity

3.9 Traffic Analysis

A defined set of performance measures was used to assess the potential impacts of the Project on motor vehicle travel. Impacts were assessed by comparing the traffic analysis results for the No Build and Revised Build Alternatives with respect to vehicular movements and congestion. These performance measures are described in the following subsections.

3.9.1 Volume-to-Capacity Ratios

The principal performance measure ODOT uses when evaluating motor vehicle operating characteristics on the state highway system is v/c ratio. The APM states that a v/c ratio reflects the ability of a facility to serve motorized vehicle traffic volume over a given time period under ideal conditions such as good weather, no incidents, no heavy vehicles, and no geometric deficiencies. The v/c ratio is the degree of utilization of the capacity of a segment, intersection, or approach. Under the future conditions, the measure is considered to be a *demand* to capacity ratio. In general, a lower v/c ratio indicates smooth operations and minimal delays. As the ratio approaches 1.0, congestion increases, and operational performance is reduced. At 1.0, the capacity is fully utilized (ODOT 2020a). A lower ratio indicates that that local mobility and accessibility needs are met, and motorists are able to travel with less delay. A higher ratio, such as 1.0 or greater, indicates higher levels of congestion. Other agencies also use v/c ratios as performance measures for facilities they have jurisdiction over, while some depend more on LOS (see Section 3.9.3).

3.9.2 Average Vehicle Delay

Average vehicle delay represents the average wait times in seconds per vehicle, specifically at intersection locations. Vehicular delays were used to gauge overall intersection congestion levels based on predefined ranges and thresholds used to determine LOS (described in the next section). Delays were provided from the Synchro analysis and reflect HCM reporting methodologies.

3.9.3 Level of Service

LOS is a performance measure or index, defined in the HCM6, that is commonly used in transportation studies to represent congestion levels for vehicles on arterials, rural highways, limited-access roadways[5], and intersections. LOS for intersections is based on average vehicle control delay (seconds per vehicle), with letter "grades" of A through F representing little to no delay through very high delays, respectively. Intersection LOS was provided from the Synchro analysis and reflects HCM6 reporting methodologies. LOS for limited-access roadway mainline segments and ramp merge and diverge segments is based on density, expressed in terms of passenger cars per mile per lane (pc/mi/ln). HCS7 was used to evaluate the traffic operations along I-205.

3.9.4 Multimodal Level of Service

Multimodal level of service (MMLOS) analysis can be used to measure the performance of bicycle, pedestrian, and transit facilities. For this analysis, MMLOS analysis was conducted for pedestrian and transit facilities (bicycle performance was assessed using level of traffic stress [LTS] described in the next section). This analysis uses the ODOT APM methodology for transit LOS and pedestrian LOS. Transit LOS analysis quantifies user perception of quality of transit service based on various transit and roadway characteristics. Similar to vehicle LOS, MMLOS A is the best or most suitable level and MMLOS F is the worst or least suitable level. Transit LOS inputs include transit speed, frequency, estimated ridership, and on-time performance. Pedestrian LOS on access facilities to transit service is also factored into the transit rating because most transit users also use pedestrian infrastructure during their transit journey. Pedestrian LOS results are also provided separately to convey pedestrian conditions on study corridors. Pedestrian LOS inputs include number of lanes, sidewalk width, speed limit, and traffic volume. In the assessment of future conditions, traffic volume is the differentiating factor for pedestrian conditions. For transit, traffic volume and travel time are the differentiating factors. All other pedestrian and transit service characteristics used were the same between the alternatives.

3.9.5 Level of Traffic Stress

LTS is an analysis method used to quantify multimodal conditions by estimating the perceived safety of bicycle and pedestrian infrastructure. The LTS analysis provides scores of 1 through 4 for each mode, with level 1 representing little or no traffic stress and level 4 representing high stress. The levels reflect the range of users who feel comfortable using facilities at different stress levels. The LTS targets for both bicycle and pedestrian use is level 2 or lower. This analysis uses the ODOT APM methodology, which is based on functional classification, roadway configuration, speed limit, average daily traffic, and other roadway characteristics. In the assessment of future conditions, traffic volume is the differentiating factor

[5] Limited-access roadways generally refer to roads designed for high-speed traffic that have limited or no access to adjacent property and few or no intersecting cross streets.

between alternatives. All other pedestrian and bicycle characteristics used were the same as existing or No Build conditions to allow for clearer comparison between the alternatives.

3.9.6 Queuing

Queuing was estimated for all relevant approaches at each of the study intersections. Queues were based on 95th percentile queue lengths reported in Synchro/SimTraffic and were compared to the safe storage capacity of each facility in question. The definition of safe storage capacity incorporates specific features of the roadway environment, including length of turn lanes, sight distance concerns, proximity of other intersections, and potential to back up onto highway ramps and affect mainline operations. Queues exceeding the safe storage capacity were identified as unacceptable, and strategies for addressing the issues were developed.

3.9.7 Travel Time

Travel time is a measure of the length of time a segment, facility, or route can be traversed in a given time period. Travel time is most often reported for a given direction during the peak period and expressed as the average travel time of all vehicles (ODOT 2020a). Average travel times during typical weekday peak periods were reported from the DTA model.

3.9.8 Travel Time Reliability

Travel time reliability considers the range of potential travel times roadway users may experience, the consistency of travel times, and the ability of roadway conditions to provide a desired travel time. Travel-time reliability for existing year (2021) Conditions was measured using a travel time index (TTI). A TTI is calculated as actual travel time divided by the expected free-flow travel time or posted-speed travel time (ODOT 2020a).

3.9.9 Vehicle-Miles Traveled

Vehicle-miles traveled (VMT) is the amount of vehicle travel on a system in terms of vehicle volume and distance. VMT is the relationship of the total vehicle volume on the specified links multiplied by the total link lengths (ODOT 2020a). Regional VMT was generated through the RTDM.

3.9.10 Vehicle-Hours Traveled

Vehicle-hours traveled (VHT) is calculated from speed and miles traveled data to measure overall vehicle travel time in a given roadway or study area (i.e., the API) (U.S. Department of Transportation Volpe Center). VHT depends both on demand (VMT) and delay (travel time). Regional VHT was generated through the RTDM.

3.10 Safety Analysis

3.10.1 Existing Conditions

The safety analysis consisted of an assessment of the five most recent years of crash data obtained from ODOT's Crash Analysis and Reporting Unit (ODOT 2021c) for study intersections and study corridors in the Project area. The safety analysis included:

- Crash rate calculation for study intersections and study corridors
- Critical crash rate comparison
- Identification of patterns in the crash data indicating potential for safety improvements

- Identification of safety focus locations based on critical crash rate and excess proportion of a specific crash-type screening methods
- Identification of pedestrian- and bicycle-involved crashes
- Location of top 15% Safety Priority Index System (SPIS) sites
- Highway Safety Manual (HSM) Part C methodology analysis for 2021 existing conditions at study corridors and intersections, not including I-205.

3.10.2 Future Conditions

The safety analysis for 2045 conditions included calculating predictive crash frequencies for the study intersections and study corridors using the Highway Safety Manual Part C methodology (AASHTO 2010). The Revised Build Alternative's potential impacts on safety conditions within the API was assessed for all modes at intersections and along identified study corridors that would have different conditions under the Revised Build Alternative.

Study intersections and roadway segments were evaluated based on the following primary and secondary criteria:

- **Primary Criteria**
  - When the predicted fatal/serious injury crashes would increase by 0.05 crashes per year (equivalent to one fatal/serious injury crash every 20 years).
  - If the intersection or segment is identified as a SPIS location in the top 15th percentile, and the total fatal/serious injury crashes would increase by 0.01 crashes per year (equivalent to one fatal/serious injury crash every 100 years).
- **Secondary Criteria**
  - If the intersection exceeds the critical crash rate under existing conditions and if the total fatal/serious injury crashes would increase by any amount.
  - If the segment is classified as a safety corridor and if the total fatal/serious injury crashes would increase by any amount.
  - If the intersection would not meet the mobility target and would worsen with the Project, and if the total fatal/serious injury crashes would increase by any amount.

When an intersection or segment would meet one or more primary criteria, even if it would not meet any secondary criteria, mitigation could be considered. When an intersection or segment does not meet the primary criteria but meets one or more of the secondary criteria, conditions would be monitored to determine if mitigation could be considered.

4 Affected Environment

This section describes the existing transportation conditions in the API. This information provides the context for the transportation analysis and evaluation of impacts associated with the Project. API elements analyzed include I-205 mainline and ramp operations, study intersection operations, and travel times and crash data along the study corridor segments. This section also describes existing transit, bicycle, pedestrian, and freight operations. Also provided is current data on who uses the corridor, and what user travel characteristics are known. This provides context for better understanding environmental consequences in Chapter 5.

4.1 Study Corridors

Table 4-1 lists the roadway characteristics for study corridors in the API for transportation, including functional classifications, posted speeds, and presence of bicycle and pedestrian facilities.

Table 4-1. Study Area Corridor Roadway Characteristics

Street Name	Functional Classification	Posted Speed	Bicycle Facilities	Pedestrian Facilities
I-205 between Stafford Rd and SE 82nd Dr	Interstate	55–65 mph	No	No
SW Stafford Rd between Tualatin River and Mountain Rd	Minor Arterial	40–45 mph	Partial	Partial
OR 43 (Willamette Dr) between Hidden Springs Rd and Main St	Principal Arterial	25–35 mph	Partial	Yes
Main St (15th St to OR 99E)	Major Collector	25 mph	Partial	Yes
OR 99E between W Arlington St and Liberty St NE: *Dunes Dr to S 2nd St (Oregon City); and SE Territorial Rd to SW Berg Pkwy (Canby)*	Principal Arterial	30–45 mph	Partial	Partial
OR 99E between W Arlington St and Liberty St NE: *S 2nd St (Oregon City) to SE Territorial Rd (Canby); and SW Berg Pkwy to NE Liberty St*	Minor Arterial	25–55 mph	Partial	Partial

Source: Functional classifications from ODOT map (ODOT 2020b); posted speeds from ODOT TransGIS (ODOT 2022a); bicycle and pedestrian facilities from © 2022 Google Maps
Notes: In the API, OR 99E has two functional classifications, so it is split in the table to reflect the conditions for each classification level. Segment extents are provided in the first column. "Partial" under the Bicycle and Pedestrian Facilities columns indicate that the relevant facility exists only for a portion of the roadway segment considered.
mph = miles per hour; SB = southbound

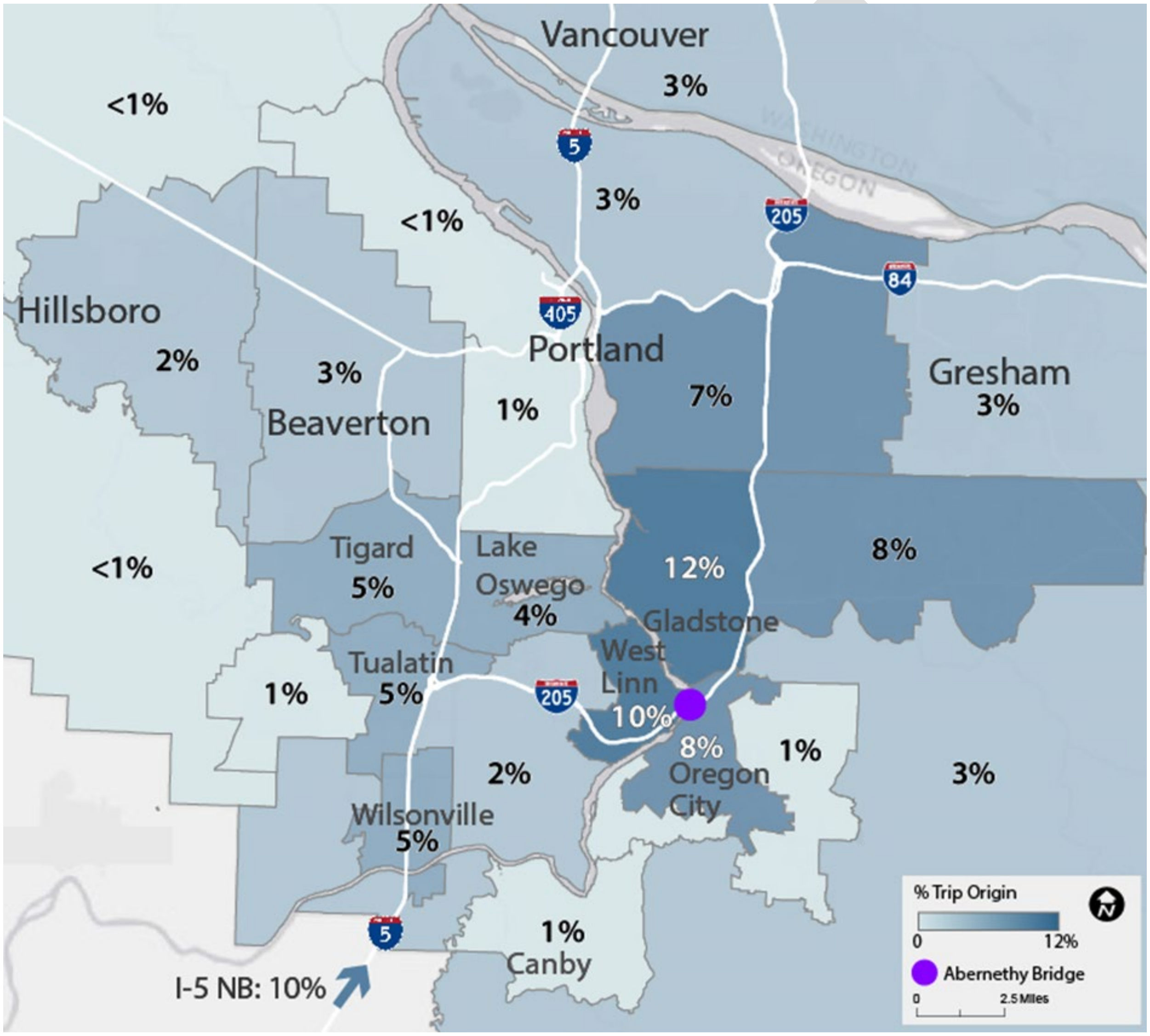
4.2 Existing Year (2021) Corridor User Travel Patterns

ODOT commissioned the I-205 Corridor User Analysis to better understand travel characteristics of current users of the segment of I-205 included in the API (ODOT 2021a). Findings from the analysis are presented in the following subsections.

4.2.1 Origins and Destinations of Current I-205 Corridor Users

Although I-205 corridor users come from the Portland metropolitan region and beyond, a large share of trips originates locally within the corridor. Figure 4-1 shows the origins of travelers crossing the Abernethy Bridge. Darker blue shading zones indicate a higher percentage of trips from those zones. Higher percentages of users come from nearby areas such as West Linn, Oregon City, Gladstone, and Clackamas. Fewer travelers come from areas farther away, including approximately 3% from Clark County, Washington.

Figure 4-1. Regional Origins of I-205 Trips Crossing the Abernethy Bridge

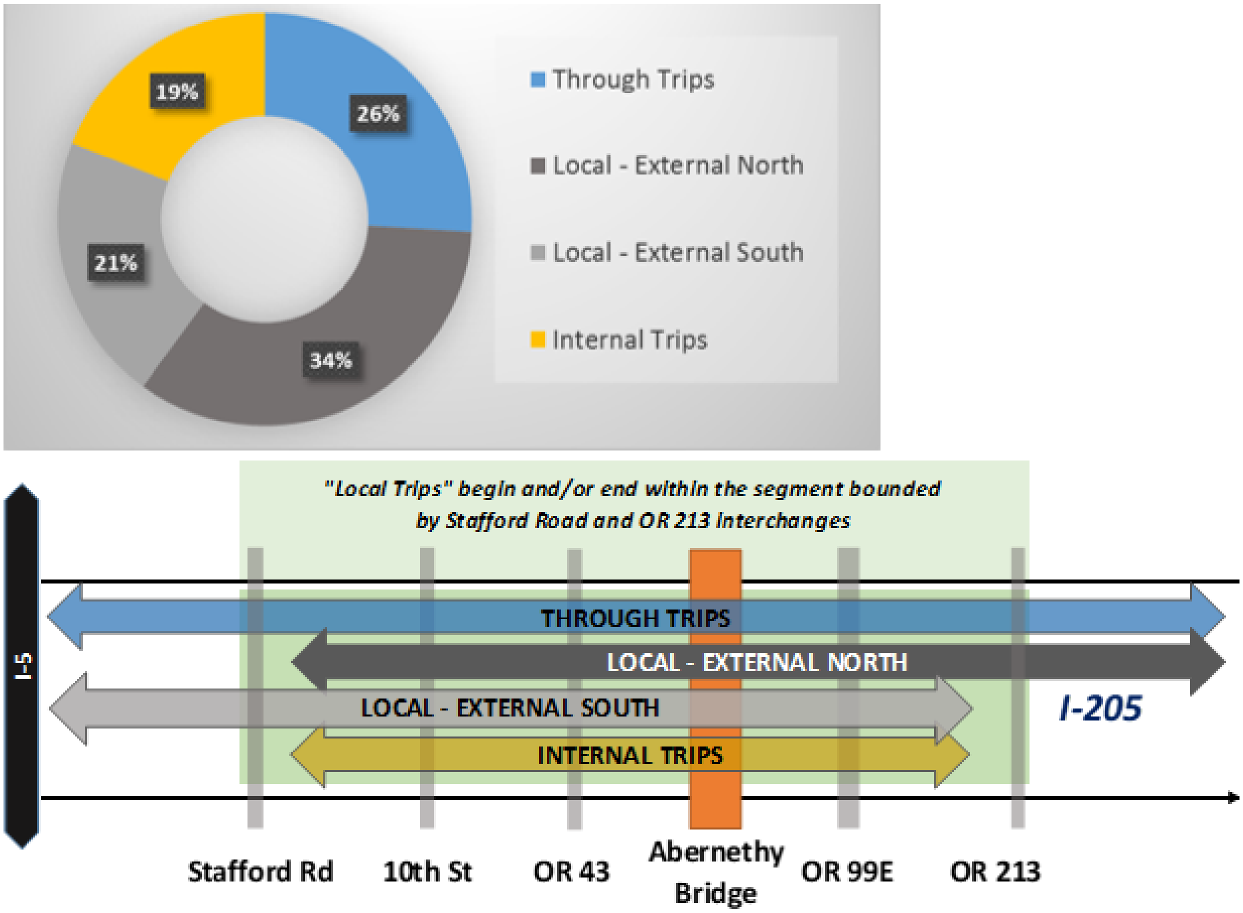


4.2.2 Through Trips versus Internal-based Trips

Through trips compose about one-quarter of the trips on the segment of I-205 between SW Stafford Road and OR 213. The remaining three-quarters of users access I-205 locally by entering or exiting at one of the five interchanges in this segment (Figure 4-2). Of all users on I-205 between SW Stafford Road and

OR 213, 19% take “internal” trips, which both enter and exit I-205 on interchanges between SW Stafford Road and OR 213.

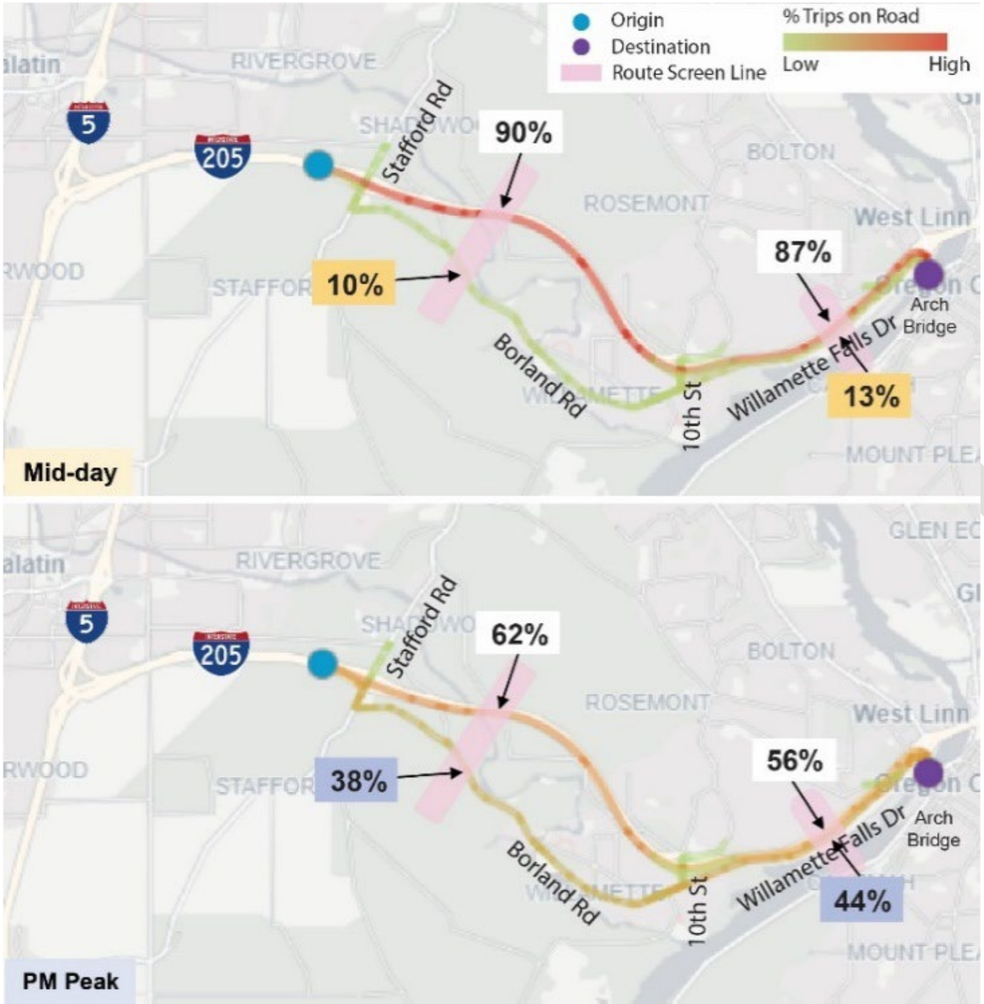
Figure 4-2. Trips Using I-205 Between SW Stafford Road and OR 213



4.2.3 Current Rerouting off I-205 during Times of Congestion

Vehicles currently reroute from I-205 to other roadways during higher demand periods when traffic congestion is present, as shown in Figure 4-3. For example, for northbound I-205 travelers to the Oregon City Arch Bridge, an estimated 10% to 13% of trips exit I-205 and take alternative roads (SW Borland Road and Willamette Falls Drive) during the midday period when there is little congestion. However, during the PM peak period, the proportion of travelers choosing these alternative routes to get to the Arch Bridge increases to between 38% and 44%. This difference indicates that during the PM peak period, about 20% to 30% of these travelers may be rerouting away from I-205 to local routes to avoid traffic congestion. Rerouting analyses for other origin/destination pairs indicate that shifts in traffic routing away from I-205 to local routes during peak travel times may be greater than 50% for some travel patterns. SW Borland Road, Willamette Falls Drive, OR 99E, SW Stafford Road, and SW Schaeffer Road were identified as alternative routes that experience the most rerouting.

Figure 4-3. Example of Existing Rerouting Pattern



Source: StreetLight Insight Platform

4.3 Traffic Volumes

Figure 4-4 presents pre-pandemic average weekday daily traffic volumes for study corridors. Aside from I-205, study corridors within and surrounding the API carrying relatively high daily traffic volumes include I-5, OR 43, OR 213, and OR 99E. Figure 4-5 shows peak-hour volumes at each of the I-205 ramp terminals and I-205 mainline. Attachment E contains the existing year (2021) AM and PM peak-hour turning movement volumes for the study intersections.

Figure 4-4. Pre-Pandemic Year (2019) Daily Traffic Volumes in Area of Potential Impact

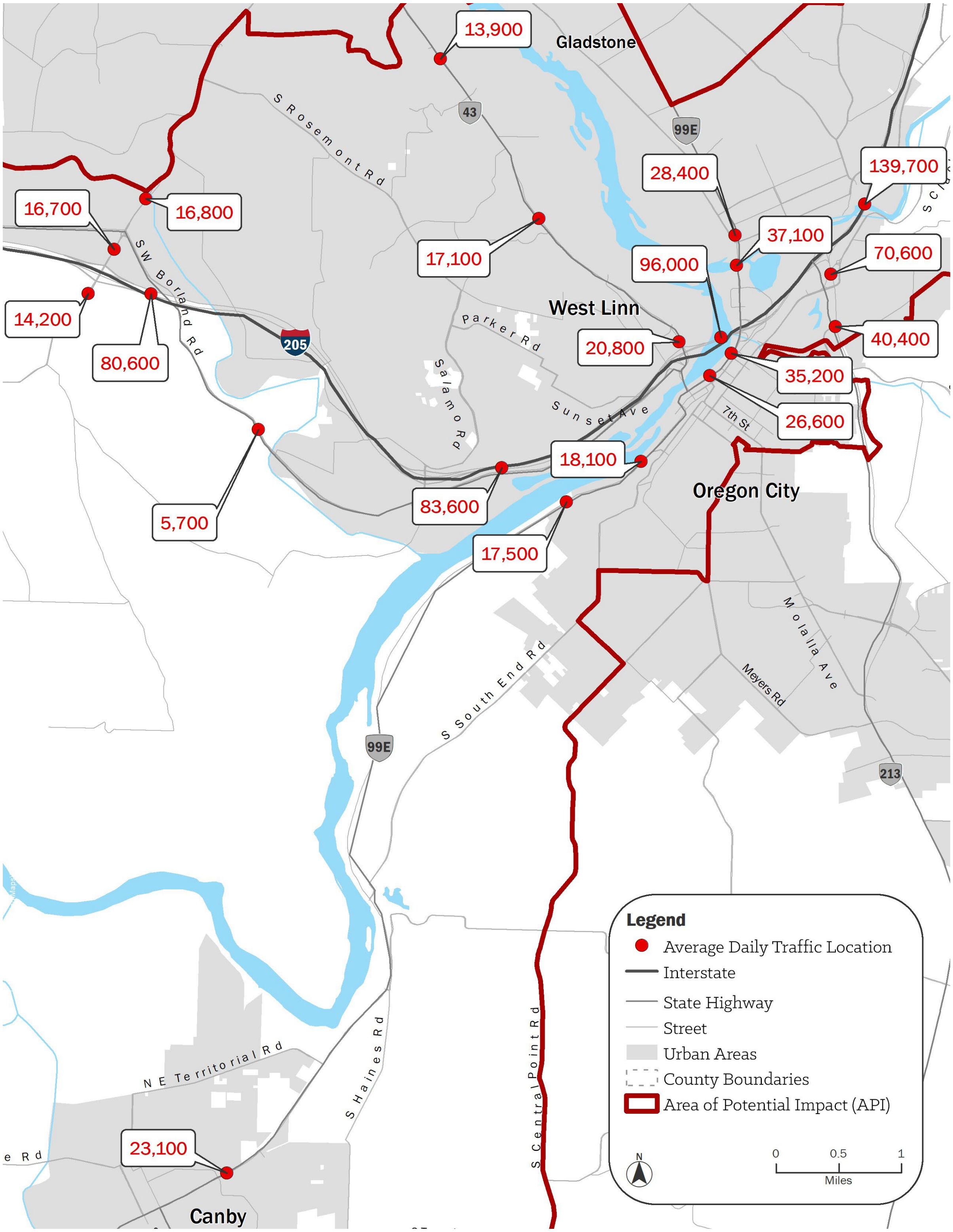
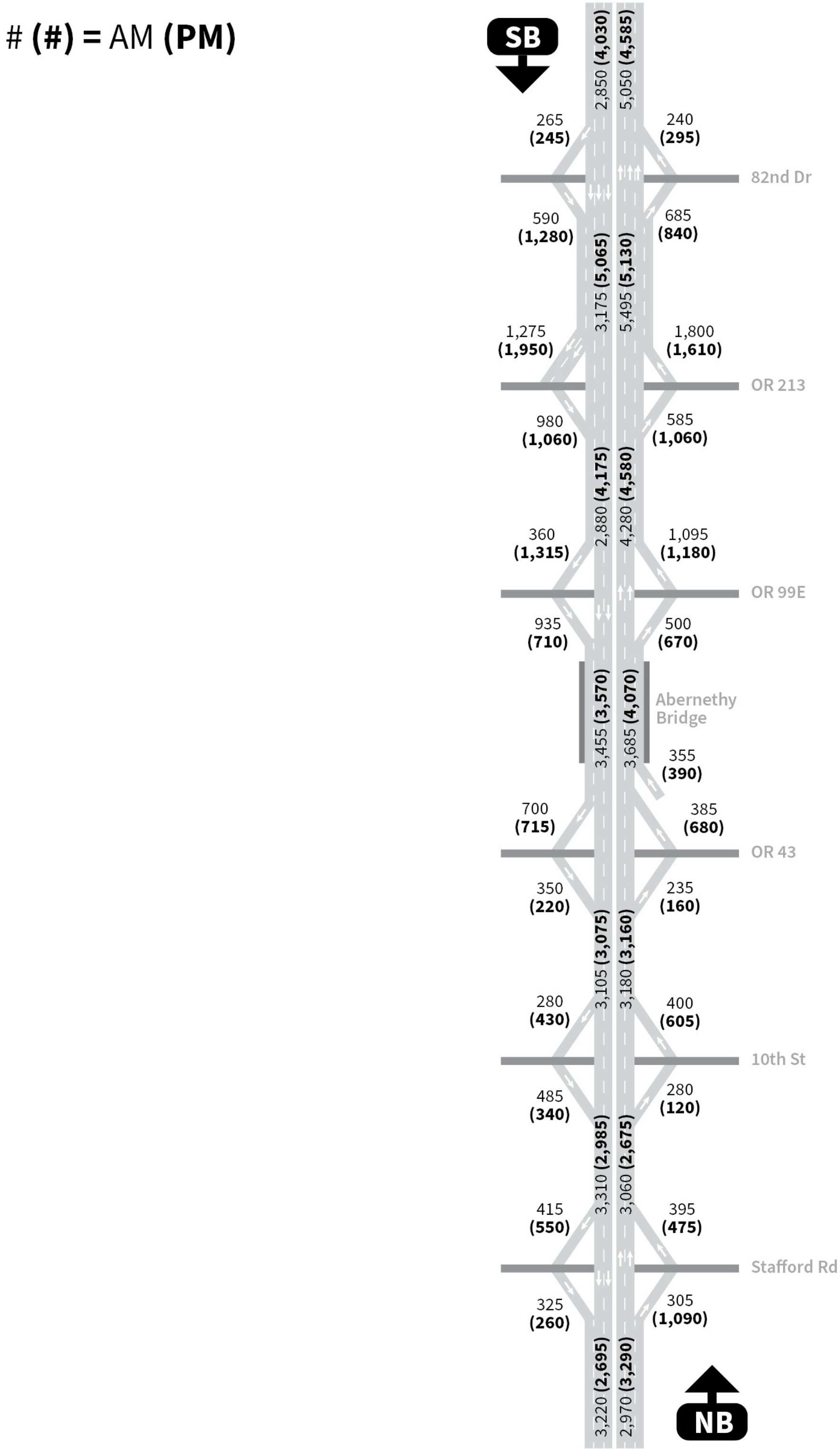


Figure 4-5. Existing Year (2021) I-205 Mainline and Ramps Peak-Hour Volumes



Source: ODOT Automatic Traffic Recorder

4.4 Traffic Operations

An analysis of existing year (2021) traffic operations was conducted for I-205 segments and study intersections within the API to establish a baseline for the Project.

4.4.1 I-205 Corridor Operations

As shown in Table 4-2. and Table 4-3, all segments along I-205 northbound and I-205 southbound meet the state mobility target (v/c ratio of 0.99 or less) during the AM peak hour and PM peak hour under existing year (2021) conditions, except for the I-205 northbound weaving segment between OR 213 and SE 82nd Drive in the AM peak hour and the I-205 northbound merge from OR 99E (ODOT 1999).

During the AM peak hour, the northbound I-205 segments between 10th Street and OR 43, and between OR 213 and SE 82nd Drive operate at LOS E and LOS F respectively. In addition, during the PM peak hour, the northbound I-205 segments between the 10th Street off-ramp and the on-ramp from SE 82nd Drive operate at LOS E/LOS F, which is consistent with field observations over the past several years that indicate congestion and queuing occur during these times at these locations. Also, the weaving segments on southbound I-205 between 82nd Drive and OR 213, and between OR 213 and OR 99E, operate at LOS F during the PM peak hour.

Table 4-2. Existing Year (2021) I-205 Northbound Highway Operations Analysis Results

I-205 Northbound Highway Segment	Segment Type	Mobility Target (v/c)	AM Peak Hour				PM Peak Hour			
			Speed	v/c	Density	LOS	Speed	v/c	Density	LOS
South of SW Stafford Rd	Basic	0.99	61.8	0.48	17.9	B	61.8	0.68	25.3	C
Off-ramp to SW Stafford Rd	Diverge	0.99	60.9	0.47	18.2	C	59.4	0.63	25.0	C
On-ramp from SW Stafford Rd	Merge	0.99	57.0	0.72	26.8	C	36.6	0.83	35.1	F
Between SW Stafford Rd and 10th St	Basic	0.99	61.3	0.73	27.7	D	59.0	0.84	32.9	D
Off-ramp to 10th St	Diverge	0.99	57.5	0.72	30	D	32.9	0.81	40.0	F
On-ramp from 10th St	Merge	0.99	50.3	0.78	27.8	C	36.0	0.89	39.7	F
Between 10th St and OR 43	Basic	0.99	50.1	0.80	35.1	E	32.9	0.86	57.5	F
Off-ramp to OR 43	Diverge	0.99	49.1	0.78	29.1	D	28.0	0.83	42.7	F
On-ramp from OR 43	Merge	0.99	49.1	0.82	31.1	D	47.8	0.93	35.0	F
Between OR 43 and OR 99E	Weaving	0.99	43.0	0.68	31.4	D	41.9	0.77	36.8	E
On-ramp from OR 99E	Merge	0.99	50.3	0.71	31.6	D	47.8	**1.00***	**42.4***	**F**
Between OR 99E and OR 213	Basic	0.99	50.3	0.72	31.6	D	47.8	0.92	42.4	F
Off-ramp to OR 213	Diverge	0.99	51.4	0.71	27.4	C	50.4	0.90	33.9	F
Between OR 213 and SE 82nd Dr	Weaving	0.99	34.7	**1.00***	**43.4***	**F**	38.5	0.75	38.6	F
On-ramp from SE 82nd Dr	Merge	0.99	49.6	0.81	28.9	D	49.8	0.79	28.3	F

Source: ODOT, Mobility targets from 2011 Oregon Highway Plan Speed, v/c ratio and LOS from HCS7 Freeway Facilities Report.

Notes: For merge and diverge segments, LOS criteria is based on ramp density. For basic and weaving segments, LOS criteria is based on density. **Bold** font and an asterisk (*) indicate that v/c ratio exceeds mobility target. Existing year (2021) highway operations details are presented in Attachment F.

LOS = level of service; v/c = volume-to-capacity ratio

Table 4-3 Existing Year (2021) I-205 Southbound Highway Operations Analysis Results

I-205 Southbound Highway Segment	Segment Type	Mobility Target (v/c)	AM Peak Hour				PM Peak Hour			
			Speed	v/c	Density	LOS	Speed	v/c	Density	LOS
North of SE 82nd Dr	Basic	0.99	51.3	0.47	20.1	C	51.3	0.66	28.4	D
Off-ramp to SE 82nd Dr	Diverge	0.99	53.3	0.46	18.5	B	53.1	0.65	24.9	C
Between SE 82nd Dr and OR 213	Weaving	0.99	47.3	0.58	19	B	43.6	0.95	31.1	F
Between OR 213 and OR 99E	Weaving	0.99	43.9	0.58	24.8	C	43.6	0.94	34.0	F
Between OR 99E and OR 43	Weaving	0.99	40.2	0.69	31.2	D	41.0	0.67	30.8	D
On-ramp from OR 43	Merge	0.99	49.7	0.76	30.1	D	49.9	0.72	29.1	D
Between OR 43 and 10th St	Basic	0.99	50.5	0.76	33.4	D	50.5	0.74	32.3	D
Off-ramp to 10th St	Diverge	0.99	50.8	0.75	29.5	D	50.6	0.72	28.5	D
On-ramp from 10th St	Merge	0.99	49.8	0.8	29.7	D	50.4	0.70	26.5	C
Between 10th St and SW Stafford Rd	Basic	0.99	61.2	0.77	29.3	D	62.6	0.68	25.2	C
Off-ramp to SW Stafford Rd	Diverge	0.99	57.1	0.76	28	C	56.8	0.67	24.3	C
On-ramp from SW Stafford Rd	Merge	0.99	65	0.50	18.1	C	60.7	0.40	15.5	B
South of SW Stafford Rd	Basic	0.99	63.7	0.50	18.3	C	63.7	0.40	14.8	B

Source: Mobility targets from 2011 Oregon Highway Plan; Speed, v/c and LOS from HCS7 Freeway Facilities Report.
Note: For merge and diverge segments, LOS criteria is based on ramp density. For basic and weaving segments, LOS criteria is based on density.
Bold font and an asterisk (*) indicate that v/c ratio exceeds mobility target. Existing year (2021) highway operations details are presented in Attachment F.
LOS = level of service; v/c = volume-to-capacity ratio

Regional Integrated Transportation Intelligent System (RITIS) data from June 2021 was used to determine the average typical weekday (i.e., Tuesday, Wednesday, and Thursday) travel times and travel-time reliability for I-205 between I-5 and SE 82nd Drive, as shown in Table 4-4. For reference, a trip at the speed limit between I-5 and SE 82nd Drive in either direction should take about 10minutes to cross a 9-mile section without traffic congestion. From the RITIS data, average weekday travel times for northbound I-205 were approximately 10 minutes during the AM peak period and 24 minutes during the PM peak period. Average weekday travel times for southbound I-205 were approximately 12 minutes during the AM peak period and 10 minutes during the PM peak period. This data is consistent with observed conditions in the corridor that indicate that the southbound direction is more slightly slower during the AM peak periods and northbound is more congested during the PM peak periods.

Table 4-4. 2021 Average Peak-Hour Travel Times on I-205 between Stafford Road and SE 82nd Drive (minutes)

Direction	AM Peak (7:00 a.m.– 9:00 a.m.)	PM Peak (4:00 p.m. – 6:00 p.m.)
Northbound	10	24
Southbound	12	10

Source: RITIS June 2019 data

To determine current travel-time reliability for this section of I-205, buffer time index data from RITIS was used and is illustrated in Figure 4-6 and Figure 4-7 for the northbound and southbound directions, respectively. The buffer time index (expressed as a percentage) represents the extra time (or buffer) that most people would add to their travel time when planning trips to ensure on-time arrival 95% of the time. This extra time is added to account for any unexpected delays that might occur during the trip. For example, a buffer index of 50% means that for a 20-minute average travel time a traveler should budget an additional 10 minutes (20 minutes × 50% = 10 minutes) to ensure on-time arrival 95% of the time. In this example, the 10 extra minutes is called the buffer time. In June 2021, the average northbound AM peak-period travel time was 10 minutes; travel times were highly reliable and did not vary much. Northbound PM peak travel times, with a higher average travel time of 24 minutes, were highly unreliable. In the southbound direction, the average AM peak-hour travel time (12 minutes) was higher than the PM peak-hour travel time (10 minutes). Reliability in the AM peak hour was better than in the PM peak hour for the northbound direction. However, in the southbound direction reliability was better in the PM peak hour compared to the AM peak hour.

Figure 4-6. I-205 Northbound Average Weekday Travel-Time Reliability Comparison (AM and PM Peak Periods)

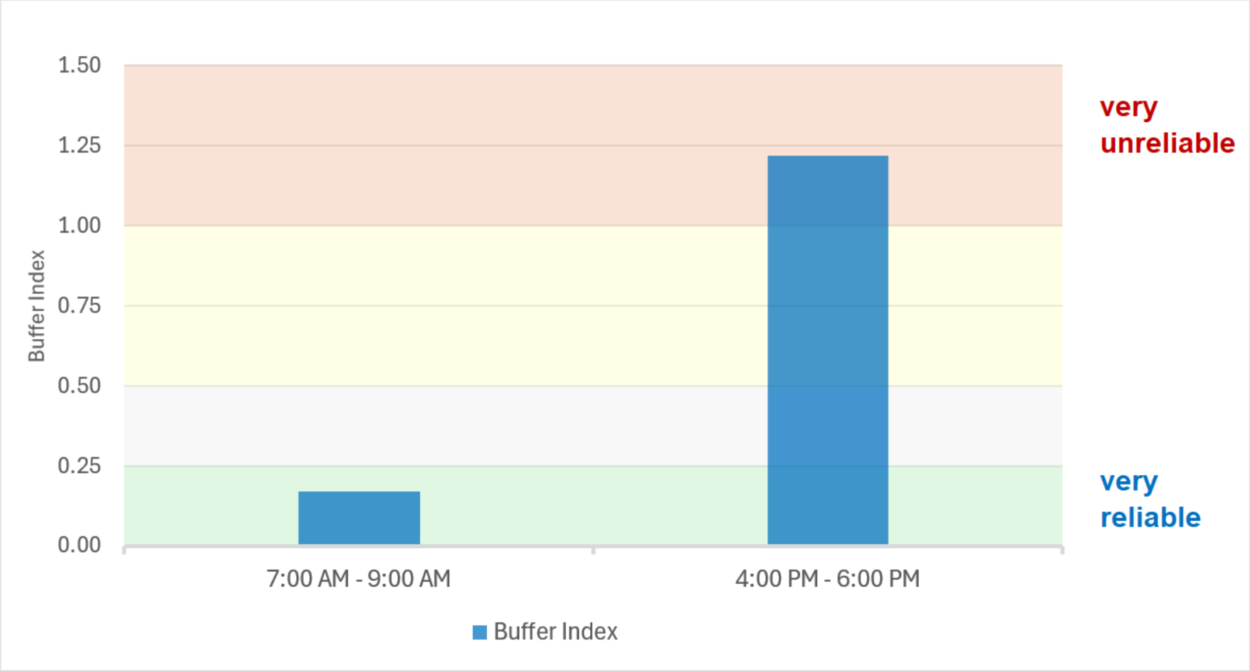
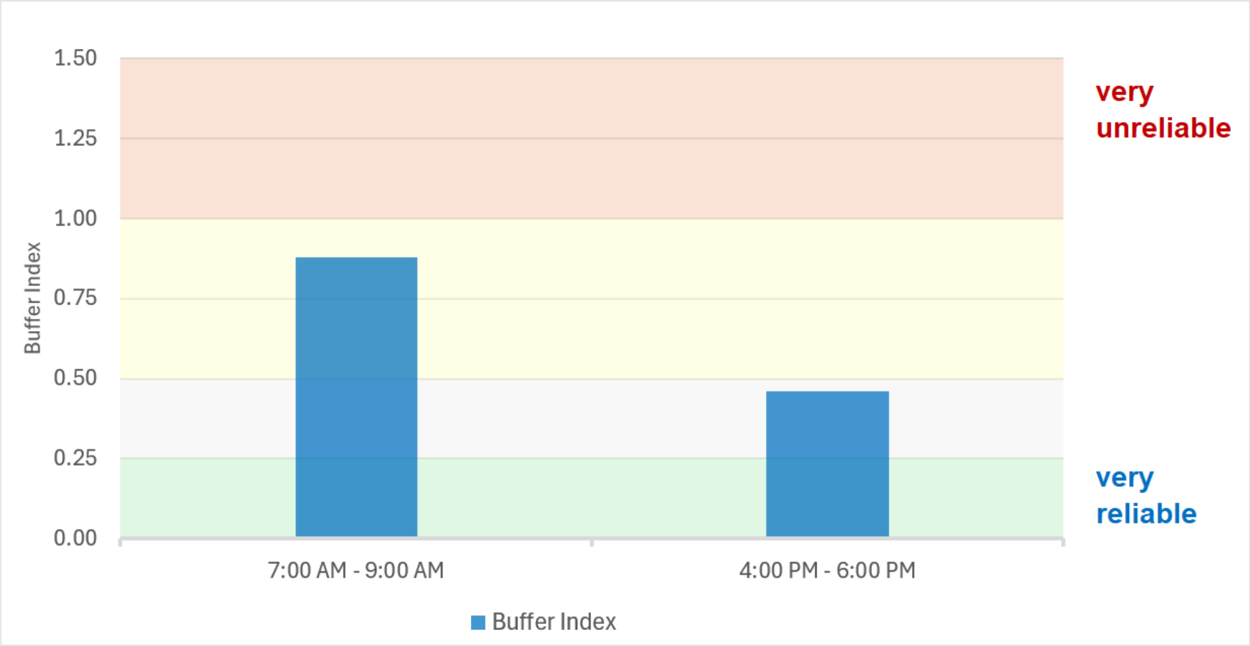


Figure 4-7. I-205 Southbound Average Weekday Travel-Time Reliability Comparison (AM and PM Peak Periods)



4.4.2 Intersection Operations

Existing year (2021) operations results are presented in Table 4-5 and Attachment G. The intersection mobility targets vary by jurisdiction and facility type, with 14 of them being measured as v/c ratios and one intersection measured as LOS. The type of mobility measure is each jurisdiction's choice.

During the AM peak hour, 12 of the 15 study intersections operate within identified mobility targets under existing year (2021) conditions. The following three intersections currently do not meet the mobility target during the AM peak hour:

- The stop-controlled intersection at OR 43 and Willamette Falls Drive.
- The stop-controlled intersection at OR 99E and South End Road.
- The stop-controlled intersection at Main Street and 10th Street.

During the PM peak hour, 10 of the 15 study intersections operate within identified mobility targets under existing year (2021) conditions. The following five intersections do not meet the mobility target during the PM peak hour:

- The stop-controlled intersection at OR 43 and Willamette Falls Drive.
- The signalized intersection at OR 99E and I-205 Northbound Ramps
- The signalized intersection at OR 99E and S 2nd Street
- The stop-controlled intersection at OR 99E and South End Road.
- The stop-controlled intersection at Main Street and 10th Street.

Because the v/c ratio is not dependent on vehicle delay at intersections, it is also informative to report the estimated average delay at each intersection. Based on the Highway Capacity Manual (Exhibit 12-17), conditions can be considered congested when the intersection experiences over 50 seconds of delay on average, which is considered to be LOS E or worse. As shown in Table 4-5, vehicles at six intersections both in the AM peak hour and PM peak hour experience average delays of greater than 50 seconds.

Table 4-5. Existing (2021) Intersection Operational Analysis Results AM Peak Hour and PM Peak Hour

No.	Intersection	Traffic Control	Mobility Target	AM Peak Hour			PM Peak Hour		
				v/c	Delay (secs/ veh)	LOS	v/c	Delay (secs/ veh)	LOS
1	OR 43 and Hidden Springs Rd	Signalized	v/c 0.99	0.76	23.3	C	0.85	29.2	C
2	OR 43 and McKillican St	Signalized	v/c 0.99	0.18	19.4	B	0.44	49.5	D
3	OR 43 and Willamette Falls Dr	Stop Controlled	v/c 0.99	**1.92***	**>300***	**F***	**>2***	**>300***	**F***
4	OR 99E and I-205 NB Ramps	Signalized	v/c 0.85	0.53	254.5	F	**0.88***	**135.1***	**F***
5	OR 99E and 15th St	Stop Controlled	v/c 1.1	0.89	65.1	F	0.87	62.2	F
6	OR 99E and 14th St	Signalized	v/c 1.1	0.80	29.6	C	0.95	24.8	C
7	OR 99E and 10th St	Signalized	v/c 1.1	0.65	14.4	B	0.89	15.7	B
8	OR 99E and Main St	Signalized	v/c 1.1	0.59	8.1	A	0.86	27.5	C
9	OR 99E and S 2nd St	Signalized	v/c 1.1	1.09	145.3	F	**1.45***	**26.1***	**C***
10	OR 99E and South End Rd	Stop Controlled	v/c 0.75	**1.09***	**157.9***	**F***	**>2***	**>300***	**F***
11	OR 99E and S New Era Rd	Stop Controlled	v/c 0.75	0.23	13.7	B	0.26	111.2	F

No.	Intersection	Traffic Control	Mobility Target	AM Peak Hour			PM Peak Hour		
				v/c	Delay (secs/ veh)	LOS	v/c	Delay (secs/ veh)	LOS
12	OR 99E and W Arlington St	Signalized	v/c 1.1	0.55	23.7	C	1.00	100.3	F
13	OR 99E and 12th St	Signalized	v/c 1.1	0.35	12.4	B	0.64	11.1	B
14	Main St and 10th St	Stop Controlled	LOS D	**1.00***	**74.3***	**F***	**0.84***	**42.8***	**E***
15	SW Stafford Rd and I-205 SB Ramps	Signalized	v/c 0.85	0.26	17.2	B	0.42	19.3	B

Source: Delay and LOS results are derived from Synchro 11 HCM6 reports for all intersections; while v/c ratio for each intersection was calculated per ODOT Guidance (ODOT 2022b) using the critical v/c ratio calculation method. As a result, there may be discrepancies between v/c results and delay and/or LOS results reported for each intersection.

Mobility targets from 2013 Clackamas County Comprehensive Plan, 2011 Oregon Highway Plan, 2016 West Linn Transportation System Plan (TSP), 2013 Oregon City TSP, and 2017 Gladstone TSP.

Notes: **Bold*** values with an asterisk (*) indicate intersection does not meet mobility target.

Minor street worst leg results are reported for unsignalized intersections.

LOS = level of service; secs/veh = seconds per vehicle; v/c = volume-to-capacity ratio; NB = northbound; SB = southbound

4.5 Transit

The transit analysis focuses on the study corridors (I-205, OR 99E, OR 43, and Main Street). These corridors are within the TriMet service area. TriMet is the largest transit operator in the Portland metropolitan area. Four other transit service providers operate in the API:

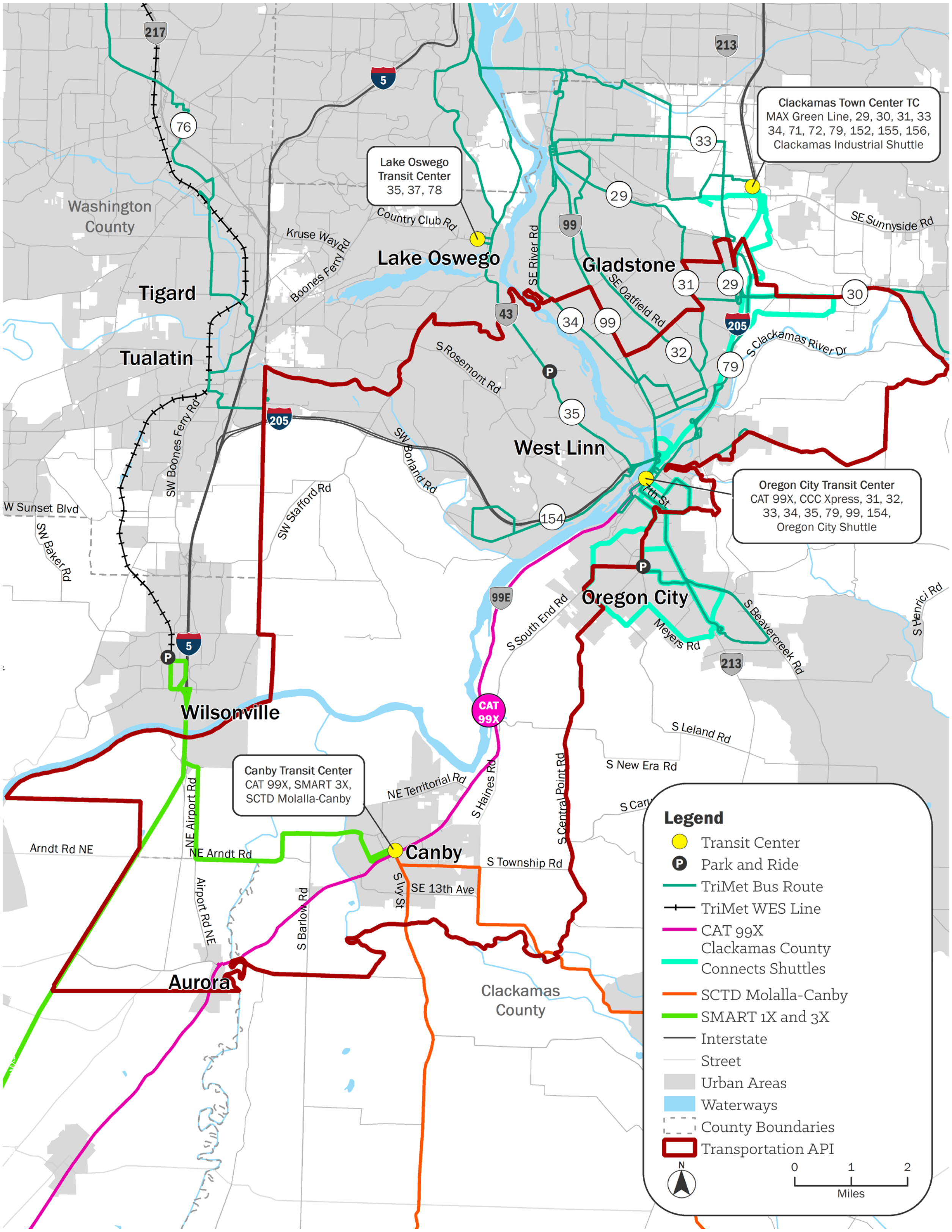
- Canby Area Transit (CAT)
- Clackamas County
- South Clackamas Transportation District (SCTD)
- South Metro Area Transit (SMART)

In July 2021, Clackamas County launched two new transit shuttles serving Oregon City and the Clackamas Industrial Area. In addition, Clackamas County later began operating the CCC Xpress shuttle service between the Clackamas Community College (CCC) Oregon City campus and the CCC Harmony Campus, with stops at Oregon City Transit Center (OCTC) and Clackamas Town Center. This service was previously provided by CCC but was discontinued during the early years of the COVID-19 pandemic. Clackamas County revived the service in August 2023.

Three park-and-ride lots and two transit centers are available in the API. Figure 4-8 shows existing fixed transit routes and facilities in the API.

Within the API, Oregon City and Gladstone (OR 99E and Main Street) contain more transit coverage than West Linn (OR 43) and Canby (OR 99E), as shown in Figure 4-8. The I-205 study corridor has no transit service west of OR 43, and most routes only use the Abernethy Bridge or other short segments of the interstate. The OCTC is a major transit hub within the API and has seven bus bays. The OCTC is between McLoughlin Boulevard (OR 99E) and Main Street. A pair of bus-only streets connect the two streets. Eight TriMet lines, one CAT line, and two Clackamas County shuttles connect at the OCTC.

Figure 4-8. Existing Year (2021) Fixed Transit Service/Facilities within and near the I-205 Toll Project Area of Potential Impact



The CCC Xpress route travels through the API on I-205. Three other bus routes travel along I-205 directly, and two of them use the Abernethy Bridge. Most of the buses in the API use McLoughlin Boulevard (OR 99E) to cross the Clackamas River. TriMet Lines 33 and 35 provide direct regional connections from Portland to cities in and near the API. These two routes have the highest weekday ridership effectiveness[6] for routes in the Project area but are below TriMet's weekday bus system average.

Three of the 10 lines in the Project area provide 15-minute frequency or greater weekday peak service. The other seven operate every 30 to 60 minutes in the peak periods. TriMet Line 33-McLoughlin Boulevard/King Road provides frequent midday service, and eight lines run every 30 to 60 minutes during midday. Five TriMet lines operate on Saturday and Sunday, and CAT Line 99X runs on Saturday. TriMet Line 99 has the lowest on-time performance among lines in the Project area and is the only one that is below the TriMet average. This route runs only during the more congested peak hours and travels a longer distance than other routes, running between CCC and downtown Portland.

Traffic congestion affects transit on-time performance, particularly during peak hours. A fall 2016 analysis by TriMet showed that OR 99E and OR 43 experienced high weekday run time variability (ODOT 2020c). Run time variability is measured as percentage difference between 90th percentile and 10th percentile speeds.

Transit service characteristics can also be measured using an MMLOS analysis. This analysis quantifies user perception of quality of transit service based on various transit and roadway characteristics. Transit level of service (i.e., MMLOS) does not apply to roadways with no transit stops. Although bus routes are present on I-205, the buses do not make any stops, and thus transit LOS does not apply. Transit LOS for the study corridors that have transit service is shown in Table 4-6.

The OR 43 study corridor has a high transit LOS, despite having only one bus route (35), due to its high-frequency service, which also covers a majority of the study corridor. OR 99E has a wider variation in its transit LOS ratings (LOS A through LOS C) because it is a longer study corridor spanning multiple towns and varying conditions. Ten different bus routes use the OR 99E corridor in different sections, with some overlap. Pedestrian LOS also has a wide range (LOS C through LOS F) in this corridor, meaning that pedestrian access to transit in the corridor is average to poor (see Table 4-9). Main Street is also a varied corridor, with many bus routes serving the OCTC but few routes traveling along Main Street.

---

6 Ridership effectiveness indicates a route's success in attracting ridership.

Table 4-6. Existing Year (2021) Transit Level of Service for Study Corridors

Study Corridor	Extent	Direction	Transit LOS
OR 43	Main St to Hollowell St	Both	N/A
	Hollowell St to McKillican St	NB	A
		SB	B
	McKillican St to Burns St	NB	A
		SB	B
	Burns St to Hidden Springs Rd	Both	B
	Overall		**A-B**
OR 99E	W Arlington St to Dunes Dr	Both	A
	Dunes Dr to I-205 SB ramps	SB	B
		NB	A
	I-205 SB ramps to 15th St	Both	B
	15th St to 12th St	Both	A
	12th St to 11th St	Both	A
	11th St to Main St	Both	C
	Main St to Railroad Ave	Both	A
	Railroad Ave to MP 12.74	SB	A
		NB	B
	MP 12.74 to S 2nd St	SB	A
		NB	B
	S 2nd St to New Era Rd	Both	C
	Overall		**A-C**
Main Street	OR 99E to 10th St	Both	B
	10th St to 12th St	Both	A
	12th St to 14th St	EB	B
		WB	C
	14th St to 15th St	EB	N/A
		WB	D
	Overall		**A-D**

Source: ODOT TransGIS (ODOT 2022a) and © 2022 Google Maps
Notes: Calculated transit LOS using ODOT *Analysis Procedures Manual (APM) Version 2* (ODOT 2020a).
LOS = level of service; MP = milepost; N/A = not applicable; EB = eastbound; N/A = not applicable; NB = northbound; SB = southbound; WB = westbound

4.6 Active Transportation

The active transportation analysis focuses on the study corridors (I-205, OR 43, Main Street and OR 99E) and/or study intersections. Traffic volumes and speed on I-205 are not conducive to non-motorized travel, and pedestrians and bicycle users are prohibited on the facility north of the OR 43 interchange. Parallel routes are also limited, although both I-205 river crossings in the API are close to bridges that include sidewalks and allow for non-motorized connectivity (e.g., SW Borland Road across the Tualatin River, and Arch Bridge across the Willamette River). However, access to those pedestrian crossings is circuitous. The following analysis focused on the study corridors more commonly used by pedestrians and bicycle riders: OR 43 and OR 99E.

4.6.1 Pedestrian Facilities

There are pedestrian facilities such as sidewalks and marked or signalized crossings within the API, but not in all areas. Downtown Oregon City has a comprehensive network of sidewalks and many signalized crossings that provide increased mobility. Elsewhere in the API, pedestrian facilities are generally lacking, especially pedestrian facilities that provide connectivity between Oregon City, West Linn, and Gladstone. Roadways lacking adequate pedestrian facilities are barriers to access public transit and non-motorized transportation.

For the purposes of this analysis, study corridor segments with sidewalks 5 feet wide or greater were inventoried. On OR 43, sidewalks (5 feet wide or greater) are present on both sides of the roadway between Main Street and Webb Street, Failing Street and Buck Street, and Pimlico Drive and Mark Lane. Sidewalks are present on one side of the roadway between Webb Street and Failing Street, Buck Street and Pimlico Drive, and Mark Lane and Hidden Springs Road.

Sidewalks exist on both sides of Main Street all the way through downtown Oregon City (15th Street to OR 99E).

On OR 99E, sidewalks are present on both sides of the roadway between Arlington Street and Dunes Drive, the I-205 southbound ramps and Main Street, and Hedges Street and Pacquet Street. Sidewalks are present on one side of the roadway between Dunes Drive and the I-205 southbound ramps and Main Street and Hedges Street. There are no sidewalks between Pacquet Street and New Era Road.

4.6.2 Bicycle Facilities

There are bicycle facilities such as bicycle lanes and local shared-use pathways within the API, but with limited connectivity. Roadways lacking adequate bicycle facilities are barriers to access public transit and non-motorized transportation. Oregon City has bicycle lanes entering the downtown area and shared lane markings within its downtown area, but citywide bicycle connections are limited. West Linn and Gladstone have few bicycle facilities, which are located mainly within their historical areas. No separated connection exists across the Willamette River for bicyclists, and direct bicycle connections between cities are limited.

For the purposes of this analysis, bicycle lanes 4 feet wide or greater were considered adequate based on the ODOT APM. On OR 43, bicycle lanes (4 feet wide or greater) are present on one or both sides of the roadway between Mill Street and Burns Street, Failing Street and Buck Street, Barlow Street and White Tail Drive, and Dillow Drive and Hidden Springs Road. Bicycle lanes of less than 4 feet are present on one or both sides of the roadway between Burns Street and Mohawk Way. There are bicycle lanes between Main Street and Mill Street.

Dedicated bicycle facilities do not currently exist on Main Street through downtown Oregon City, but sharrows are present along the roadway (i.e., indicating that motor vehicles share the road with bicycles).

On OR 99E, bicycle lanes are present on one or both sides of the roadway between Arlington Street and the I-205 southbound ramps (with a gap on the McLoughlin Bridge), and Hedges Street to Pacquet Street. There are no bicycle lanes for the remainder of the corridor.

4.6.3 Active Transportation Analysis

Anticipated direct effects of this Project on people who walk, roll, or bicycle would be caused by increased traffic volumes at unprotected crossings, or unsignalized intersections within the API. To quantify existing year (2021) bicycle and pedestrian conditions, pedestrian level of traffic stress (PLTS) and bicycle level of traffic stress (BLTS) were calculated for the five study intersections that are unsignalized. Two of the intersections are not applicable ("N/A") for PLTS because they are rural and do not have pedestrian infrastructure. For BLTS, rural intersections are denoted with "R" in the score. LTS ranges from 1 to 4, with the higher LTS numbers reflecting worse conditions. Factors involved in higher stress scores for pedestrians include lack of illumination and Americans with Disabilities Act-compliant ramps. Three of the five intersections currently experience LTS 4 for bicyclists, and one of the two applicable intersections experiences LTS 4 for pedestrians. As summarized in Table 4-7, most of the study intersections have existing LTS scores of 4 overall.

Table 4-7. Pedestrian and Bicycle Level of Traffic Stress for Five Study Intersections

Study Intersection	Pedestrian Level of Traffic Stress	Bicycle Level of Traffic Stress
OR 43 and Willamette Falls Dr	4	4
OR 99E (NB) at 15th St	1	2
OR 99E and South End Rd	N/A	R4
OR 99E and S New Era Rd	N/A	R4
Main St and 10th St	3	3

Source: ODOT TransGIS (ODOT 2022a) and © 2022 Google Maps
Notes: Calculated pedestrian and BLTS stress using ODOT APM (ODOT 2020a). Per the APM, in rural areas with no pedestrian infrastructure, PLTS should not be calculated (those intersections are noted "N/A"). For BLTS, "R" is added to the score in rural areas to denote rural conditions.
N/A = not applicable; NB = northbound

LTS can also be calculated for corridors, but only BLTS for mixed traffic roadways is affected by traffic volumes, per the APM methodology. "Mixed traffic" roadways are those where bike facilities are not present or are sub-standard. BLTS was calculated for the entirety of the study corridors to provide a full picture of conditions in each roadway, despite the presence of several non-mixed traffic segments (Table 4-8). BLTS scores for segments with existing bike facilities are not affected by changes in traffic volumes. Traffic volume is also not a factor in the PLTS corridor methodology, so pedestrian MMLOS is provided instead because it does consider traffic volumes.

Table 4-8. Bicycle Level of Traffic Stress for Study Corridors

Study Corridor	Extent	Direction	BLTS
OR 43	Main St to Mill St	Both	3
	Mill St to Willamette Falls Dr	Both	2
	Willamette Falls Dr to Holly St	Both	3
	Holly St to Hidden Springs Rd	Both	3
	Overall	**3**	
OR 99E	Arlington St to 15th St	Both	4
	15th St to 10th St	SB	1
		NB	3
	10th St to MP 12.74	SB	3
		NB	3
	MP 12.74 to MP 15	SB	4
		NB	4
	MP 15 to MP 17	SB	R4
		NB	R3
	MP 17 to MP 18.16	Both	R4
	MP 18.16 to New Era Rd	SB	R4
		NB	R3
	Overall	**4**	

Source: ODOT TransGIS (ODOT 2022a) and © 2022 Google Maps
Notes: Calculated BLTS using ODOT APM (ODOT 2020a). Per the APM, in rural areas, "R" is added to the score to denote rural conditions.
BLTS = bicycle level of traffic stress; MP = milepost; NB = northbound; OR= Reong Route; SB = southbound

Most of the study corridors contain a mix of conditions for bicyclists, including segments of bike lanes and varying shoulder widths. Many segments within the study corridors are already at the highest or worst level (BLTS 4). OR 43 is currently at BLTS 3, mainly due to roadway configuration and speed limit. According to ODOT data, many of the bike lanes along OR 43 are currently sub-standard (less than 4 feet wide) (ODOT 2022a). In rural areas (denoted with "R"), shoulders are more important to the BLTS results because safety concerns tend to be higher (ODOT 2020a). The southern end of OR 99E is considered rural.

For the Project, pedestrian level of service (MMLOS) is a more accurate metric for measuring pedestrian conditions on the study corridors than PLTS because MMLOS is influenced by traffic volumes and PLTS is not. Traffic volumes are part of the analysis metrics because they are the main impact from the Project. Table 4-9 provides the pedestrian MMLOS results for study corridors, using the ODOT APM methodology.

Table 4-9. Pedestrian Level of Service for Study Corridors

Study Corridor	Extent	Direction	Pedestrian MMLOS
OR 43	Main St to Willamette Falls Dr	Both	B
	Willamette Falls Dr to Hollowell St	Both	C
	Hollowell St to Webb St	Both	B
	Webb St to Failing St	NB	C
		SB	B
	Failing St to Buck St	Both	B
	Buck St to Pimlico Dr	NB	C
		SB	B
	Pimlico Dr to Mark Ln	Both	B
	Mark Ln to Mapleton Dr	NB	B
		SB	C
	Mapleton Dr to Hidden Springs Rd	NB	C
		SB	B
	Overall	**B–C**	
OR 99E	Arlington St to Dunes Dr	Both	E
	Dunes Dr to I-205 SB ramps	Both	E
	I-205 SB ramps to 15th St	Both	F
	15th St to 12th St	SB	E
		NB	C
	12th St to 11th St	SB	E
		NB	C
	11th St to 10th St	Both	C
	10th St to Main St	Both	C
	Main St to Railroad Ave	SB	E
		NB	C
	Railroad Ave to MP 12.74	SB	C
		NB	E
	MP 12.74 to S 2nd St	Both	E
	S 2nd St to Hedges St	SB	C
		NB	E
	Hedges St to Pacquet St	Both	C
	Pacquet St to South End Rd	Both	E
	South End Rd to MP 18.16	Both	E
	MP 18.16 to New Era Rd	Both	E
	Overall	**C–F**	

Source: ODOT TransGIS (ODOT 2022a) and © 2022 Google Maps

Notes: Calculated pedestrian level of service using ODOT APM (ODOT 2020a).
MMLOS results range from level A (best) to level F (worst).
MMLOS = multimodal level of service; MP = Milepost; NB = northbound; SB = southbound

All of the study corridors contain a mix of existing conditions for pedestrians, with varying levels of pedestrian infrastructure and contributing roadway factors. OR 43 has the best existing pedestrian conditions with all results at level B or C. Existing pedestrian conditions on OR 99E range from level C to F, which overall reflects poorer pedestrian conditions than OR 43. This is a wide range, and people will have different perceptions of the pedestrian conditions on this corridor. However, much of the OR 99E corridor is vehicle-oriented, lacks pedestrian infrastructure, and may not see much pedestrian traffic because it is a major highway.

4.7 Freight

The freight network within the API includes two national highway freight routes (I-5 and I-205) and two connector freight routes (OR 99E and OR 213). These freight routes connect and serve the industrial areas within the Portland metropolitan area that are vital to the regional economy. Figure 4-9 illustrates the existing freight network within the API.

I-205 is a primary north-south interstate freight route providing an east-side alternative to I-5. I-205 carries the second highest truck volume (after I-5) in the Portland region with a daily volume of 7,000 to 14,000 trucks. This accounts for about 8% of total traffic on the entire I-205 corridor, including the sections within the API. The value of the commodities transported along I-205 between SW Stafford Road and OR 213 range from $34 million to $43 million per day (ODOT 2021b).

Regional congestion and travel delay affect freight movement and consequently affect businesses throughout the state, threatening national and international competitiveness. Buffer times in the mid-day period on the major freight routes are now consistently higher than in the AM peak period, indicating ongoing issues with reliability of freight delivery to and through the Portland region throughout the day. Many business owners report that they have changed to staggered shifts, added evening and overnight operations, and increased operations during off-peak hours, with some delivery shifts now starting as early as 2 a.m. (ODOT 2021b).

Industrial areas are one of the main regional freight trip generators within the API. Metro protects industrial lands under Title 4 of Metro's Urban Growth Management Functional Plan. The Title 4 land data delineates employment, industrial, and regionally significant industrial areas where types and scale of non-industrial uses are limited to provide and protect a supply of these sites for employment. Figure 4-9 shows the industrial areas in the following three categories and colors, as defined by Metro:

- **Regionally significant industrial areas** (RSI areas, shown in dark purple on Figure 4-9) are near major transportation facilities that enable efficient movement of freight, and movement and storage of goods. These areas are considered vital to the region's economy. Along with zoning by cities and counties, Metro also regulates these areas to ensure their continued use and availability as industrial lands.
- **Industrial areas** (IND areas, shown in medium purple on Figure 4-9) are not necessarily located near the most important regional transportation connections. They are also protected against certain types of non-industrial uses and for efficient movement of freight.
- **Employment areas** (EMP areas, shown in light purple on Figure 4-9) include a mix of employment uses. They may feature higher concentrations of office and retail businesses. Retail businesses in these areas primarily serve workers nearby. This characteristic distinguishes employment areas from

neighborhood business districts and other commercial areas that serve both nearby residents and visitors.

A major freight hub, or RSI area, that attracts a high volume of truck freight traffic is shown in Figure 4-9 south of OR 212 and east of I-205. Many of the truck trips associated with this hub use I-205 between SW Stafford Road and OR 213. I-5 and I-205 are essential freight routes that serve a substantial volume of trucks within the API. The intersection of these two interstates is a vital point in freight movement. Figure 4-10 shows the truck volumes as a percentage of total traffic volumes for two locations on I-205 and the four ramps connecting I-5 and I-205. This data provides an indicator of the freight volumes to and from the I-205 corridor and indicates that a higher percentage of trucks travel between I-205 and I-5 to the south (as opposed to I-5 to the north), which is consistent with I-205 serving as an east-side bypass route of the Portland metropolitan area. Table 4-10 provides more details and summarizes the daily truck volumes for these six locations. The data reports daily volumes for a typical weekday in 2019.

Table 4-10. Existing Year (2019) Daily Heavy Truck Volumes and Percentages of Total Volumes

Location	Name	Cars	Trucks	Total	Truck Percentage
A	I-205 SB	44,900	5,700	50,600	11%
B	I-205 NB	40,150	8,470	48,620	17%
C	I-205 SB to I-5 NB	25,310	1,890	27,200	7%
D	I-205 SB to I-5 SB	19,600	3,800	23,400	16%
E	I-5 NB to I-205 NB	15,880	6,680	22,560	30%
F	I-5 SB to I-205 NB	24,250	1,800	26,050	7%

Source: MS2, daily truck volumes for Wednesday, June 19, 2019

Note: The Location IDs identified in the first column of this table corresponded to Location IDs A through F in Figure 4-10.

MS2 daily volumes are classified based on vehicles length in up to five categories (0 to 20, 20 to 35, 35 to 61, 61 to 150, and 150+ foot-long vehicles. Truck volumes reported in this section refer to vehicles longer than 20 feet. (20- to 35-foot-long vehicles are classified as Medium trucks, and vehicles longer than 35 feet are classified as Heavy trucks.)

NB = northbound; SB = southbound

Figure 4-9. Existing Year (2021) Freight Facilities within the Area of Potential Impact

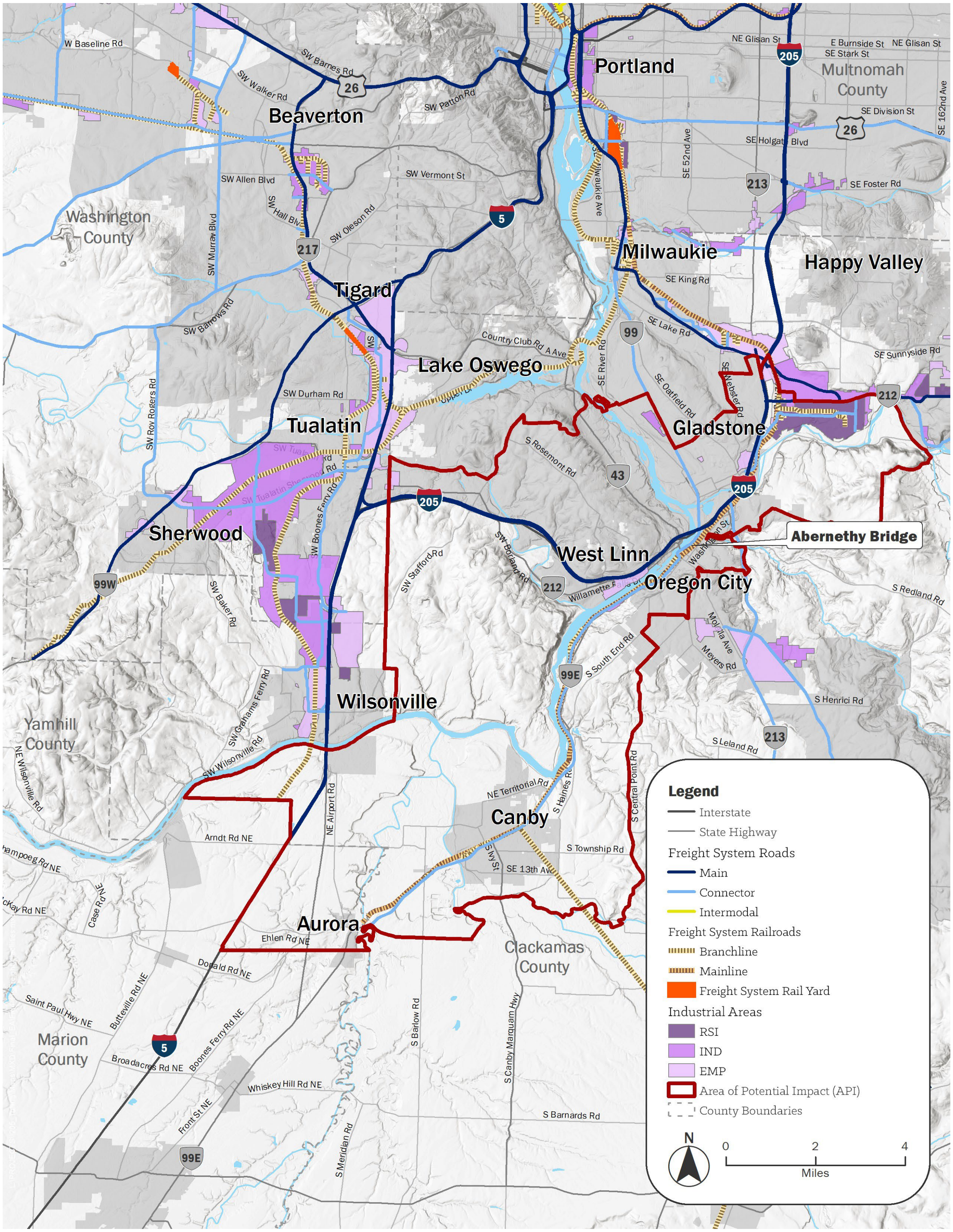
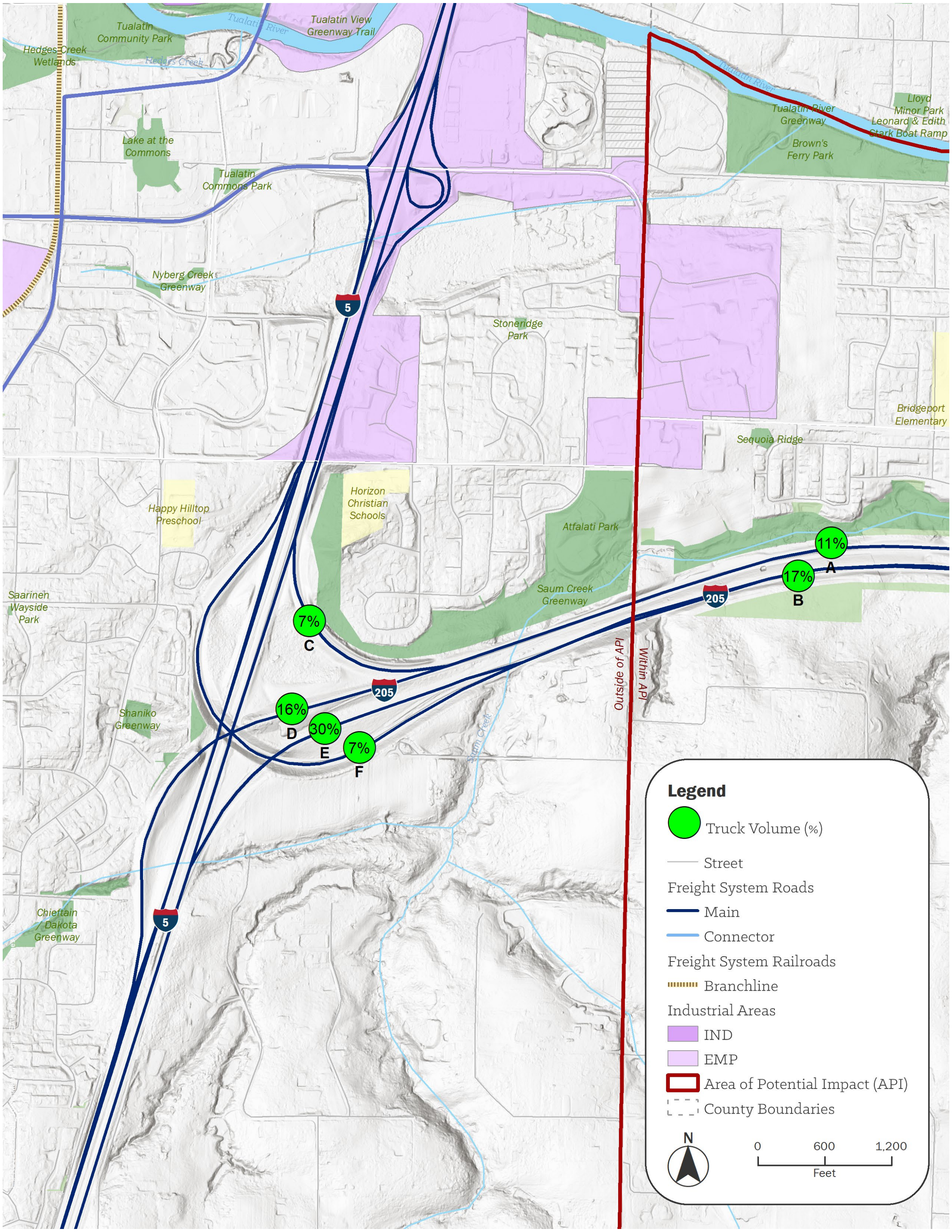


Figure 4-10. Existing Year (2021) Truck Volumes (as Percentage of Total Volumes) within the Area of Potential Impact



Source: MS2

The charts in Figure 4-11 and Figure 4-12 illustrate the 24-hour profile of hourly truck volumes and peak-hour information for southbound and northbound I-205, respectively (locations A and B in Table 4-10, and in Figure 4-12). In the southbound direction, truck volumes peak around 9 a.m. However, high truck volumes occur from approximately 8:00 a.m. to 3:00 p.m. in both directions, with southbound ranging from 400 to 450 trucks per hour and northbound ranging from 600 to 700 trucks per hour. Attachment H contains the 24-hour profiles for locations C through F.

Figure 4-11. 24-Hour Truck Volume Profiles on I-205 Southbound

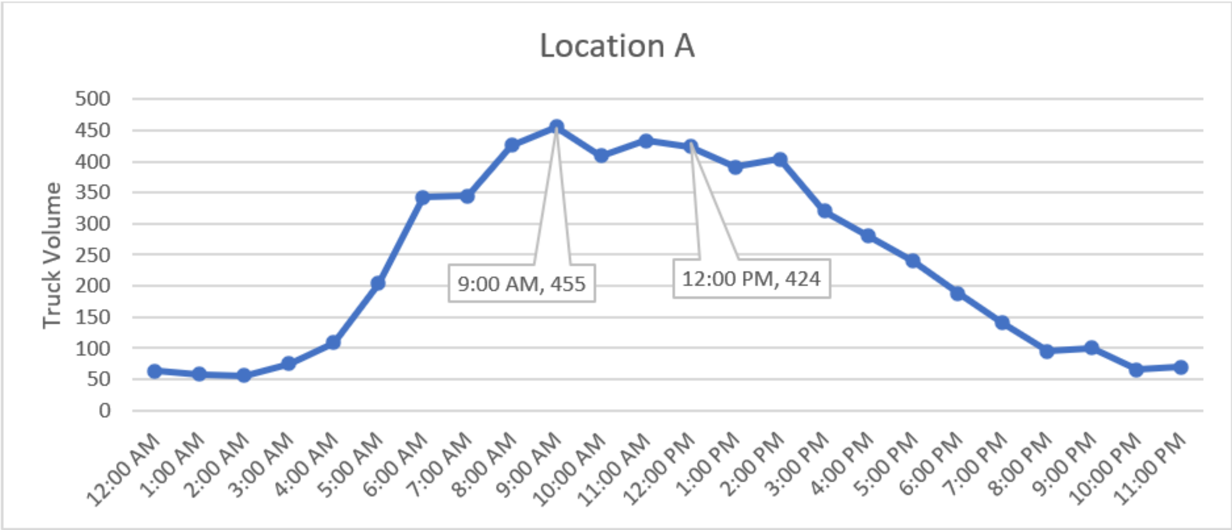
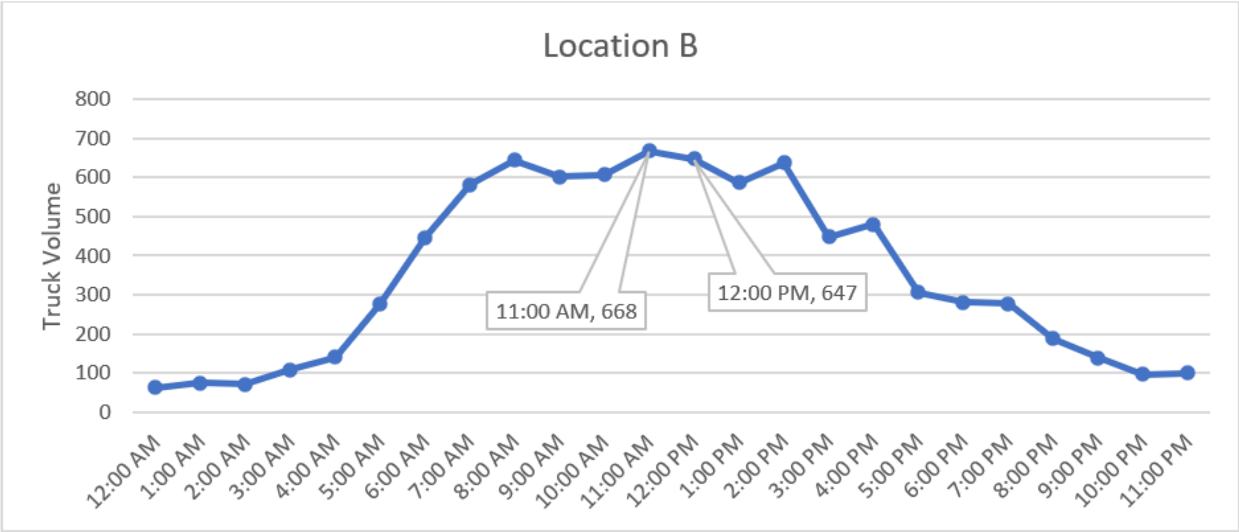


Figure 4-12. 24-Hour Truck Volume Profiles on I-205 Northbound



4.8 Transportation Safety

4.8.1 Study Corridor Crash Analysis

An analysis of crashes occurring between 2017 and 2021 was conducted to identify current traffic safety issues. The analysis used data from official crash records recorded by ODOT's Crash Analysis and Reporting Unit and includes all crash types involving motor vehicles (including those with bicycles and pedestrians). Within the API, roadways experienced 1,687 crashes along study corridors and intersections between 2017 and 2021. In general, the number of reported crashes per year within the API decreased over time until 2020, with an upward trajectory in 2021, as shown in Table 4-11. At the start of 2018, the State of Oregon increased the minimum dollar value for reporting property damage only (PDO) crashes from $1,500 to $2,500. This increase in damage-reporting minimums may have artificially reduced the number of crashes recorded by ODOT after 2018 because incidents resulting in less damage were no longer required to be reported.

Table 4-11. Area of Potential Impact Corridor Crashes by Year (2017 through 2021)

Corridor	2017	2018	2019	2020	2021	Total
I-205	268	253	194	123	191	1,029
OR 99E	118	106	116	70	87	497
OR 43	39	32	33	28	29	161
Total	**425**	**391**	**343**	**221**	**307**	**1,687**

Source: ODOT Crash Reporting Unit: https://tvc.odot.state.or.us/tvc/

Most of the crashes along the study corridors resulted in injury or PDO, with three fatalities occurring along OR 99E, as shown in Table 4-12. Those three fatal crashes along OR 99E involved motor vehicles.

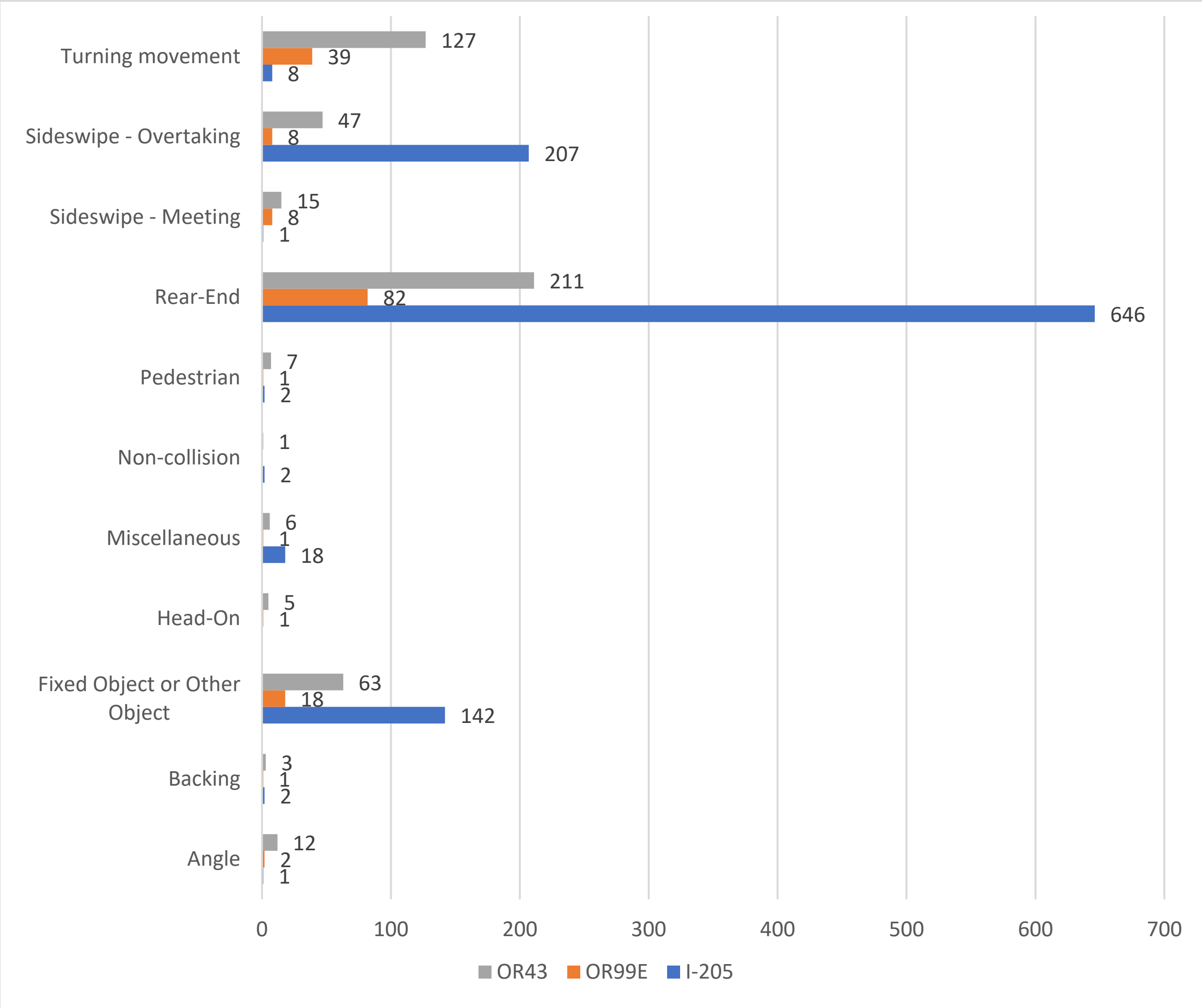
Table 4-12. Area of Potential Impact Corridor Crashes by Severity (2017 through 2021)

Corridor	Fatal	Injury	Property Damage Only	Total
I-205	0	541	488	1,029
OR 99E	3	279	215	497
OR 43	0	82	79	161
Total	**3**	**902**	**782**	**1,687**

Source: ODOT Crash Reporting Unit: https://tvc.odot.state.or.us/tvc/

As shown in Figure 4-13, the predominant crash type across all corridors was rear-end crashes, followed by sideswipe, fixed object or other object, and turning movement.

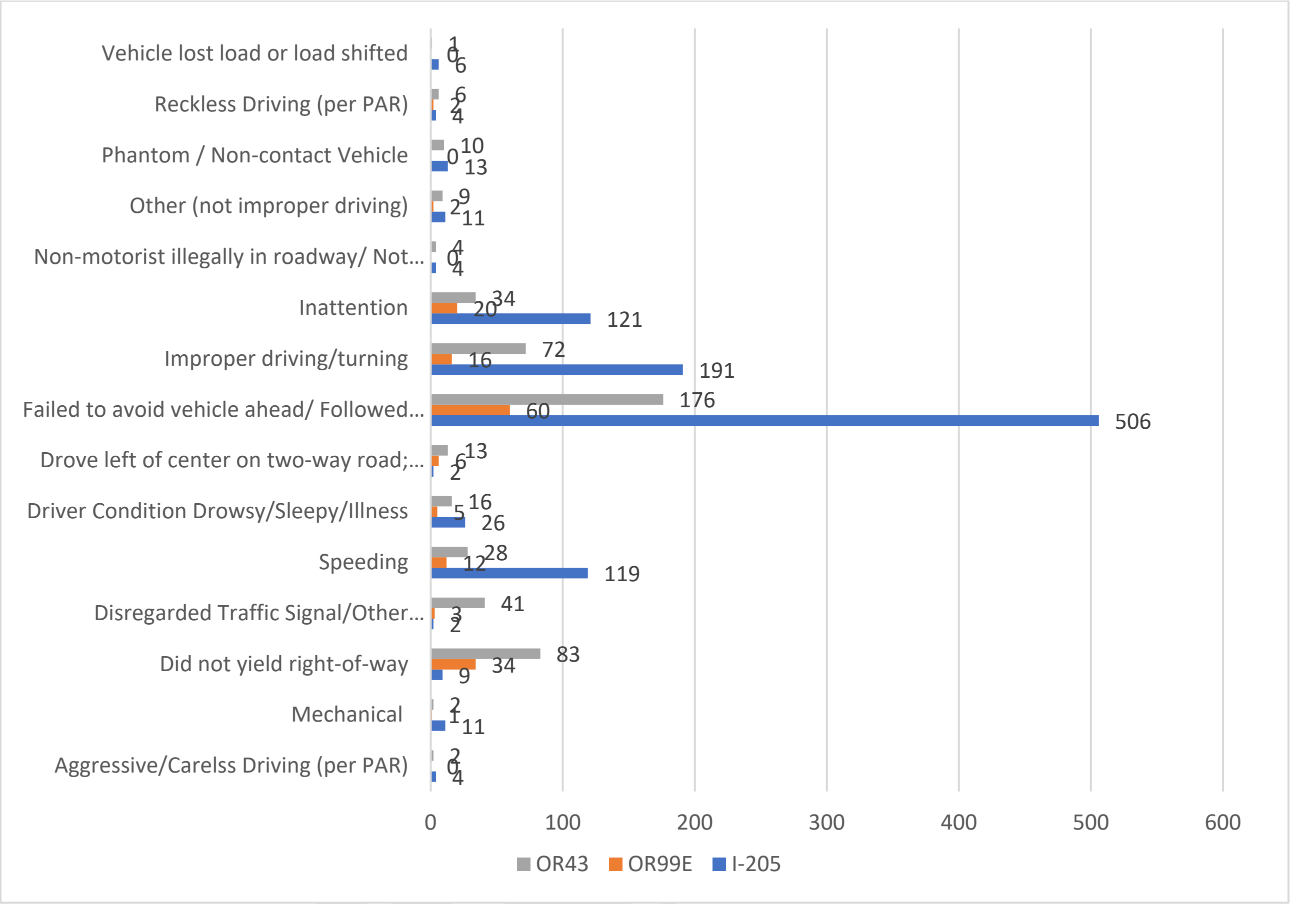
Figure 4-13. Total Area of Potential Impact Corridor Crashes by Type (2017 through 2021)



Note: Miscellaneous crashes include parking and unidentified.
Source: ODOT Crash Reporting Unit: https://tvc.odot.state.or.us/tvc/

The most common type of crash occurring within the API was due to motorists failing to avoid the vehicle ahead, followed by improper driving/turning, inattention, speeding, and failing to yield the right-of-way, as shown on Figure 4-14.

Figure 4-14. Total Area of Potential Impact Corridor Crashes by Crash Cause (2017 through 2021)



PAR = Police Accident Report
Note: Other Improper Driving includes mechanical defects, alcohol or drugs impairment, visibility issues, and others.
Source: ODOT Crash Reporting Unit: https://tvc.odot.state.or.us/tvc/

Typically, crashes involving pedestrians or bicycles result in greater injury severity. As shown in Table 4-13, a total of 10 crashes involving pedestrians along the study corridors occurred between 2017 and 2021; all 10 crashes were reported as injury type C.[7] Most (7 of 10) of the pedestrian crashes occurred along OR 99E, with the next highest numbers occurring on I-205 and OR 43. Although I-205 in the study corridor is substantially larger in scale and traffic, pedestrians are prohibited on the interstate by OAR 734-020-0045 north of the I-205 and OR43 Avenue interchange, so pedestrian-related crashes on I-205 are rare. Pedestrian crash numbers were higher along other corridors due to the presence of pedestrians in areas where there are heavy traffic volumes, especially along OR 99E.

[7] Injury C is a minor Injury where the most severe injury in the crash was that someone reports an injury, a pain or ache, but no injury is apparent (ODOT 2012)

Table 4-13. Area of Potential Impact Corridor Crashes Involving Pedestrians by Severity (2017 through 2021)

Corridor	Fatality	Non-Fatal Injury	Property Damage Only
I-205	0	2	0
OR 99E	0	7	0
OR 43	0	1	0
Total	**0**	**10**	**0**

Source: ODOT Crash Reporting Unit: https://tvc.odot.state.or.us/tvc/

A total of five recorded crashes involved a bicyclist within the study corridors from 2017 through 2021, as shown in Table 4-14. All five crashes involving a bicyclist resulted in an injury. Similar to crashes involving pedestrians, most of the crashes involving bicyclists occurred along OR 99E. Bicycle crash numbers were higher where both bicyclist and motorized traffic volumes are relatively high.

Table 4-14 Area of Potential Impact Corridor Crashes Involving Bicyclists by Severity (2017 through 2021)

Corridor	Fatality	Non-Fatal Injury	Property Damage Only
I-205	0	1	0
OR 99E	0	3	0
OR 43	0	1	0
Total	**0**	**5**	**0**

Source: ODOT Crash Reporting Unit: https://tvc.odot.state.or.us/tvc/

4.8.2 Intersection Crash Analysis

Intersection crash rates were calculated at the 15 study intersections, and other intersections within the safety study corridors. These other intersections—which were not flagged as study intersections—were included to avoid gaps in the safety analysis along the study corridors. All intersections were compared to other intersections with similar characteristics within the region. This comparison was done by calculating a second crash rate known as the critical crash rate. The critical crash rate is a statistical method for comparing the crash rate at one location to the weighted average crash rate with intersections of similar characteristics within the study area. The intersection crash rate is the total number of crashes occurring at an intersection in proportion to the vehicles entering the intersection. The crash rate is defined as crashes per million entering vehicles. Table 4-15 shows the total number of crashes that occurred at each of the study intersections during a 5-year period, along with the intersection crash rate and the critical crash rate. Figure 4-15 shows intersections exceeding the critical crash rate. Four of the 15 study intersections were identified as having above-average crash rates compared to the other intersections within the API.

Table 4-15. Intersection Crash Rate (2017 through 2021)

Intersection	Intersection Population Type	5-Year Crash Total	Intersection Crash Rate (MEV)	Critical Crash Rate	Over or Under Critical Crash Rate
OR 99E/Arlington	Urban 4SG	41	**0.75***	**0.44***	**Over***
OR 99E/Dunes	Urban 4SG	29	**0.43***	**0.42***	**Over***
OR 99E/I-205 SB Ramp	Urban 3SG	29	0.37	0.42	Under
OR 99E/I-205 NB Ramp	Urban 3SG	35	0.37	0.41	Under
OR 99E/15th St	Urban 3ST	15	0.18	0.29	Under
OR 99E/14th St	Urban 3SG	25	0.32	0.42	Under
OR 99E/12th St	Urban 3SG	16	0.25	0.44	Under
OR 99E/10th St	Urban 3SG	10	0.22	0.46	Under
OR 99E/Main St	Urban 4SG	9	0.21	0.45	Under
OR 99E/S 2nd St	Urban 3SG	15	0.31	0.46	Under
OR 99E/South End Rd	Rural 3ST	9	0.19	0.48	Under
OR 99E/New Era Rd	Rural 3ST	12	0.25	0.48	Under
OR 43/Hidden Springs	Urban 3SG	13	0.28	0.46	Under
OR 43/Pimlico	Urban 3ST	6	0.15	0.29	Under
OR 43/West A St	Urban 4SG	2	0.05	0.45	Under
OR 43/McKillican St	Urban 4SG	6	0.12	0.44	Under
OR 43/I-205 SB Off Ramps	Urban 4SG	12	0.28	0.45	Under
OR 43/I-205 NB Off Ramps	Urban 4SG	2	0.05	0.46	Under
OR 43/Willamette Falls Dr	Urban 3ST	17	**0.45***	**0.29***	**Over***
Main St/10th St	Urban 4ST	18	**0.62***	**0.40***	**Over***
SW Stafford Rd /I-205 SB Ramps	Urban 4SG	10	0.46	0.52	Under

Source: ODOT Crash Reporting Unit: https://tvc.odot.state.or.us/tvc/
Notes: **Bold/Red*** values with an asterisk (*) indicate intersection rate over the critical crash rate.
[1] Values in the table have been rounded to the nearest hundredth.
MEV = Million Entering Vehicles; NB = northbound; SB = southbound
3ST = Three-leg stop controlled intersection, 4ST = Four-leg stop controlled intersection, 3SG = Three-leg signalized intersection, 4ST = Four-leg signalized intersection.

4.8.3 Segment Crash Analysis

Similar to the intersection crash rate comparison, segment crash rates were also compared to those of similar segments within the region. The segment crash rate calculation involves volumes, segment length, and total crashes within the 5-year period (2017 through 2021). I-205 had a segment that exceeded the critical crash rate. It is important to note that segment crash rates are a function of segment length. The shorter the segment, the more sensitive it becomes to crash rate; thus, shorter segments can be skewed and result in higher crash rates. To account for this, segments under 1 mile were normalized to 1 mile. Table 4-16 and Figure 4-15 show the segments that exceeded the critical crash rate. A list of all the segment crash rates is presented in Attachment I.

Table 4-16. Study Segments over the Critical Crash Rate (2017 through 2021)

Corridor	Begin	End	Segment Length	5-Year Crash Total	Segment Crash Rate (MVM)
I-205	Milepost 6.88	Milepost 7.48	0.60	66	1.24

Source: ODOT Crash Reporting Unit: https://tvc.odot.state.or.us/tvc/
Notes: All segment crash rates in this table exceed the critical crash rate.
MVM = Million Vehicle Miles

4.8.4 Existing 2021 Predictive vs. Expected Crash Analysis

Safety analysis was performed along study corridors at segments and intersections using the HSM predictive crash frequency methodology. The predictive average crash frequency represents the number of crashes a similar intersection or roadway segment is anticipated to experience on average. It is calculated with safety performance functions, which are equations derived from empirical data based on a facility's characteristics, such as geometry, lighting, traffic control, and traffic volumes.

The expected average crash frequency is the estimated number of crashes a facility is likely to experience, accounting for both the predictive crash frequency and the observed crash history. The number of predictive/expected crashes are reported in decimal form because it represents a calculation over time—for example, a 0.2 crash could be defined as one crash occurring over a 5-year period, on average. Table 4-17 and Table 4-18 show intersections and segments where the expected crash rate is greater than predictive. The intersection at OR 99E and Arlington Street and the segment along OR 99E from Arlington Street to Dunes Street had the greatest difference between predictive and expected average crash frequency. Detailed results are provided in Appendix J.

Table 4-17. Existing (2021) Predictive vs. Expected – Intersections

Intersection	Total 2021 Predictive	Total 2021 Expected	Predictive Minus Expected
OR 43/Pimlico	0.54	0.67	0.12
OR 43/West A St	2.81	2.96	0.15
OR 99E/S 2nd St	2.48	2.65	0.17
OR 99E/I-205 SB Ramp	4.71	5.18	0.47
OR 99E/14th St	3.67	4.27	0.60
OR 99E/I-205 NB Ramp	5.67	6.45	0.78
OR 99E/Dunes Dr	2.84	4.03	1.19
OR 99E/Arlington St	6.03	7.30	1.27

Source: ODOT Crash Reporting Unit:
NB = northbound; SB = southbound

Table 4-18. Existing (2021) Predictive vs. Expected – Segments

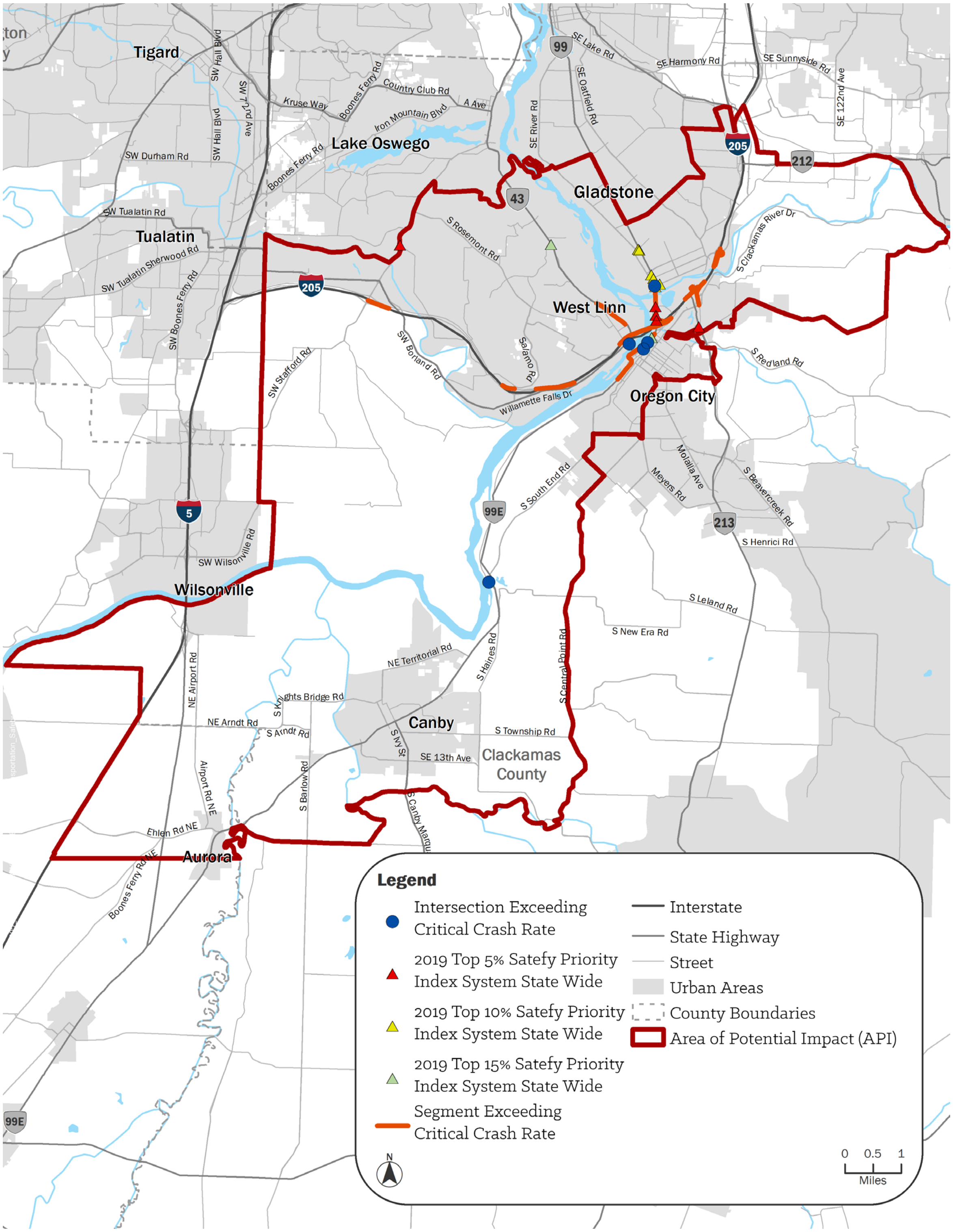
Intersection	Total 2021 Predictive	Total 2021 Expected	Predictive Minus Expected
OR 43: I-205 MP 11.14 to I-205 MP 11.29	0.49	0.56	0.06
OR 43: Willamette Falls Dr to Main St	0.24	0.43	0.19
OR 99E: 15th St to 14th St	0.27	0.52	0.25
OR 43: Hidden Springs-Pimlico	2.12	2.38	0.26
OR 99E: 14th St to 12th St	0.74	1.07	0.33
OR 99E: Dunes to I-205 SB Ramp	0.48	0.96	0.48
OR 99E: I205 SB Ramp to I-205 NB Ramp	0.83	1.34	0.50
OR 43: Pimlico to West A St	1.25	1.76	0.51
OR 43: McKillican St to I-205 MP 11.13	1.16	1.72	0.56
OR 99E: 10th St to Main St	1.04	2.09	1.05
OR 43: West A St to McKillican St	2.21	3.88	1.67
OR 99E: Main St to S 2nd St	1.13	3.33	2.20
OR 99E: Arlington St to Dunes Dr	3.12	7.12	4.00

Source: ODOT Crash Reporting Unit:
MP = Milepost; NB = northbound; SB = southbound

4.8.5 Safety Priority Index Location

ODOT uses an SPIS, which is a method to identify potential safety issues on state highways by identifying state highway segments with higher than typical crash histories. State highway segments with SPIS values that rank in the top 5%, 10%, and 15% by ODOT region are considered priorities for potential safety improvement projects. Figure 4-15 shows the SPIS locations identified within the API.

Figure 4-15. Existing Year (2021) High Crash Locations and Safety Priority Index System Locations (2015 through 2019)



Source: ODOT (https://gis.odot.state.or.us/transgis/)

5 Environmental Consequences

This section describes the anticipated benefits and impacts of the Project. Section 5.1 provides an overview of Revised Build Alternative impacts related to construction. Section 5.2 describes in detail the benefits and impacts of the Revised Build Alternative relative to the No Build Alternative with respect to traffic, transit, active transportation, freight mobility, and safety. Section 5.3 summarizes impacts and benefits by alternative.

5.1 Revised Build Alternative: Construction Impacts

The same number of through lanes and speed of traffic as existing conditions would generally be maintained on I-205 throughout construction of the Revised Build Alternative during daytime hours.

The Abernethy Bridge would require one mainline and two ramp gantries just south of the bridge. Most toll-related construction would be conducted alongside the roadway, within the existing right-of-way. Pavement work would be very limited or not required. Erection of the overhead toll gantries would require full roadway closures that would be limited to brief overnight periods. Closures would be limited to one per gantry and would last less than 2 hours. Short-term detours with temporary signing may be used for the roadway closures. Additional lane closures would be required to complete equipment mounting and fine-tuning of the toll technology over the lanes, but most of these closures would be kept to short periods of time.

Full construction closure details, including durations and frequency of closures, would be determined once the construction contractor is selected.

5.2 Revised Build Alternative: Impacts and Benefits Relative to No Build Alternative

This section describes the anticipated impacts and potential benefits of the Revised Build Alternative as compared to the No Build Alternative.

The No Build Alternative represents conditions in the API if the Project were not implemented. The data used for this analysis assumes that all other transportation projects and programs in Metro's 2018 Regional Transportation Plan would be implemented as scheduled, including all phases of the I-205 Improvement Project and tolling on the Tualatin River Bridges (Metro 2018). Planned future phases of the I-205 improvements include construction of a third through lane in each direction of I-205 between the interchange with Stafford Road and the interchange with OR 43, a northbound auxiliary lane between OR 99E and OR 213, and replacement of or seismic upgrades to multiple bridges along I 205. These projects would be constructed as part of a package that included a replacement and point toll of the I-205 twin bridges over the Tualatin River.

The Revised Build Alternative represents conditions in the API if the Project (tolling at the Abernethy Bridge) were implemented in addition to all other transportation projects and programs in Metro's Regional Transportation Plan, including all phases of the I-205 Improvements Project and tolling on the Tualatin River Bridges.

5.2.1 Transportation System Measures

This section documents the evaluation of transportation system performance measures such as VMT, VHT, changes in modes of travel, and average trip length to assess the effects of the Revised Build

Alternative as compared to the No Build Alternative from a systemwide perspective covering the entire Portland metropolitan area.

Vehicle Miles Traveled/Vehicle Hours Traveled

Table 5-1 summarizes the difference in daily VMT and VHT across the entire Portland metropolitan area for the Revised Build Alternative in comparison to the No Build Alternative in 2045. The daily regional VMT under the Revised Build Alternative would be just over 1% lower on regional highways (e.g., I-205, I-5, I-84) and would be slightly higher (0.2%) on non-highway roadway links in the region compared to the No Build Alternative. This difference reflects the number of trips that would reroute from I-205 to other roadways or change their mode of travel to avoid the additional tolls at the Abernethy Bridge under the Revised Build Alternative. Overall, when considering both highway and non-highway trips, there would be similar (0.3% lower) VMT under the Revised Build Alternative as compared to the No Build Alternative. Similarly, VHT would also be slightly lower for highways and slightly higher for non-highways (arterials) under the Revised Build Alternative as compared to the No Build Alternative, reflecting some rerouting from I-205 to avoid the added tolls on the Abernethy Bridge. Overall, there would be similar (0.2% lower) VHT under the Revised Build Alternative as compared to the No Build Alternative.

Table 5-1. Revised Build Alternative vs. No Build Alternative Difference in Daily Regional VMT and VHT in 2045

Roadway Type	2045 Revised Build Minus No Build			
	Change in Regional VMT	% Change in Regional VMT	Change in Regional VHT	% Change in Regional VHT
Highway	-274,326	-1.3%	-7,813	-1.6%
Non-Highway	+71,593	+0.2%	+2,787	+0.3%
Total	**-189,544**	**-0.3%**	**-3,696**	**-0.2%**

VHT = vehicle hours traveled; VMT = vehicle miles traveled

Figure 5-1, Figure 5-2, and Figure 5-3 compare differences in total regional VMT by time of day for total trips, limited-access (highway) roadway trips, and arterial (non-highway) roadway trips respectively. Each chart describes the difference in VMT between the No Build and Revised Build Alternatives, with positive values indicating greater VMT under the Revised Build Alternative for a given hour and negative values indicating lower VMT.

Figure 5-1 shows that total VMT would primarily be lower during the daytime hours (6 a.m. to 7 p.m.) when toll rates would be the highest, indicating that while some travelers on I-205 may take alternative routes to avoid the tolls, others will change the time of day that they make their trips, change modes, or shorten their trips to avoid the highest tolls. The overnight hours with the lowest proposed tolls are expected to experience higher VMT because some trips would shift to outside of the higher toll periods, and alternative routes at these times would be relatively uncongested, which would make the option to use these routes instead of paying the toll more attractive.

Figure 5-1. Revised Build Alternative Total Regional VMT Relative to No Build Alternative by Time of Day in 2045

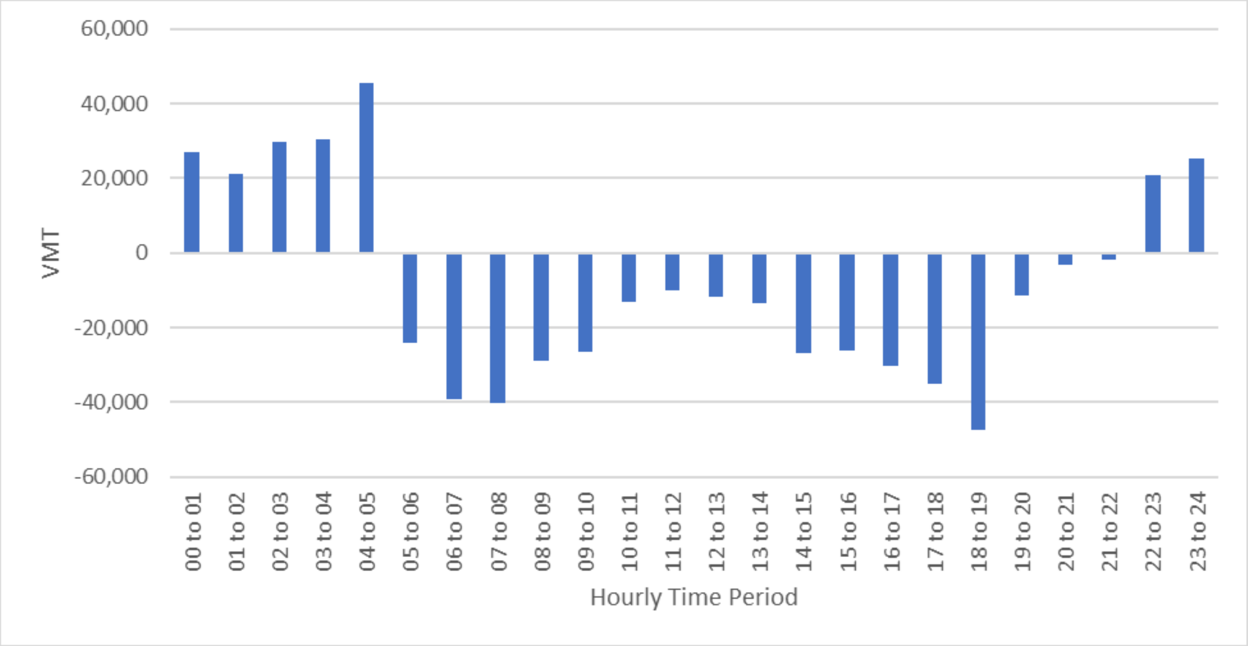


Figure 5-2 shows that with the Revised Build Alternative, the number and/or distance of limited-access roadway trips would be lower in most daytime and evening hours of the day as compared to the No Build Alternative. The greatest reduction would occur during the peak traffic times even though they would have the highest toll rates on I-205. The reasons for this include a combination of factors:

- Users reroute to avoid the higher tolls during daytime hours.
- Corridor users may change their time of travel to avoid the higher toll periods, pushing more travel to outside of these hours.
- Corridor users may change their modes of travel (from single-occupancy vehicle to high-occupancy vehicle, transit, and active transportation modes)

Figure 5-2. Revised Build Alternative Limited-Access Roadway Regional VMT Relative to No Build Alternative by Time of Day in 2045

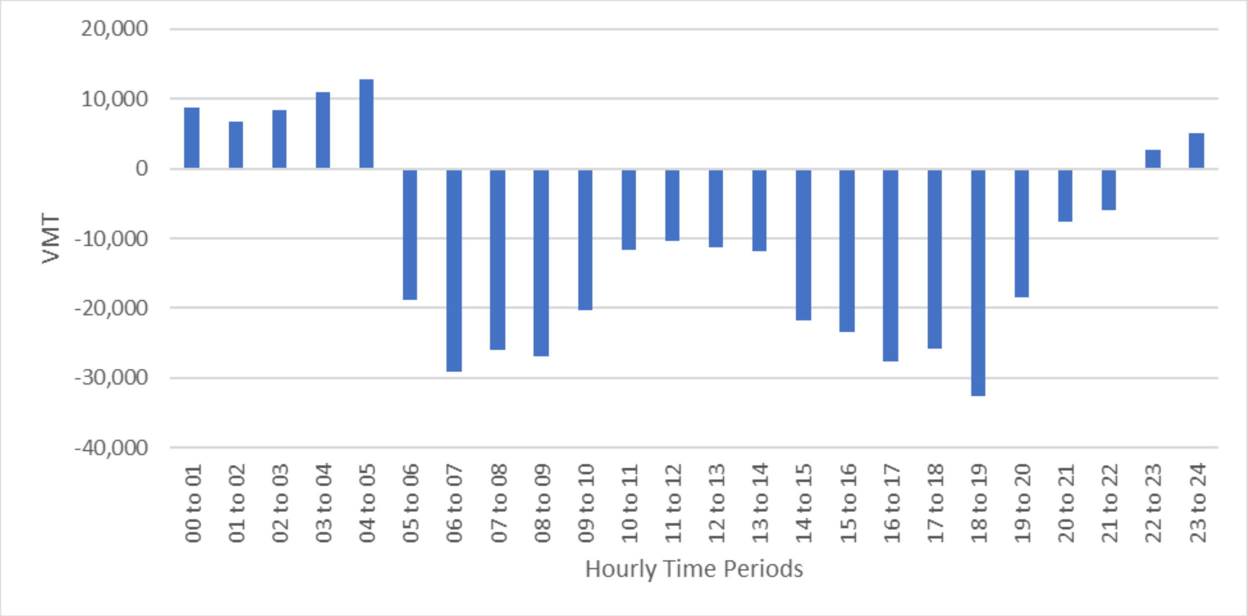


Figure 5-3 shows that with the Revised Build Alternative, the number and/or distance of trips on arterial roadways would be lower through most of the daytime hours. The reduced VMT on arterials reflects the overall shifts of trips from daytime hours (with higher tolls) to overnight hours (with lower tolls) under the Revised Build Alternative compared to the No Build Alternative.

Figure 5-3. Revised Build Alternative Arterial Roadway Regional VMT Relative to No Build Alternative by Time of Day in 2045

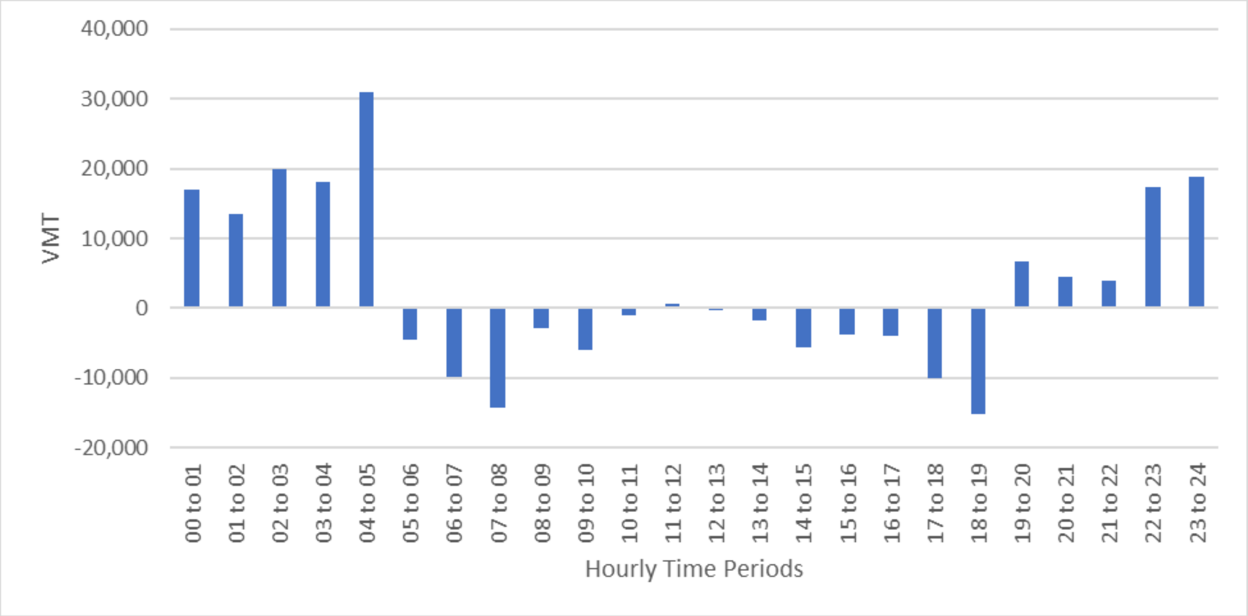


Figure 5-4, Figure 5-5, and Figure 5-6 compare differences in regional VHT by time of day for all trips, limited-access roadway trips, and arterial roadway trips respectively between the No Build and Revised Build Alternatives. The general trends through the day for regional VHT are similar to those for VMT. These figures demonstrate a notable increase in VMT at times from 10pm to 5am. While this is a reasonable model output related to the model's peak spreading algorithm (shifting trip travel times), it may be overestimating the reality of this condition.

For all trips combined, Figure 5-4 shows that total VHT would be substantially lower during the peak traffic periods when toll rates are highest, while the hours immediately before these peak traffic and highest toll periods would experience relatively higher VHT. This difference reflects the trend that some travelers would change the time of day that they make their trip to avoid the highest tolls. In addition, with fewer trips during the peak traffic periods, there would be less congestion, resulting in reduced travel times for travelers. Because VHT is a component of number of trips as well as travel times, reduced travel times would also result in lower VHT, reflecting less congestion and delay.

Figure 5-4. Revised Build Alternative Total Regional VHT Relative to No Build Alternative by Time of Day in 2045

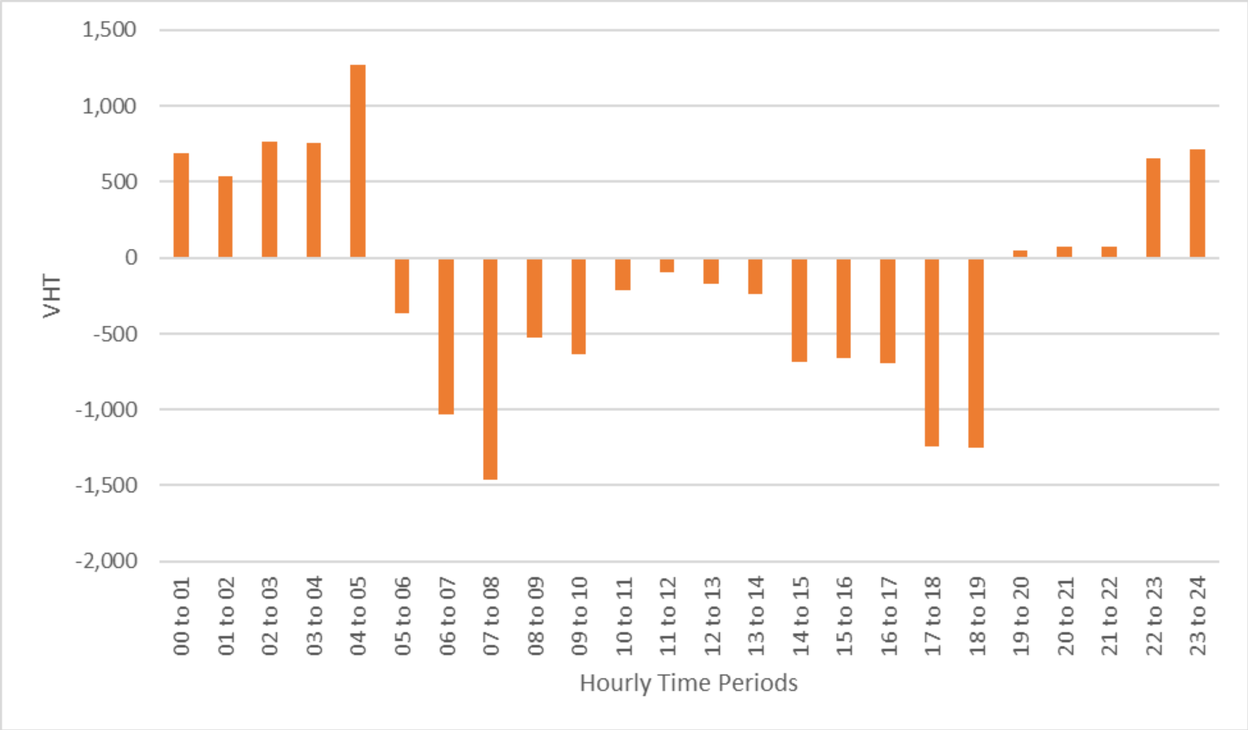


Figure 5-5 indicates that across daytime hours, the number of trips and travel times on limited-access roadways would be lower with the Revised Build Alternative as compared to the No Build Alternative. The greatest difference in VHT would occur during the peak traffic times that would have the highest toll rates. The higher toll rates would not only cause some trips to not be made during these hours, but they would also result in faster speeds on I-205, which would further reduce overall VHT.

Figure 5-5. Revised Build Alternative Limited-Access Roadway Regional VHT Relative to No Build Alternative by Time of Day in 2045

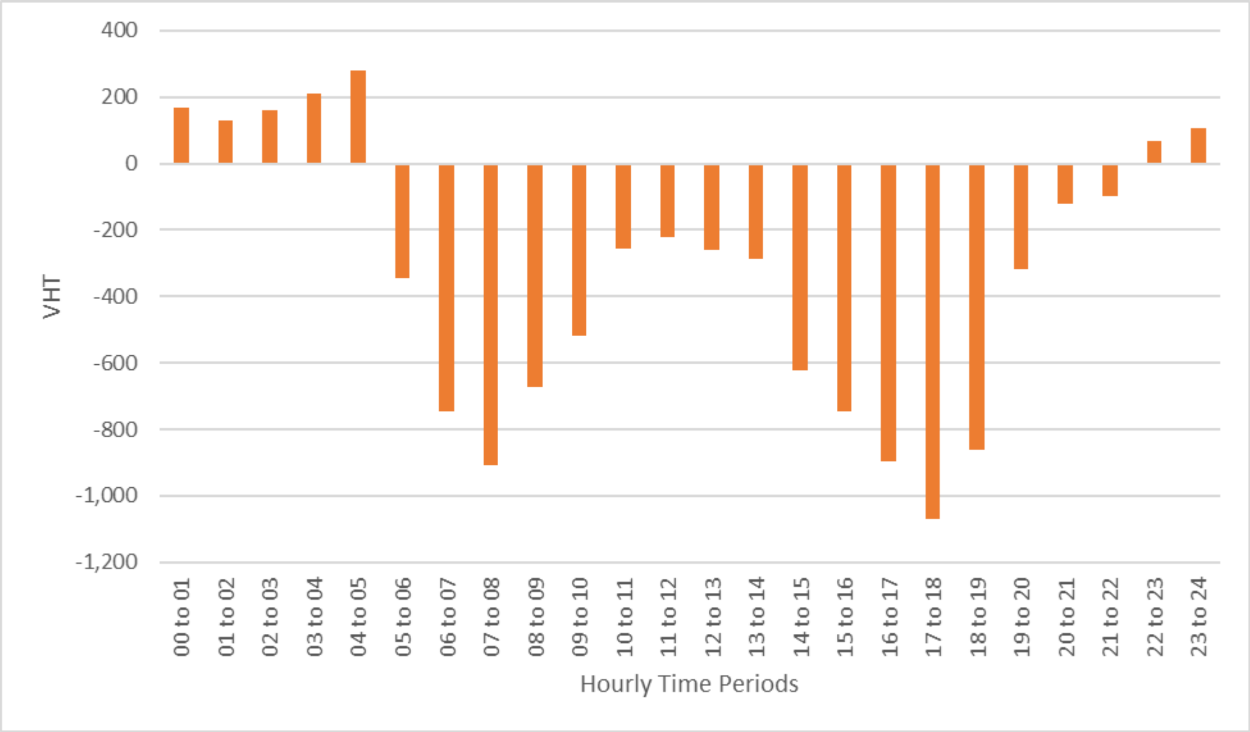
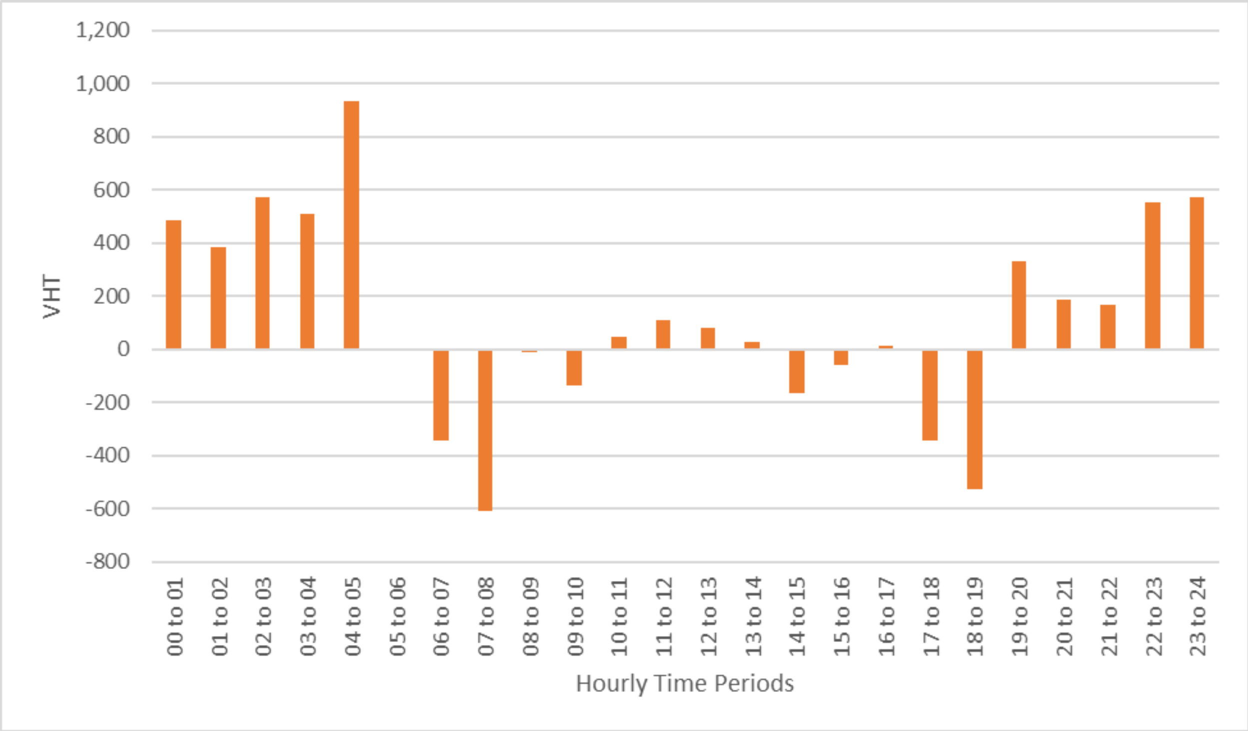


Figure 5-6 shows arterial roadway VHT would be lower during peak traffic and higher toll periods and higher during overnight hours under the Revised Build Alternative as compared to the No Build Alternative. The midday hours would not experience much difference between the alternatives. The differences reflect the overall shifts in trips from daytime hours (with higher tolls) to overnight hours (with lower tolls) under the Revised Build Alternative compared to the No Build Alternative.

Figure 5-6. Revised Build Alternative Arterial Roadway Regional VHT Relative to No Build Alternative by Time of Day in 2045



Travel Mode Shift

Table 5-2 shows the number of regional trips made by different travel modes under the Revised Build Alternative as compared with the No Build Alternative. The Revised Build Alternative is projected to have a relatively small effect on choice of travel mode in the region, with the trend indicating slightly fewer single-occupancy vehicle trips and slightly more high-occupancy vehicle, transit, and active transportation trips. These differences in mode choice would likely be due to the lower travel cost for those modes compared to the cost of one person in a car paying the additional toll at the Abernethy Bridge.

Table 5-2. Comparison of Trips by Travel Mode in 2045: Revised Build Alternative to No Build Alternative

Travel Mode	No Build Alternative Trips	Revised Build Alternative Trips	Difference (Build minus No Build)
Single-Occupancy Vehicle	5,134,800	5,129,900	-4,900
High-Occupancy Vehicle	4,765,400	4,768,500	+3,100
Transit	693,100	693,900	+800
Active	1,284,300	1,285,300	+1,000
Total	**11,877,600**	**11,877,600**	**0**

Average Trip Length

To assess whether the Project is expected to affect the length of regional trips, average trip lengths for the Revised Build and No Build Alternatives were compared, as shown in Table 5-3. The Revised Build Alternative would have a minimal effect on overall trips lengths in the region.

Table 5-3. Comparison of No Build and Revised Build Alternative Average Trip Length in 2045

Performance Metric	No Build Alternative	Revised Build Alternative
Region-wide Average Trip Length	7.70 miles	7.68 miles

5.2.2 Traffic Volumes and Potential Rerouting

This section discusses projected traffic volumes for the No Build and Revised Build Alternatives in 2045 on roadways within the API, including I-205 and study arterials that feed or indirectly affect traffic in the API. The potential for rerouting is also discussed. Specific roadway capacities are omitted from this document as the volume changes are developed from post-processed model outputs. Although the models consider capacity in the distribution of traffic volumes, they are not necessarily representative of true operational capacities due to downstream congestion and operations at intersections. Section 5.2.3 discusses traffic operations and utilizes the volume to capacity ratio to better contextualize the increased volumes would result in impacts on a segment or intersection.

Daily Traffic Volumes

Table 5-4. summarizes the total daily trips that would enter and exit the API, comparing the No Build and Revised Build Alternatives. The regional modeling analysis indicates that the number of trips in and out of the API would be less under the Revised Build Alternative as compared to the No Build Alternative, with an overall reduction of approximately 2%.

Table 5-4. Projected Difference in 2045 Average Weekday Volumes into and out of API

Cordon Volume	No Build Alternative	Revised Build Alternative	Difference
Daily In (50%)	701,981	686,196	-2%
Daily Out (50%)	701,981	686,196	
Daily Total	1,403,961	1,372,392	

Peak-Hour Volumes

This section discusses AM and PM peak-hour volumes for the Revised Build Alternative as compared to the No Build Alternative in 2045, including I-205 and study arterials. For existing year (2021) conditions, the study area system AM peak hour is from 7:15 to 8:15 a.m. and the system PM peak hour is from 5:00 to 6:00 p.m. These peak hours were determined by assessing observed counts as described in Section 3.7.1. For 2045 conditions, the peak hour is assumed to be sometime within the 2-hour peak periods of 7:00 to 9:00 a.m. (AM peak) and 4:00 to 6:00 p.m. (PM peak).

Figure 5-8 shows projected AM and PM peak-hour volumes on I-205 and its on- and off-ramps from south of the SW Stafford Road interchange to north of the SE 82nd Drive interchange. Table 5-5 compares projected 2045 AM and PM peak-hour Revised Build Alternative and No Build Alternative volumes by direction on I-205 segments. In the AM peak hour, Revised Build Alternative peak-hour volumes would be lower than No Build Alternative volumes in both the northbound and southbound directions of I-205 due to the toll at the Abernethy Bridge. The largest reduction in northbound volumes would be on the Tualatin River Bridge (i.e., the segment of I-205 between 10th Street and SW Stafford Road), with projected 16% lower AM traffic volumes. In the southbound direction, the Tualatin River Bridge is also expected to experience the largest difference in peak-hour volumes under the Revised Build Alternative, at 20% lower than under the No Build Alternative. This change in volumes would likely result from the proposed toll at the Abernethy Bridge, as well as the existence of reasonably close and less congested southbound alternative roadways for rerouting.

For the PM peak hour, northbound I-205 would experience between 2% and 8% lower traffic volumes under the Revised Build Alternative as compared to the No Build Alternative between SW Stafford Road and OR 213. The alternative routes during the PM peak hour would attract more travelers to avoid potential congestion and tolls on the I-205 bridges. Southbound I-205 would also experience lower traffic volumes under the Revised Build Alternative as compared to the No Build Alternative, with the biggest difference projected between 10th Street and SW Stafford Road where traffic volumes would be nearly 44% lower under the Revised Build Alternative as compared to the No Build Alternative.

Figure 5-7. Projected No Build and Revised Build Alternative I-205 Mainline and Ramps Peak-Hour Volumes in 2045

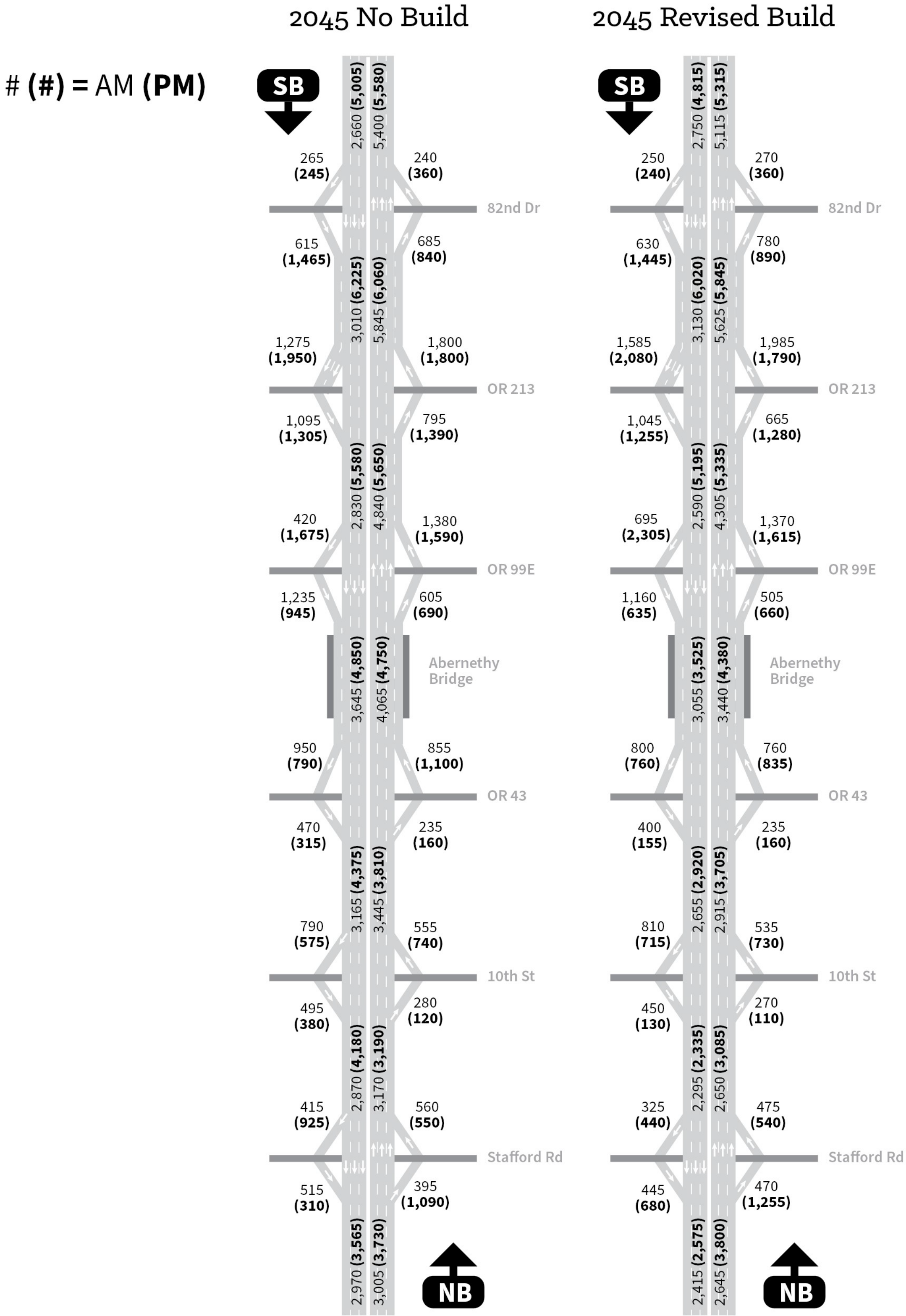


Table 5-5. Peak-Hour Volumes on I-205 Segments – No Build and Revised Build Alternatives in 2045

I-205 Segment	No Build Alternative		Revised Build Alternative		% Difference	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Northbound						
Between I-5 and SW Stafford Rd	3,005	3,730	2,645	3,800	-12.0%	1.9%
Between SW Stafford Rd and 10th St (Tualatin River Bridges)	3,170	3,190	2,650	3,085	-16.4%	-3.3%
Between 10th St and OR 43	3,445	3,810	2,915	3,705	-15.4%	-2.8%
Between OR 43 and OR 99E (Abernethy Bridge)	4,065	4,750	3,440	4,380	-15.4%	-7.8%
Between OR 99E and OR 213	4,840	5,650	4,305	5,335	-11.1%	-5.6%
Southbound						
Between OR 213 and OR 99E	2,830	5,580	2,590	5,195	-8.5%	-6.9%
Between OR 99E and OR 43 (Abernethy Bridge)	3,645	4,850	3,055	3,525	-16.2%	-27.3%
Between OR 43 and 10th St	3,165	4,375	2,655	2,920	-16.1%	-33.3%
Between 10th St and SW Stafford Rd (Tualatin River Bridges)	2,870	4,180	2,295	2,335	-20.0%	-44.1%
Between SW Stafford Rd and I-5	2,970	3,565	2,415	2,575	-18.7%	-27.8%

Projected changes in peak-hour volumes on local roadways are reflected in the No Build Alternative and Revised Build Alternative intersection volumes forecasted for the 15 study intersections. Detailed turning volumes data at the 15 study intersections are provided in Attachment J and Attachment K, respectively, for the No Build and Revised Build Alternatives. Table 56 compares projected AM and PM peak-hour Revised Build Alternative and No Build Alternative volumes in 2045 by direction on study corridors, and in some cases show how volumes at adjacent intersections may change. Figure 59 shows the locations of the numbered locations from Table 56.

The largest differences in local roadway volumes would occur along OR 99E, particularly in the Oregon City portion of the highway, because some travelers would reroute their trips to avoid the toll on the Abernethy Bridge. On some roadways in the western portion of the corridor an increase in volumes in the PM peak hour is expected as well. This increase is driven by changes in how local drivers would access I-205 under the Revised Build Alternative. OR 43 would also experience higher peak-hour volumes primarily in the peak AM (southbound) and peak PM (northbound) directions, due to the toll implementation in the Revised Build Alternative. Higher volumes do not necessarily indicate greater congestion beyond acceptable levels. If the capacity of the roadway and intersections can accommodate the higher volumes, then it is likely that no notable increase in congestion will occur. Congestion that may constitute an impact, would only occur if the intersection V/C ratios exceed 1.0 (see section 5.2.3 and table 5-11).

Figure 5-8. Locations of Arterial Study Corridors Used in Peak-Hour Volume Analysis

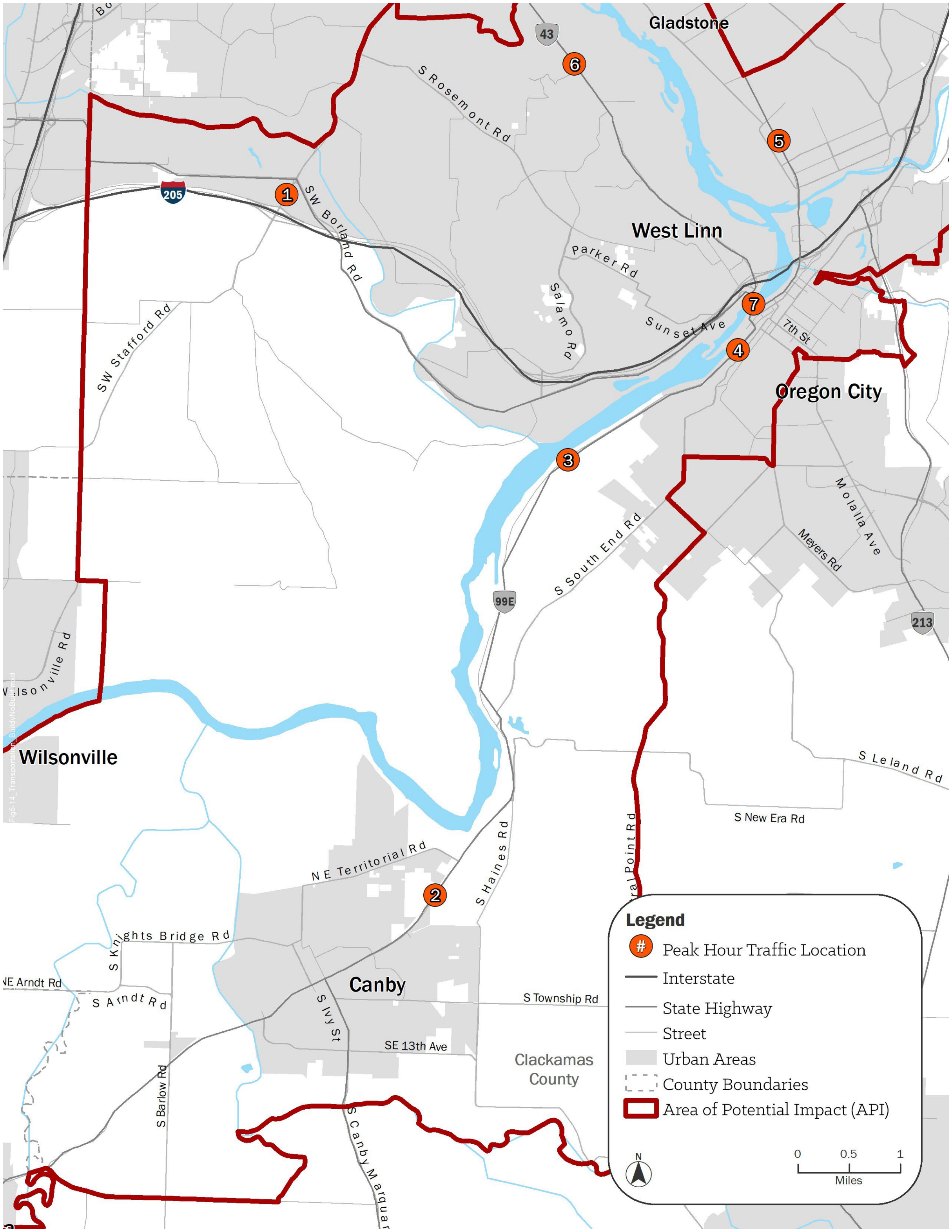


Table 5-6 Peak-Hour Volumes and Percentage Difference on Study Corridors – No Build and Revised Build Alternatives in 2045

Arterial Location	Direction	AM Peak Hour			PM Peak Hour		
		No Build	Revised Build	Percentage Difference	No Build	Revised Build	Percentage Difference
1. SW Stafford Rd North of I-205 Ramp Interchange	NB/EB	915	975	7%	1,030	975	-5%
	SB/WB	850	755	-11%	715	1,090	52%
2. OR 99E east of Redwood St	NB/EB	1,565	1,425	-9%	1,100	1,040	-5%
	SB/WB	635	745	17%	1,700	2,065	21%
3. OR 99E north of South End Rd	NB/EB	1,435	1,315	-8%	970	945	-3%
	SB/WB	540	630	17%	1,675	2,000	19%
4. OR 99E west of 10th St	NB/EB	1,195	1,185	-1%	1,410	1,450	3%
	SB/WB	875	1,275	46%	1,910	2,660	39%
5. OR 99E north of Gloucester St	NB/EB	1,300	1,190	-8%	1,385	1,390	0%
	SB/WB	1,040	1,010	-3%	2,195	1,870	-15%
6. OR 43 north of Hidden Springs Rd	NB/EB	1,360	1,395	3%	1,135	1,315	16%
	SB/WB	765	850	11%	1,155	945	-18%
7. OR 43 at Oregon City Arch Bridge	NB/EB	1,520	1,545	2%	1,030	1,285	25%
	SB/WB	580	765	32%	990	985	-1%

Note: Arterial location numbers in the first column correspond to the numbered locations in Figure 5-9.
EB = eastbound; NB = northbound; SB = southbound; WB = westbound

5.2.3 Traffic Operations

Future traffic operations under the No Build and Revised Build Alternatives in 2045 were analyzed for I--205 segments and study intersections within the API to determine Revised Build Alternative effects.

Northbound I-205 Corridor

HCM Freeway Facilities methodology (American Association of State Highway and Transportation Officials (AASHTO) 2005) was used to evaluate the traffic operating conditions on I-205 under the No Build and Revised Build Alternatives in 2045, as discussed in Chapter 3. To reflect the constrained demand conditions as projected by the DTA model under the No Build Alternative in 2045, adjustment factors were applied in the HCS 7 model.

Table 5-7 summarizes the highway operations analysis results for the No Build and Revised Build Alternatives in 2045 in the northbound direction for both AM and PM peak hours. As described above, LOS for the highway mainline and ramp segments is based on the calculated density at the segment. Some of the segments summarized in Table 5-7 and later in Table 5-8 would have low density and v/c ratio (less than 1.0) but are still anticipated to operate at LOS F. This is because, when the projected demand at a segment exceeds the capacity of the segment, the HCM methodology assigns an LOS F regardless of density or v/c ratio at that segment. The calculated demand-to-capacity (d/c) ratio at those segments would be greater than 1.0.

Attachment L and Attachment M include the HCS7 worksheets for the No Build and Revised Build Alternatives, respectively, that show the calculated d/c ratio at the study segments.

Table 5-7. No Build and Revised Build Alternative Highway Operations Analysis Results for Northbound I-205 in 2045

I-205 Northbound Highway Segment	Peak Hour	No Build Alternative				Revised Build Alternative			
		Speed	v/c	Density	LOS	Speed	v/c	Density	LOS
Between I-5 and Off-ramp to SW Stafford Rd	AM	61.8	0.48	17.9	B	61.8	0.42	15.8	B
	PM	61.8	0.59	22.2	C	61.8	0.60	22.7	C
Off-ramp to SW Stafford Rd	AM	60.8	0.47	10.9	B	60.3	0.41	16.9	A
	PM	59.4	0.58	16.0	B	59.0	0.62	16.8	B
On-ramp from SW Stafford Rd	AM	60.0	0.49	18.4	B	60.4	0.41	15.4	B
	PM	59.9	0.51	18.7	B	60.0	0.49	18.2	B
Between SW Stafford Rd and 10th St Off-ramp	AM	61.8	0.50	18.7	C	61.8	0.41	15.6	B
	PM	61.8	0.51	19.2	C	61.8	0.50	18.7	C
Off-ramp to 10th St	AM	61.1	0.49	21.4	C	60.9	0.41	18.4	B
	PM	61.5	0.51	21.6	C	61.5	0.49	21.1	C
On-ramp from 10th St	AM	51.6	0.56	19.8	B	52.0	0.47	16.9	B
	PM	51.3	0.62	22.3	C	51.5	0.61	21.8	C
Between 10th St and OR 43	AM	50.5	0.57	24.8	C	50.5	0.48	20.9	C
	PM	50.5	0.64	27.8	D	50.5	0.62	27.2	D
Off-ramp to OR 43	AM	52.0	0.56	20.8	C	52.0	0.47	17.8	B
	PM	52.1	0.62	22.8	C	52.1	0.61	22.3	C
Between OR 43 and OR 99E	AM	41.3	0.57	26.8	C	43.1	0.49	21.6	C
	PM	39.2	0.67	32.4	D	40.6	0.62	29.7	D
Between OR 99E and OR 213	AM	56.3	0.89	23.7	C	57.7	0.82	20.5	C
	PM	54.7	0.93	22.2	**F**	55.2	0.93	21.4	**F**
Between OR 213 and SE 82nd Dr	AM	33.7	**1.00***	47.9	**F**	36.5	**1.00***	38.5	**F**
	PM	36.2	0.83	36.6	**F**	36.0	0.87	36.7	**F**
On-ramp from SE 82nd Dr	AM	49.0	0.88	31.0	D	50.1	0.74	26.9	C
	PM	50.4	0.70	25.9	C	50.5	0.69	25.6	C

Notes: For merge and diverge segments, LOS criteria is based on ramp density. For basic and weaving segments, LOS criteria is based on density.
Bold* cells with an asterisk (*) indicate facility does not meet mobility target (i.e., 0.99 for the No Build Alternative and the Revised Build Alternative).
For v/c ratio value of merge and diverge segments, the higher one of freeway v/c ratio and ramp v/c ratio is selected.
LOS E/LOS F conditions shown in **BOLD** font.
Demand exceeds capacity (d/c): when d/c is greater than 1.0, then LOS F is assigned for that segment per HCM methodology.
Speed = mph; density = pc/mi/ln
LOS = level of service; v/c = volume-to-capacity ratio

Under the No Build Alternative in 2045, all segments along northbound I205 would meet the mobility standard (v/c ratio of 0.99 or less) during the AM peak hour and PM peak hour, except the segment between OR 213 and SE 82nd Drive during the AM peak hour. During the AM peak hour, northbound I-205 between OR 213 and SE 82nd Drive is projected to operate at LOS F. In addition, during the PM peak hour, the segments of northbound I205 from OR 99E to OR 213 and from OR 213 to 82nd Drive are projected to operate at LOS F. The mobility standard and LOS are based on two different but related measures. While the mobility standard focuses on v/c ratio, LOS is based on density of traffic at the study segment.

Under the Revised Build Alternative in 2045, the same northbound I-205 segment between OR 213 and SE 82nd Drive would exceed the mobility target of 0.99 v/c ratio. Note that the ODOT Highway Design Manual (HDM) (ODOT 2023) v/c ratio has a design standard of 0.75 during both the AM and PM peak hours, but because this project is not providing any roadway capacity infrastructure improvements, the HDM design standard is not applicable. In addition, the northbound segment between OR 99E and OR 213 in the PM peak hour and the segment between OR 213 and SE 82nd Drive in the AM and PM peak hours are projected to operate at LOS F.

These results are consistent with the traffic patterns extracted from the DTA model. Figure 5-10 and Figure 5-11 illustrate the speeds on northbound I-205 under the No Build and Revised Build Alternatives during the AM and PM peak periods, respectively. In these figures, time is reflected along the X axis for the 2-hour peak period and distance is indicated by the Y axis through the corridor between I-5 and the OR 212/224 interchange. Speeds are reflected by the colors within the charts, with red colors indicating very slow speeds (less than 10 miles per hour [mph]) and blue shades representing the highest speeds (50 mph or greater).

Under both the No Build Alternative and Revised Build Alternative, northbound I-205 speeds would be predominantly 50 mph or higher throughout the entire corridor during the AM peak period, as shown in Figure 5-10. A similar trend would occur on northbound I-205 in the PM peak period between SW Stafford Road and OR 212/OR 224, as shown in Figure 5-11. However, south of Stafford Road, both alternatives are projected to experience slower speeds during the full two-hour peak period under the No Build Alternative but only during a portion of the peak period (about an hour) for the Revised Build Alternative. Overall, under the Revised Build Alternative in 2045, there would be less congestion on northbound I-205 during the PM peak period compared to the No Build Alternative. The Revised Build Alternative is expected to provide better operating conditions with lower travel times and higher speeds on I-205 in the northbound direction. Overall, conditions are expected to be slightly better with the Revised Build Alternative in comparison to the No Build Alternative.

Figure 5-9. No Build and Revised Build Alternative Highway Speed Temporal Charts for I-205 Northbound AM Peak Period in 2045

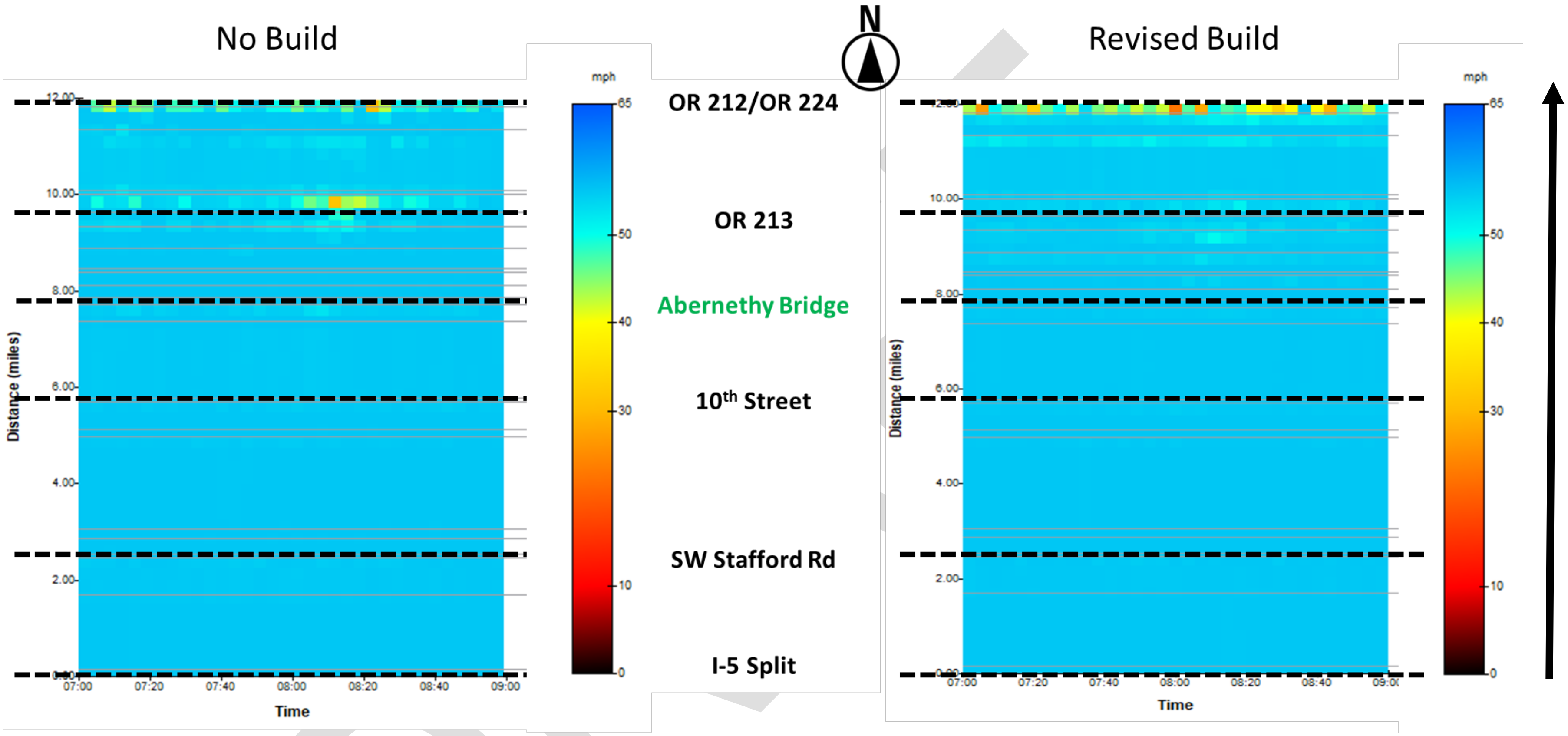
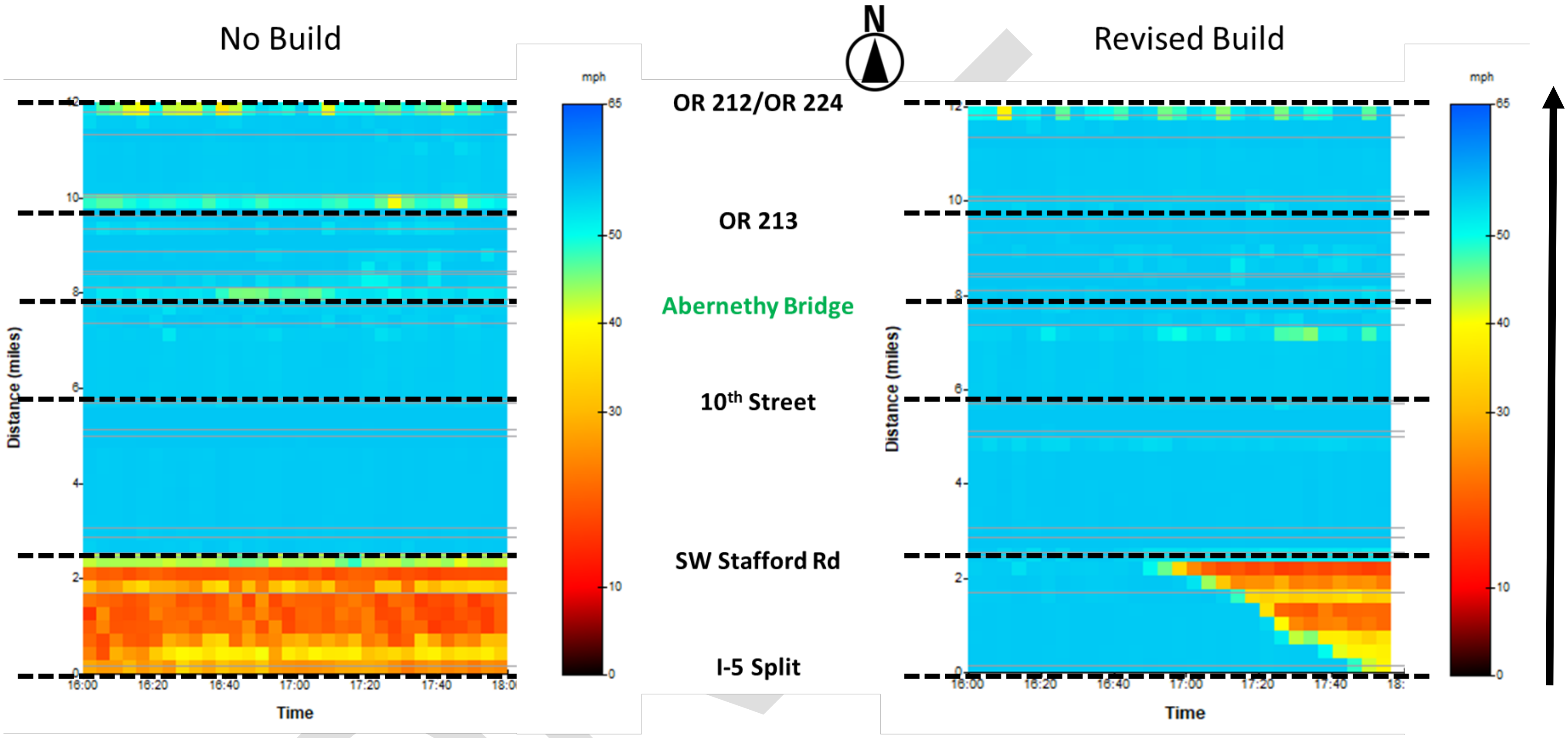


Figure 5-10. No Build and Revised Build Alternative Highway Speed Temporal Charts for I-205 Northbound PM Peak Period in 2045



Southbound I-205 Corridor

Table 5-8 summarizes the highway operations analysis results for the No Build and Revised Build Alternatives in 2045 on southbound I-205 for both the AM and PM peak hours. See Attachments L and M for details.

Under the No Build Alternative in 2045, all segments along southbound I-205 would meet the mobility target during the AM peak hour and PM peak hour. However, southbound I-205 between SE 82nd Drive and OR 213 would operate at LOS E during the PM peak hour.

Table 5-8. No Build and Revised Build Alternative Highway Operations Analysis Results for Southbound I-205 in 2045

I-205 Southbound Highway Segment	Peak Hour	No Build Alternative				Revised Build Alternative			
		Speed	v/c	Density	LOS	Speed	v/c	Density	LOS
North of SE 82nd Dr	AM	51.3	0.43	18.6	C	51.3	0.44	19.2	C
	PM	51.3	0.81	34.9	D	51.3	0.78	33.6	D
Off-ramp to SE 82nd Dr	AM	53.3	0.42	17.3	B	53.3	0.44	17.8	B
	PM	52.7	0.80	29.2	D	52.8	0.77	28.4	D
Between SE 82nd Dr and OR 213	AM	47.7	0.56	17.2	B	47.8	0.66	17.9	B
	PM	40.9	0.94	40.6	**E**	41.5	0.98	38.4	**E**
On-ramp from OR 213	AM	51.7	0.59	20.5	C	51.8	0.56	19.1	B
	PM	48.8	0.90	34.3	D	49.6	0.82	31.9	D
Off-ramp to OR 99E	AM	53.0	0.45	18.4	B	52.4	0.41	17.7	B
	PM	51.3	0.89	34.1	D	50.0	**1.14***	34.2	**F**
Between OR 99E and OR 43	AM	39.1	0.88	25.3	C	41.0	0.78	20.3	C
	PM	38.8	0.69	33.5	D	41.9	0.58	23.1	C
On-ramp from OR 43	AM	51.4	0.51	21.0	C	51.7	0.43	18.2	B
	PM	50.3	0.70	26.2	C	51.4	0.48	19.0	B
Between OR 43 and 10th St	AM	50.5	0.51	22.4	C	50.5	0.43	18.8	C
	PM	50.5	0.71	31.0	D	50.5	0.49	21.3	C
Off-ramp to 10th St	AM	52.5	0.50	21.7	C	52.3	0.42	19.0	B
	PM	52.7	0.70	27.3	C	52.6	0.48	20.7	C
On-ramp from 10th St	AM	51.8	0.46	17.7	B	52.2	0.37	14.7	B
	PM	50.8	0.66	23.8	C	52.1	0.39	14.5	B
Between 10th St and SW Stafford Rd	AM	62.7	0.44	16.4	B	62.7	0.35	13.1	B
	PM	62.7	0.64	23.9	C	62.7	0.38	13.9	B
Off-ramp to SW Stafford Rd	AM	60.6	0.44	16.0	B	60.6	0.35	12.6	B
	PM	59.7	0.64	23.8	C	60.4	0.37	13.6	B
On-ramp from SW Stafford Rd	AM	60.4	0.46	16.5	B	60.7	0.37	13.5	B
	PM	59.9	0.54	18.7	B	60.5	0.41	15.3	B
South of SW Stafford Rd	AM	63.7	0.45	16.7	B	63.7	0.37	13.6	B
	PM	63.7	0.55	20.0	C	63.7	0.41	15.1	B

Notes: For merge and diverge segments, ramp density is used. For basic and weaving segments, density is used.

Bold* cells with an asterisk (*) indicate facility does not meet mobility target (i.e., 0.99 for the No Build Alternative and the Revised Build Alternative).
For v/c ratio value of merge and diverge segments, the higher one of freeway v/c ratio and ramp v/c ratio is selected.
LOS E/LOS F conditions shown in **BOLD** font.
Demand exceeds capacity (d/c): when d/c is greater than 1.0, then LOS F is assigned for that segment per HCM methodology.
Speed = mph; density = pc/mi/ln
LOS = level of service; v/c = volume-to-capacity ratio

Under the Revised Build Alternative in 2045, all segments along southbound I-205 would meet the mobility target during the AM peak hour and PM peak hour. However, the southbound I-205 off-ramp to OR 99E would exceed the mobility target of 0.99 v/c ratio. Also, the segment between 82nd Drive and OR 213 and the southbound I-205 off-ramp to OR 99E are projected to operate at LOS E/LOS F during the PM peak hour.

Figure 5-12 and Figure 5-13 illustrate the speeds on southbound I-205 under the No Build and Revised Build Alternatives in 2045 during the AM and PM peak periods from the DTA model. Under the No Build Alternative, bottleneck conditions would occur on southbound I-205 during the PM peak period. During both the AM and PM peak periods, southbound I-205 would slow down between OR 212 and OR 43 under the No Build Alternative.

Under the Revised Build Alternative in 2045, there would be less congestion on a short segment from OR 212 to OR 213 in the southbound direction during the AM peak period compared to the No Build Alternative. Similarly, during the PM peak period, there would be less congestion on a short segment from OR 212 to north of OR 213. Traffic speeds would increase starting just south of OR 213. Overall, the Revised Build Alternative would provide better operating conditions with improved travel times on southbound I-205.

Figure 5-11. No Build and Revised Build Alternative Highway Speed Temporal Charts for I-205 Southbound AM Peak Period in 2045

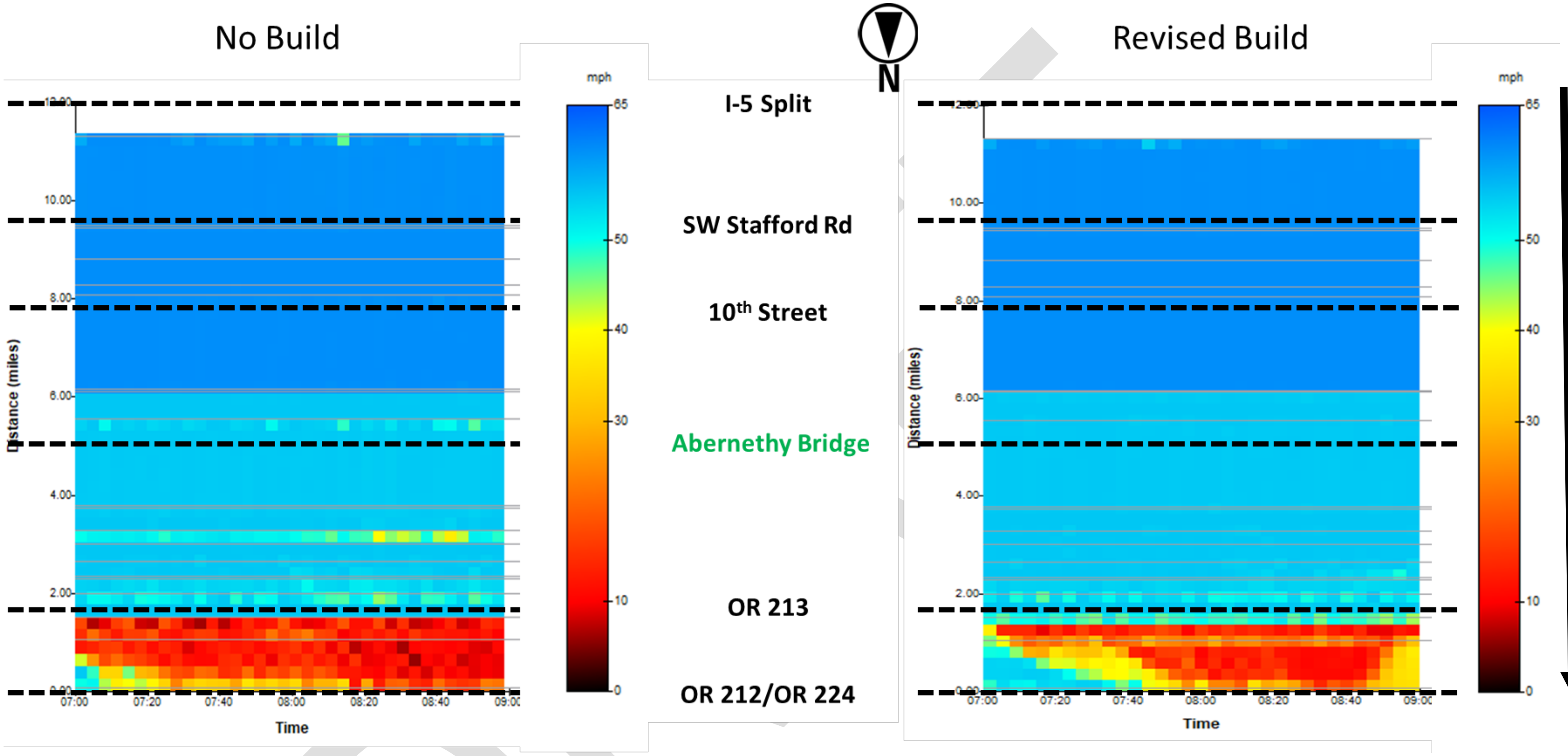
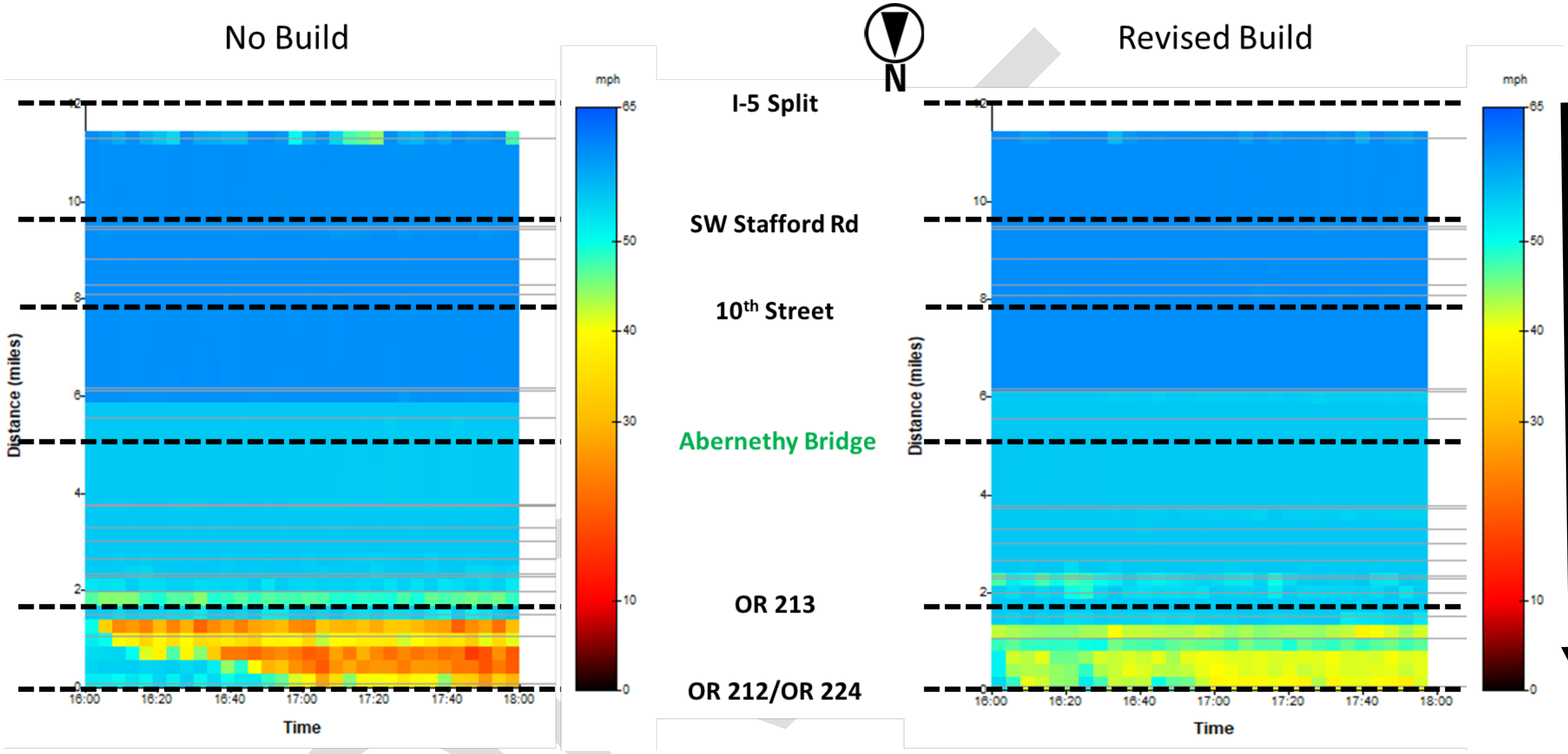


Figure 5-12. No Build and Revised Build Alternative Highway Speed Temporal Charts for I-205 Southbound PM Peak Period in 2045



Another way to compare the No Build Alternative and Revised Build Alternative is to project how many hours of a typical weekday that a roadway would operate under congested conditions. Table 5-9 summarizes a simple indicator of congestion based on v/c ratios from the RTDM. Heavy congestion includes any hour of the day where the v/c ratio would be greater than 0.90, while moderate congestion is indicated where the v/c ratio would be between 0.80 and 0.90.

Under the No Build Alternative, two I-205 segments (at the Abernethy Bridge and between OR 99E and OR 213) are expected to be congested for up to 6 hours a typical weekday. Under the Revised Build Alternative, one segment (between OR 99E and OR 213) is projected to be congested for up to 3 hours during a typical weekday.

Table 5-9. Revised Build Alternative vs. No Build Alternative Typical Weekday Hours of Congestion on I-205 in 2045

Alternative	Level of Congestion	Hours of Congestion by I-205 Segment							
		SW Stafford Rd – 10th St		10th St – OR 43		Abernethy Bridge		OR 99E – OR 213	
		NB	SB	NB	SB	NB	SB	NB	SB
No Build	Heavy	0	0	0	0	0	0	0	3
	Moderate	0	0	0	0	2	2	3	6
Revised Build	Heavy	0	0	0	0	0	0	0	0
	Moderate	0	0	0	0	0	0	0	3

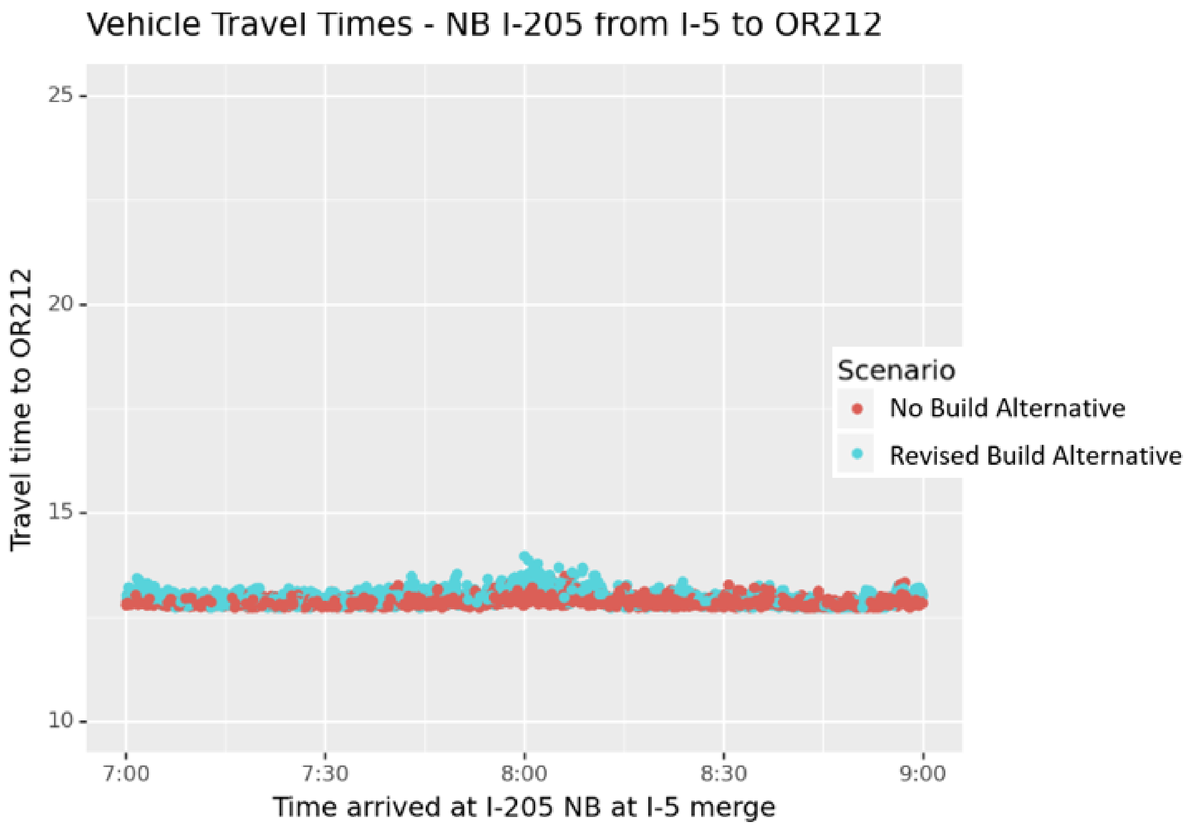
NB = northbound; SB = southbound

I-205 Travel-Time Reliability

Travel-time reliability relates to how consistently predictable travel time for a given trip is. Reliability is particularly important for roadway users who need to arrive at their destinations by a given time (e.g., commuters who need to be at work by a certain time, freight haulers who need to deliver goods by a certain time). To provide an indication of the reliability of trips along I-205 during peak periods, travel time results for each trip simulated in the DTA model between I-5 and OR 212 were plotted. Results are shown in Figure 5-14, Figure 5-15, Figure 5-16, and Figure 5-17 for northbound AM and PM peak periods and for southbound AM and PM peak periods, respectively. Each figure shows estimated travel times for the No Build and Revised Build Alternatives in 2045. The greater the width of the plotted line for each alternative in the figure, as well as the amount of variability over each 2-hour period, the more unreliable a trip during that time period would be. As a facility becomes more congested, traffic operations become more unstable and wider variations in travel time occur as a result.

For the northbound direction in the AM peak period (Figure 5-14), both the No Build and Revised Build Alternatives are projected to experience a stable 13- to -14-minute trip throughout the AM peak period.

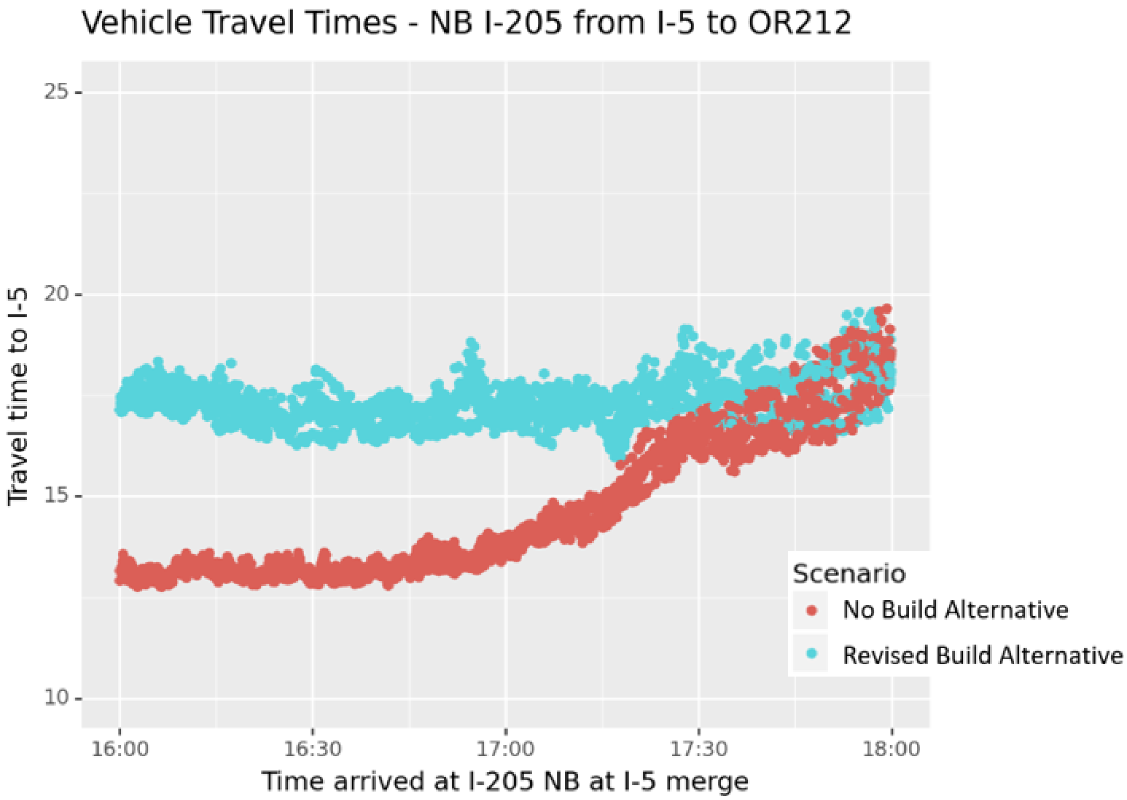
Figure 5-13. I-205 Northbound AM Peak-Period Travel Times – Model Results* for No Build and Revised Build Alternatives in 2045



*Source: DTA model

Overall traffic conditions are expected to be the most congested on I-205 northbound during the PM peak period. For this direction and time period, the No Build Alternative is projected to experience some variation, with travel times ranging between 16 and 19 minutes (Figure 5-15). The Revised Build Alternative, however, is projected to experience more stable conditions during the first hour, with trip times projected to be from 13 to 15 minutes between 4:00 p.m. and 5:00 p.m., and then as congestion builds to rise steadily to about 19 minutes at 6:00 p.m. The variation still remains between 16 and 19 minutes at 6 p.m.

Figure 5-14. I-205 Northbound PM Peak-Period Travel Times – Model Results* for No Build and Revised Build Alternatives in 2045



*Source: DTA model

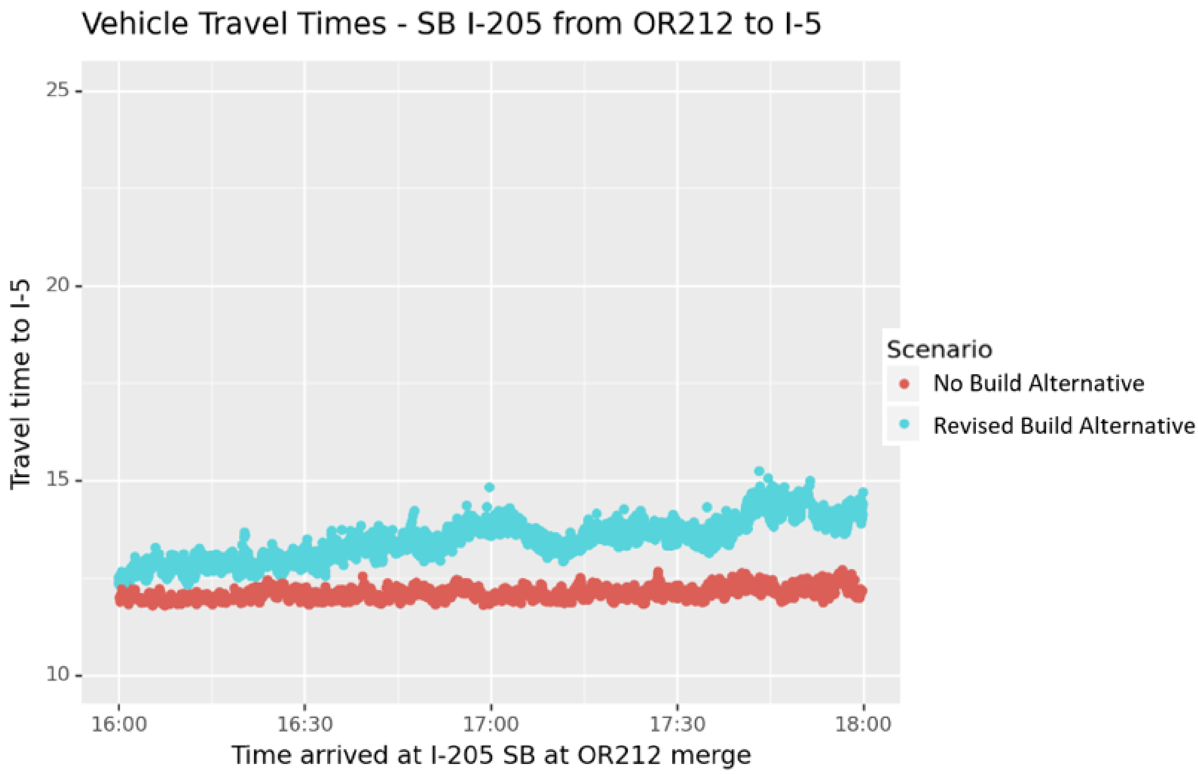
Overall traffic conditions are also expected to be congested on I-205 southbound during the AM peak period. For this direction and time period, the No Build Alternative is projected to experience continual variation, with travel times ranging between 15 and 23 minutes (Figure 5-16) and to be volatile during any point in time during that period. For example, a trip at 7:30 a.m. could vary between 16 and 20 minutes, and at 8:45 a.m., between 18 and 23 minutes. The Revised Build Alternative is projected to experience a consistently lower travel time between 7:00 a.m. and 7:45 a.m., ranging from 12 to 15 minutes, with a variation of about 2 minutes. After 7:45 a.m., travel time would increase up to 20 to 23 minutes and continues to remain in the same range until 9:00 a.m., with a variation of 2 to 4 minutes at any single point of time from 7:45 a.m. to 9:00 a.m.

Figure 5-15. I-205 Southbound AM Peak-Period Travel Time – Model Results* for No Build and Revised Build Alternatives in 2045

*Source: DTA model

For the southbound direction in the PM peak period (Figure 5-17), the No Build Alternative is projected to experience a slight variation, with travel times ranging between 13 and 15 minutes. The Revised Build Alternative is projected to experience slightly lower travel times, between a 12 and 13 minute trip throughout the 2-hour period.

Figure 5-16. I-205 Southbound PM Peak-Period Travel Time – Model Results* for No Build and Revised Build Alternatives in 2045



*Source: DTA model

Peak Hour I-205 Travel Times

Table 5-10 summarizes expected peak-period travel times along I-205 between the I-5 ramps and SE 82nd Drive for the Revised Build and No Build Alternatives in 2045. Under the Revised Build Alternative, the largest difference in I-205 travel times would occur during the PM peak period in the northbound direction. Travel times would be more than 17 minutes under the No Build Alternative and less than 14 minutes under the Revised Build Alternative, which amounts to 25% lower travel times for the Revised Build Alternative. I-205 travel times would be similar between the No Build and Revised Build Alternatives during the AM peak period in the northbound direction and during both peak periods in the southbound direction, with 1% to 2% lower travel times under the Revised Build Alternative compared to the No Build Alternative. These travel times are also displayed graphically in Figure 5-18, along with projected No Build and Revised Build Alternative travel times for study arterial roadways within the API.

Table 5-10. No Build and Revised Build Alternative Average Peak-Hour Travel Times on I-205 between I-5 and SE 82nd Drive (minutes) in 2045

Corridor	From	To	No Build		Revised Build		Difference		% Difference	
			7-9 AM	4-6 PM	7-9 AM	4-6 PM	7-9 AM	4-6 PM	7-9 AM	4-6 PM
I-205 NB	I-5 ramps	SE 82nd Dr	11.2	17.4	11.1	13.2	-0.1	-4.3	-1%	-25%
I-205 SB	SE 82nd Dr	I-5 ramps	13.6	11.7	13.3	11.4	-0.3	-0.3	-2%	-2%

NB = northbound; SB = southbound

Peak-Hour Travel Times along Study Arterial Corridors

Figure 5-19 through Figure 5-23 highlight travel times along SW Stafford Road, I-205 between I-5 and SE 82nd Drive, OR 43, Main Street in Oregon City, and OR 99E within the API, respectively. Each figure breaks the corridor down into sub-segments to identify segments that would have the most substantial differences in travel times under the Revised Build Alternative compared to the No Build Alternative.

Figure 5-19 shows projected travel times on SW Stafford Road for two segments: (1) between SW Borland Road and the northbound I-205 ramps and (2) between the northbound ramps and SW Mountain Road. The largest changes are expected to occur during the PM peak hour for northbound traffic traveling toward the I-205 interchange. On northbound SW Stafford Road between SW Mountain Road and the I-205 northbound ramps, travel times in the PM peak hour are projected to be more than 6 minutes lower under the Revised Build Alternative than under the No Build Alternative. On southbound SW Stafford Road from SW Borland Road to the I-205 northbound ramps, travel times during the PM peak hour are projected to be more than 2 minutes lower under the Revised Build Alternative compared to the No Build Alternative. These differences would occur because the Revised Build Alternative is expected to result in improved northbound I-205 operations during the PM peak hour, which would result in lower levels of congestion along SW Stafford Road leading to the interchange.

Figure 5-20 shows projected travel times on I-205 between I-5 and SE 82nd Drive. On southbound I-205, there would be minimal differences in travel times during both the AM and PM peak hours under the Revised Build Alternative compared to the No Build Alternative. On northbound I-205, PM peak-hour travel times are projected to be more than 4 minutes lower under the Revised Build Alternative compared to the No Build Alternative, while AM peak hour travel times are projected to be similar between the Revised Build and No Build Alternatives.

Figure 5-21 shows projected travel times for OR 43 for two segments: (1) between Hidden Springs Road and McKillican Street and (2) between McKillican Street and Main Street. In the northbound direction, there would be minimal differences in travel times between the Revised Build and No Build Alternatives for both segments during both the AM and PM peak periods. In the southbound direction, travel times would be similar between both alternatives on the Hidden Springs Road to McKillican Street segment during the AM peak hour. Travel times on this same segment would be about 5 minutes lower during the PM peak hour under the Revised Build Alternative because of a reduction in traffic volumes, as some trips using southbound OR 43 would reroute to northbound I-205 north of the study area. For the southbound McKillican Street to Main Street segment, which crosses the Arch Bridge into downtown Oregon City, travel times are projected to be more than 1 minute lower under the Revised Build Alternative compared to the No Build Alternative during the AM peak period. However, the PM peak-hour travel time is projected to be nearly 5 minutes higher under the Revised Build Alternative primarily due to backups from congestion in downtown Oregon City.

Figure 5-22 shows travel times for the Main Street corridor in downtown Oregon City for two segments: (1) between 10th Street and 15th Street and (2) between 10th Street and OR 99E. The Oregon City

Transit Center, a regional transit hub, is located on Main Street between Moss Street and 11th Street. In the southbound direction, travel times for the full Main Street corridor would have no notable difference during the AM peak hour and would be about 4 minutes higher during the PM peak hour under the Revised Build Alternative compared to the No Build Alternative. In the northbound direction, travel times for the full Main Street corridor would be more than 1 minute higher during both the AM and PM peak hours under the Revised Build Alternative compared to the No Build Alternative. Most of the higher travel times during the PM peak hour would occur in the south half of the corridor between 10th Street and OR 99E. The higher northbound travel times would be mainly due to increased volumes along Main Street going to the Arch Bridge. The signal at Main Street and 7th Street is capacity constrained, which would contribute to the higher travel times on southbound Main Street between 10th Street and OR 99E.

Figure 5-23 shows travel times on OR 99E for three segments: (1) north of Oregon City (between Concord Road and W Arlington Street), (2) through downtown Oregon City (between W Arlington Street and S 2nd Street), and (3) south of Oregon City to Canby (between S 2nd Street and Grant Street). In the southbound direction, travel times for the full OR 99E corridor would be more than 1 minute lower under the Revised Build Alternative compared to the No Build Alternative during the AM peak hour, while there would be minimal projected differences between the alternatives during the PM peak hour. In the northbound direction, overall travel times are projected to be about 1 minute higher under the Revised Build Alternative compared to the No Build Alternative during both the AM and PM peak hours.

Figure 5-17. No Build Alternative vs. Revised Build Alternative (Revised Build minus No Build) Peak-Hour Travel Times for Study Corridors in 2045

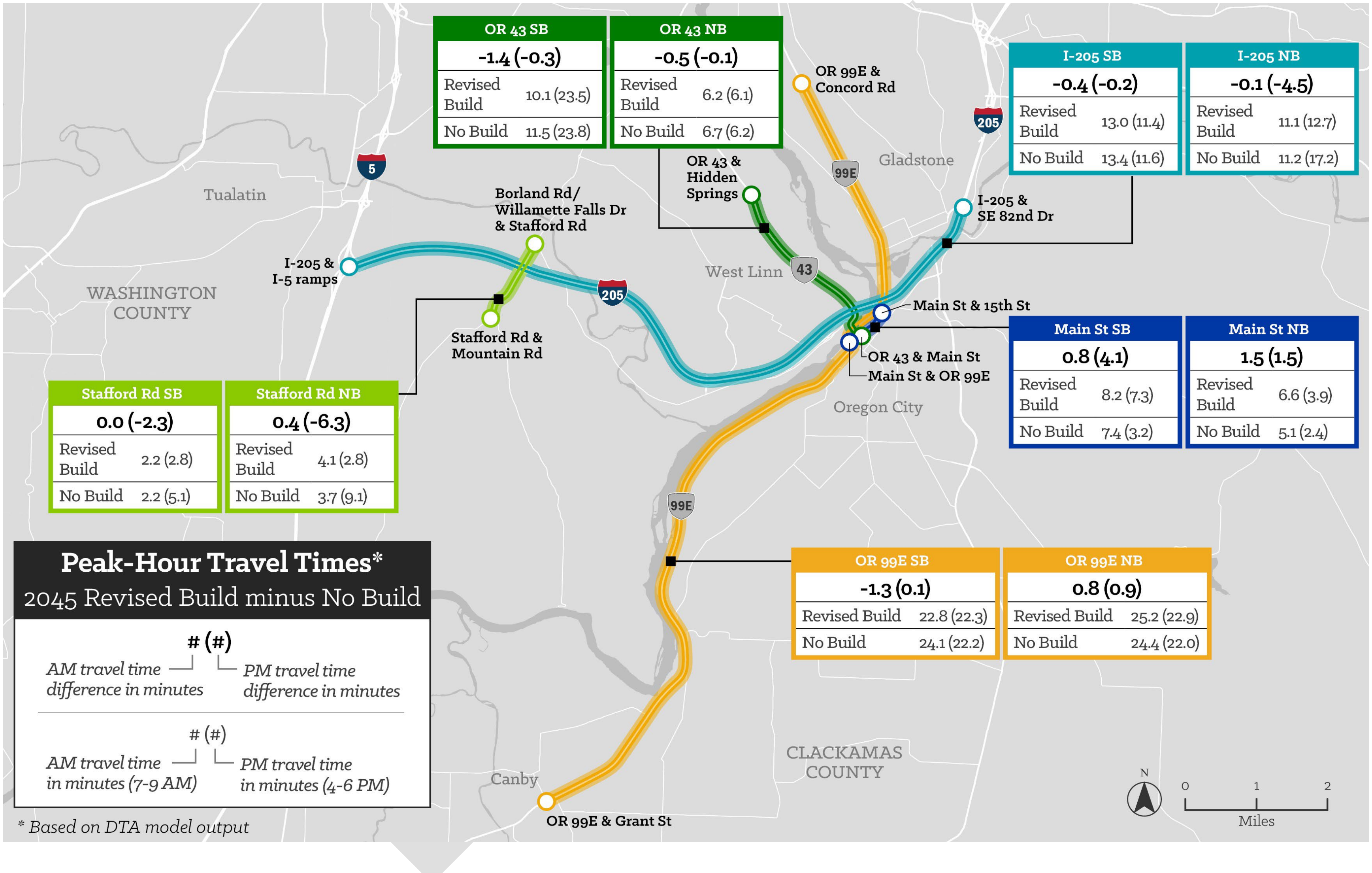


Figure 5-18. No Build Alternative vs. Revised Build Alternative (Revised Build minus No Build) Peak-Hour Travel Times – SW Stafford Road Corridor in 2045

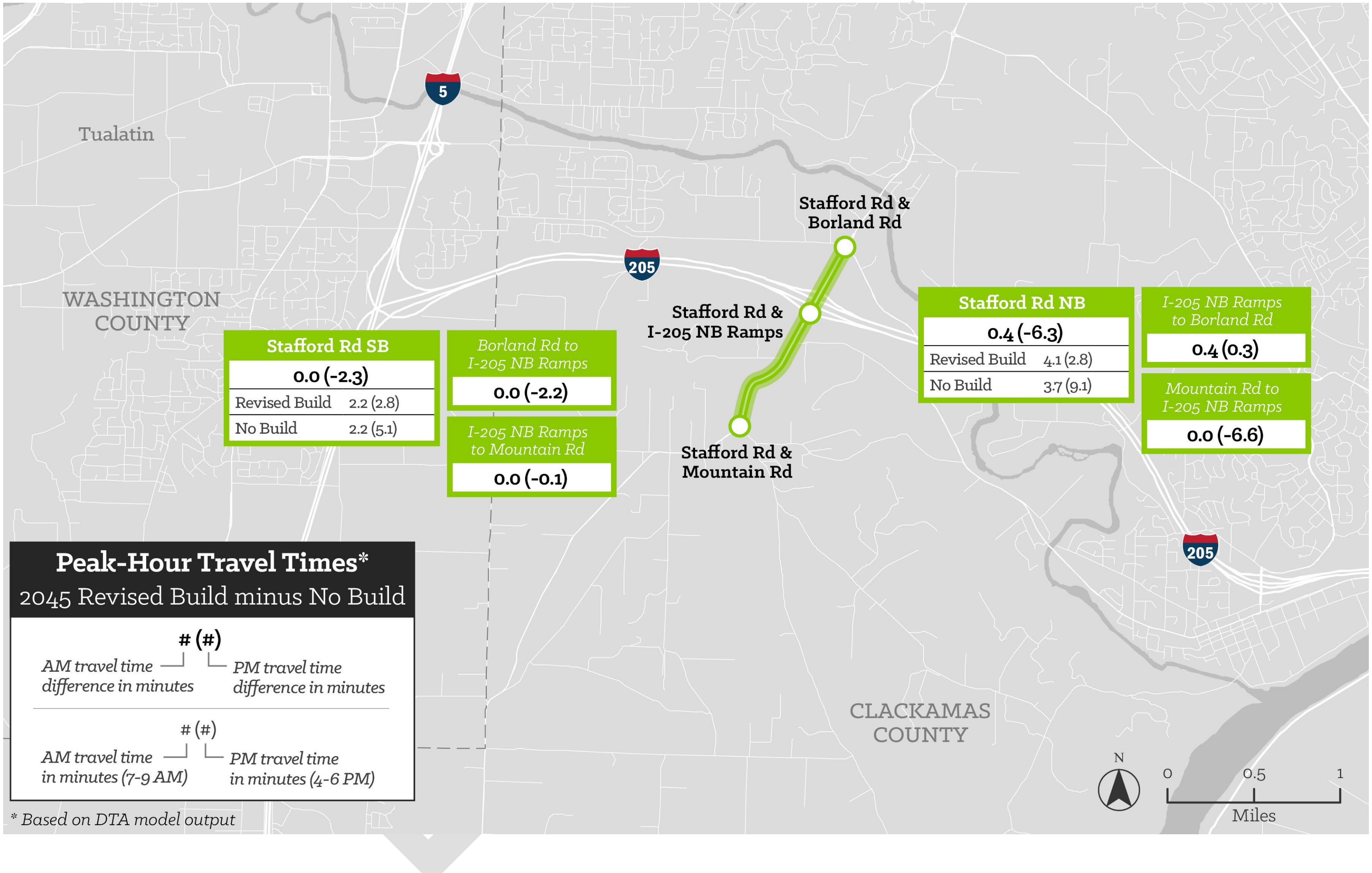


Figure 5-19. No Build Alternative vs. Revised Build Alternative (Revised Build minus No Build) Peak-Hour Travel Times – I-205 Corridor in 2045

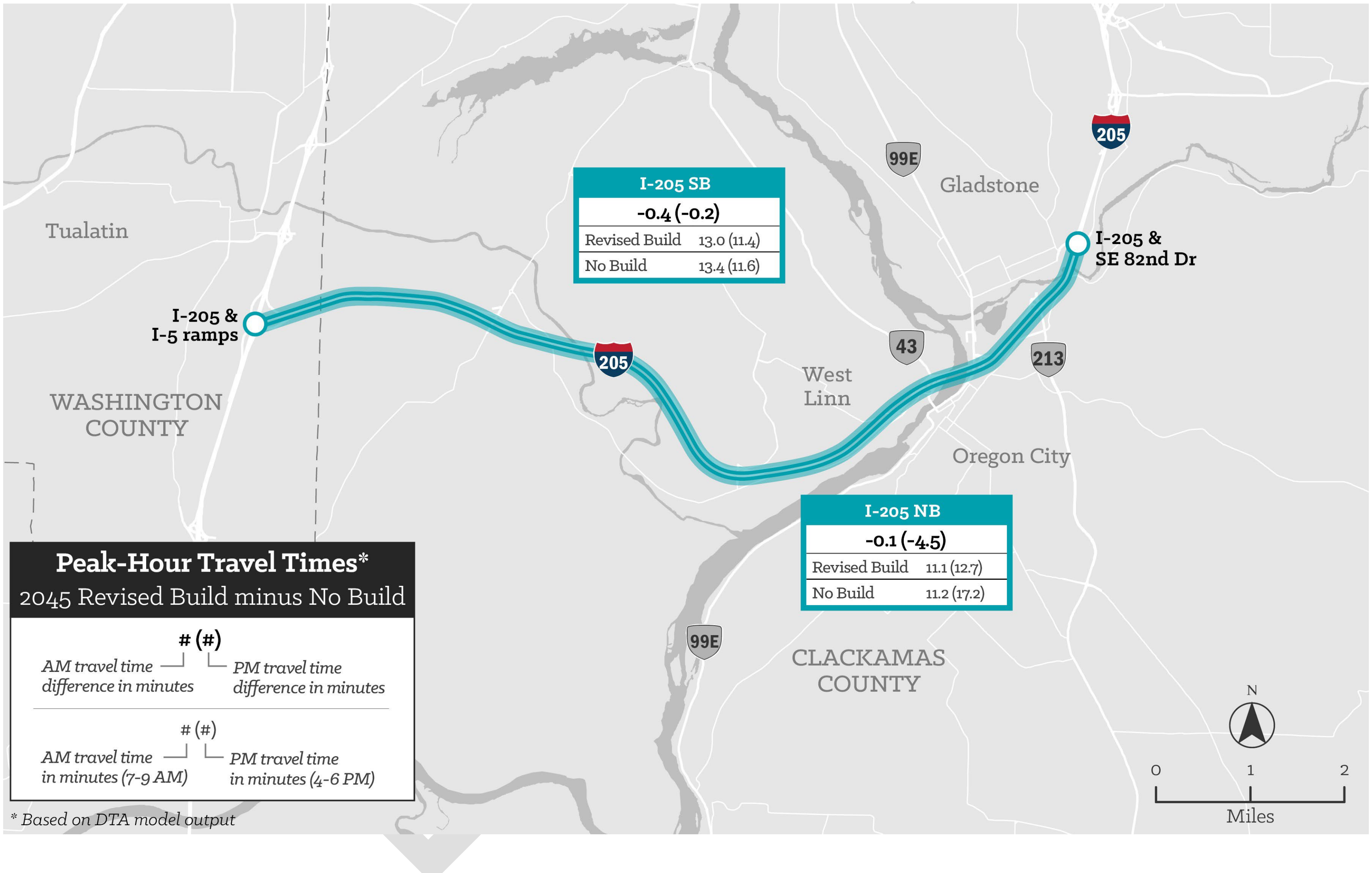


Figure 5-20. No Build Alternative vs. Revised Build Alternative (Revised Build minus No Build) Peak-Hour Travel Times – OR 43 Corridor in 2045

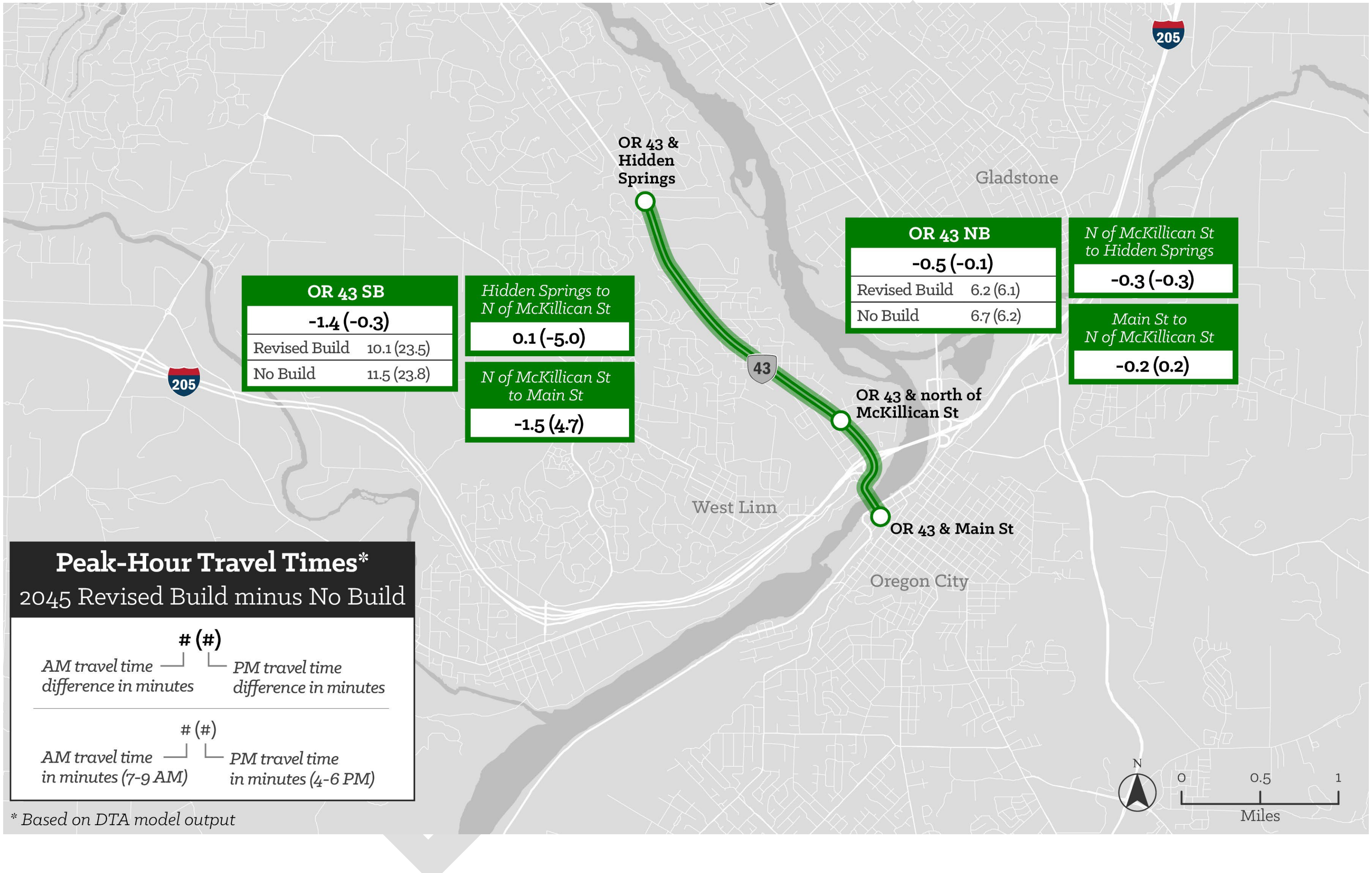


Figure 5-21. No Build Alternative vs. Revised Build Alternative (Revised Build minus No Build) Peak-Hour Travel Times – Oregon City Main Street Corridor in 2045

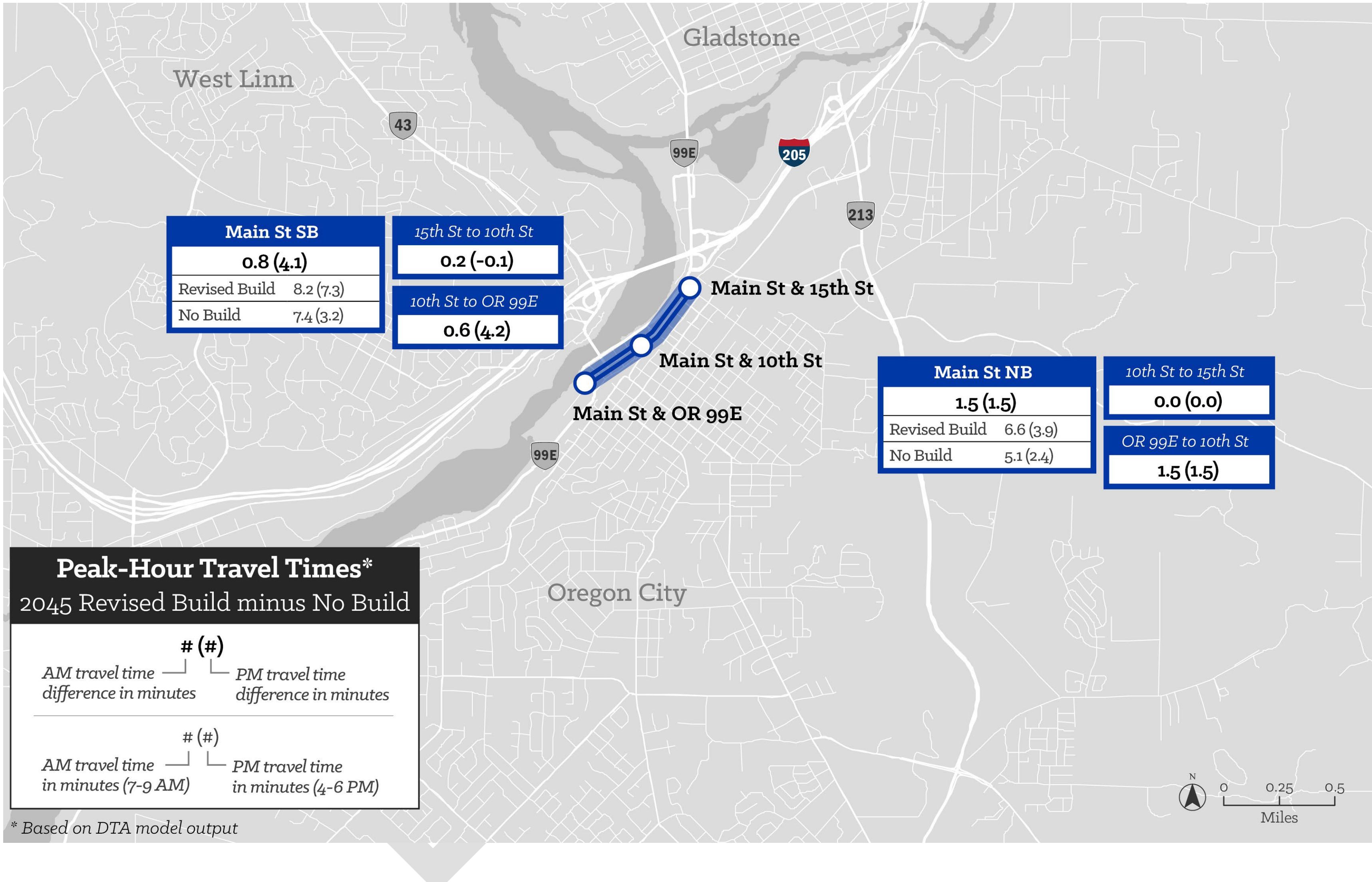
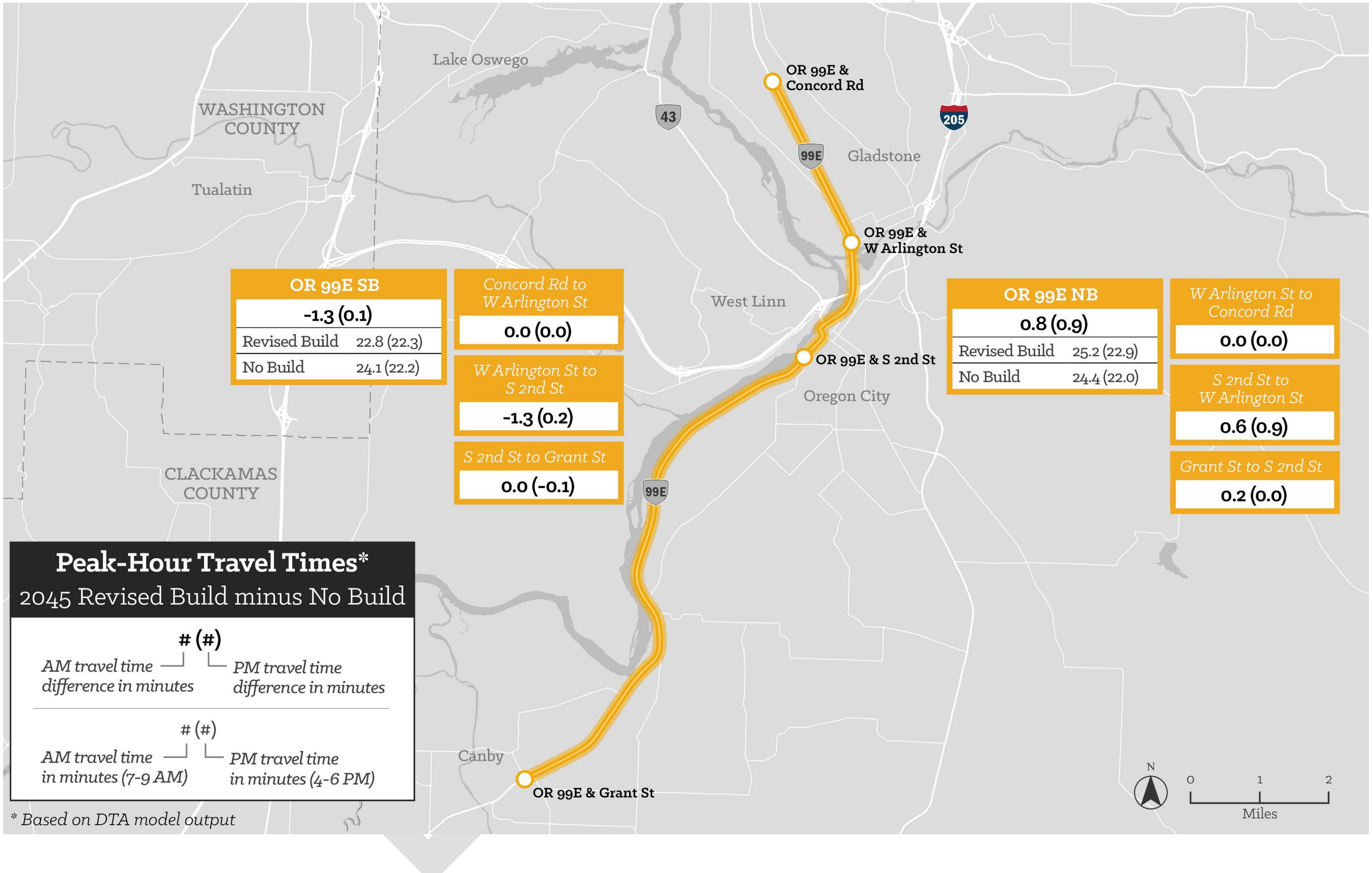


Figure 5-22. No Build Alternative vs. Revised Build Alternative (Revised Build minus No Build) Peak-Hour Travel Times – OR 99E Corridor in 2045



2045 Intersection Operations

AM Peak Hour

Table 5-11 lists the No Build and Revised Build Alternative intersection operational analysis results for the AM peak hour (see Attachments N and O for details) in 2045 and compares them to the mobility target for each location. Of the 15 study intersections, seven would operate within identified mobility targets under both the No Build Alternative and the Revised Build Alternative. As shown in Table 5-11, the following eight intersections would not meet the mobility target during the AM peak hour under both the No Build and Revised Build Alternatives:

- The signalized intersection at OR 43 and Hidden Springs Road
- The stop-controlled intersection at OR 43 and Willamette Falls Drive
- The stop-controlled intersection at OR 99E and 15th Street
- The signalized intersection at OR 99E and 14th Street
- The signalized intersection at OR 99E and S 2nd Street
- The stop-controlled intersection at OR 99E and South End Road
- The stop-controlled intersection at OR 99E and S New Era Road
- The stop-controlled intersection at Main Street and 10th Street

Conditions would be comparatively[8] worse under the Revised Build Alternative compared to the No Build Alternative at two of the eight intersections listed above:

- The signalized intersection at OR 43 and Hidden Springs Road, where critical eastbound left-turn and southbound left-turn movements would experience higher delays due to increased mainline traffic volume along OR 43 under the Revised Build Alternative.
- The stop-controlled intersection at OR 99E and S New Era Road, where an increase in New Era Road left-turn traffic seeking a gap along the high-speed OR 99E traffic in both travel directions at once would lead to higher delays under the Revised Build Alternative.

[8] An intersection is considered comparatively worse if the calculated v/c ratio under the Revised Build Alternative is at least 0.05 greater than under the No Build Alternative, or the increase in average delay at the intersection is at least 10 seconds greater based on the jurisdictional mobility measure.

Table 5-11. No Build and Revised Build Alternative Intersection Operational Analysis Results for AM Peak Hour in 2045

No.	Intersection	Traffic Control	Mobility Target	No Build Alternative			Revised Build Alternative		
				v/c	Delay (secs/veh)	LOS	v/c	Delay (secs/veh)	LOS
1	OR 43 and Hidden Springs Rd	Signalized	v/c 0.99	**1.72***	**153.2***	**F***	**1.87***	**185.7***	**F***
2	OR 43 and McKillican St	Signalized	v/c 0.99	0.26	170.6	F	0.49	205.0	F
3	OR 43 and Willamette Falls Dr	Stop Controlled	v/c 0.99	**>2***	**>300***	**F***	**>2***	**>300***	**F**
4	OR 99E and I-205 NB Ramps	Signalized	v/c 0.85	0.73	55.7	E	0.73	62.8	E
5	OR 99E and 15th St	Stop Controlled	v/c 1.1	**1.48***	**274.9***	**F***	**1.25***	**180.5***	**F***
6	OR 99E and 14th St	Signalized	v/c 1.1	**1.38***	**42.0***	**D***	**1.21***	**36.2***	**D***
7	OR 99E and 10th St	Signalized	v/c 1.1	0.86	17.7	B	0.83	14.9	B
8	OR 99E and Main St	Signalized	v/c 1.1	0.79	15.5	B	0.77	13.9	B
9	OR 99E and S 2nd St	Signalized	v/c 1.1	**1.41**	**129.0***	**F***	**1.30***	**98.4***	**F***
10	OR 99E and South End Rd	Stop Controlled	v/c 0.75	**>2***	**>300***	**F***	**>2***	**>300***	**F***
11	OR 99E and S New Era Rd	Stop Controlled	v/c 0.75	**1.41***	**>300***	**F***	**>2***	**>300***	**F***
12	OR 99E and W Arlington St	Signalized	v/c 1.1	0.69	17.4	B	0.63	16.3	B
13	OR 99E and 12th St	Signalized	v/c 1.1	0.65	17.6	B	0.42	15.8	B
14	Main St and 10th St	Stop Controlled	LOS D	**1.05***	**90.3***	**F***	**0.85***	**43.3***	**E***
15	SW Stafford Rd and I-205 SB Ramps	Signalized	v/c 0.85	0.38	18.4	B	0.33	15.7	B

Source: Delay and LOS results are derived from Synchro 11 HCM6 reports for all intersections; while v/c ratio for each intersection was calculated per ODOT Guidance (ODOT 2022b) using the critical v/c ratio calculation method. As a result, there may be discrepancies between v/c results and Delay and/or LOS results reported for each intersection.

Notes: Mobility targets from 2013 Clackamas County Comprehensive Plan, 2011 Oregon Highway Plan, 2016 West Linn Transportation System Plan (TSP), 2013 Oregon City TSP, and 2017 Gladstone TSP.
Bold* values with an asterisk (*) indicate intersection does not meet mobility target.
Minor street worst leg results are reported for unsignalized intersections.

LOS = level of service; NB = northbound; SB = southbound; secs/veh = seconds per vehicle; v/c = volume-to-capacity ratio

PM Peak Hour

Table 5-12 lists the No Build and Revised Build Alternative intersection operation analysis results for the PM peak hour in 2045 (see Attachments P and Q for details) and compares them to the mobility target for each location. Of the 15 study intersections, four would meet the identified mobility targets under the No Build Alternative, and six would meet mobility targets under the Revised Build Alternative. As shown in Table 5-12, the following eight intersections would not meet the mobility target during the PM peak hour under both the No Build and Revised Build Alternatives:

- The stop-controlled intersection at OR 43 and Willamette Falls Drive
- The signalized intersection at OR 99E and I-205 northbound ramps
- The stop-controlled intersection at OR 99E and 15th Street
- The signalized intersection at OR 99E and 14th Street
- The signalized intersection at OR 99E and S 2nd Street
- The stop-controlled intersection at OR 99E and South End Road
- The stop-controlled intersection OR 99E and S New Era Road
- The stop-controlled intersection at Main Street and 10th Street

Conditions would get comparatively worse under the Revised Build Alternative for three of the eight intersections listed above:

- The signalized intersection at OR 99E and I-205 northbound ramps
- The signalized intersection at OR 99E and 14th Street
- The signalized intersection at OR 99E and S 2nd Street

The worsened conditions at all three intersections located along OR 99E corridor can be attributed to increases in traffic volume associated with mainline through and critical turning movements at each intersection.

The following three intersections would not meet the mobility target during the PM peak hour under the No Build Alternative; however, they would meet the targets under Revised Build Alternative:

- The signalized intersection at OR 99E and 10th Street
- The signalized intersection at OR 99E and W Arlington Street
- The signalized intersection at OR 99E and 12th Street

Table 5-12. No Build and Revised Build Alternative Intersection Operational Analysis Results for PM Peak Hour in 2045

No.	Intersection	Traffic Control	Mobility Target	No Build Alternative			Revised Build Alternative		
				v/c	Delay (secs/ veh)	LOS	v/c	Delay (secs/ veh)	LOS
1	OR 43 and Hidden Springs Rd	Signalized	v/c 0.99	0.98	40.0	D	0.68	33.0	C
2	OR 43 and McKillican St	Signalized	v/c 0.99	0.61	72.1	E	0.53	76.2	E
3	OR 43 and Willamette Falls Dr	Stop Controlled	v/c 0.99	**>2***	**>300***	**F***	**>2***	**>300***	**F***
4	OR 99E and I-205 NB Ramps	Signalized	v/c 0.85	**1.13***	**40.8***	**D***	**1.30***	**45.8***	**D***
5	OR 99E and 15th St	Stop Controlled	v/c 1.1	**1.64***	**>300***	**F***	**1.40***	**256.8***	**F***
6	OR 99E and 14th St	Signalized	v/c 1.1	**1.45***	**125.5***	**F***	**1.51***	**172.5***	**F***
7	OR 99E and 10th St	Signalized	v/c 1.1	**1.11***	**28.9***	**C***	0.99	58.9	E
8	OR 99E and Main St	Signalized	v/c 1.1	1.09	58.1	E	**>2***	**>300***	**F***
9	OR 99E and S 2nd St	Signalized	v/c 1.1	**1.91***	**69.6***	**E***	**>2***	**115.6***	**F***
10	OR 99E and South End Rd	Stop Controlled	v/c 0.75	**>2***	**>300***	**F***	**>2***	**>300***	**F***
11	OR 99E and S New Era Rd	Stop Controlled	v/c 0.75	**>2***	**>300***	**F***	**>2***	**>300***	**F***
12	OR 99E and W Arlington St	Signalized	v/c 1.1	**1.17***	**105.4***	**F***	1.09	77.4	E
13	OR 99E and 12th St	Signalized	v/c 1.1	**1.22***	**53.1***	**D***	1.07	44.2	D
14	Main St and 10th St	Stop Controlled	LOS D	**1.39***	**202.2***	**F***	**1.06***	**93.0***	**F***
15	SW Stafford Rd and I-205 SB Ramps	Signalized	v/c 0.85	0.66	29.4	C	0.69	20.4	C

Source: Delay and LOS results are derived from Synchro 11 HCM6 reports for all intersections; while v/c ratio for each intersection was calculated per ODOT Guidance (ODOT 2022b) using the critical v/c ratio calculation method. As a result, there may be discrepancies between v/c ratio results and Delay and/or LOS results reported for each intersection.

Notes: Mobility targets from 2013 Clackamas County Comprehensive Plan, 2011 Oregon Highway Plan, 2016 West Linn Transportation System Plan (TSP), 2013 Oregon City TSP, and 2017 Gladstone TSP.

Bold* values with an asterisk (*) indicate intersection does not meet mobility target.

Minor street worst leg results are reported for unsignalized intersections.

LOS = level of service; NB = northbound; SB = southbound; secs/veh = seconds per vehicle; v/c = volume-to-capacity ratio

Queuing

A queuing analysis was also performed to assess whether queues from OR 99E, OR 43, and SW Stafford Road ramp termini intersections in Oregon City and West Linn would exceed off-ramp storage lengths in 2045 and potentially affect mainline operations along I-205. Table 5-13 compares the 95th percentile queues for the No Build and Revised Build Alternatives in 2045 in the AM and PM peak hours. The results are an average of five or more simulation runs.

Table 5-13. Revised Build Alternative Peak-Hour 95th Percentile Queues at I-205 Ramp Intersections in 2045

Intersection	Ramp Movement	Total Ramp Storage Length (approx. feet)	Measured Deceleration Length (approx. feet)	Effective Ramp Storage Length (approx. feet)	AM Peak-Hour Queue Length (feet)		PM Peak-Hour Queue Length (feet)	
					2045 No Build	2045 Revised Build	2045 No Build	2045 Revised Build
OR 99E and I-205 NB Ramps	WB Left	1,150	220	930	365	365	345	340
	WB Thru				*N/A*	*N/A*	*N/A*	*N/A*
	WB Right				**1,190***	**1,235***	**1,090***	**1,095***
OR 99E and I-205 SB Ramps	WB Left	1,500	330	1,170	240	240	**>2000***	**>2000***
	WB Thru				*N/A*	*N/A*	*N/A*	*N/A*
	WB Right				135	210	740	745
OR 43 and I-205 NB Ramps	EB Left	1,200	360	840	80	140	55	60
	EB Thru				*N/A*	*N/A*	*N//A*	*N/A*
	EB Right				80	140	55	60
OR 43 and I-205 SB Ramps	WB Left	1,050	450	600	**845***	**755***	230	315
	WB Thru				**845***	**755***	230	315
	WB Right				**1,340***	**1,175***	335	585
SW Stafford Rd and I-205 SB Ramps	WB Left	1,325	525	800	175	135	680	280
	WB Thru				175	135	680	280
	WB Right				185	140	410	145

Notes: **Bold*** values with an asterisk (*) indicate 95th percentile queues exceed available storage length.
Effective ramp storage length noted in this table excludes the ramp deceleration length.
EB = eastbound; NB = northbound; SB = southbound; WB = westbound
NA = measurement not applicable for this movement

The 95th percentile queues would exceed the effective ramp storage lengths at the following location(s) under both the No Build Alternative and the Revised Build Alternative:

- OR 99E and I-205 northbound ramps (AM peak and PM peak)
- OR 99E and I-205 southbound ramps (PM peak)
- OR 43 and I205 southbound ramps (AM peak)

SimTraffic output summaries are included in Attachment R.

2027 Intersection Operations

AM and PM peak-hour intersection operations analyses were conducted for 2027 to inform the expected timing of the effects identified with the 2045 analysis.

AM Peak Hour

Table 5-14 lists the No Build and Revised Build Alternative intersection operational analysis results for the AM peak hour in 2027 for intersections (see Attachments S and T for details). Of the 15 study intersections, 10 would meet the identified mobility targets under the No Build Alternative and the Revised Build Alternative. As shown in the table, the following five intersections would not meet the jurisdictional mobility target during the 2027 AM peak hour under both the No Build and Revised Build Alternatives:

- The signalized intersection at OR 43 and Hidden Springs Road
- The stop-controlled intersection at OR 43 and Willamette Falls Drive
- The signalized intersection at OR 99E and S 2nd Street
- The stop-controlled intersection at OR 99E and South End Road
- The stop-controlled intersection at Main Street and 10th Street

Table 5-14. No Build and Revised Build Alternative Intersection Operational Analysis Results for AM Peak Hour in 2027

No.	Intersection	Traffic Control	Mobility Target	No Build Alternative			Revised Build Alternative		
				v/c	Delay (secs/veh)	LOS	v/c	Delay (secs/veh)	LOS
1	OR 43 and Hidden Springs Rd	Signalized	v/c 0.99	**1.39***	**81.2***	**F***	**1.13***	**46.0***	**D***
2	OR 43 and McKillican St	Signalized	v/c 0.99	0.21	168.2	F	0.31	95.5	F
3	OR 43 and Willamette Falls Dr	Stop Controlled	v/c 0.99	**>2***	**>300***	**F***	**>2***	**>300***	**F***
4	OR 99E and I-205 NB Ramps	Signalized	v/c 0.85	0.61	33.4	C	0.63	33.5	C
5	OR 99E and 15th St	Stop Controlled	v/c 1.1	1.04	102.0	F	1.02	95.8	F
6	OR 99E and 14th St	Signalized	v/c 1.1	1.06	26.2	C	0.92	16.1	B
7	OR 99E and 10th St	Signalized	v/c 1.1	0.67	14.3	B	0.94	19.3	B
8	OR 99E and Main St	Signalized	v/c 1.1	0.77	18.0	B	0.78	18.7	B
9	OR 99E and S 2nd St	Signalized	v/c 1.1	**1.27***	**134.1***	**F***	**1.26***	**120.5***	**F***
10	OR 99E and South End Rd	Stop Controlled	v/c 0.75	**1.90***	**>300***	**F***	**1.87***	**>300***	**F***
11	OR 99E and S New Era Rd	Stop Controlled	v/c 0.75	0.45	19.9	C	0.42	19.5	C
12	OR 99E and W Arlington St	Signalized	v/c 0.85	0.73	22.2	C	0.62	17.7	B
13	OR 99E and 12th St	Signalized	v/c 1.1	0.44	16.5	B	0.31	14.1	B
14	Main St and 10th St	Stop Controlled	LOS D	**1.15***	**128.0***	**F***	**1.13***	**105.0***	**F***
15	SW Stafford Rd and I-205 SB Ramps	Signalized	v/c 0.85	0.32	26.4	C	0.32	26.0	C

Source: Delay and LOS results are derived from Synchro 11 HCM6 reports for all intersections; while v/c ratio for each intersection was calculated per ODOT Guidance (ODOT 2022b) using the critical v/c ratio calculation method. As a result, there may be discrepancies between v/c ratio results and Delay and/or LOS results reported for each intersection.

Notes: Mobility targets from 2013 Clackamas County Comprehensive Plan, 2011 Oregon Highway Plan, 2016 West Linn Transportation System Plan (TSP), 2013 Oregon City TSP, and 2017 Gladstone TSP.
Bold* values with an asterisk (*) indicate intersection does not meet mobility target.
Minor street worst leg results are reported for unsignalized intersections.

LOS = level of service; NB = northbound; SB = southbound; secs/veh = seconds per vehicle; v/c = volume-to-capacity ratio

PM Peak Hour

Table 5-15 lists the No Build and Revised Build Alternative intersection operational analysis results for the PM peak hour in 2027 (see Attachments U and V for details). Of the 15 study intersections, six would meet the identified mobility targets under the No Build Alternative, and five would meet mobility targets under the Revised Build Alternative. As shown in the table, the following nine intersections would not meet the mobility target during the PM peak hour under both the No Build and Revised Build Alternatives:

- The signalized intersection at OR 43 and Hidden Springs Road
- The stop-controlled intersection at OR 43 and Willamette Falls Drive
- The signalized intersection at OR 99E and I-205 northbound ramps
- The stop-controlled intersection at OR 99E and 15th Street
- The signalized intersection at OR 99E and 14th Street
- The signalized intersection at OR 99E and S 2nd Street
- The stop-controlled intersection at OR 99E and South End Road
- The stop-controlled intersection at OR 99E and S New Era Road
- The stop-controlled intersection at Main Street and 10th Street

Conditions would worsen under the Revised Build Alternative in comparison to the No Build Alternative for the following six of the eight intersections listed above:

- The signalized intersection at OR 99E and I-205 northbound ramps
- The stop-controlled intersection at OR 99E and 15th Street
- The signalized intersection at OR 99E and 14th Street
- The signalized intersection at OR 99E and S 2nd Street
- The stop-controlled intersection at OR 99E and S New Era Road
- The stop-controlled intersection at Main Street and 10th Street

Similar to 2045, the worsened conditions at OR 99E corridor intersections within Oregon City can be attributed to increases in traffic volume associated with 2027 mainline through and critical turning movements at each intersection under the Revised Build Alternative as compared to the No Build Alternative. At OR 99E and S New Era Road, higher volumes of S New Era Road left-turn traffic seeking a gap along the high-speed OR 99E traffic in both travel directions at once would lead to higher delays under the Revised Build Alternative.

The signalized intersection at OR 99E and Main Street would not meet the mobility target during the PM peak hour under the Revised Build Alternative; however, it would meet the target under the No Build Alternative.

Table 5-15. No Build and Revised Build Alternative Intersection Operational Analysis Results for PM Peak Hour in 2027

No.	Intersection	Traffic Control	Mobility Target	No Build Alternative			Build Alternative		
				v/c	Delay (secs/veh)	LOS	v/c	Delay (secs/veh)	LOS
1	OR 43 and Hidden Springs Rd	Signalized	v/c 0.99	**1.35***	**72.2***	**E***	**1.03***	**51.6***	**D***
2	OR 43 and McKillican St	Signalized	v/c 0.99	0.51	56.9	E	0.31	32.4	C
3	OR 43 and Willamette Falls Dr	Stop Controlled	v/c 0.99	**>2***	**>300***	**F***	**>2***	**>300***	**F***
4	OR 99E and I-205 NB Ramps	Signalized	v/c 0.85	**0.98***	**28.3***	**C***	**1.22***	**28.1***	**C***
5	OR 99E and 15th St	Stop Controlled	v/c 1.1	**1.16***	**146.1***	**F***	**1.37***	**234.8***	**F***
6	OR 99E and 14th St	Signalized	v/c 1.1	**1.21***	**46.6***	**D***	**1.45***	**139.1***	**F***
7	OR 99E and 10th St	Signalized	v/c 1.1	0.99	21.2	C	0.85	14.7	B
8	OR 99E and Main St	Signalized	v/c 1.1	1.03	51.6	D	**1.56***	**199.9***	**F***
9	OR 99E and S 2nd St	Signalized	v/c 1.1	**1.69***	**43.0***	**D***	**>2***	**133.7***	**F***
10	OR 99E and South End Rd	Stop Controlled	v/c 0.75	**>2***	**>300***	**F***	**>2***	**>300***	**F***
11	OR 99E and S New Era Rd	Stop Controlled	v/c 0.75	**0.77***	**>300***	**F***	**1.96***	**>300***	**F***
12	OR 99E and W Arlington St	Signalized	v/c 1.1	0.94	64.2	E	1.04	83.7	F
13	OR 99E and 12th St	Signalized	v/c 1.1	0.82	20.6	C	1.07	20.5	C
14	Main St and 10th St	Stop Controlled	LOS D	**0.99***	**75.3***	**F***	**1.04***	**88.2***	**F***
15	SW Stafford Rd and I-205 SB Ramps	Signalized	v/c 0.85	0.53	22.4	C	0.53	21.3	C

Source: Delay and LOS results are derived from Synchro 11 HCM6 reports for all intersections; while v/c ratio for each intersection was calculated per ODOT Guidance (ODOT 2022b) using the critical v/c ratio calculation method. As a result, there may be discrepancies between v/c ratio results and Delay and/or LOS results reported for each intersection.

Notes: Mobility targets from 2013 Clackamas County Comprehensive Plan, 2011 Oregon Highway Plan, 2016 West Linn Transportation System Plan (TSP), 2013 Oregon City TSP, and 2017 Gladstone TSP.
Bold* values with an asterisk (*) indicate intersection does not meet mobility target.
Minor street worst leg results are reported for unsignalized intersections.
LOS = level of service; NB = northbound; SB = southbound; secs/veh = seconds per vehicle; v/c = volume-to-capacity ratio

Queuing

A queuing analysis was also performed to assess whether queues from OR 99E, OR43, and SW Stafford Road ramp termini intersections within Oregon City and West Linn would exceed off-ramp storage lengths in 2027 and potentially affect mainline operations along the I-205. Table 5-16 compares the 95th percentile queues for the 2027 No Build and Revised Build Alternatives in the AM and PM peak hours. The results are an average of five or more simulation runs.

The 95th percentile queues would exceed the effective ramp storage lengths at the following location(s) under both the No Build Alternative and the Revised Build Alternative:

- OR 99E and I-205 northbound ramps (PM peak)
- OR 99E and I-205 southbound ramps (PM peak)

SimTraffic output summaries are included in Attachment R.

Table 5-16. Revised Build Alternative Peak-Hour 95th Percentile Queues at I-205 Ramp Intersections in 2027

Intersection	Ramp Movement	Total Ramp Storage Length (approx. feet)	Measured Deceleration Length (approx. feet)	Effective Ramp Storage Length (approx. feet)	AM Peak-Hour Queue Length (feet)		PM Peak-Hour Queue Length (feet)	
					2027 No Build	2027 Revised Build	2027 No Build	2027 Revised Build
OR 99E and I-205 NB Ramps	WB Left	1,150	220	930	350	380	405	405
	WB Thru				*N/A*	*N/A*	*N/A*	*N/A*
	WB Right				830	970	**1,275***	**1,265***
OR 99E and I-205 SB Ramps	WB Left	1,500	330	1,170	185	355	**>2000***	**>2000***
	WB Thru				*N/A*	*N/A*	*N/A*	*N/A*
	WB Right				125	210	730	750
OR 43 and I-205 NB Ramps	EB Left	1,200	360	840	75	655	55	125
	EB Thru				*N/A*	*N/A*	*N/A*	*N/A*
	EB Right				75	655	55	125
OR 43 and I-205 SB Ramps	WB Left	1,050	450	600	**840***	145	210	105
	WB Thru				**840***	145	210	105
	WB Right				**1,300***	150	275	165
SW Stafford Rd and I-205 SB Ramps	WB Left	1,325	525	800	210	185	395	370
	WB Thru				210	185	395	370
	WB Right				175	205	220	190

Notes: **Bold*** values with an asterisk (*) indicate 95th percentile queues exceed available storage length.
Effective ramp storage length noted in this table excludes the ramp deceleration length.
EB = eastbound; NB = northbound; SB = southbound; WB = westbound
N/A = measurement not applicable for this movement

5.2.4 Transit

This section discusses how the Revised Build Alternative may affect transit operations and ridership within the API in comparison to the No Build Alternative.

Transit Operations

Table 5-17 provides travel times for study corridors in the API that accommodate transit service and compares the No Build and Revised Build Alternatives. This data indicates potential impacts and benefits on transit routes on these corridors. Green highlighted cells marked with "^" indicate segments with lower (better) travel times under the Revised Build Alternative as compared with the No Build Alternative, and red highlighted cells marked with "*" indicate segments with higher (worse) travel times under the Revised Build Alternative as compared with the No Build Alternative.

Table 5-17. Comparison of No Build and Revised Build Alternative Projected Change in Travel Times for Study Corridors with Transit Service in 2045

	No Build		Revised Build		Difference	
Corridor	AM Travel Time (minutes) 7-9 AM	PM Travel Time (minutes) 4-6 PM	AM Travel Time (minutes) 7-9 AM	PM Travel Time (minutes) 4-6 PM	AM Travel Time (minutes) 7-9 AM	PM Travel Time (minutes) 4-6 PM
OR 43 (NB), Main St to McKillican St	3.07	2.83	2.85	2.98	-0.22	0.15
OR 43 (NB), McKillican St to Hidden Springs Rd	3.59	3.35	3.35	3.10	-0.24	-0.25
OR 43 (SB), Main St to McKillican St	8.65	14.81	7.18	19.49	-1.47^	4.69*
OR 43 (SB), McKillican St to Hidden Springs Rd	2.86	9.01	2.90	4.01	0.04	-5.00^
OR 43 Corridor Total	**18.17**	**30.01**	**16.28**	**29.59**	**-1.90^**	**-0.42**
OR 99E (SB), Arlington St to S 2nd St	7.48	5.76	6.12	5.97	-1.35^	0.21
OR 99E (SB), S 2nd St to Grant St	11.83	11.66	11.86	11.57	0.03	-0.09
OR 99E (NB), Arlington St to S 2nd St	7.55	5.34	8.15	6.23	0.60*	0.89*
OR 99E (NB), S 2nd St to Grant St	12.05	11.83	12.27	11.85	0.21	0.03
OR 99E Corridor Total	**38.91**	**34.60**	**38.40**	**35.64**	**-0.51^**	**1.04***
Main Street (NB), OR 99E to 10th St	2.38	1.32	3.91	2.76	1.53*	1.44*
Main Street (NB), 10th St to 15th St	2.74	1.12	2.69	1.13	-0.04	0.01
Main Street (SB), 10th St to OR 99E	4.08	1.70	4.62	5.88	0.55^	4.18*
Main Street (SB), 15th St to 10th St	3.30	1.46	3.52	1.38	0.21	-0.08
Main Street Corridor Total	**12.50**	**5.61**	**14.74**	**11.16**	**2.24***	**5.55***
I-205 (NB), I-5 Ramps to Gladstone	11.14	17.15	11.06	12.66	-0.08	-4.48^
I-205 (SB), I-5 Ramps to Gladstone	13.35	11.62	12.97	11.40	-0.37	-0.22
I-205 Corridor Total	**24.49**	**28.77**	**24.04**	**24.06**	**-0.45**	**-4.71^**

Notes: Green^ values with a caret (^) indicate segments with lower (better) travel times under the Revised Build Alternative as compared to the No Build Alternative.
Red* values with an asterisk (*) indicate segments with higher (worse) travel times under the Revised Build Alternative as compared to the No Build Alternative.
Segments with 0.5 minutes or less difference were not marked.
NB = northbound; SB = southbound

Transit travel times under the Revised Build Alternative would be better than under the No Build Alternative for all segments in the I-205 corridor. Travel times under the Revised Build Alternative would be shorter overall than the No Build Alternative in the OR43 corridor, albeit by a smaller margin than for I-205. Travel times under the Revised Build Alternative overall would be slightly worse than the No Build Alternative in the OR 99E corridor, although results are mixed. For OR 99E, the PM peak travel time would be worse overall under the Revised Build Alternative but the AM peak travel time would be better overall. For Main Street, travel times under the Revised Build Alternative would be worse overall.

The MMLOS analysis to compare the No Build and Revised Build Alternatives quantified user perception of quality of transit service based on multiple inputs, including projected future average daily traffic volumes and travel times. Results for this MMLOS analysis are shown in Table 5-18, providing a comparison between the No Build and Revised Build Alternatives. Values in the table that are highlighted green and marked with "^" indicate a better score under the Revised Build Alternative as compared with the No Build Alternative, and red highlighted cells marked with "*" indicate the opposite. The factors causing the variations between alternatives are projected changes in traffic volumes and travel times.

Table 5-18. No Build and Revised Build Alternative Transit Multimodal Level of Service for Study Corridors in 2045

Extent	Direction	No Build	Revised Build
Transit MMLOS Results for OR 43			
Main St to Hollowell St	Both	N/A	N/A
Hollowell St to McKillican St	NB	C	C
	SB	D	D
McKillican St to Burns St	NB	A	A
	SB	B	A^
Burns St to Hidden Springs Rd	NB	A	A
	SB	B	A^
Overall Transit MMLOS for OR 43		**A-D**	**A-D**
Transit MMLOS Results for OR 99E			
W Arlington St to Dunes Dr	SB	A	A
	NB	A	B*
Dunes Dr to I-205 SB ramps	SB	B	A^
	NB	B	B
I-205 SB ramps to 15th St	SB	B	A^
	NB	B	B
15th St to 12th St	SB	A	A
	NB	A	B*
12th St to 11th St	Both	A	A
11th St to Main St	Both	D	D
Main St to Railroad Ave	SB	B	A^
	NB	A	A
Railroad Ave to MP 12.74	SB	A	A
	NB	B	B
MP 12.74 to S 2nd St	SB	B	A^
	NB	B	B
S 2nd St to New Era Rd	Both	C	C

Extent	Direction	No Build	Revised Build
Overall Transit MMLOS for OR 99E		**A-D**	**A-D**
Transit MMLOS Results for Main Street			
OR 99E to 10th St	Both	C	D^
10th St to 12th St	Both	B	B
12th St to 14th St	EB	C	C
	WB	C	C
14th St to 15th St	EB	N/A	N/A
	WB	D	D
Overall Transit MMLOS for Main Street		**B-D**	**B-D**

Source: ODOT TransGIS (ODOT 2022a) and © 2022 Google Maps
Notes: Calculated MMLOS using ODOT *Analysis Procedure Manual* (ODOT 2020a).
Green^ values with a caret (^) indicate a better score under the Revised Build Alternative as compared with the No Build Alternative.
Red* values with an asterisk (*) indicate a worse score under the Revised Build Alternative compared to the No Build Alternative.
EB = eastbound; MMLOS = multimodal level of service; MP = milepost; N/A = not applicable; NB = northbound; SB = southbound; WB = westbound

For the study corridors analyzed, transit MMLOS ranges from A through D. Transit MMLOS is projected to be better under the Revised Build Alternative as compared to the No Build Alternative at the following locations:

- On southbound OR 43 from McKillican Street to Hidden Springs Road
- On southbound OR 99E from Dunes Drive to 15th Street
- On southbound OR 99E from Main Street to Railroad Avenue
- On southbound OR 99E from Milepost 12.74 to S 2nd Street

Transit MMLOS is projected to be worse under the Revised Build Alternative as compared to the No Build Alternative at the following locations:

- On northbound OR 99E from Arlington Street to Dunes Drive
- On northbound OR 99E from 15th Street to 12th Street
- On both directions of Main Street from OR 99E to 10th Street

Transit Ridership

Table 5-19 compares modeled transit ridership between the No Build and Revised Build Alternatives for transit routes within the API. TriMet routes 35, 79, and 154, and the CCC Xpress shuttle use I-205. While the three TriMet buses use I-205 for a short distance to cross the river (via the Abernethy Bridge or High Rocks Bridge), the CCC Xpress follows I-205 for about 3 miles in each direction. Data for the CCC Xpress was not available, so it is not included in the table. The transit lines in the transportation API that do not use I-205 are TriMet routes 31, 32, 33, 34, and 99; the SCTD Molalla-Canby bus; and the CAT 99X. TriMet route 31 launched in 2019 so it could not be modeled from 2015 data.

Modeled transit trips include fixed route transit service, but the model does not explicitly break out paratransit service, shuttles, and other smaller-scale ride-share programs. Therefore, the CCC Xpress and Clackamas County shuttles are not included in the ridership analysis.

Table 5-19. Comparison of No Build and Revised Build Alternative Regional Transit Ridership in 2045

Transit Routes	2045 No Build Boardings	2045 Revised Build Boardings	Revised Build minus No Build Alternative	
			Difference	% Difference
Total for transit lines that use I-205 *(TriMet Routes 35, 79, 154)*	28,466	29,086	620	2.20%
Total for transit lines that do not use I-205 *(TriMet Routes 32, 33, 34, 99; SCTD Molalla-Canby; CAT 99X)*	32,505	32,578	73	0.25%

Note: Modeling is based on existing transit routes, which could change in the future.

The analysis compared modeled boardings in 2045 for the No Build and Revised Build Alternatives. The differences between No Build and Revised Build Alternative ridership projections would be small, though transit ridership under the Revised Build Alternative is projected to be slightly higher than under the No Build Alternative. Additionally, routes that use I-205 are expected to have a slightly higher ridership increase under the Revised Build Alternative compared to No Build Alternative than routes that do not use I-205. This projected difference would result from Project-related improvements in travel times on I-205.

5.2.5 Active Transportation

The LTS intersection analysis, shown in table 5-20, quantified the pedestrian and bicycle conditions projected at study intersections in the API by estimating the PLTS and BLTS based on the intersection infrastructure and projected traffic volumes. This analysis was conducted for both the No Build and Revised Build Alternatives in 2045. The analysis used modeled future average daily traffic volumes to provide an estimate of future conditions at the five unsignalized study intersections.

Table 5-19. Modeled No Build and Revised Build Alternative Pedestrian and Bicycle Level of Traffic Stress for the Five Unsignalized Study Intersections in 2045

Study Intersection	Pedestrian Level of Traffic Stress		Bicycle Level of Traffic Stress	
	No Build	Revised Build	No Build	Revised Build
OR 43 and Willamette Falls Dr	4	4	4	4
OR 99E (NB) at 15th St	2	2	2	2
OR 99E and South End Rd	N/A	N/A	R4	R4
OR 99E and New Era Rd	N/A	N/A	R4	R4
Main St and 10th St	3	3	3	3

Source: ODOT and © 2022 Google Maps
Notes: Calculated pedestrian and bicycle level of traffic stress using ODOT *Analysis Procedure Manual*.
In rural areas, PLTS is marked as "N/A" when no pedestrian infrastructure is present, and BLTS adds "R" to the score if the location is considered to be rural.
N/A = not applicable; NB = northbound; SB = southbound

None of the analyzed intersections are expected to have differences in PLTS or BLTS under the Revised Build Alternative as compared to the No Build Alternative. Overall, the estimated PLTS and BLTS both would range from 2 through 4. For the OR 99E and 15th Street intersection, 15th Street is the only leg of the intersection that is eligible for this analysis because the other legs cannot be crossed by people walking or bicycling.

The sections below discuss the bicycle and pedestrian corridor analyses.

Bicycle Corridor Analysis

A BLTS corridor analysis was also conducted for No Build and Revised Build Alternatives, using the same constraints as the intersection analysis. Results are summarized in Table 5-21 and Table 5-22, respectively, for the OR 43 and OR 99E corridors. No differences were found between the No Build and Revised Build Alternatives for these two corridors.

Table 5-20. No Build and Revised Build Alternative Bicycle Level of Traffic Stress for Study Corridors – OR 43 in 2045

Extent	Direction	No Build	Revised Build
Main St to Mill St	Both	3	3
Mill St to Willamette Falls Dr	Both	2	2
Willamette Falls Dr to Holly St	Both	3	3
Holly St to Hidden Springs Rd	Both	3	3
Overall		**3**	**3**

Source: ODOT and © 2022 Google Maps
Notes: Calculated bicycle level of traffic stress using ODOT *Analysis Procedure Manual*.

Table 5-21. No Build and Revised Build Alternative Bicycle Level of Traffic Stress for Study Corridors – OR 99E in 2045

Extent	Direction	No Build	Revised Build
Arlington St to 15th St	Both	4	4
15th St to 10th St	SB	1	1
	NB	4	4
10th St to MP 12.74	SB	4	4
	NB	4	4
MP 12.74 to MP 15	SB	4	4
	NB	4	4
MP 15 to MP 17	SB	R4	R4
	NB	R3	R3
MP 17 to MP 18.16	Both	R4	R4
MP 18.16 to New Era Rd	SB	R4	R4
	NB	R3	R3
Overall		**4**	**4**

Source: ODOT and © 2022 Google Maps
Notes: Calculated bicycle level of traffic stress using ODOT *Analysis Procedure Manual (APM)*. Per the APM, in rural areas, “R” is added to the score to denote rural conditions.
MP = milepost; NB = northbound; SB = southbound

For the study corridors analyzed, BLTS would range from 1 through 4 for individual segments. The overall study corridors scored BLTS 3 and 4 respectively for OR 43 and OR 99E. No segments within the two corridors would have differences between the No Build and Revised Build Alternatives.

Pedestrian Corridor Analysis

For the pedestrian corridor analysis, an MMLOS analysis was completed to compare the No Build Alternative and the Revised Build Alternative. This analysis used the same constraints as the LTS analyses. Results are summarized in Table 5-23 and Table 5-24 respectively for the OR 43 and OR 99E corridors. Only the OR 99E corridor is projected to differ between the No Build Alternative and Revised Build Alternative. The tables include green highlighted values marked with “^” to indicate when the Revised Build Alternative is expected to have a better score than the No Build Alternative, and red highlight marked with “*” to indicate a worse score.

Table 5-22. No Build and Revised Build Alternative Pedestrian Level of Service for Study Corridors in 2045 – OR 43

Extent	Direction	No Build	Revised Build
Main St to Willamette Falls Dr	Both	B	B
Willamette Falls Dr to Hollowell St	Both	C	C
Hollowell St to Webb St	Both	B	B
Webb St to Failing St	NB	C	C
	SB	B	B
Failing St to Buck St	Both	B	B
Buck St to Pimlico Dr	NB	C	C
	SB	B	B
Pimlico Dr to Mark Ln	Both	B	B
Mark Ln to Mapleton Dr	NB	B	B
	SB	C	C
Mapleton Dr to Hidden Springs Rd	NB	C	C
	SB	B	B
Overall		**B–C**	**B–C**

Source: ODOT and © 2022 Google Maps
Notes: Calculated pedestrian level of service using ODOT *Analysis Procedure Manual*.
NB = northbound; SB = southbound

Table 5-23. No Build and Revised Build Alternative Pedestrian Level of Service for Study Corridors in 2045 – OR 99E

Extent	Direction	No Build	Revised Build
Arlington St to Dunes Dr	Both	E	E
Dunes Dr to I-205 SB ramps	Both	F	F
I-205 SB ramps to 15th St	Both	F	F
15th St to 12th St	Both	E	E
12th St to 11th St	SB	E	E
	NB	E	C^
11th St to 10th St	Both	E	E
10th St to Main St	SB	C	E*
	NB	C	C
Main St to Railroad Ave	SB	E	E
	NB	C	C
Railroad Ave to MP 12.74	SB	C	E*
	NB	E	E
MP 12.74 to S 2nd St	SB	E	E
	NB	F	F
S 2nd St to Hedges St	SB	C	C
	NB	E	E
Hedges St to Pacquet St	Both	C	C
Pacquet St to South End Rd	Both	E	E
South End Rd to MP 18.16	SB	E	F*
	NB	E	E
MP 18.16 to New Era Rd	SB	E	F*
	NB	F	E^
Overall		**C–F**	**C–F**

Source: ODOT and © 2022 Google Maps
Notes: Calculated pedestrian level of service using ODOT *Analysis Procedure Manual*.
Values shaded red* with an asterisk (*) indicate a worse score than the other scenario (No Build vs. Revised Build Alternatives).

Values shaded green^ with a caret (^) indicate a better score than the other scenario (No Build vs. Revised Build Alternatives).
MP = milepost; NB = northbound; SB = southbound

For the study corridors analyzed, pedestrian MMLOS would range from B through F. Pedestrian MMLOS is projected to be better under the Revised Build Alternative as compared to the No Build Alternative at the following locations:

- On northbound OR 99E from 12th Street to 11th Street
- On northbound OR 99E from Milepost 18.16 to New Era Road

Pedestrian MMLOS is projected to be worse under the Revised Build Alternative as compared to the No Build Alternative at the following locations:

- On southbound OR 99E from 10th Street to Main Street
- On southbound OR 99E from Railroad Ave to Milepost 12.74
- On southbound OR 99E from South End Road to New Era Road

5.2.6 Truck Freight Mobility

Most of the truck freight corridor roadway segments within the API would experience similar or lower travel times under the Revised Build Alternative as compared with the No Build Alternative. Table 5-25 summarizes the estimated travel-time differences on truck freight routes. Table cells with green shading and marked with "†" indicate an improvement in travel times for the Revised Build Alternative as compared to the No Build Alternative, while cells shaded red and marked with "*" indicate where travel times would worsen.

Travel times on northbound I-205, a major truck route, would be about 4 minutes lower in the northbound direction during the PM peak hour under the Revised Build Alternative as compared with the No Build Alternative. The Revised Build Alternative travel times on northbound I-205 during the AM peak hour and on southbound I-205 during both the AM and PM peak hours would be similar to the No Build Alternative.

Table 5-24. Freight Corridor Travel Times for No Build and Revised Build Alternatives (minutes) in 2045

Corridor	From	To	No Build		Revised Build		Difference	
			7-9 AM	4-6 PM	7-9 AM	4-6 PM	7-9 AM	4-6 PM
I-205 NB	**I-5 ramps**	**Gladstone**	**11.1**	**17.1**	**11.1**	**12.7**	**0.0**	**-4.4**
I-205 SB	**Gladstone**	**I-5 ramps**	**13.3**	**11.4**	**13.5**	**11.7**	**0.2**	**0.3**
OR 99E NB	**Grant St (Canby)**	**Concord Rd**	**27.3**	**23.2**	**31.4**	**21.9**	**4.1**	**-1.3**
OR 99E NB 1	*Grant St (Canby)*	*S 2nd St*	11.8	11.8	11.8	11.8	**0.0**	**0.0**
OR 99E NB 2	*S 2nd St*	*W Arlington St*	10.7	6.6	14.7	5.2	**4.0**	**-1.4**

Corridor	From	To	No Build		Revised Build		Difference	
			7-9 AM	4-6 PM	7-9 AM	4-6 PM	7-9 AM	4-6 PM
OR 99E NB 3	*W Arlington St*	*Concord Rd*	4.8	4.8	4.8	4.8	**0.0**	**0.0**
OR 99E SB	**Concord Rd**	**Grant St (Canby)**	**24.4**	**22.1**	**25.3**	**22.1**	**0.9**	**0.0**
OR 99E SB 1	*Concord Rd*	*W Arlington St*	4.8	4.8	4.8	4.8	**0.0**	**0.0**
OR 99E SB 2	*W Arlington St*	*S 2nd St*	7.7	5.8	8.6	5.6	**0.9**	**-0.2**
OR 99E SB 3	*S 2nd Street*	*Grant St (Canby)*	11.9	11.6	11.8	11.6	**-0.1**	**0.0**

Notes: Values shaded **green**† with a † indicate a faster travel time under the Revised Build Alternative as compared to the No Build Alternative, and values shaded **red*** with an asterisk (*) indicate a slower travel time under the Revised Build Alternative as compared to the No Build Alternative. Changes of 2% or less were considered negligible and were not marked. For cells with no highlight the difference was insignificant or there was no difference.

NB = northbound; SB = southbound

There would be minimal to no change in travel times along most roadway sections on northbound OR 99E during the AM peak period and PM peak period, except for the section between S 2nd Street and W Arlington Street, which would experience higher travel times by about 4 minutes during the AM peak period. However, the same segment would experience a decrease in travel times of nearly 1.5 minutes in the PM peak period. Southbound OR 99E would experience minimal to no change in travel times during the AM peak period, with the largest difference expected to be about 1 minute on the segment through Oregon City between W Arlington Street and S 2nd Street. Overall travel times would be the same on southbound OR 99E during the PM peak period.

5.2.7 Transportation Safety

The transportation safety analysis included calculating predictive crash frequencies (number of crashes) for the study intersections and study corridors using the HSM Part C methodology (AASHTO 2010), calibrated to Oregon conditions (crash reduction factors, CRFs, developed as part of the ODOT ARTS program). The number of predictive/expected crashes is reported with a decimal because it is a calculation over time. For example, 0.2 crashes per year could be defined as one crash occurring in a 5-year period. This methodology estimates predictive average crash frequency as a function of traffic volume and roadway characteristics (e.g., number of lanes, median type, intersection control, number of approach legs). The analysis was conducted for 2045 and 2027 for the No Build and Revised Build Alternatives, using RTDM average daily traffic volume forecasts for the study facilities. Because there are not proposed roadway changes with the Revised Build Alternative, forecasted volumes will proportionally alter crash predictions.

The safety assessment focused on segments and intersections where fatal and serious injury type crashes would increase as a result of the Project. The HSM methodology does not segregate injury type crashes by severity; therefore, percentage distributions of severity from the existing crash data were applied to the predicted injury type crashes for each site. A detailed list of predictive crash frequencies for all severities at each site is presented in Attachment X.

The sections below describe the safety analysis for API study intersections and corridors.

2045 Intersection and Segment Predictive Analysis

The 15 study intersections were evaluated using HSM methodologies based on the following street classifications: rural multilane highways[9] and urban and suburban arterials.[10] This methodology breaks down predictive crashes by severity to predict the number of fatal and injury crashes and property damage only crashes. Table 5-26 and Table 5-27 show predictive crashes by severity for the No Build and Revised Build Alternatives in 2045 on rural multilane highways and on urban/suburban arterials, respectively. This analysis includes 15 study intersections and other intersections along the safety corridors that were not identified as study intersections to avoid gaps in the analysis. In general, the number of predictive crashes under the No Build Alternative compared to the Revised Build Alternative would vary by location because of differences in traffic volumes related to rerouting from I-205 to local streets. The number of crashes would be higher at locations with relatively higher traffic volumes and lower at locations with relatively lower traffic volumes.

Table 5-25. Predictive Number of Crashes for Rural Multilane Highway Intersections in 2045

Intersection	No Build Alternative			Revised Build Alternative		
	Number Predictive Fatality/ Injury	Number Predictive PDO	Number Predictive (Total)	Number Predictive Fatality/ Injury	Number Predictive PDO	Number Predictive (Total)
OR 99E and South End Rd	1.35	2.13	**3.48**	1.43	2.28	**3.70**
OR 99E and New Era Rd	1.43	2.32	**3.75**	1.53	2.55	**4.09**

NB = northbound; PDO = property damage only; SB = southbound

9 Highway Safety Manual, Chapter 11 (AASHTO 2010)

10 Highway Safety Manual, Chapter 12 (AASHTO 2010)

Table 5-26. Predictive Number of Crashes for Urban and Suburban Arterials Intersections in 2045

Segment	No Build Alternative					Revised Build Alternative				
	Number of Predictive Ped	Number of Predictive Bike	Number of Predictive Fatality/ Injury	Number of Predictive PDO	Number of Predictive (Total)	Number of Predictive Ped	Number of Predictive Bike	Number of Predictive Fatality/ Injury	Number of Predictive PDO	Number of Predictive (Total)
OR 99E/Arlington	0.06	0.12	2.67	5.09	**7.94**	0.06	0.11	2.49	4.77	**7.43**
OR 99E/Dunes	0.10	0.03	1.22	2.48	**3.83**	0.10	0.03	1.14	2.30	**3.56**
OR 99E/I-205 SB Ramp	0.17	0.05	1.64	4.08	**5.94**	0.19	0.04	1.48	3.70	**5.41**
OR 99E/I-205 NB Ramp	0.17	0.06	2.03	5.02	**7.28**	0.14	0.05	1.99	4.60	**6.78**
OR 99E/15th St	0.16	0.06	2.32	5.44	**7.99**	0.16	0.07	2.45	5.75	**8.43**
OR 99E/14th St	0.13	0.04	1.54	3.33	**5.04**	0.13	0.04	1.64	3.57	**5.38**
OR 99E/12th St	0.13	0.03	1.19	2.42	**3.76**	0.11	0.03	1.21	2.33	**3.68**
OR 99E/Tenth St	0.15	0.02	0.96	1.98	**3.11**	0.15	0.03	1.19	2.57	**3.94**
OR 99E/Main St	0.16	0.03	1.23	2.60	**4.02**	0.16	0.04	1.50	3.30	**5.00**
OR 99E/S 2nd St	0.15	0.03	1.12	2.38	**3.67**	0.15	0.03	1.29	2.85	**4.33**
OR 43/Hidden Springs	0.01	0.02	0.84	1.71	**2.58**	0.01	0.02	0.79	1.60	**2.42**
OR 43/Pimlico	0.00	0.00	0.23	0.44	**0.67**	0.00	0.00	0.21	0.39	**0.61**
OR 43/West A St	0.03	0.06	1.23	2.40	**3.72**	0.03	0.05	1.03	2.02	**3.13**
OR 43/McKillican St	0.05	0.08	1.71	3.29	**5.13**	0.05	0.07	1.47	2.87	**4.46**
OR 43/I-205 SB Off Ramps	0.05	0.11	2.40	4.85	**7.41**	0.04	0.12	2.54	4.99	**7.69**
OR 43/I-205 NB Off Ramps	0.01	0.03	1.12	2.30	**3.46**	0.01	0.03	1.27	2.82	**4.14**
OR 43/Willamette Falls Dr	0.00	0.00	0.18	0.47	**0.66**	0.01	0.01	0.27	0.69	**0.98**
Main St/10th St	0.01	0.38	0.30	0.45	**1.14**	0.01	0.36	0.35	0.51	**1.23**

NB = northbound; PDO = property damage only; Ped = pedestrian; SB = southbound

Similar to the intersection analysis, other roadway segments were evaluated based on segment characteristics and street classification for 2045. Table 5-28 and Table 5-29 show the number of predictive crashes by severity for the No Build Alternative and Revised Build Alternative in 2045 on rural multilane highways and on urban/suburban arterials, respectively. Like the intersection analysis, the number of expected crashes under the No Build Alternative and Revised Build Alternative is similar for most corridors. The number of crashes would be higher at locations with relatively higher traffic volumes and lower at locations with relatively lower traffic volumes.

Table 5-27. Predictive Number of Crashes for Rural Multilane Highway Segments in 2045

Intersection	No Build Alternative			Revised Build Alternative		
	Number Predictive Fatality/ Injury	Number Predictive PDO	Number Predictive (Total)	Number Predictive Fatality/ Injury	Number Predictive PDO	Number Predictive (Total)
OR 99E: Paquet St to MP 15.7	5.71	6.66	**12.37**	6.31	7.48	**13.79**
OR 99E: MP 15.7 to South End Rd	4.80	5.46	**10.25**	5.32	6.16	**11.47**
OR 99E: South End Rd to New Era Rd	1.94	2.21	**4.16**	2.15	2.49	**4.65**

MP = milepost; NB = northbound; PDO = property damage only; SB = southbound

Table 5-28. Predictive Number of Crashes for Urban and Suburban Arterial Segments in 2045

Segment	No Build Alternative					Revised Build Alternative				
	Number of Predictive Ped	Number of Predictive Bike	Number of Predictive Fatality/ Injury	Number of Predictive PDO	Number of Predictive (Total)	Number of Predictive Ped	Number of Predictive Bike	Number of Predictive Fatality/ Injury	Number of Predictive PDO	Number of Predictive (Total)
OR 99E: Arlington St to Dunes Dr	0.01	0.01	0.73	1.63	**2.38**	0.01	0.03	1.22	2.88	**4.13**
OR 99E: Dunes to I-205 SB Ramp	0.01	0.02	1.05	2.86	**3.95**	0.01	0.02	0.99	2.69	**3.72**
OR 99E: I-205 SB Ramp to I-205 NB Ramp	0.02	0.01	0.52	1.35	**1.90**	0.02	0.01	0.48	1.26	**1.77**
OR 99E: I-205 NB Ramp to 15th St	0.01	0.01	0.28	0.79	**1.08**	0.01	0.01	0.26	0.73	**1.00**
OR 99E: 15th St to14th St	0.01	0.01	0.24	0.65	**0.90**	0.01	0.01	0.23	0.64	**0.89**
OR 99E: 14th St to 12th St	0.10	0.05	0.82	2.38	**3.35**	0.10	0.05	0.87	2.53	**3.56**
OR 99E: 12th St to 10th St	0.04	0.03	1.34	3.09	**4.51**	0.05	0.03	1.45	3.35	**4.88**
OR 99E: 10th St to Main St	0.07	0.04	2.05	4.97	**7.13**	0.08	0.05	2.28	5.57	**7.98**
OR 99E: Main St to S 2nd St	0.01	0.02	0.98	2.60	**3.61**	0.01	0.03	1.23	3.32	**4.59**
OR 99E: S 2nd St to Paquet St	0.08	0.05	1.98	4.76	**6.87**	0.11	0.08	2.95	6.52	**9.65**
OR 43: Hidden Springs to Pimlico	0.09	0.06	2.47	5.46	**8.08**	0.10	0.07	2.91	6.22	**9.31**
OR 43: Pimlico to West A St	0.05	0.01	2.00	5.26	**7.33**	0.06	0.02	2.28	5.98	**8.34**
OR 43: West A St to McKillican St	0.02	0.00	0.74	1.91	**2.67**	0.02	0.00	0.67	1.71	**2.40**
OR 43: McKillican St to I-205 MP 11.13	0.00	0.01	0.31	0.67	**0.99**	0.00	0.01	0.28	0.59	**0.87**
OR 43: I-205 MP 11.14 to I-205 MP 11.29	0.00	0.01	0.27	0.70	**0.98**	0.00	0.01	0.25	0.63	**0.89**
OR 43: I-205 MP11.30 to Willamette Falls Dr	0.00	0.00	0.16	0.43	**0.59**	0.00	0.00	0.14	0.37	**0.52**
OR 43: Willamette Falls Dr to Main St	0.02	0.00	0.23	0.61	**0.86**	0.02	0.00	0.25	0.68	**0.95**

NB = northbound; PDO = property damage only; Ped = pedestrian; SB = southbound

2045 Highway Predictive Analysis

The Enhanced Interchange Safety Analysis Tool (ISATe) was used for the analysis of highway segments and ramps. Similar to the segment and intersection analysis, the method predicts the crash rate frequency for 2045 and calculates expected average crash rate frequency based on the predictive and observed crash information. The ISATe analysis breaks down expected crashes by crash severity. Table 5-30 shows the total number of predictive crashes for I-205 within the API. Based on this tool, there would be 32 fewer predictive crashes along the entire API section of I-205 under the Revised Build Alternative compared to the No Build Alternative, which represents approximately 7.7% fewer crashes. The lower crash frequency could be attributed to anticipated lower volumes along I-205 associated with the implementation of tolling. Similar to the segment and intersection safety analyses, crash frequency would be different between the No Build and Revised Build Alternatives because of differences in I-205 traffic volumes. A breakdown of the ISATe analysis by individual segments and ramps is included in Attachment Y.

Table 5-29. Expected Number of Highway and Ramp Crashes by Severity on I-205 in 2045

Segment	No Build Alternative					Revised Build Alternative				
	No. of Fatal Crashes	No. of Serious/ Moderate Injury Crashes	Number of Mild Injury Crashes	No. of PDO Crashes	Total	No. of Fatal Crashes	No. of Serious/ Moderate Injury Crashes	No. of Mild Injury Crashes	No. of PDO Crashes	Total
I-205 within the API	3	9	160	244	**416**	3	55	102	224	**384**

API = area of potential impact; PDO = property damage only

2027 Intersection and Segment Predictive Analysis

The HSM analysis for 2027 was conducted using the HSM methodologies, as was done for 2045. Table 5-31 and Table 5-32 show predictive crashes by severity for the No Build Alternative and the Revised Build Alternative in 2027 on rural multilane highway intersections and on urban/suburban arterial intersections, respectively. This analysis includes 15 study intersections and other intersections along the study corridors that were not flagged as study intersections The number of predictive crashes under the No Build Alternative compared to the Revised Build Alternative would vary. Other intersections include some intersections along the study corridors that were not identified as study intersections to avoid gaps in the analysis. The number of crashes would be higher at locations with relatively higher traffic volumes and lower at locations with relatively lower traffic volumes.

Table 5-30. Predictive Number of Crashes for Rural Multilane Highway Intersections in 2027

Intersection	No Build Alternative			Revised Build Alternative		
	No. of Predictive Fatality/ Injury	No. of Predictive PDO	No. of Predictive (Total)	No. of Predictive Fatality/ Injury	No. of Predictive PDO	No. of Predictive (Total)
OR 99E and South End Rd	1.13	1.71	**2.84**	1.18	1.80	**2.99**
OR 99E and New Era Rd	1.11	1.63	**2.74**	1.16	1.72	**2.88**

NB = northbound; PDO = property damage only; SB = southbound

Table 5-31. Predictive Number of Crashes for Urban and Suburban Arterial Intersections in 2027

Intersections	No Build Alternative					Revised Build Alternative				
	Number of Predictive Ped	Number of Predictive Bike	Number of Predictive Fatality/ Injury	Number of Predictive PDO	Number of Predictive (Total)	Number of Predictive Ped	Number of Predictive Bike	Number of Predictive Fatality/ Injury	Number of Predictive PDO	Number of Predictive (Total)
OR 99E/Arlington	0.06	0.10	2.22	4.31	**6.69**	0.06	0.10	2.04	4.00	**6.19**
OR 99E/Dunes	0.10	0.02	1.03	2.03	**3.18**	0.10	0.02	0.96	1.87	**2.96**
OR 99E/I-205 SB Ramp	0.17	0.04	1.46	3.52	**5.20**	0.18	0.04	1.32	3.18	**4.72**
OR 99E/I-205 NB Ramp	0.18	0.05	1.78	4.34	**6.35**	0.15	0.05	1.72	3.92	**5.83**
OR 99E/15th St	0.16	0.05	2.00	4.57	**6.78**	0.16	0.05	2.07	4.67	**6.95**
OR 99E/14th St	0.13	0.03	1.30	2.72	**4.18**	0.13	0.03	1.39	2.93	**4.48**
OR 99E/12th St	0.13	0.02	1.03	2.08	**3.26**	0.11	0.03	1.09	2.11	**3.34**
OR 99E/10th St	0.15	0.02	0.79	1.61	**2.57**	0.16	0.03	1.01	2.15	**3.34**
OR 99E/Main St	0.16	0.02	1.00	2.02	**3.20**	0.17	0.03	1.21	2.59	**3.99**
OR 99E/S 2nd St	0.15	0.02	0.87	1.77	**2.82**	0.15	0.02	1.00	2.11	**3.29**
OR 43/Hidden Springs	0.01	0.02	0.72	1.42	**2.17**	0.01	0.02	0.64	1.26	**1.93**
OR 43/Pimlico	0.00	0.00	0.20	0.38	**0.58**	0.00	0.00	0.17	0.32	**0.49**
OR 43/West A St	0.03	0.05	1.00	1.97	**3.05**	0.03	0.04	0.80	1.61	**2.47**
OR 43/McKillican St	0.05	0.07	1.48	2.88	**4.48**	0.04	0.05	1.16	2.30	**3.56**
OR 43/I-205 SB Off Ramps	0.04	0.10	2.00	4.10	**6.24**	0.04	0.11	2.31	4.57	**7.03**
OR 43/I-205 NB Off Ramps	0.01	0.02	0.94	1.90	**2.87**	0.01	0.03	1.24	2.80	**4.08**
OR 43/Willamette Falls Dr	0.00	0.00	0.16	0.39	**0.56**	0.01	0.00	0.25	0.61	**0.88**
Main St/10th St	0.01	0.32	0.26	0.41	**1.00**	0.01	0.30	0.33	0.49	**1.13**

NB = northbound; Ped = pedestrian; PDO = property damage only; SB = southbound

Similar to the intersection analysis, other roadway segments were evaluated based on segment characteristics and street classification for 2027. Table 5-33 and Table 5-34 show the number of predictive crashes for roadway segments by severity for the No Build Alternative and Revised Build Alternative in 2027. Like the intersection analysis, the number of expected crashes under the No Build Alternative and the Revised Build Alternative would be similar for most corridor segments. The number of crashes would be higher at locations with relatively higher traffic volumes and lower at locations with relatively lower traffic volumes.

Table 5-32. Predictive Number of Crashes for Rural Multilane Highway Segments in 2027

Segment	No Build Alternative			Revised Build Alternative		
	Number of Predictive Fatality/Injury	Number of Predictive PDO	Number of Predictive (Total)	Number of Predictive Fatality/Injury	Number of Predictive PDO	Number of Predictive (Total)
OR 99E: Paquet St to MP 15.7	4.81	5.44	**10.25**	5.27	6.05	**11.32**
OR 99E: MP 15.7 to South End Rd	3.74	4.07	**7.81**	4.00	4.40	**8.40**
OR 99E: South End Rd to New Era Rd	1.52	1.65	**3.17**	1.62	1.79	**3.41**

MP = milepost; NB = northbound; Ped = pedestrian; PDO = property damage only; SB = southbound

Table 5-33. Predictive Number of Crashes for Urban and Suburban Arterial Segments in 2027

Segment	No Build Alternative					Revised Build Alternative				
	Number of Predictive Ped	Number of Predictive Bike	Number of Predictive Fatality/ Injury	Number of Predictive PDO	Number of Predictive (Total)	Number of Predictive Ped	Number of Predictive Bike	Number of Predictive Fatality/ Injury	Number of Predictive PDO	Number of Predictive (Total)
OR 99E: Arlington to Dunes	0.01	0.01	0.65	1.45	**2.12**	0.01	0.03	1.20	2.84	**4.07**
OR 99E: Dunes to I-205 SB Ramp	0.01	0.02	0.91	2.46	**3.40**	0.01	0.02	0.85	2.29	**3.16**
OR 99E: I-205 SB Ramp to I-205 NB Ramp	0.02	0.01	0.44	1.13	**1.60**	0.01	0.01	0.41	1.04	**1.47**
OR 99E: I-205 NB Ramp to 15th St	0.01	0.01	0.24	0.68	**0.93**	0.01	0.00	0.22	0.63	**0.86**
OR 99E: 15th St to 14th St	0.01	0.00	0.21	0.57	**0.79**	0.01	0.00	0.20	0.55	**0.77**
OR 99E: 14th St to 12th St	0.08	0.04	0.70	2.02	**2.84**	0.09	0.04	0.73	2.10	**2.96**
OR 99E: 12th St to 10th St	0.04	0.02	1.15	2.62	**3.82**	0.04	0.03	1.23	2.82	**4.12**
OR 99E: 10th St to Main St	0.06	0.04	1.76	4.22	**6.08**	0.07	0.04	1.98	4.81	**6.90**
OR 99E: Main St to S 2nd St	0.01	0.02	0.82	2.12	**2.96**	0.01	0.02	1.04	2.76	**3.83**
OR 99E: S 2nd St to Paquet St	0.06	0.04	1.46	3.73	**5.30**	0.08	0.06	2.03	4.86	**7.02**
OR 43: Hidden Springs to Pimlico	0.06	0.05	1.66	3.99	**5.75**	0.07	0.05	1.84	4.34	**6.30**
OR 43: Pimlico to West A St	0.04	0.01	1.44	3.79	**5.28**	0.04	0.01	1.57	4.13	**5.76**
OR 43: West A St to McKillican St	0.02	0.00	0.61	1.57	**2.20**	0.01	0.00	0.50	1.28	**1.80**
OR 43: McKillican St to I-205 MP 11.13	0.00	0.01	0.26	0.55	**0.81**	0.00	0.00	0.21	0.43	**0.65**
OR 43: I-205 MP 11.14 to I-205 MP 11.29	0.00	0.01	0.24	0.62	**0.87**	0.00	0.00	0.20	0.49	**0.70**
OR 43: I-205 MP 11.30 to Willamette Falls Dr	0.00	0.00	0.14	0.37	**0.52**	0.00	0.00	0.12	0.29	**0.41**
OR 43: Willamette Falls Dr to Main St	0.01	0.00	0.19	0.49	**0.69**	0.02	0.00	0.23	0.62	**0.87**

MP = milepost; NB = northbound; PDO = property damage only; Ped = pedestrian; SB = southbound

5.3 Summary of Impacts and Benefits by Alternative

This section summarizes the impacts of the Revised Build Alternative relative to the No Build Alternative for roadway effects, transit effects, and active transportation effects. Table 5-36 in Section 5.3.5 provides a comparison of anticipated transportation impacts and benefits by alternative.

5.3.1 Roadway Effects

Figure 5-24 and Figure 5-25 graphically illustrate locations that may be affected by the Project in either 2027 or 2045. The most notable impacts would be at intersections that are projected to meet jurisdictional mobility targets under the No Build Alternative but would not meet those targets under the Revised Build Alternative in either the AM or PM peak hour.

One intersection, the signalized intersection at OR 99E and Main Street (Intersection #8 on Figure 5-25), would meet the jurisdictional mobility target under the No Build Alternative but would not meet it under the Revised Build Alternative in 2027 and 2045 during the PM peak hour.

Currently, there is a two-phase signal operation under actuated-coordinated control at this intersection during the PM peak hour, with each approach lane including a shared through plus left and/or right turn movement(s). All turn movements are permissive as a result, and the southbound shared through/left turning traffic would experience long delays under both the 2027 and 2045 Revised Build condition. This expected operational impact can be attributed to the following factors:

- Current lane configuration;
- Lack of flexibility to modify existing signal phasing for providing protected left/right turn(s); and
- High volume on OR 99E through movements blocked by gap-seeking critical left-turn movements in the southbound travel direction.

The OR 99E and Main Street intersection would also operate close to capacity under the No Build Alternative in 2027 and 2045.

The following six intersections would not meet jurisdictional mobility targets under the No Build Alternative and would experience comparatively worse conditions under the Revised Build Alternative in 2027:

- The signalized intersection at OR 99E and I-205 northbound ramps (Intersection #4 on Figure 5-25)
- The signalized intersection at OR 99E and 15th Street (Intersection #5 on Figure 5-25)
- The signalized intersection at OR 99E and 14th Street (Intersection #6 on Figure 5-25)
- The signalized intersection at OR 99E and S 2nd Street (Intersection #9 on Figure 5-25)
- The signalized intersection at OR 99E and S New Era Road (Intersection #11 on Figure 5-25)
- The stop-controlled intersection at Main Street and 10th Street (Intersection #14 on Figure 5-25)

The following five intersections would not meet mobility targets for either the No Build Alternative or Revised Build Alternative, and they would experience comparatively worse conditions under the Revised Build Alternative in 2045:

- The signalized intersection at OR 43 and Hidden Springs Road (Intersection #1 on Figure 5-25)
- The signalized intersection at OR 99E and I-205 northbound ramps (Intersection #4 on Figure 5-25)
- The signalized intersection at OR 99E and 14th Street (Intersection #6 on Figure 5-25)
- The signalized intersection at OR 99E and S 2nd Street (Intersection #9 on Figure 5-25)
- The stop-controlled intersection at OR 99E and S New Era Road (Intersection #11 on Figure 5-25)

The following three intersections would not meet the mobility target under the No Build Alternative; however, they would meet the targets under Revised Build Alternative in 2045:

- The signalized intersection at OR 99E and 10th Street (Intersection #7 on Figure 5-25)
- The signalized intersection at OR 99E and W Arlington Street (Intersection #12 on Figure 5-25)
- The signalized intersection at OR 99E and 12th Street (Intersection #13 on Figure 5-25)

The likelihood of off-ramp termini intersections to experience off-ramp queues that would spill back onto the I-205 mainline and affect mainline operations was also assessed. This was projected to occur at the OR 99E and I-205 northbound ramps intersection and the OR 99E and I-205 southbound ramps intersection in 2027 and 2045, and at the I-205 southbound ramps in the AM peak hour in 2045. ODOT will monitor conditions at these ramps to determine if and when mitigation may be required.

Table 5-35 summarizes the intersections where there would be impacts. The table includes whether the impact was identified with the 2027 or 2045 analysis, or both, and whether it would meet targets under the No Build Alternative but not the Revised Build Alternative, or if it would not meet targets under both alternatives but be comparatively worse under the Revised Build Alternative.

Of the 15 study intersections, five would not experience new impacts under the Revised Build Alternative compared to the No Build Alternative in 2027 and/or 2045. As shown in Figure 5-24, Figure 5-25, and Table 5-35, of those that do experience impacts, two intersections would experience them only in 2027, one intersection would experience impacts only in 2045, and five intersections would experience impacts in both 2027 and/or 2045 under the Revised Build Alternative compared to the No Build Alternative.

Table 5-34. Summary of Intersection Impacts

ID[1]	Intersection	Traffic Control	Meets Targets under No Build, but Not Revised Build		Does Not Meet Targets under Both Alternatives, Worsens under Revised Build	
			2027	2045	2027	2045
1	OR 43 and Hidden Springs Rd	Signalized				X
4	OR 99E and I-205 NB Ramps	Signalized			X	X
5	OR 99E and 15th St	Stop Controlled			X	
6	OR 99E and 14th St	Signalized			X	X
8	OR 99E and Main St	Signalized	X	X		
9	OR 99E and S 2nd St	Signalized			X	X
11	OR 99E and S New Era Rd	Stop Controlled			X	X
14	Main St and 10th St	Stop Controlled			X	

[1] Each intersection ID number corresponds to the location numbers identified in Figure 5-24 and Figure 5-25.

Figure 5-23. Summary of Intersection Effects in 2027 and 2045 in the Area of Potential Impact

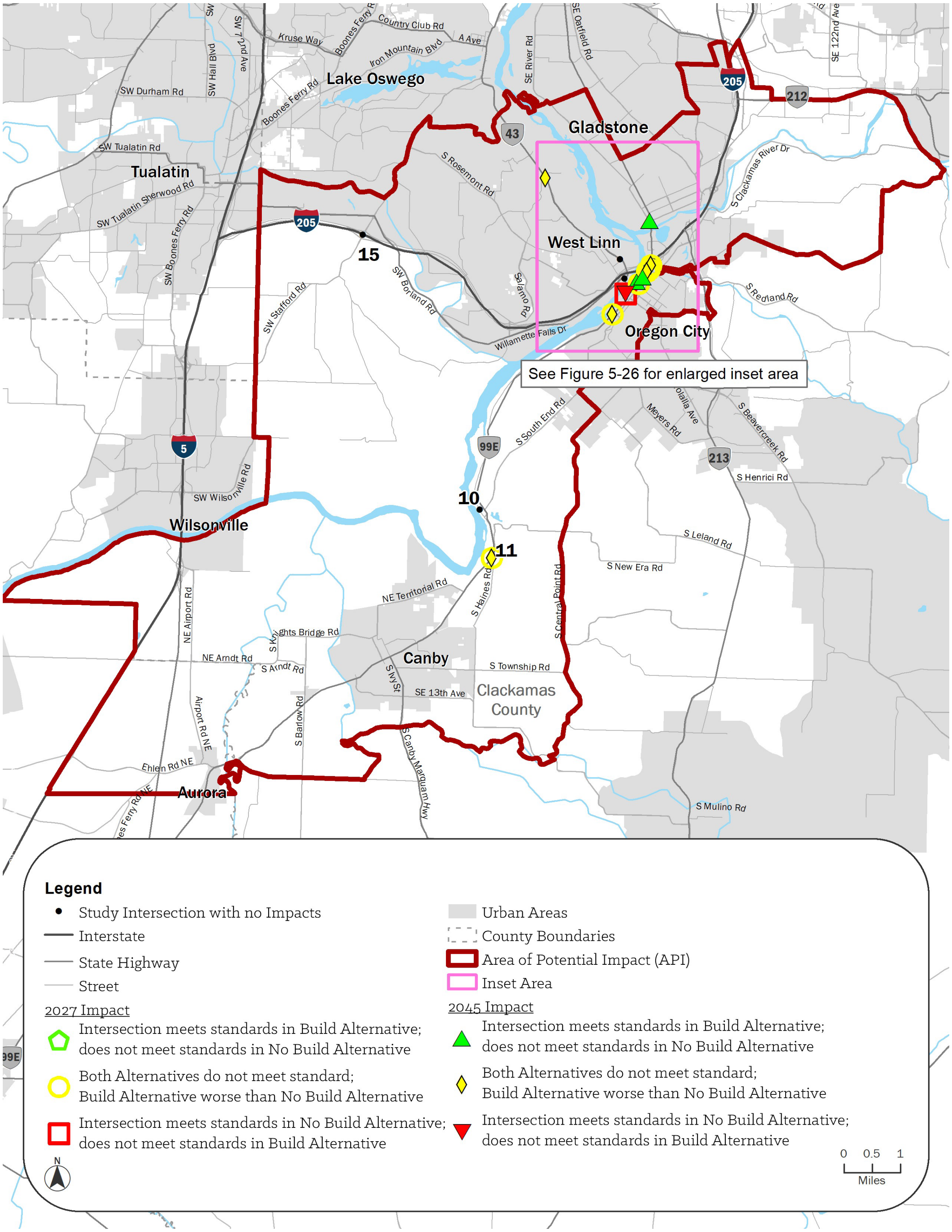
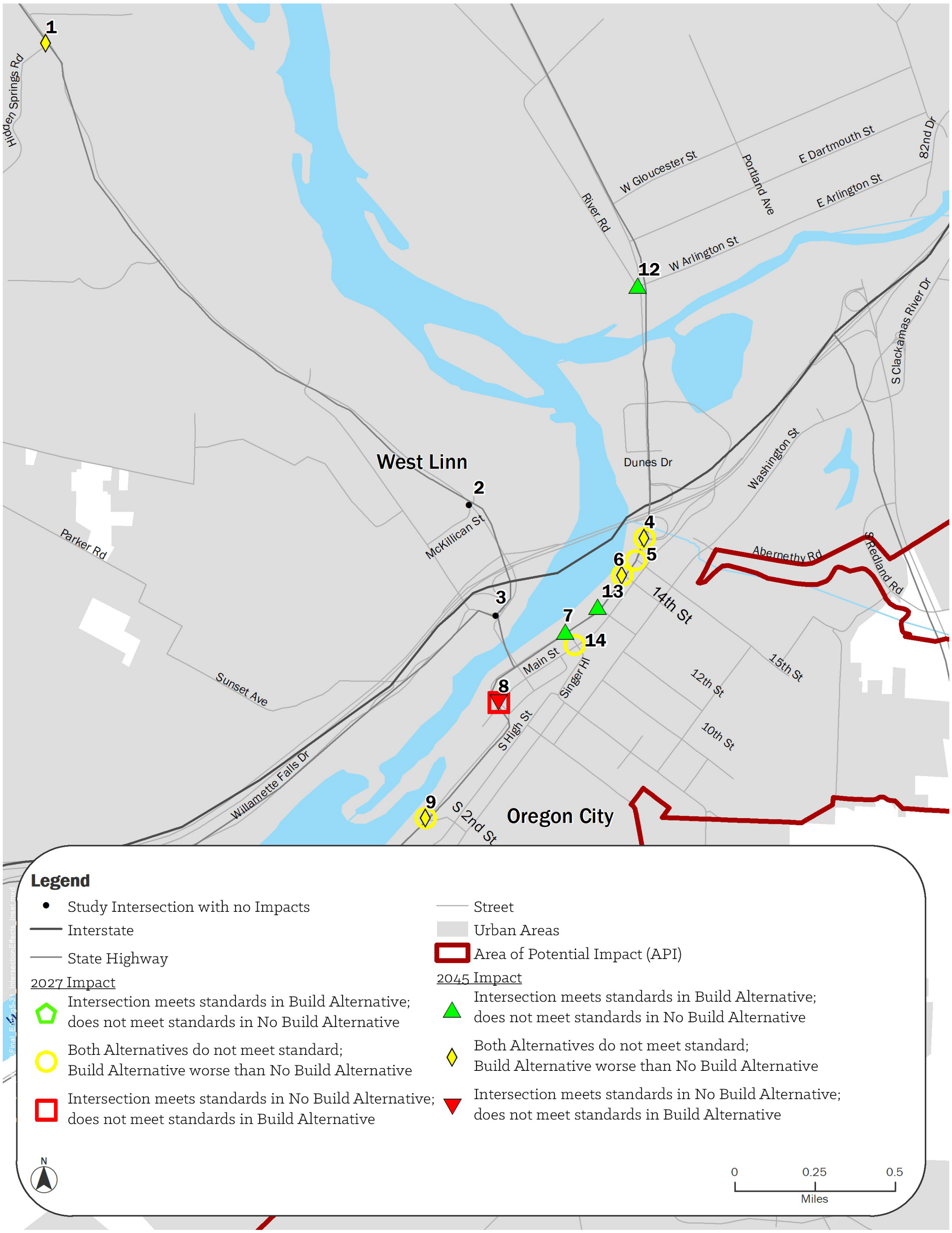


Figure 5-24. Summary of Intersection Effects in 2027 and 2045 in the Area of Potential Impact – Oregon City, West Linn, Gladstone



5.3.2 Transit Effects

For transit, the following roadway segments are expected to experience a worse transit MMLOS under the Revised Build Alternative as compared to the No Build Alternative in 2045:

- OR 99E from W Arlington Street to Dunes Drive (northbound)
- OR 99E from 15th Street to 12th Street (northbound)
- Main Street from OR 99E to 10th Street (both directions)

The following roadway segments are expected to experience a better transit MMLOS under the Revised Build Alternative as compared to the No Build Alternative in 2045:

- OR 43 from McKillican Street to Hidden Springs Road (southbound)
- OR 99E from Dunes Drive to 15th Street (southbound)
- OR 99E from Main Street to Railroad Avenue (southbound)
- OR 99E from Milepost 12.74 to South 2nd Street (southbound)

5.3.3 Active Transportation Effects

Regarding pedestrian mobility, the following roadway segments are expected to experience a worse pedestrian MMLOS under the Revised Build Alternative as compared to the No Build Alternative in 2045:

- OR 99E from 10th Street to Main Street (southbound)
- OR 99E from Railroad Avenue to Milepost 12.74 (southbound)
- OR 99E from South End Road to New Era Road (southbound)

The following roadway segments are expected to experience a better pedestrian MMLOS under the Revised Build Alternative as compared to the No Build Alternative in 2045:

- OR 99E from 12th Street to 11th Street (northbound)
- OR 99E from Milepost 18.16 to New Era Road (northbound)

For BLTS, no differences were found between the No Build and Revised Build Alternatives for the two study corridors.

5.3.4 Safety Effects

Analysts identified impacts at study intersections and roadway segments based on the following primary and secondary criteria:

- **Primary criteria**
  - When the predicted fatal/serious injury crashes would increase by 0.05 crash per year (equivalent to one fatal/serious injury crash every 20 years).
  - If the intersection or segment is identified as a SPIS location in the top 15th percentile, and the total fatal/serious injury crashes would increase by 0.01 crash per year (equivalent to one fatal/serious injury crash every 100 years).
- **Secondary criteria**
  - If the intersection exceeds the critical crash rate under existing conditions and if the total fatal/serious injury crashes would increase by any amount.

- If the segment is classified as a safety corridor and if the total fatal/serious injury crashes would increase by any amount.
- If the intersection would not meet the mobility target and would worsen with the Project, and if the total fatal/serious injury crashes would increase by any amount.

When an intersection or segment would meet one or more of the primary criteria, even if it would not meet any secondary criteria, mitigation could be considered. When an intersection or segment does not meet the primary criteria but meets one or more of the secondary criteria, conditions would be monitored to determine if mitigation could be considered.

Safety impacts related to potential traffic diversion were identified at the following intersections and segments based on 2027 and 2045 crash predictions and meeting one of the two primary criteria.

Intersections

There were no intersections that were projected to meet the primary criteria in 2027 or in 2045. Two intersections were projected to meet the secondary criteria in 2027 and/or 2045:

- OR 99E and S 2nd Street
- Main Street and 10th Street

Segments

One corridor segment was projected to meet the primary criteria in 2027 and in 2045.

- S 2nd Street to Paquet Street

5.3.5 Summary of Effects

Table 5-36 summarizes all transportation effects by alternative.

Table 5-35. Summary of Transportation Effects by Alternative

Effects	No Build Alternative	Revised Build Alternative
Short-Term Effects	• None	• The number and speed of I-205 through lanes would generally be maintained throughout construction of the Project. • Limited full I-205 roadway closures would be required, with short-term detours in place as needed.
Direct Impacts and Benefits – 2027 Analysis Results	• 5 of the 15 study intersections analyzed would not meet jurisdictional mobility targets during the AM peak hour. • 10 of the 15 study intersections would not meet jurisdictional mobility targets during the PM peak hour. • OR 99E and I-205 NB ramps and OR 99E and I-205 SB ramps off-ramp termini intersections would experience off-ramp queues that would spill back onto the I-205 mainline causing impacts on mainline operations during the PM peak hour.	• 1 of the 15 study intersections would meet targets under the No Build Alternative and would not meet targets under the Revised Build Alternative during the PM peak hour. • 6 of the 15 study intersections would not meet mobility targets in the AM and/or PM peak period under both alternatives and would get comparatively worse under the Revised Build Alternative. • The OR 99E and I-205 NB ramps and OR 99E and I-205 SB ramps off-ramp termini intersections would experience off-ramp queues that would spill back onto the I-205 mainline causing impacts on mainline operations during the PM peak hour. • Based on the predictive safety analysis, 2 of the 15 study intersections would experience impacts under the Build Alternative. • Based on the predictive safety analysis, 1 segment along OR 99E would experience impacts under the Build Alternative.

Effects	No Build Alternative	Revised Build Alternative
Direct Impacts and Benefits – 2045 Analysis Results	• 8 of the 15 study intersections would not meet jurisdictional mobility targets during the AM peak hour. • 11 of the 15 study intersections would not meet jurisdictional mobility targets during the PM peak hour. • All of the northbound I-205 segments would meet the mobility target of a v/c ratio of 0.99 during the AM and PM peak hours except for 1 segment between OR 213 and SE 82nd Dr. • All of the southbound I-205 segments would meet the mobility target of a v/c ratio of 0.99 during the PM peak hour. • OR 99E and I-205 NB ramps and OR99E and I-205 SB ramps off-ramp termini intersections would experience off-ramp queues that would spill back onto the I-205 mainline causing impacts on mainline operations during both AM and PM peak hours. • 2 study corridors with transit would have worse travel times than under the Revised Build Alternative, and 1 corridor would be better. • 4 roadway segments would have worse transit MMLOS than under the Revised Build Alternative, and 2 segments would be better. • 2 roadway segments would have worse pedestrian MMLOS than under the Revised Build Alternative, and 3 segments would have better pedestrian MMLOS.	• 3 of the 15 study intersections would not meet targets under the No Build Alternative and would meet targets under the Revised Build Alternative during the AM and/or PM peak hour. • 1 of the 15 study intersections would not meet jurisdictional mobility targets under the Revised Build Alternative but would meet them under the No Build Alternative. • 5 of the 15 study intersections would not meet mobility targets in the AM and/or PM peak period under both alternatives and would get comparatively worse with the Revised Build Alternative. • Travel times and operating levels of service are projected to improve on I-205 in the AM and PM peak periods in both directions • All of the northbound I-205 segments would meet the v/c ratio mobility target of 0.99 except for 1 segment in the AM peak hour. • All of the southbound I-205 segments would meet the v/c ratio mobility target of 0.99. • OR 99E and I-205 NB ramps and OR 99E and I-205 SB ramps off-ramp termini intersections would experience off-ramp queues that would spill back onto the I-205 mainline causing impacts on mainline operations during both AM and PM peak hours. • 2 study corridors with transit would have better travel times than under the No Build Alternative, and 1 corridor would be worse. • 4 roadway segments would have better transit MMLOS than under the No Build Alternative, and 2 would be worse. • 2 roadway segments would have better pedestrian MMLOS than under the No Build Alternative, and 3 segments would have worse pedestrian MMLOS. • There would be about 8% fewer crashes on I-205.
Indirect Impacts and Benefits	• Rerouting to other roadways due to congestion on I-205 and tolls at the Tualatin River Bridge is expected to occur under No Build Alternative. • Vehicle users may avoid peak-period travel to avoid paying higher tolls at the Tualatin River Bridge.	• Minor changes in mode choice away from single-occupant vehicles are expected to occur. • Additional rerouting to alternative routes is expected to occur due to the added tolls at the Abernethy Bridge. • More vehicle users may avoid peak-period travel to avoid paying additional tolls at the Abernethy Bridge. • For transit routes in the API, transit ridership is projected to be slightly higher under the Revised Build Alternative than under the No Build Alternative.

API = area of potential impact; LTS = level of traffic stress; HDM = Highway Design Manual; MMLOS = multimodal level of service; NB = northbound; SB = southbound; v/c = volume-to-capacity

6 Mitigation Measures

This chapter describes potential mitigation measures assessed for roadway, transit, active transportation, and safety impacts identified in Section 5.3.

6.1 Roadway Mitigation

The potential transportation impacts detailed in Section 5.3 are based on assumptions built into the RTDM and dependent on existing conditions data. To account for potential deviations from these assumptions and conditions once tolling is implemented, ODOT proposes a dynamic monitoring system that can respond to the impacts of tolling as they occur. One of the first actions that ODOT would take is to set up an Active Transportation Monitoring Framework to be in place prior to the initial implementation of tolls on I-205. This program would help guide the development of a Project-specific plan to track conditions on roadways in the API as agreed upon with local jurisdictions to assess the extent of rerouting and its impact on the transportation system. This program would be used to identify baseline traffic volumes before construction and impacts after toll implementation. Based on this data, ODOT would have the ability to identify and implement new mitigation requirements and/or move up mitigation planned for a later date.

In addition, ODOT plans to establish a group consisting of local leaders, staff, and/or elected officials to meet with ODOT staff on an agreed upon basis immediately after tolling is implemented to be a direct line of communication with ODOT to address rerouting concerns.

Most of the potential impacts are expected to occur along OR 99E between the I-205 interchange and South 2nd Street. Because of the interconnectedness of the transportation system through this area, with effects on OR 99E potentially affecting operations of downtown Oregon City streets, as well as the desire to balance mobility across all modes of transportation, it is recommended that a multimodal corridor study of the OR 99E corridor be conducted to assess competing needs and develop potential improvements that work for all corridor stakeholders. This study would be a coordinated effort between ODOT and local jurisdictions/agencies (e.g., Oregon City, Clackamas County, TriMet), and would be aimed at developing solutions that are appropriate for the entire corridor rather than only spot-by-spot intersection improvements.

The Project team assessed potential mitigation measures to address impacts at other intersections outside of the OR 99E/Oregon City corridor that would meet local mobility targets with the No Build Alternative but not with the Revised Build Alternative in 2027 (see Section 5.3.2):

- OR 99E/New Era Road: A potential solution to address this impact would be to restrict left turns from New Era Road/Haines Street to southbound OR 99E. This would require a relatively small amount of traffic (less than 25 vehicles in the PM peak hour) to reroute to the south and access OR 99E from Territorial Road, which has a traffic signal and could more effectively and safely accommodate those turns.
- OR 99E/15th Street: This intersection would be included in the OR 99E/Oregon City corridor study.

6.2 Transit Mitigation

Multiple factors affect transit MMLOS, including transit speed and reliability, and the ability of pedestrians to safely access transit stops. Implementing transit priority treatments and improving pedestrian facilities along the following transit corridor segments would improve areas that may experience transit MMLOS impacts in 2045:

- OR 99E from Dunes Drive to Arlington Street (northbound direction)
- OR 99E from 12th Street to 15th Street (northbound direction)
- Main Street from OR 99E to 10th Street (both directions)

Specific transit improvements could be identified and refined through the OR 99E/Oregon City Corridor Study, and could potentially include the following:

- OR 99E/Arlington Street: Transit signal priority (pending agreement on acceptable technology).
- OR 99E north of Dunes Drive: Widen to provide southbound transit queue jump space (i.e., an area that allows transit to "jump" ahead of cars with an advance green light) just north of Dunes Dr.
- OR 99E/Dunes Drive: Transit signal priority (pending agreement on acceptable technology).
- OR 99E/I-205 Southbound Ramps: Transit signal priority (pending agreement on technology). Provide northbound bus pocket at intersection and implement advance green light.
- OR 99E/I-205 Northbound Ramps: Transit signal priority (pending agreement on technology), advance green for southbound transit.
- OR 99E/14th Street and OR 99E/12th Street: Transit signal priority (pending agreement on technology).

6.3 Active Transportation Mitigation

Potential pedestrian impacts were identified along the roadway segments listed below. All of these impacts would be due to expected traffic volume increases on OR 99E:

- OR 99E from 10th Street to Main Street (southbound)
- OR 99E from Railroad Avenue to Milepost 12.74 (southbound)
- OR 99E from South End Road to New Era Road (southbound)

Potential mitigation measures to address these impacts could include improving sidewalk conditions (e.g., widening or reconstructing), enhancing connectivity (e.g., filling in gaps in the pedestrian network), and providing ADA ramps. Specific pedestrian improvements could be identified and refined through the OR 99E/Oregon City Corridor Study and would potentially include:

- Widen/Improve southbound sidewalk on OR 99E between 10th Street and Railroad Avenue.
- Coordinate with the City of Oregon City to implement the OR 99E Bike and Pedestrian Improvements Project, which would improve active transportation facilities on the southbound side of OR 99E.

6.4 Safety Mitigation

Potential safety impacts under the Revised Build Alternative in 2027 were identified at intersections and roadway segments, as discussed in Section 5.2.7, Transportation Safety. Safety impacts identified for 2045 are at the same locations identified for 2027.

One segment was identified for evaluation of safety-specific mitigation in 2027 and 2045 based on the safety analysis primary criteria discussed in Section 5.3.5, Safety Effects:

- OR 99E: S 2nd Street to Paquet Street

Two intersections were identified for safety-specific monitoring in 2027 and 2045 based on the safety analysis secondary criteria:

- Main Street and 10th Street
- OR 99E and S 2nd Street

The following section list treatments that could be implemented to improve safety along the segment identified as meeting the safety primary criteria under the Revised Build Alternative in 2027 and 2045. The list also provides safety treatments that could be implemented at the signalized intersection, OR 99E and S 2nd Street, identified as meeting the safety secondary criteria under the Revised Build Alternative 2027 and 2045 if the monitoring deems it necessary. These are preliminary safety mitigations; a feasibility analysis would need to be conducted to assess the viability of implementing these mitigations and to confirm consistency with any other planned projects. Potential mitigations were selected from ODOT's *Highway Safety Improvements Program (HSIP) Countermeasures and Crash Reductions Factors* (ODOT 2022c), which outlines a list of crash reductions factors that have been recognized as effective countermeasures by ODOT. Each crash reduction factor also includes a range of its overall effectiveness based on available research.

Potential Safety Treatments

Add 3-inch Yellow Retroreflective Sheeting to Signal Backplates

Adding 3-inch yellow retroreflective sheeting to signal backplates could reduce all crashes by 15%. This treatment enhances signal visibility during daytime and nighttime conditions, and it may alert drivers of the signalized intersection during a power outage. A signal backplate is a metal piece that frames the signals and can be installed with a reflective border to improve the visibility of traffic lights, especially in bright conditions (ODOT 2022c, Section I13).

Improve Signal Hardware: Lenses, Reflectorized Back plates, Size, and Number

Signal improvements consist of treatments such as twelve-inch signal lenses, LED lenses on all signals, reflectorized back plates on all signal heads, supplemental signal heads, removal of night flashing operations, signal timing adjustments, and adding right-turn lane signal to reduce right-turn conflicts. Implementing three to four of these treatments can reduce all crashes by 25%. All these treatments can reduce crashes by increasing signal visibility and improving operations (ODOT 2022c, Section I2).

Speed Feedback Signs

Installing a speed feedback sign would reduce all crashes of all severities by 10%. Speed feedback signs enhance safety by managing speeds and reducing the risk of speed-related crashes (ODOT 2022c, Section RD12).

7 Preparers

Individuals involved in preparing the Supplemental Transportation Technical Report are identified in Table 7-1.

Table 7-1. List of Preparers

Name	Role	Education	Years of Experience
Abby Caringula	Technical Report Author	MS, Civil Engineering BE, Civil Engineering	17
Rachel Haukkala, AICP	Technical Report Author	BS, Community and Regional Planning and Environmental Studies	7
Edith Lopez	Technical Report Author	MS, City and Regional Planning BA, Geography and Environmental Studies	9
Dwij Dave	Technical Report Author	MSc, Transportation Planning and Engineering BE, Civil Engineering	8
Chris Wellander	Transportation Analysis Lead, Technical Report Author, Reviewer	MS, Civil Engineering BS, Civil Engineering	40
Anne Broache, AICP	Technical Report Reviewer	MUP, Urban Planning BSJ, Journalism	17
Jeff Crisafulli	Technical Report Editorial Reviewer	BA, English	25

8 References

American Association of State Highway and Transportation Officials (AASHTO). 2010. *Highway Safety Manual* (HSM). http://www.highwaysafetymanual.org/Pages/Tools.aspx. Accessed April 2022.

City of Gladstone. 2017. City of Gladstone Transportation System Plan. https://www.ci.gladstone.or.us/sites/default/files/2017_transportation_system_safety_plan_with_appendices.pdf. Accessed April 2022.

City of West Linn. 2016. City of West Linn Transportation System Plan. https://westlinnoregon.gov/sites/default/files/fileattachments/public_works/page/5402/ord_1646_2016_transportation_system_plan.pdf. Accessed April 2022

Clackamas County. 2022a. Index to Maps, Tables and figures. https://www.clackamas.us/planning/maptoc.html. Accessed April 2022

Clackamas County Comprehensive plan. 2022b. Chapter 5: Transportation System Plan. https://dochub.clackamas.us/documents/drupal/4f347d01-968b-47c4-ae92-7eaac0776a0f. Accessed April 2022

Garcia-López, Miquel-Àngel, Ilias Pasidis and Elisabet Viladecans-Marsal (Garcia-López et al.). 2020. "Congestion in highways when tolls and railroads matter: Evidence from European cities," Working Papers wpdea2011, Department of Applied Economics at Universitat Autonoma of Barcelona. https://ideas.repec.org/p/uab/wprdea/wpdea2011.html.

Google Maps. 2022. https://www.google.com/maps. Accessed April 2022.

Metro. 2013. Regional Land Information System. https://rlisdiscovery.oregonmetro.gov/. Accessed January 2024.

Metro. 2018. Regional Transportation Plan. https://www.oregonmetro.gov/sites/default/files/2020/07/29/Adopted-2018-RTP-all-chapters.pdf. Accessed January 2024.

Oregon City. 2013. 2013 Transportation System Plan. https://www.orcity.org/publicworks/2013-transportation-system-plan. Accessed April 2022.

Oregon Department of Transportation (ODOT). 1999. *1999 Oregon Highway Plan Including amendments November 1999 through May 2015.* https://www.oregon.gov/odot/Planning/Documents/OHP.pdf. Accessed November 5, 2021.

Oregon Department of Transportation (ODOT). 2010. *Environmental Impact Statement Annotated Template.* https://www.oregon.gov/ODOT/GeoEnvironmental/Docs_NEPA/EIS_Annotated_Template.pdf. Accessed November 5, 2021.

Oregon Department of transportation (ODOT). 2012. Oregon department of transportation Highway Design Manual. https://www.oregon.gov/odot/Engineering/Pages/Hwy-Design-Manual.aspx. Accessed April 2022.

Oregon Department of Transportation (ODOT). 2020a. *Transportation Planning and Analysis Unit Analysis Procedures Manual.* https://www.oregon.gov/odot/Planning/Documents/APMv2.pdf.

Oregon Department of Transportation (ODOT). 2020b. Oregon Transportation Map Showing Federal Functional Classification of Roads, Clackamas County. https://www.oregon.gov/odot/Data/Documents/County_Clackamas_01of02.pdf

Oregon Department of Transportation (ODOT). 2020c. *I-205 Toll Project Transit/Multimodal Existing Conditions.* https://www.oregon.gov/odot/tolling/Documents/2020-0812_I-205Toll_TransitMM_ExistingConditionsMemo_Final.pdf

Oregon Department of Transportation (ODOT) February 2021a. I-205 Corridor User Analysis. Oregon Department of Transportation (ODOT): *Region 1. December 2021b, 2020 Traffic Performance Report.*

Oregon Department of Transportation (ODOT). 2021b. I-205 Corridor User Analysis. https://www.oregon.gov/odot/tolling/Documents/I205%20Corridor%20User%20Analysis%20Final.pdf

Oregon Department of Transportation (ODOT). 2021c. Crash Analysis and Reporting. https://tvc.odot.state.or.us/tvc/. Accessed April 2022.

Oregon Department of Transportation (ODOT). 2022a. ODOT TransGIS. https://gis.odot.state.or.us/transgis/

Oregon Department of Transportation (ODOT). 2022b. Email: APM guidance on critical v/c calculation from Peter.L.SCHUYTEMA@odot.oregon.gov.

Oregon Department of Transportation (ODOT). 2022c. Oregon Department of Transportation (ODOT) HSIP Countermeasures and Crash Reduction Factors. https://www.oregon.gov/odot/Engineering/ARTS/CRF-Appendix.pdf

Oregon Department of Transportation (ODOT). 2023. *I-205 Toll Project Environmental Assessment.* https://www.oregon.gov/odot/tolling/Documents/I-205%20Toll%20Project%20Environmental%20Assessment_508.pdf. Accessed January 12, 2024.

Transportation Research Board (TRB). 2016. Highway Capacity Manual (HCM) Reporting Methodology. Washington, D.C.

TriMet. 2022. Oregon City Transit Center Reconfiguration Preliminary Analysis Summary on McLoughlin Boulevard (OR 99E).

This page intentionally left blank.