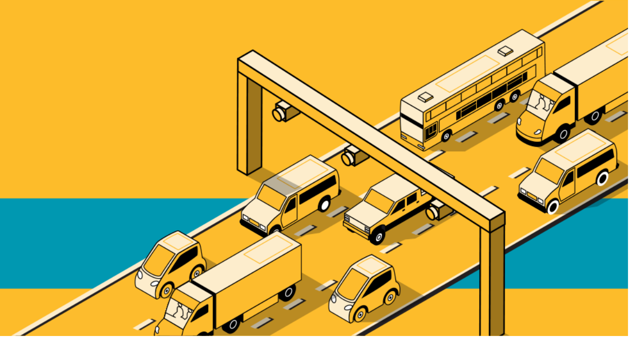
I-205 Tolling

MEMORANDUM



Date	September 1, 2021
To	Lucinda Broussard, Alex Bettinardi, Carol Snead, and Michael Holthoff (ODOT)
From	Abby Caringula, Chris Wellander, Mat Dolata, WSP
Subject	Transportation Methodology Memorandum
CC	

INTRODUCTION

This memorandum describes the methods that will be used in the I-205 Toll Project (Project) Environmental Assessment (EA) analysis to evaluate transportation impacts of the Project alternatives. The analysis and results will be documented in a technical report and summarized in the EA that will be developed to comply with federal guidelines and regulations, including the National Environmental Policy Act (NEPA) and local and state policies, standards, and regulations.

The transportation analysis will evaluate impacts from the construction and operations of the Project and will identify mitigation measures as needed. The transportation analysis assumes that Project toll revenues will be used to construct the I-205 Improvements: Stafford Road to OR 213 Project.

AREA OF POTENTIAL IMPACT

An area of potential impact (API) is a geographic boundary within which impacts to the human and natural environment could occur with the Project alternatives. The Transportation API is defined as the area that comprises locations where state and local roadways, bicycle and pedestrian facilities, and transit services could potentially experience adverse and/or beneficial impacts associated with the potential alternatives. While, the API will be the primary focus of the impact analysis, the modeling tools used will extend beyond this area and will be used to assess or confirm whether any regional rerouting impacts may be expected to occur outside of this focus area. Depending on those results, the API may be modified. However, regardless of those results, regional measures will be included beyond the API to capture indirect effects in the transportation technical memorandum.

The Transportation API was identified by examining the anticipated traffic volume changes (for daily, a.m. peak hour, and p.m. peak hour) from Metro regional travel demand model results for 2045 model scenarios.[1] Input from local jurisdictions regarding specific intersections they were concerned about were also included. The API generally extends north-south along I-205

[1] Project alternatives and model scenarios are described in the Draft Comparison of I-205 Screening Alternatives Technical Report (WSP 2020).

from the I-5 interchange near Tualatin to the 82nd Drive interchange near Gladstone, as shown in Figure 1. The Transportation API typically ranges from 0.75 to 3 miles on either side of I-205 and includes I-205 interchange ramp terminal intersections, key intersections, and key corridors in the I-205 vicinity. It also extends south along OR 99E by about 10 miles to Aurora.

To more comprehensively capture the potential impacts of re-routing due to tolling on I-205, key intersections that may experience notable changes in traffic volumes are included within the Transportation API, including intersections in unincorporated Clackamas County, Oregon City, West Linn, and Gladstone. Figure 2 shows an inset of the API with a focus on the intersection locations at the center of the study area. The 50 study intersections within the Transportation API illustrated in Figure 1 and Figure 2 are listed below.

1. Stafford Road and Borland Road
2. Stafford Road and I-205 Northbound Ramps
3. Stafford Road and I-205 Southbound Ramps
4. Stafford Road and Ek Road
5. Stafford Road and Johnson Road
6. 19th Street and Willamette Falls Drive
7. 10th Street and Willamette Falls Drive
8. 10th Street and Salamo Road
9. 10th Street and I-205 Northbound Ramps
10. 10th Street and I-205 Southbound Ramps
11. Rosemont Road and Salamo Road
12. Hidden Springs Road and Santa Anita Drive
13. Hidden Springs Road and Willamette Falls Drive
14. OR 43 and Willamette Falls Drive
15. OR 43 and I-205 Northbound Ramps
16. OR 43 and I-205 Southbound Ramps
17. OR 43 and McKillican Street
18. 7th Street and Main Street
19. OR 99E and I-205 Northbound Ramps
20. OR 99E and I-205 Southbound Ramps
21. OR 99E and 15th Street
22. 15th Street and Washington Street
23. OR 99E and 10th Street
24. Abernethy Road and Washington Street
25. OR 99E and Arlington Street
26. OR 99E and Gloucester Street
27. OR 99E and Jennings Avenue
28. OR 213 and I-205 Northbound Ramps
29. OR 213 and I-205 Southbound Ramps
30. OR 213 and Washington Street
31. Oatfield Road and Jennings Avenue

32. 82nd Drive and I-205 Northbound Ramps
33. 82nd Drive and I-205 Southbound Ramps
34. 82nd Drive and Princeton Avenue
35. SW Stafford and SW Mountain Road
36. Borland and 65th
37. 12th Street and Willamette Falls Dr
38. I-5NB and Nyberg
39. I-5SB and Nyberg
40. Mcloughlin Blvd. and Dunes Dr
41. Mcloughlin Blvd. and 14th Ave
42. SW Stafford Road and Childs Road
43. SW Stafford and Rosemont
44. OR 43 and McVey
45. OR 43 and A Ave
46. OR99E and South End Rd
47. OR99E and New Era Rd
48. OR99E and Ivy St
49. OR99E and Lone Elder Rd
50. OR99E and Redwood

A qualitative assessment of travel effects outside of the Portland metro area will be informed by using ODOT's Statewide Integrated Model to assess the extent of potential changes in statewide travel patterns due to tolling.

The API and study intersections will be reassessed and potentially modified once the Subarea Dynamic Traffic Assignment (DTA) model runs have been reviewed, in coordination with ODOT.

Figure 1. Transportation API

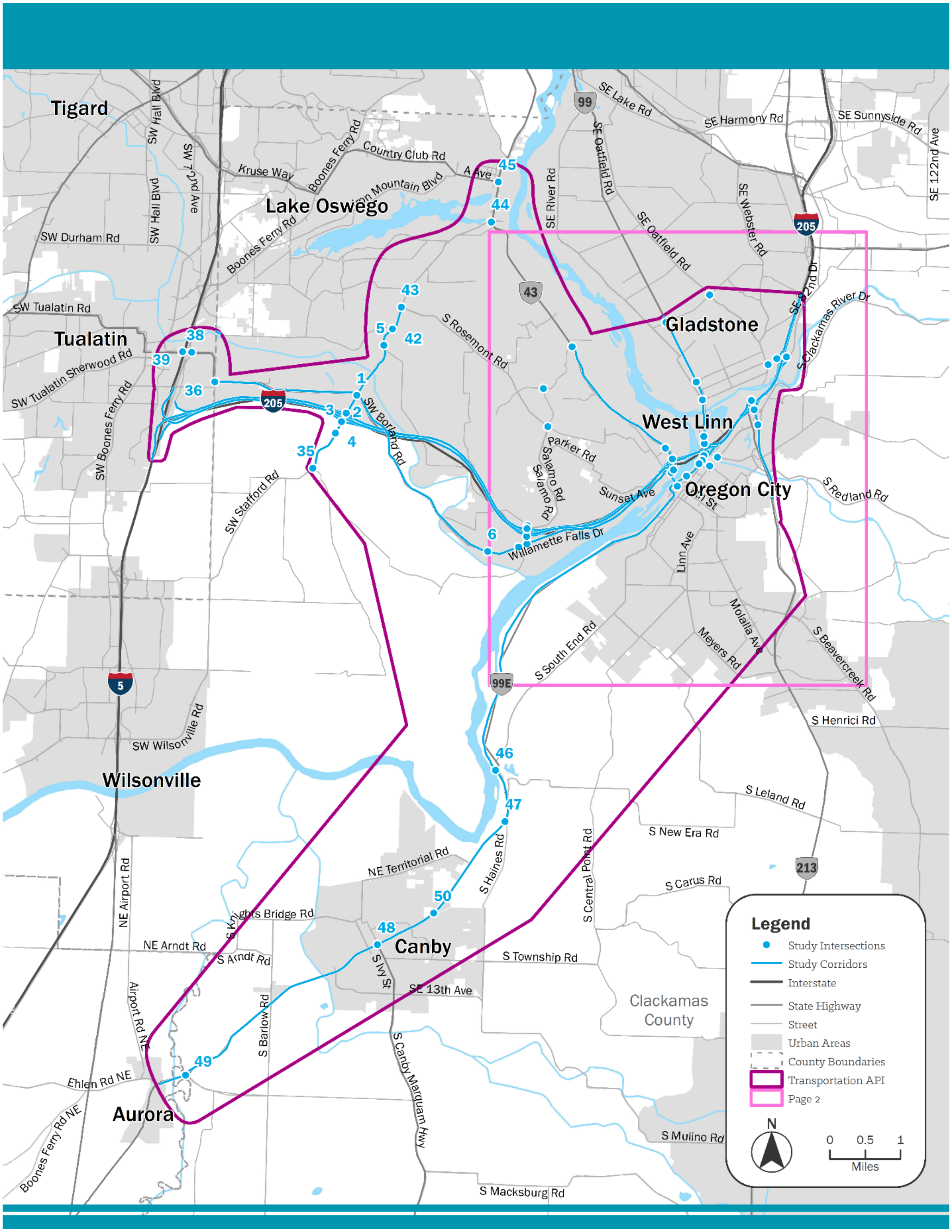
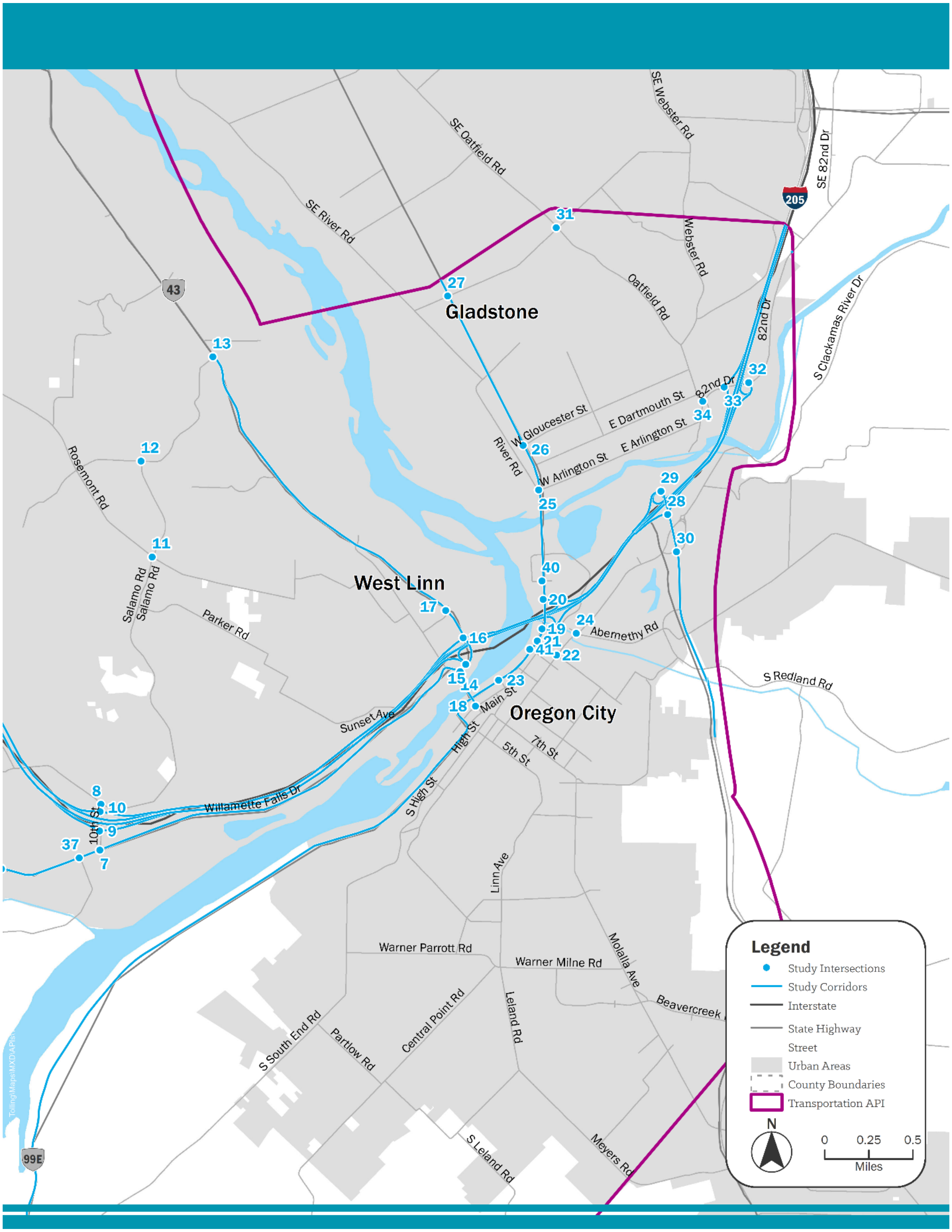


Figure 2. Transportation API – Oregon City Focus Area



GENERAL STUDY APPROACH

The analysis and documentation process for examining transportation effects will follow a transportation planning analysis format typically used to support environmental documentation efforts. Key tasks associated with the analysis include the following (in sequential order):

- Review existing data and collect and compile new data (traffic counts, collision data, facilities inventory, etc.).
- List assumptions included in the Metro regional travel demand model.
- Utilize land use growth assumptions from the Metro 2018 Regional Transportation Plan for interim year and future year No Build model scenarios.
- Assess existing transportation conditions (intersection traffic operations, active transportation facilities, transit routes, crash history, etc.) with consideration of seasonal variations.
- Consider transportation-related input from stakeholder interviews as available (i.e., feedback from businesses, agencies, emergency responders and the public regarding the state of the corridor including current challenges and opportunities for improvement).
- Develop forecasts for 2027 interim year and 2045 future year traffic volumes.
- Analyze and document interim year and future year traffic No Build and Build conditions.
- Monitor regional and national trends related to changes in commute travel patterns due to COVID-19 pandemic.
- Identify/develop mitigation as necessary.

TRANSPORTATION DATA

To conduct a comprehensive assessment of transportation conditions associated with the Project, a variety of transportation data will be collected and/or compiled from available existing resources including the following:

- A.m. and p.m. peak hour intersection turning movement volumes including bicycle, pedestrian, and heavy vehicle counts
- Twenty-four-hour tube counts on key roadways
- Updated vehicle classification volumes for I-205
- Signal timing and phasing data for the signalized study intersections
- Roadway geometry data and pedestrian/bicycle facilities at study intersections and on roadway corridors which access or run parallel to I-205 within the API
- Historical crash data for I-205 and other study corridors identified as being significantly impacted by the Project

- Freight volumes and documentation on future freight system demands on I-205, as available
- Data from ODOT Overdimensional Trip Permitting Program, as available
- Transit routes and ridership (as available) in the API
- Key emergency responders within the Project vicinity
- Geographic information system (GIS) data representing parcel boundaries, right of way, critical areas, topography, and utilities, as available
- Origin-destination data of corridor users
- Project area aerial imagery
- Travel time data along I-205 and other study corridors identified as being substantially affected by the Project

Because of the ongoing COVID-19 pandemic, new data collection may not be reflective of typical weekday peak hour conditions. Hence, the transportation analysis may utilize available historical data where appropriate.

Data used in the 2018 Documented Categorical Exclusion (DCE) prepared for the I-205 Improvements Project will be reviewed to confirm its relevancy and applicability to this study.

Existing Conditions Traffic Volume Development

Due to significant changes in travel behavior and traffic volumes during the COVID-19 pandemic, the project team will look for alternative sources to collecting year 2020 traffic count data. Traffic volume information will be compiled using existing resources in accordance with Analysis Procedure Manual (APM).[2] The existing conditions analysis will represent pre-COVID conditions in 2020 or 2019, as available. Once the API and study intersections are finalized, data sources and post processing methodology for each study corridor/study intersection would be coordinated with ODOT and documented in the transportation technical report.

Turning movement counts gathered through the data collection/gathering process will be post-processed using the methodology described in the APM (ODOT 2020) to determine the 30th highest hour (30HV) volumes. The overall process for developing the 30HV volumes is as follows:

1. Document raw count volumes, types, and durations
2. Identify a system peak hour
3. Apply growth factor based on historical data (for counts collected prior to 2020)
4. Apply seasonal factor for ODOT design hour (30HV)
5. Balance the a.m. and p.m. peak hour volumes
6. Round the a.m. and p.m. peak hour volumes

[2] Appendix 3E - Traffic Volume Development During Disruptive Events of the ODOT Transportation Planning and Analysis Unit (TPAU) (ODOT 2020).

Turning movement counts will also be used to determine heavy vehicle percentage and bicycle and pedestrian volumes at each study intersection.

Future Conditions Volume Forecasting

Future weekday a.m. and p.m. peak hour traffic volume forecasts will be developed for the interim year (2027) and future year (2045) for No Build conditions and Build conditions. 2045 volumes will be developed from future year model results from the I-205 Subarea DTA model.[3] The Metro regional travel demand model may also be used for any locations located outside of the DTA subarea, as needed.

Standardized methods described in the APM and the National Cooperative Highway Research Program (NCHRP) Report 765 will be used to post-process raw model link volumes. The difference or growth between base year and 2045 year model output will be calculated and compared on a relative percentage or increment basis. Once the difference is applied to the existing volumes to develop 2045 post-processed volumes, interim year 2027 volumes can be derived by linear extrapolation.

For the final 2045 volume set, each intersection's and/or freeway's inbound link volumes are balanced with the outbound link volumes. For intersections, the weekday peak hour turning movement volumes are then created using the existing year turning movements as an initial guide. The resulting volumes are then balanced between adjacent intersections, as appropriate.

The No Build condition for the I-205 Toll Project includes the current configuration of I-205 in the corridor with the addition of Phase 1a of the I-205 Improvements Project (reconstruction and widening of Abernethy Bridge and improvements to the OR 43 and OR 99E interchanges). The Build condition would include the rest of the I-205 Improvements Project (Phases 1b, 1c, 1d, and 2), widening I-205 by one lane in each direction between Stafford Road and OR 213 and reconstruction of other bridges in this segment of I-205. While the No Build for the I-205 Toll Project is different than that assumed for the I-205 Improvements Project, the latter can be used as a benchmark comparison. Hence, for consistency purposes the Project's future year (2045) No Build analysis results will be compared with the I-205 Improvements Project[4] results for future year No Build conditions. This information will be reviewed and any analysis results that have a difference of one or more LOS between the two projects will be noted and discussed in the transportation technical report.

[3] The DTA model will be based on demand from the Metro regional travel demand model. The modeling approach is addressed in the I-205 Modeling Methodology Memorandum.

ANALYSIS TOOLS

The weekday peak hour intersection traffic operations analysis for the study intersections will be performed using Synchro (version 10) software with results reflecting the Highway Capacity Manual (HCM) 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. Key data input items required by Synchro include motor vehicle traffic volumes, vehicle composition, traffic control, signal timing and phasing, lane geometry, transit stops, and non-motorized volumes (bicycle movements and pedestrian volumes). Typical performance measures and outputs generated by Synchro include average vehicle delays, volume to capacity (v/c) ratios, queues, and level of service. Where v/c ratios exceed 0.90, SimTraffic would be used to report queues.

To assess complex corridor operations such as I-205 segments with complex weave/merge/diverge geometry, Vissim 11 microsimulation software may be used to capture vehicular queuing or merge/diverge movements. Any Vissim microsimulation will be performed in compliance with the ODOT's Vissim Protocol (ODOT 2011). This protocol is intended to standardize the analysis process when Vissim micro-simulation is used as a basis for planning and/or design decisions.

The I-205 Subarea DTA model in Dynameq software will be used to develop future year (2045) volumes at the study intersections. The Metro regional travel demand model may also be used for any locations located outside of the DTA subarea, as needed.

ANALYSIS SCENARIOS

The following scenarios will be analyzed as a part of this study:

- Existing Conditions (pre-Covid 19)
- Interim Year 2027 No Build Conditions
- Future Year 2045 No Build Conditions
- Interim Year 2027 Build Conditions (up to three alternatives)
- Future 2045 Build Conditions (up to three alternatives)

The No Build scenarios will assume no tolls on I-205 and construction of only Phase 1a (Abernethy Bridge and interchanges with OR 43 and OR 99E) of the I-205 Improvements from Stafford Road to OR 213 Project.

ANALYSIS PARAMETERS

Transportation analysis parameters will be determined from varying sources and methodologies. Data will be gathered via collected volume data, aerial photos, GIS, ODOT inventory, collision reports, and other sources. Table 1 lists analysis parameters and potential data sources.

Table 1: Analysis Parameters

Parameter	Analysis Element	Potential 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 HV, Design Hour Volumes (DHV)	Traffic counts, Travel demand/traffic modeling
Traffic Operations	v/c, level of service (LOS), Delay, 95th percentile queues, travel time reliability	Calculated using HCM 6 methodology for signalized intersections and un-signalized intersections
Crash Data	Intersection/segment crashes, Safety Priority Index System (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

TRAFFIC ANALYSIS

A defined set of performance measures will be relied on to assess the potential impacts of the Project on motor vehicle travel. The impacts will be assessed by comparing the traffic analysis results for all alternatives including the No Build Alternative, with respect to vehicular movements and congestion. These performance measures are described briefly below.

Volume to Capacity Ratios

The principal performance measure ODOT uses when evaluating motor vehicle operating characteristics on the state highway system is the v/c ratio, which is a measure of how close to capacity an intersection or roadway segment is operating. 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, no geometric deficiencies. The v/c ratio is the degree of utilization of the capacity of a segment, intersection or approach. Since volumes cannot exceed capacity, v/c ratios that exceed 1.0 are not defined. Under those (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 performance is reduced. At 1.0, the capacity is fully utilized (ODOT 2020).

Average Vehicle Delay

This measure will represent average vehicle wait times in seconds per vehicle specifically at intersection locations. Vehicular delays will be used to gauge overall intersection congestion levels based on predefined ranges and thresholds used to determine level of service. Delays will be provided from the Synchro analysis and/or Vissim analysis and will reflect HCM reporting methodologies.

Level of Service (LOS)

Level of Service (LOS) is a performance measure or index reflected in the HCM that is commonly used in transportation studies to represent congestion levels for facilities such as arterials, rural highways, freeways, 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 and very high delays, respectively. LOS will be provided from the Synchro analysis and/or Vissim analysis and will reflect HCM reporting methodologies.

Queuing

Traffic backups or queuing will be estimated for all relevant approaches at each of the study intersections. Queues will be based on 95th percentile queue lengths reported in Synchro/SimTraffic and/or Vissim and will be compared to the safe storage capacity of the facility in question. The definition of safe storage capacity will incorporate specific features of the roadway environment, including length of turn lanes, sight distance concerns, proximity of other intersections, and potential to back-up onto freeway ramps and affect mainline operations. Queues exceeding the safe storage capacity will be identified as unacceptable and strategies for addressing the issue will be developed.

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. It is most often reported for a given direction during the peak period and expressed as the average travel time of all vehicles. Average travel time during peak period will be reported from the regional travel demand modeling results and/or Vissim. (ODOT 2020).

Travel Time Reliability

Travel time reliability considers (1) the range of potential travel times roadway users may experience, (2) the consistency of travel times, and (3) the ability of a roadway to provide a desired travel time. Travel time reliability will be measured using a Travel Time Index (TTI). A TTI is calculated as a travel time divided by the free-flow travel time or posted-speed travel time (ODOT 2020).

Vehicle Miles Traveled (VMT)

Vehicle miles traveled (VMT) is a measure used extensively in transportation planning for a variety of purposes. VMT is the amount of vehicle travel on a system in terms of both vehicle volume and distance. VMT is the relationship of the total vehicle volume on the specified links multiplied by the total link lengths. (ODOT 2020). Regional VMT will be provided from the regional travel demand modeling results.

Vehicle Hours Traveled (VHT)

Vehicle hours traveled (VHT) is calculated from data on speed and miles traveled to measure overall vehicle travel time in a given roadway or study area (API) (U.S. Department of Transportation Volpe Center). VHT depends both on demand (VMT) and delay (travel time). Regional VHT will be provided from the regional travel demand modeling results.

As the Project involves a robust multi-resolution modeling approach that covers regional, corridor and intersection level transportation analysis, performance measures as listed in Table 2 below will be produced to assess each facility within and outside the transportation API.

Table 2: Preliminary Transportation Performance Measures

Category	Performance Measures	Scenario/Time Periods	Tool and/or Data Source for Assessment of Measure
API Intersection Performance	• v/c ratios • LOS • Delay • Queuing • Qualitatively assess any differences in intersection performance in areas where Equity Framework-identified communities live in comparison to overall general API population	• a.m. and p.m. peak hour	• Synchro
API Corridor Performance	• Travel Times (including qualitative comparison of changes in a.m. and p.m. peak hour travel times for trips reflective of Equity Framework-identified communities travel with overall API travel time changes) • LOS • Queuing • Change in Average Trip Length • Safety (described in following section)	• a.m. and p.m. peak hour	• Synchro, HCS and/or Vissim for LOS • RTDM or DTA model for travel times and average trip length
Selected Major Roadways (Identified in Figures 1 and 2 as "Study Corridors")	• Change in average weekday daily traffic • Change in daily traffic cordon volumes surrounding the API	• Daily	• Regional travel demand model

Category	Performance Measures	Scenario/Time Periods	Tool and/or Data Source for Assessment of Measure
Highway Traffic Operations	• Vehicle throughput on I-205 segments between Stafford and OR 213 • Person and freight throughput • Travel time • Travel time reliability • Hours of congestion • VHT within the API for freeway and non-freeway facilities, for peak, off-peak and daily	• a.m. and p.m. peak hour • Daily	• Vehicle throughput: traffic counts, regional travel demand model (daily) and DTA (peak hours) • Person and freight throughput: Regional travel demand model (daily) and DTA (peak hours) • Peak hour travel time: DTA • Travel time reliability: MCE and/or Regional Integrated Transportation Information System (RITIS). • Hours of congestion: Regional travel demand model
Regional Transportation System Performance	• Regional and study area vehicle miles traveled (VMT) for freeway and non-freeway travel • Change in vehicle miles traveled within Transportation API (areas possibly impacted by diversion), and model outputs for Metro Equity groups and selected transportation area zones (TAZs) that represent areas with Equity Framework-identified communities • Regional and study area person miles travelled (PMT) for freeway and non-freeway travel • Regional and study area vehicle hours traveled (VHT) for freeway and non-freeway travel • Change in Average Trip Length • Change in regional person trips by single occupancy vehicles compared to other modes (transit, vanpooling, or carpooling);	• a.m. and p.m. peak hour • Off-peak hours • Daily	• Regional travel demand model • Potential impacts to Equity Framework-identified communities, not explicitly broken out in regional model
	• Identify barriers and opportunities to encourage greater use of higher occupancy vehicles and other modes of transportation for the general population and Equity Framework-identified communities	• N/A	• Qualitative, based on feedback from the Transit Multimodal Work Group and community engagement

Category	Performance Measures	Scenario/Time Periods	Tool and/or Data Source for Assessment of Measure
Support equitable and reliable access to job centers and community places, such as grocery stores, schools, and gathering places	• Effects on travel time, reliability, and access by mode (auto, transit, bike, and walk) to jobs and community places delineated between the general population and Equity Framework-identified communities	• Community places and jobs accessible by mode (auto, transit, bike, walk); change in access will be qualitatively assessed for region and Transportation Area of Potential Impact (areas likely impacted by diversion). This will be informed by model outputs, knowledge of representative travel patterns and areas that represent Equity Framework-identified communities	• Regional travel demand model
Implementation and System Expansion	• Relative effort associated with implementation • Flexibility to respond to changes in traffic conditions in the project vicinity • Potential to expand system in future to a broader tolling system including other state facilities or different tolling structures • Eligibility under preferred federal tolling authority program • Potential to integrate the toll system with other transportation systems (transit, parking, RUC, etc.)	• N/A	Best professional judgement
Regional and environmental justice communities	• Value of travel time savings	• Daily, AM/PM peak hour, Off-peak	• MCE

Category	Performance Measures	Scenario/Time Periods	Tool and/or Data Source for Assessment of Measure
Safety	• Change in roadway safety conditions • Change in roadway safety conditions on roadways serving equity framework-identified communities • Changes in peak hour roadway queues that could affect safety	• Daily, AM/PM peak hour, Off-peak	• Highway Safety Manual Part C Methodology, • MCE • Queues will be based on 95th percentile queue lengths reported in Synchro/SimTraffic and/or Vissim
Diversion Effects	• Change in regional person trips by mode	• Daily	• Regional travel demand model
	• Qualitative level of rerouting • Change in traffic volumes on selected major roadways (Identified in Figures 1 and 2 as "Study Corridors") • Change in peak hour vehicle trips • Change in auto volumes in the region, Transportation Area of Potential Impact (areas possibly impacted by diversion), and areas where Equity Framework-identified communities live	• a.m. and p.m. peak hour • Afternoon and evening off-peak • Daily	• Regional travel demand model and DTA model
Mode Shift	• Change in regional person trips by single occupancy vehicles compared to other modes (transit, vanpooling, or carpooling); qualitatively delineate between impact to general population and Equity Framework-identified communities	• a.m. and p.m. peak hour • Daily	• Regional travel demand model
Pedestrian	• Change in level of traffic stress (LTS) for pedestrian corridors impacted by traffic volume changes due to the project • Qualitatively assess any differences in pedestrian LTS for areas where Equity Framework-identified communities live in comparison to overall general population	• N/A	• ODOT's Pedestrian LTS calculations
	• Availability of pedestrian infrastructure adjacent to I-205 segments between Stafford Road and OR 213	• N/A	• Qualitative

Category	Performance Measures	Scenario/Time Periods	Tool and/or Data Source for Assessment of Measure
Transit	• Change to travel time on transit-service roadways adjacent to I-205 between Stafford Road and OR 213 • Qualitative comparison of changes in transit travel times for Equity Framework-identified communities versus general population • VHT changes within the API for freeway and non-freeway facilities, for peak and off-peak	• a.m. and p.m. peak hour	• DTA model
	• Qualitative assessment of change in transit reliability based on changes in overall congestion on transit-service roadways and the presence/ absence of transit priority treatments along those roadways • Qualitative comparison of changes in transit reliability for Equity Framework-identified communities versus general population	• a.m. and p.m. peak hour	• Operational results indicating roadway and intersection operational conditions from traffic models (DTA and Synchro models)
	• Adequacy of transit service on I-205 segments between Stafford Road and OR 213	• N/A	• Qualitative
	• Transit ridership on I-205 segments between Stafford Road and OR 213 and other transit routes within the API	• Daily	• Regional travel demand model
	• Simplified MMLOS for transit users for study corridors within the API	• N/A	• ODOT's MMLOS calculation tool
Bicycle	• Availability of bicycle infrastructure adjacent to I-205 segments between Stafford Road and OR 213	• N/A	• Qualitative
	• Change in level of traffic stress (LTS) for bicycle corridors impacted by traffic volume changes due to the project • Qualitatively assess any differences in bicycle LTS for areas where Equity Framework-identified communities live in comparison to overall general population	• N/A	• ODOT's Bicycle LTS calculations

Category	Performance Measures	Scenario/Time Periods	Tool and/or Data Source for Assessment of Measure
Freight	• Freight or commercial vehicle throughput on I-205 and nearby roadways impacted by volume changes due to toll project • Best professional judgement of the impact to Equity Framework-identified populations and businesses based on the analysis and community engagement	• a.m. and p.m. peak hour • Daily	• Regional travel demand model (daily) and DTA (peak hours)

SAFETY ANALYSIS

Existing Conditions

The safety analysis will consist of an assessment of the five most recent years of crash data obtained from ODOT's Crash Analysis and Reporting Unit for study intersections and study corridors in the project area. The safety analysis will include:

- Crash rate calculation for study intersections and study corridors
- 90th percentile 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 10 percent Safety Priority Index System Sites (SPIS)
- Qualitative assessment of community safety concerns

Future Conditions

The safety analysis for future conditions will include calculating predicted crash frequencies for the study intersections and study corridors using the Highway Safety Manual (HSM) Part C methodology (AASHTO 2010). This methodology will assess the Build Alternatives' potential effect on safety conditions within the API for all modes at intersections and along identified study corridors that change with the Build Alternatives.

Additionally, information from MCE toolkit can be used to inform the assessment at regional scale. MCE can calculate safety benefits (fatal, injury, property-damage only crashes) based on link data from Regional Travel Demand Model. The methodology is based on Highway Safety Manual.

The approach to assess mode safety impacts will be to first understand current locations within the corridor that experience bicycle/pedestrian crashes and identify the typical crash causes (e.g. lack of protected bicycle/pedestrian crossings; lack of sidewalks and/or bicycle facilities; heavy traffic congestion; high speeds). This will provide the baseline for understanding what safety concerns there may be on the corridor system and what factors contribute to the concerns. Once a review of existing crashes is complete, the project's impact to the traffic volumes and speeds on the roadways and surrounding corridor network will be reviewed to determine potential impacts to safety based on projected changes in traffic volumes, speeds, and congestion.

MULTIMODAL ANALYSIS

The multimodal analysis will be focused on assessing how well the API serves people traveling on foot, by bicycle, or on transit—and if the quality of that service is likely to be affected by the Project.

A detailed review will be performed of in-process ODOT projects within the API that would potentially address multimodal facilities.

A transit assessment will also be performed to look at the frequency of transit along the corridor as well as boarding and alighting data to determine gaps in service based on likely trip generators. A simple walkshed analysis based on station locations and presence of sidewalks will also determine where gaps in simple accessibility may exist along the identified corridors within the API preventing pedestrians from accessing their nearest transit locations.

The existing and future conditions will also analyze the level of comfort for bicyclists, pedestrians, and transit users through the following methods:

- Level of stress (LTS) calculations for bicyclists as outlined in the APM for study corridors within the API
- LTS for pedestrians as outlined in the APM for study corridors within the API
- Simplified MMLOS for transit users as outlined in the APM for study corridors within the API
- Qualitative assessments of the walkability and bike-ability for study corridors within the API

MITIGATION APPROACH

Prior to the beginning of the transportation analysis, jurisdictional mobility targets/standards will be identified for all study intersections and study corridors. Study intersections and study corridors will be evaluated against their respective jurisdictional mobility targets/standards for all analysis scenarios. Should the Project impact result in unacceptable levels of traffic operations, potential mitigation treatment options considered for addressing corridor deficiencies or "hot spots" will be identified based on the following criteria:

- If the Build Alternatives' results in operational levels that exceed the local jurisdictional standard for a given study intersection or study corridor
- If the future conditions safety analysis results in significant safety concerns at study intersections or along identified study corridors compared to the No Build Alternative

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